Reader for the

5th BIOTA para-ecologist training course

held at the Van Rhyn Guest House

in Vanrhynsdorp / South Africa

(17th April to 6th May 2008)

Conducted by
Dr. Ute Schmiedel, University of Hamburg
Dipl. Geogr. Bettina Koelle, INDIGO development & change
Mr Vilho Snake Mtuleni, BIONaSC
with a contribution by Prof Timm Hoffman, University of Cape Town

What are para-ecologists? (copied from reader of 2007)

Para-ecologists ...

- are members of local communities where BIOTA works in
- are fulltime employed & trained by BIOTA (Job creation, asset for the communities)
- have no academic background (but may decide to study at a later stage)
- are supervised by a BIOTA researcher
- similar to para-medics, para-vets, parataxonomists

Para-ecologists are not only field assistants!!
Tasks of para-ecologists are

- help to communicate research with land users and vice versa (the needs for research to the researchers)
- contact persons in the community (community - BIOTA)
- develop capacities that might be helpful/ useful for the community)
- to support researchers in the field
- conduct work during the absence of the scientists
- are unique!!

Which criteria do we find important for the selection of a person employed for work (like para-ecologists)

Typical criteria at which people look at if they want to employ somebody or evaluate their performance.

- motivated
- punctual (always on time)
- willing to learn,
- honest and can therefore be trusted
- should have communication skills -> should be able and prepared to ask questions
- work independently and in a group
- prepared to work flexible hours
- hard working and prepared to work under tough conditions (if necessary)
- must have background of topics and respective skills
- must be able to work under pressure

at least 5 years of driving experiences and a valid driving license

What is BIOTA AFRICA ?

BIOTA AFRICA is a research project which is conducted in different parts of Africa, i.e.,

- in West Africa: Burkina Faso, Cote d' Ivoire, Benin
- in East Africa. Kenya, Uganda
- in Southern Africa: South Africa, Namibia
- Morocco

BIOTA AFRICA is sponsored by the German Federal Ministry of Education and Research.

The project conducts research on the impact of climate change and land use on biodiversity in Africa.

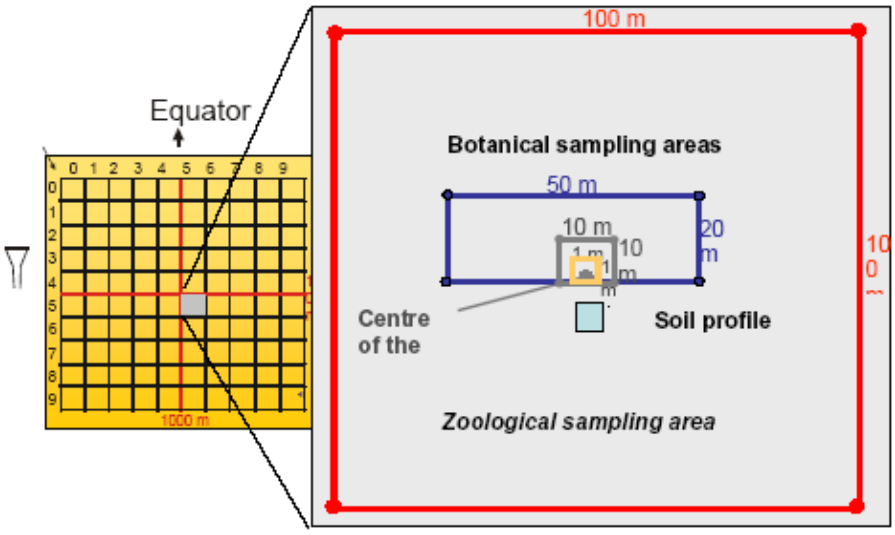
The project is a long-term project (started in October 2000 and the present (3rd) phase will run until December 2009. There are good chances that the project will be continued after 2009.

BIOTA Southern Africa works along a transect from the Cape to the Kavango, covering winter and summer rainfall areas and areas with high and low annual rainfall.

About 400 researcher from Germany and Africa are involved in BIOTA AFRICA. Among them are many students from African Universities and Technicons. There are also para-ecologists involved in the project. The research is conducted by different disciplines (it is an interdisciplinary project), such as: soil science, botany, zoology, social science, remote sensing (analysis of satellite images and aerial photographs).

