2nd BIOTA Training Workshop for Para Ecologists in Gellap Ost, Keetmanshoop / Namibia

(9th – 21st of May 2005)

Training has been conducted by

Dr Ute Schmiedel, University of Hamburg / Germany
Mr Vilho Snake Mtuleni, BioNasc / Namibia
Ms Veronica Siteketa, DRFN / Namibia

Team contract:

How do we want to work together?

- learn and understand more via practical exercises
- behave and respect each other
- conduct good team work
- pay attention in classes
- stick to the time
- don't have classes too late in the day
- have fun

What do we want not to happen?

- Misunderstandings among ourselves
- Disrespect each other
- Sleepiness and boredom in classes
- Un-understandable explanations
- Sessions on Sundays because of church

BIOTA Southern Africa

In group work and role plays it has been discussed what BIOTA is (aims, methods, set-up of the project) and what para-ecologists are.
The 12 different **subproject of BIOTA Southern Africa** and their researchers have been looked at:

Subproject S01 Remote Sensing: Michael Schmidt, Melanie Vogel, Christoph Schulz, Ben Strohbach, Ndafuda, Bruce Hewitson
Subproject S02 Soil Science: Alex Groengroeft, Guenter Miehlich, Andreas Petersen, Anthony Mills
Subproject S03a Micorrhiza (Fungi): Claudia Goerke, Elisabeth Uhlmann
Subproject S03b Rust Fungi: Reinhard Berndt, Anja Ritschel
Subproject S04 Lichens: Luciana Zedda, Gerhard Rambold
Subproject S05 Biological Soil Crusts: Burkhard Büdel, Bettina Weber, Dirk Wessels, Kurt Loris
Subproject S06 Botany: Norbert Jürgens, Ute Schmiedel, Dirk Wesuls, Carolin Mayer, Sabine Greiner, Ben Strohbach, Marianne Strohbach, Nicky Allsopp, Gretel van Rooyen, Lizande Kellermann, Timm Hoffman, Ibo Zimmermann, Albertus Dyason, Richard Knight, Charl Cilliers, Charles Musil, (Gesina Pufal), (Corinna Rickert)
Subproject S07 Small Mammals (in phase I of BIOTA only): Ulrich Zeller, Anke Hoffmann, Katrin Vohland
Subproject S08 Dragonflies: Frank Suhling, Andreas Martens
Subproject S09 Kalahari / Models: Florian Jeltsch, Sue Milton, Richard Dean, Niels Blaum, Aleks Popp
Subproject S10 Termites & Ants: Joh Henschel, Eduard Linsenmair, Roxy (Veronica) Siteketa
Subproject S11 Socio-Economy: Michael Kirk, Hartmut Lang, Cornelia Limpricht, Ernst-August Nuppenau, Michael Proepper, Bernadette Bock, Constanze Grohmann, Stephanie Domptail, Marla, Christiane, Theresa Linke, Bjoern Vollan,
Subproject S12 Small Mammals: Connie Krug

Small Mammals in alliance with BIOTA: Goetz Froeschke & Rainer Harf
Wild Rice and micro-organisms: Barbara Reinhold-Hurek

Project coordination and technical assistance:
Chair of BIOTA Southern Africa: Norbert Jürgens
Chair of the South African Group: Nicky Allsopp
Chair of the Namibian Group: Ibo Zimmermann
Liaison Officer South Africa: Tessa Oliver
Liaison Officer Namibia: Bertchen Kohrs
Central Technician: Snake (Vilho) Mtuleni
Coordinator for finances, logistics, contracts etc. in Hamburg: Ingo Homburg

Biodiversity (also compare Reader of workshop in 2004)

What is biodiversity

Bio = Life (Bio-logy = Science of life / Life science)
Diversity = wide range, richness etc.
Biodiversity is the richness in life, variety of living organisms around the world
Zoo-Diversity is diversity of animals
Phyto-Diversity is diversity of plants
Geo-diversity is diversity of the non-living environment (rocks, landscape, soil)

Natural factors that influence biodiversity

- Climate
- Soil
- Landscape / Topography

Levels of Biodiversity

- richness in species
- richness in shape and structure
- richness in function (for instance insects pollinating different type of plants)
- richness in genes

Biodiversity is size dependent

The bigger the area, we look at, the more species we will find. Thus, it is important to compare the diversity of areas of the same size.

Value of Biodiversity

- provides shelter for animals and plants
- important for eco-tourism
- important for traditional use of e.g., firewood, housing, cloths, medicine, decoration
- strengthens the veld against hazards such as soil erosion, trampling, drought, overstocking
- makes environment enjoyable
- can improve productivity of the veld

(It is important to study biodiversity to understand it better).

Impact of land-use on biodiversity

- overgrazing and trampling by overgrazing
- forestry (might partly destroy the natural forests or might even replace natural, species-rich forests completely by plantings of timber wood trees)
- deforestation (replacement of natural forests by fields for agriculture)
- ploughing (destroys the natural vegetation; it takes many years / decades to recover)
- mining (destroys large parts of the landscape)
- cropping

- growing population, urbanisation
- off road driving
- industry, air pollution, water pollution
- war
- collection of dry / dead wood: can contribute to soil erosion, lack of shelter, food & housing of insects and spiders etc.

⇨ low to medium disturbance often happens in nature and has as positive effect on biodiversity

What is a species?

- There are different species among plants, animals, bacteria, fungi
- Individuals of one species have the same genes
- They look very similar particularly (for flowers) with respect to flowers, fruits
- Different species differ in shape, size, colour, flower, fruits

Radio tracking of animals

Radio tracking of animals is applied to study the behaviour of animals: Where do they go when, how far do they move? Where do they rest or eat etc. There is a tortoise project in Paulshoek, where Mariana assists. Every week they search for the tortoises by the help of the radio tracking advices, weigh them, measure them, collect their urine and dung for further analysis of what they ate etc. Similar methods are used for other animals. One project in BIOTA uses GPS collars for free ranging livestock in order to find out where they move around during they day, and where their strongest impact is by grazing / browsing and trampling.

Line intersection method

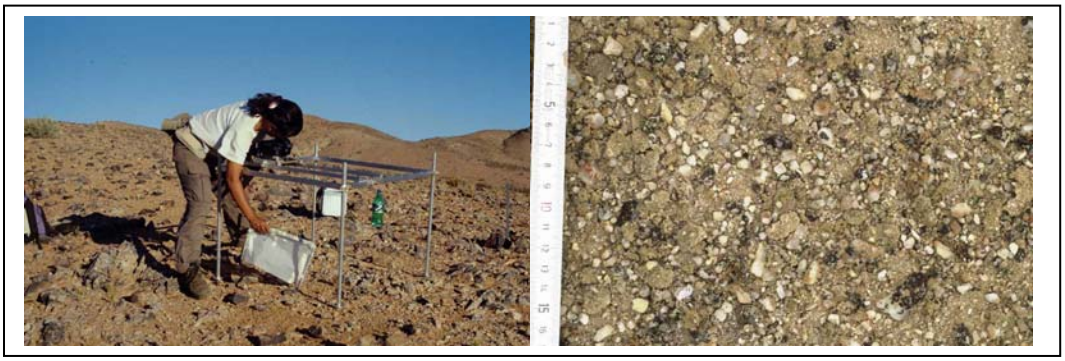
This method has been designed for measuring density and composition of herbaceous vegetation and shrubs, based primarily on the line transect. Ndafuda from the BIOTA Subproject 1 uses this method for its suitability for a fairly rapid assessment of many patches in order to determine broad patterns of shrub / grass occurrence and to correlate various edaphic features with plant cover. However, if one wants to answer more specific questions about vegetation dynamics, then you may want to use other vegetation monitoring methods. The method: Every plant that touches the line transect is recorded on the basis of its name and the distance along which the plant touches the line. The total length covered by each species divided by the total transect length gives the cover of each plant species.

What are lichens and how to monitor them in the frame of BIOTA?

Lichens are an symbiosis of fungi and algae (green and blue algae = cyanobactaria). Lichens can be distinguished according to their colour and shape, i.e., crust-like, leaf-like and shrub-like lichens. Lichens depend on the humidity in the air and are thus very good indicators on climate change and also air pollutions. (For further background information on lichens, you may refer to the reader for the 1st BIOTA training Workshop for para-ecologists).

The lichen releves and monitoring are carried out close to and north of the middle point of one hectare plot. A high resolution digital camera, mounted on an aluminium frame construction designed and constructed at the University of Bayreuth / Germany, is used for taking images. The frame is used instead of a tripod and allows to take sequences of images. With the frame it is also possible to fix the camera parallel to the soil surface and to move it along a network thanks to a guide-rail. Images of a size of about 15 × 10 cm are taken plus an overlapping of at least 10%. Each image is coded and immediately stored. The area were images are taken is

marked as "no entry area" with a yellow ribbon, to allow further investigations of the area in the future.



A method for sampling soil to determine amount of dewfall

By Anthony Mills, University of Stellenbosch (BIOTA Subproject S02)

Background

Dew could play a very important role in supplying water to plants, soil microbes and insects (e.g. desert beetles). Dew can be measured using equipment like leaf wetness sensors, but the type of soil, colour of soil, roughness of the soil can all affect dewfall, so it is better to actually measure the *dew in the soil*. Soil moisture can be measured by equipment such as neutron probes, but these probes cannot measure soil moisture accurately in the top centimetre of soil. They can only measure over about 5-10 cm. But dew occurs in the top centimetre of soil! So we need to measure there! The only way to do this, is to take samples of soil.

The procedure in general:

We take samples of soil.
We then weigh the soil.
We then dry the soil and weigh the soil again after drying.
We can then work out how much water was in the soil.

Dew forms at night, and settles in the top centimetre of soil. When the sun comes up, the soil dries out and the dew is lost. Plants and animals use the dew before the sun causes the soil to dry out. We need to sample for dew at dawn, in other words, before the sun has come up and dried out the soil.

Method for sampling:

Take three soil samples at dawn (in other words, when light, but before the sun can be seen in the sky). Find a bare patch of soil preferably near the BIOTA site. Sample from the same area every morning (but do not sample from exactly the same spot). In other words, sample in about a 50 m radius.

What is needed:

A plastic bag (without any holes!!)
A marker pen
A piece of thin cardboard for labelling the sample.
A knife
A spoon
A ruler

Label the bag at its top and the cardboard using the marker pen. There are three parts to the label:
1) Provide letters for the site name e.g. for Gellap Ost use the letters GO
2) Use “a”, “b” and “c” for the three different samples on one day.
3) Provide the date e.g. 5/05/2005
Put the card into the bag. Always label the bag at the top of the bag, and put the card at the bottom of the bag. Remove loose stones from the surface using the knife or your fingers.

Clear an area of 8 cm by 8 cm of loose stones, and mark out the area with your knife.
Loosen the soil within your marked out area. Loosen to a depth of only 1 cm. This is very important. Use the spoon to lift the loose soil into the bag. All loose soil is placed in the bag. The marked out area now has no loose soil. All the loose soil is in the bag. The soil removed is only 1 cm deep. Not deeper!!! Now make a knot in the bag. Tighten strongly! This is to ensure that the water/dew does not evaporate out of the bag.

This is what the final sample looks like:
It has a tight knot.
It has a label on the top.
It has a card with a label in the bottom of the bag.
It has soil in the bag.

How often should sampling take place?
The ideal sampling methodology is every day at dawn. The sampling can be done near to your house so this is perhaps feasible.
If this is not practical, then as many days as possible is next best.

Where should samples be stored?
Samples should be stored in an area which is protected from the sun, and as cool as possible.

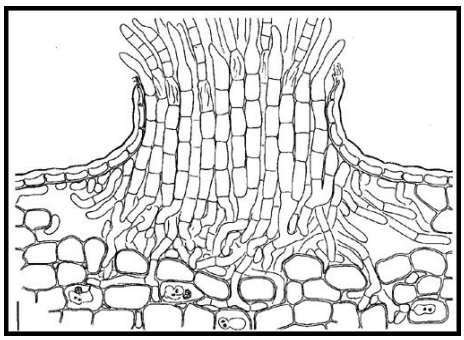
What to do with the samples?
We will hopefully be able to use BIOTA researchers that visit the site and are travelling to Cape Town, to transport the samples from the BIOTA site to Anthony Mills in Cape Town. Alternatively, we could post the samples at regular intervals. Anthony will be travelling to Namibia in July 2005, so will be able to collect a large number of the samples.

What are rust fungi?

- Very small fungal parasites which grow exclusively on plants.
- Unlike other plant pathogens which tend to attack weaken plants, rust fungi parasites also vigorously growing plants
- On the host plants they cause damages of leaves, stems or more seldom fruits or flowers or in the worst case cause dieback of the entire plant
- Rust fungi occur on a wide range of host plants (including ferns, conifers, flowering plants) and have a world-wide distribution
- Up to now, knowledge about rust fungi from Africa is incomplete.

- Rust fungi are among the economically most important plant pathogens, e.g. on Coffee, Wheat, Soybean, Cotton, Peanut or Sugarcane
- Coffee, for example, among the most important products in international world trade, is cultivated in more than 50 countries
- Coffee leaf rust is one of the deciding factors for the Coffee cultivation and plays therefore a prominent role within the global economy.

Coffee and soybean leaves as well as wheat stem



A part outside the plant (the sorus) which contains the spores is responsible for the dispersal of the fungus or for the sexual reproduction. A part inside the plant which has the function to feed the fungus with nutrients from the plant (see picture). (This structure is only a few millimetres in diameter!)

• The spores are visible with the bare eye as rounded or irregular spots on leaves, stems or seldom on fruits or flowers of plants, consisting of an orange to brown or blackish powder
• They are visible with a hand lens as very small round or egg-shaped bodies

What is needed for the collection of rust fungi?
A hand lens, folded newspaper (one for each collected fungi), newspaper sheets and plant press to dry the rust fungi and their host plants

1. Check each part of a plant accurately for discolorations or abnormal swellings
2. Search for whitish, orange, brown or blackish patches, coatings or cup-like structures of a powdery or wax-like consistence
3. Check with your hand lens, whether the „powder“ is composed of very small globes

4. Collect the infected parts of the plant in sufficient quantities (if possible, about 10-20 leaves or stems) and put them in a newspaper bag
5. Note a collection number and where (country, province, location, GPS coordinates), when (date), on which host plant (if known) the rust fungus was collected and the name of the collector
6. Collect an uninfected plant specimen including all parts (roots, leaves, flowers, fruit, stems) for determination of the host (use the same collection number as for the fungus)
7. If the host plant is unknown and too big for being picked up as whole plant, pick a representative part (branch/ twig) and describe the habit of the plant as detailed as possible (use the herbarium sheets):

- shrub or tree?
- growing singularly or in groups?
- succulent or not?
- branches with thorns or not?
- colour and structure of the bark?
- excrete milky or watery latex?
- leaves compound or simple?

The collected samples of the rust fungi and their host plants shall be dried in a plant press. Dried and pressed samples should be stored under dry conditions

GPS co-ordinates

Coordinates can be given in three different formats.

a) S 12° 05’ 25.5’’ E 25° 04’ 55.6’’ (degrees°, minutes’, seconds, decimal seconds’’)
b) S 12° 05.33.567’ E 25° 04.8965’ (degrees°, minutes, decimal minutes’)
c) S 12.06784356° E 25.07575244° (degrees, decimal degrees°)

If you get coordinates to press into your GPS in order to find a place, make sure your GPS is in the right format. To change your GPS accordingly, switch it on, press page until you get to MAIN MENU, go to SET UP MENUE, there choose POSITION FRMT and scroll up or down to find the right format for the coordinates you got:

a) hddd° mm’ ss.s’’ (degrees°, minutes’, seconds, decimal seconds’’
b) hddd° mm.mmm’ (degrees°, minutes, decimal minutes’)
c) hddd.ddddd° (degrees, decimal degrees°)

Make sure that the MAP FORMAT in the line below the POSITION FRMT is always WGS 84.

If you have more digits on the paper than the GPS allows, you have to round-up or round-off:
If the last figure you have to drop is smaller than 5 (i.e., 0,1, 2, 3, 4), you can just drop it.
If the last figure you have to drop is 5 or bigger than 5 (i.e., 5, 6, 7, 8, 9) you have to round-up the figure before this one.
Example:
35° 34.5678’ becomes 35° 34.568’
56.5397222° becomes 56.539722°

Exercises that have been conducted in this context:

Press the coordinates into your GPS and give the distance (in Meter) to where you are.

a)
S 30.0269265°
E 17.0638957°

b)
S 45° 59’ 55.46’’
E 11° 58’ 31.21’’

c)
N 30° 23.045722’
E 34° 57.058643’

d)
S 45° 46’ 23.99’’
E 33° 56’11.06’’

e)
S 12.56837822°
W 11.3678753°

f)
S 45° 17’ 14.444’’
E 13° 15’ 09.989’’

How to estimate cover of a plant on a vegetation releve?

The calculation of percentage as it has been explained during the previous workshop has been repeated (see the reader for the previous workshop for details). The following tasks have been calculated and the results compared and discussed:

How much cover in percent has a plant in a 10x10 m plot that covers the following area?

Pentzia pillulifera : 1 x 5 m = 5m² = 5 %

Salsola spec: 10 x 2 m = 20 m² = 20 %

Mesembryanthemum guerichianum: 5 x 10 m = 50%

Schmidtia kalahariense: 1 x 10 m = 10 %

Stipagrostis uniplumis: 2 x 5 m = 10 %

Acacia mellifera (3 individuals): 4 x 5 m, 1 x 3 m, 1 x 1 m = 24 %

Acacia nebrownii (4 individuals): 2 x 4m, 1.5 x 3 m, 1 x 3 m, 2 x 4 m = 23.5 %

Argyroderma pearsonii : 50 cm x 1 m = 0.5%

How much cover in percent has a plant in a 20x50 m plot that covers the following area?

Pentzia pillulifera: 5 x 20 m = 100m² = 10%

Salsola spec : 5 x 2 m = 10 m² = 1 %

Mesembryanthemum guerichiana 4 x 50 = 20 %

Schmidtia kalahariense: 10 x 5 m = 5 %

Stipagrostis uniplumis: 5x10 m = 5 %

Acacia mellifera (3 individuals) : 3 x 5 m, 10 x 10 m, 1 x 4m, 2 x 5m = 129 m² = 12.9 %

Acacia nebrownii (4 individuals). 1 x 5 m, 2 x 5m, 0.5 x 4 m, 1 x5 m = 22 m² = 2.2 %

Argyroderma pearsonii: 50x 50 m = 2,500 = 250%

Phenological monitoring

What is the purpose of phonological monitoring?

- To understand when a plant grows
- To see changes between years
- To see ho weather / climate effects the plants
- To see how veld conditions changes from year to year
- To see what of a plant has been eaten
- For management purposes

How to chose the plants to be monitored?

- plants that are eaten b y animals
- plants that occur frequently in the veld
- plants that contribute considerable to the grazing
- plant that disappear (decreaser) or increase (increaser) under strong grazing conditions

Difference between fresh and fully grown leaves

Fresh leaves are
.. freshly green (often)
.. softer
.. less damaged
… than fully grown leaves.

Make sure you tell apart buds, open flowers and finished flowers. Finished flowers might look similar to flower buds.

Why to collect plants?

- to identify them or to confirm the identification.
- to study the distribution of species
- to know more about the structures of plants

What to write on a herbarium sheet?
Collecting no (e.g., TC 0003)
Name of collector
Date
Name of plant
Locality or Observatory No

Always complete the herbarium sheets for each collection you do!!

What are some animals considered as ugly?

Funny or not nice shape.
They are (or are considered as) dangerous.
Have a scary appearance
Have fast movements which we can't foresee.
They are described in the bible them as evil (like the snake).
They are hairy (in a different way as mammals).
They are less familiar to us than mammals (with respect to movement, for instance).
Their eyes are strange (we can't look into their eyes, don't understand what they are up to).

It is most important to understand the role the animals play in the ecosystem and whether or not they are dangerous for humans or not.

How to write a report

Collect topics that have to be mentioned
Structure them according to

- time
- themes or tasks
- or any other different aspect, depending on what the report is about (for example: introduction, tasks, methods, results, problems, solutions, conclusions).

Write up, following the sequence: Don't forget headline, date, your name. Write in full sentences and tidy that other people can also read it.

How to give an oral report?

Collect topics that have to be mentioned. Consider the audience (what they do know already, what do they need to know to understand your talk?)
Put your topics into a sequence that make sense.
Write down some key words which will guide you while you talk.
Dress adequately.
Switch cell phone off.
Organise some drinking water.

While you talk:
Introduce yourself: What is your name? Where are your from? What do you do? Why are you here? Thank the audience or the organisers for the opportunity to present.
Stand up-right. Don't be too active but also not too
Look friendly.
Have eye contact with the audience.
Speak loud, clear and slowly, avoid difficult words (or explain them immediately), use complete sentences.
Use visual aids, if possible (drawings, flip-chart paper).
Stick to your time. Don't use up the time for questions with your talk.

What is a biological soil crusts

Soil crusts: layer of hard soil on surface, which breaks into pieces and form cracks.
Biological soil crusts are soil crusts formed by algae, fungi, lichens. They form a black, dark green, white, reddish or brown layer on surface.
They seal the surface which increases runoff and soil erosion but also stabilizes the soil surface.

Non-biological crusts:

- formed by clay or minerals (salt, gypsum, calcrete, silcrete = doerbank)

Special plant interviews

What aspects where covered in the texts about local knowledge on plants in Paulshoek and what could be covered by the special plant interviews?

- where the plant name comes from
- height and shape, colour of plants, and its parts (seeds, roots, leaves etc.)

- use of plant: for what (humans, animals, building purposes), what part has been used, how have the plant been processed before use? How to apply it?
- Life span on plant
- Where does it occur (distribution)
- Habitat preferences (soil type etc.)
- Flowering season, growing season = phenology
- Poisonous / not poisonous
- Drought resistance
- Plant is increasing / decreasing in number

What to do if the interviewed person mentions too few plants?
Ask in any case for the list of 10 plants and then elaborate on them. If the person does not know that many plants, just work on the plants he/she knows. To make sure you know what the person in talking about, walk with the person in the veld or show him / her pictures. Pick samples of the plant (and press it) to make sure you know what the person is talking about. Interview any person that might be knowledgeable.

What kind of conflicts did you experience in the context of your work?

(and how did you handle it?)

1) person who is not my boss is too bossy: ignored it but tired and sick of that).
How to deal with it in future?

- to talk to the person
- find out about your job description (read contract)
- in case it is not part of your job description what the person tells you to do, do it anyway (if time allows) but point out that it is not part of your job.
- Explain to the person that you are not working for her/ him and she / he is not your boss.
- Try to come to an agreement of how do deal with each other
- Involve your supervisor or other senior person if possible
- If it is not working: write it down and send it to the management of the project / company
- 3 options: change the situation, if that is not possible, live with it or leave.

2) Researchers are not listening, have too little trust: tried to talk to them and then just pray for them
How to deal with it in future?

- Try to approach the person again, try to talk to him / her about your problem
- contact supervisor, tell him / her about it, ask him / her to talk to the person
- try to involve a third person to talk to the person who is not interested in what you say

3) Lack of direct communication: tried to approach the person directly
How to deal with it in future?

- approach the person directly and ask her / him where the problem is
- Do it as soon as possible but
- Try to avoid aggression
- hold a meeting with the person and discuss problem and sort it out
- make sure communication is done in English in order to keep all people informed on the same level
- all parties involved should be informed about all steps

4) Lack of trust by the supervisors: improved itself, felt guilty, dropped some of the receipts to please the supervisors

How to deal with it in future?

- talk about the problem, ask whether there is a lack of trust
- come to joint conclusions and solutions and write them down
- write down rules of what to be done and how to be done. Agree on time schedule.

5) Talking to a third person / lack of communication: ignoring this.

How to deal with it in future?

- talk to the person directly and ask what the problem is
- come to conclusion and discuss how to do it better in future (how to select co-workers in future)
- choose a third person from the village to become involved for the conflict management
- approach supervisor

General rules for conflict management:

- talk to the person you think you have a conflict with
- involve a third person for negotiation or as a witness
- apologize
- go through the communication channels
- give feed back on a regular base, instead of waiting until the problems arise.

Recommendations for BIOTA in general:

- Training for researchers with respect to dealing with non-researchers
- make it a rule to speak English if non-Germans / non-Afrikaans people are around
- supervisors shall be mentors (persons of mutual trust)

How to organise yourself?

What are the differences between employment and self-employment? What are the advantages / disadvantages of each of them? (+ = advantage, – = disadvantage)

Employment	**Self-employment**
Work for a company / boss project	Works for yourself
Don't worry about responsibility + Told what to do and when – / + Follow rules + / – Work under time pressure – Get your salaries on a regular base – / + Work shared among different people + Expenses covered by employers (Med Aid etc.) + Get guidance / supervision + / – You are looked after + / – You just do the work that is there + / –	Have responsibilities – You may drive things yourself + Make your own rules + Not enough free time – More relaxed + Pay yourself, if there is money – Lots of expenses – Might result in expensive cars + Make sure you are experienced - / + Train yourself + / - You have to look after yourself - / + Have to make sure that there is enough work / income– / +

Situation of Para-Ecologists in that regard:

S Have some responsibility (some times too much responsibility, pressure!)
E have to follow rules
S Sometimes make your own rules
E meet deadlines
E get told what to do
S may choose part of your work yourself
E have some guidance / supervision
E Expenses are covered
E monthly salaries are paid
S start work at the time you like (most of the time)
S train yourself on things you have to know
S working load can be too much
S look out for tasks
S sometimes not enough free time

The major challenge is to organise the work in a way that is does not overwhelm you. For this purposes, follow the following steps (use forms provided):

- Make a general overview over your year. What do you have to do when?
- Make a list of all things you have to do in the upcoming month, decide whether they are important or urgent, by when they have to be done and at what time (of the month, day)
- Plan each week in detail: What do you have to do by when? And tick if you have done it.

Instruction for downloading data from MC System weather stations as used by BIOTA Southern Africa

General remarks

The data loggers of the MCS weather stations should be able to record data for about 7-8 months (depending on how many channels are in use). The buffer of the separate fog gauges (not installed with all weather stations) lasts for about 1 year (depending on the frequency of readings, i.e. fog and rain). Up to date, fog gauges are installed at Roscherpan, Moedverloren, Ratelgat, Soebatsfontein, Groot Derm / Yellow Dune, and Wlotzkas Baken).

Regular (and more frequent) downloading and checking of data is inevitable to prevent data loss due to technical problems.

Equipment needed for data download

- Laptop with sufficient battery capacity to run for about 30 minutes (or a car charger for the laptop).
- Respective software (Alog from MCSystems, version used for these instructions: 2.0.16)
- 2 different cables to connect PC with the data loggers (Note: for the weather stations and the separate fog gauge two different cables are needed).
- A strong screwdriver or blunt knife to unscrew the plastic screws and to open the lid of the logger box of the weather station. The logger of the fog gauge can be reached by pushing down and turning the funnel of the rain gauge. There is a small black box inside.
- Toilet paper or tissue to clean the funnels and tipping bucket of the rain gauge, radiation sensor etc.
- Spare battery for weather stations

- Insolation tape for wires of leaf wetness sensor
- Tap water (not too brackish!) to clean leaf-wetness sensor, radiation sensor etc.
- In case the battery of the laptop is not sufficient to run the laptop without power supply, unplug all sensors and unscrew the metal screws at the back of the logger box and take the logger (inside the box) to the power supply for downloading. For this procedure an ordinary (medium size) screwdriver is needed.

Downloading and Saving Data

1. Connect PC with data logger using the serial cable.
2. Start the program ALOG and make sure that PC and data logger communicate (the green word "Connected" must appear at the bottom of the ALOG window).
3. Clicking "Download" will download the data that has been recorded in the data logger. As the data is downloading, a progress bar is displayed, indicating the estimated time remaining. (The downloading can be stopped at any time by clicking the Stop button.) The download may take about 15 minutes.
4. After download is complete close the progress window by pressing the button "Close". The data will be displayed as a spread sheet. Save the data immediately as a .dat-file by clicking on the main menu "File", choosing a file name and file type *.dat-file and then saving it. Use the following template for the file name: ssssyymmdd.DAT with: ssss: the first four letters of the station, yymmdd: date (year, month, day) of download (e.g. for storing data of the station Ovitoto downloaded on April 17, 2003 use the file name OVIT030417.DAT. **Do not input ".DAT" because it is automatically appended by the Alog program. ***Check this*).
5. After having saved the data on the PC hard drive immediately clear the data logger buffer by starting "download" again, stopping it (click "Stop" button) and then clicking on "Clear" button. Confirm the question with "Yes". (The logger buffer can also be cleared immediately after the download mentioned in 3. before closing the window. However, if the PC breaks down before the data is saved on the PC's hard drive as in 4. it is lost forever.)

Note: The buffer should be cleared before the next measurement of the logger after the download. Otherwise the data of this measurement is lost.
Note: Once the logger buffer has been cleared, the data is lost and cannot be re-downloaded from the data logger.

Checks during download

While downloading the data please always check the following and enter the results into

(1) the form that is in the lid of the logger box and
(2) the electronic form "BIOTA South Checklist Weather Stations.doc" (store this form using the analogous template as for the raw data: ssssyymmdd.DOC):

Checks:

- **Check whether the funnel of the rain (and fog) gauge** is clean (no bird droppings, no leaves etc., no insect nests). Remove the funnel (by pushing down AND turning it at the same time) and check / clean tipping bucket carefully (without moving it!). When putting the funnel back, make sure that it sits properly.
- **Check whether the radiation sensor (on top of tall pole) is clean** and not covered by bird droppings. If necessary, clean carefully with soft tissue in order to avoid scratching the surface of the sensor. (To take to sensor down unscrew the screw in the plastic mount). If the sensor is heavily impacted by birds, please mount 3 or 4 vertical wires around the sensor by fastening them with two cable ties around the top of the pole.

- **Check whether the leaf wetness sensor (metal plate facing north) is clean** and not covered by bird droppings. If necessary, clean carefully by pouring water over it and wipe with soft tissue paper. To remove oil or so, use alcohol for cleaning and wash with clean water afterwards.
- **Check whether the yellow and red plastic sleeves of the wires that lead to the leaf wetness sensor are weathered.** If they are weathered and brittle put insolating tape around the cables.
- **Check screws that secure the rain / fog gauge to the metal plate.** The screws might loosen and the rain / fog gauge may fall off.
- **Check for any other damage.** Any damage should be reported to Ute Schmiedel as soon as possible.
- **If you had to exchange or adjust anything always check the recordings afterwards.** This can be done by manipulating the clock of the logger by setting User's clock to any hour and 59 minutes. The logger will take a reading after one minute (every full hour). Download the data and check them. Please note that the data recorded every full hour are average data from the preceding hour. You should repeat the steps again to get the correct record which only includes readings AFTER you did the changes. **Do not forget to reset the clock to the correct time.**

Checks after data download

After data download please always check the following and enter the results likewise into the form that is in the lid of the logger box and into the electronic form mentioned above:

- **Check whether the data of all sensors make sense** (e.g., do not continuously show 99.9 or 0 where figures between 1 and 100 were expected). If 99.9 is given for temperature, the sensor is broken. The sensors for soil temperature are known to break easily (possibly due to electrical currents in the soil) and take out the sensor for air temperatures as well. Check which of the sensors is broken by unplugging the sensors sequentially. Remove the broken sensor and contact Ute Schmiedel immediately in order to replace the sensor.
- **Check the battery status** by clicking on "Setup" and open the "Status" file card. The battery status should be above 3.6 V (see figures for VOLTAGE). Please inform Ute Schmiedel as soon as possible, if the voltage of the battery is below 3.6 V. Replacement batteries are stored in the store in Windhoek. The status of the battery for the fog gauge (not installed at all stations) is given in the long horizontal window ("Battery Remaining"). The figure in that window (between 0 and 100 %) gives the percentage of time remaining (out of 2 years) since the battery was installed. It does not give an exact value for the battery status!
- **Check the date and time of the logger** (by clicking on "Setup" and "RTC"). If the logger clock deviates for more than about +/- 8 minutes from the reference time (see below), adjust it by clicking on PC clock or User Clock depending on whether the PC clock or a different time should be set. Click on "Apply" to set the new date and time.
  NOTE: Any data logger shall always run on the same reference time (UTC + 2 hours). DO NOT switch from standard time to summer time (DST) or vice versa. (UTC = Universal Time Coordinated; DST = Daylight Saving Time)
  NOTE: If the buffer of the logger was full before the data could be downloaded the logger stops recording and the logger clock stops working. After having cleared the buffer, the logger continues with the date at which it stopped. Therefore, always check the date and time after downloading the data.

Please always send the files with downloaded data together with the electronic checklist for checking and processing as soon as possible to

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How can we realise environmental activities with kids?

What makes learning exciting?

- practical exercises
- being friendly with the kids
- if the teacher is lovable
- depending on the kind of topic:
    - experience it
    - suitable for target group
    - us visual aids
    - go out-door
    - should have something to do with them
- they must be interested
- make it understandable
- address them by their names
- respect their opinions
- they have to be part of the process
- one have to talk in an inspiring way
- don't bee too strict / serious

What makes learning boring?

- talking too long, too theoretical
- teaching without visual aids
- poorly prepared classes
- communication barriers (for instance language)
- environmental conditions: weather, thirst, hunger
- being unfriendly, untidy, smelly as a teacher
- not sticking to the topic
- doing too many side things
- lack of ability to explain
- talking without changes in voice
- focussing on one person only
- being impatient
- inadequate dressing
- lack of sympathy

What resources can be used for environmental activities with kids

- collaborate with the local teacher
- collaborate with the researchers: for material, info, equipment
- use books, videos
- collaborate with local institutions such as National Parks, Nature Reserves, Research stations etc. They might also support you with logistics and material