An important aspect of BIOTA AFRICA is the monitoring of biodiversity changes that are conducted annually on the so called Biodiversity Observatories (standardised research sites). The Observatories are 1 km x 1 km in size and subdivided into 100 plots of 1 ha (100 m x 100 m). Inside of these plots, north of the centre of the hectare, the botanists lay out their plots of 20 m x 50 m in size and inside of that the plot of 10 m x 10 m.

The 100 hectares are ranked randomly and all researchers work on the same plots which are ranked highest.



Layout of BIOTA Observatories (see reader of Para-Ecologist training course in 2007 for further details)

During the 3rd phase of BIOTA of BIOTA, BIOTA Southern is structured into about 30 different workpackages. The para-ecologist programme has the number Workpackage S-F4. Each of the workpackages has one or more workpackage leaders that are responsible for the finances and scientific success of the project.

Who is who in BIOTA?

- Norbert Juergens (Prof Dr), University of Hamburg → Chair of BIOTA AFRICA and BIOTA Southern Africa
- Dave Joubert (Mr), Politech of Namibia → Chair of the Namibia BIOTA researcher group (BIONaSc)
- John Donaldson (Dr), South African National Biodiversity Institute (SANB) → Chair of the South African BIOTA researcher group
- Ingo Homburg (Dr), University of Hamburg →Principle Administrator of BIOTA Southern Africa
- Bertchen Kohrs (Ms), DRFN → Namibian Liaison Officer
- Tessa Oliver (Ms), SANBI → South Africa Liaison Officer
- Vilho Mtuleni (Mr), DRFN → Central technician in Namibia

Ute Schmiedel (Dr), University of Hamburg → Project coordinator and workpackage leader of WPs S-D7, S-E2, S-F4.

How to organise my computer data

A computer makes the life much easier. But it can be quite difficult to manage your data in a way to recover it after years. This document should give you some hints to manage your data properly.

Some background information on your computer:

Hard drive C:\ of your computer has about 10 Gigabites

Hard drive D:\ of your computer has about 25 Gigabites

Your programmes (called software) take about 5 Gigabite of your hard drive C:\

Leave the rest of the space of hard drive C:\ for the programmes to work (they need a bit of free space on your laptop to operate)

Store all your files (photos, excel-tables and Work-Documents) on hard drive D:\

Check how much space your photos take up: If your photos have high resolution (many pixel per photo) they will take a lot of space per photo (about 1-2 MB = Megabite per photo). If you have about 1000 photos of that resolution, they will use up 1 to 2 Gigabites of your computer.

Films are not allowed on your work computer. They usually use 1 Gigabite of your space of your computer. Also, reduce the number of private photos on your laptop. Save them on your private CDs or DVDs.

Bites, Kilobites, Megabites, Gigabites

- 1 Kilobite (KB) = 1000 Bites
- 1 Megabite (MB) = 1000 Kilobites
- 1 Gigabite (GB) = 1000 Megabites

Different kinds of data files

In data files information is saved. Because there are different kinds of information (for example music, texts or pictures), there are different types of data files. You can identify the type of a data file by either the last three letters after the full stop or right-click on the file and choose "Properties". The table below shows common types of files:

file type	**content of the file**
.mp3, .wav	music
.doc, .txt, .rtf	text
.mpg, .mov, .avi	movies
.pdf	Portable Document Format
.html, .htm	websites
.xls	spreadsheets
.jpg, .bmp, .gif, .tif, .png	images
.ppt	presentations

There are many more file types, but those above are the most important.

Names for files

It is very important to choose a meaningful name for files (and for folders as well). Imagine, you have many files on your computer and you are searching for a text, that you have written two years ago. Filenames are essential to locate files on your computer. Try to find a system that makes you remember the content of a file.

- don't use too short names
  - you could not easily identify *flowers.doc* if you write or read many files about flowers
- don't use too long names
  - you won't easily locate any files either, if all titles look like: image_of_the_sundown_that_I_have_seen_two_years_ago.jpg
- try to use meaningful names:
  - fast to identify would be: protocol workshop April 2008.doc
- sometimes a date in the filename could help a lot:
  - Insect-Observations Jan 2008.doc, Insect-Observations Feb 2008.doc, …

- you are not allowed to use these symbols in file names:
  - \ / : * ? " < > |

When you create a file, you can give it a name. Furthermore it is possible to change a name by right-clicking on a file, choosing "Rename".

The hard disc

The data on a computer is (normally) saved on a hard disc. In Windows the hard disc is like a great folder on top of a hierarchy of sub-folders. Hard discs can be identified by a (capital) letter followed by a colon, e.g. **C:**.

Folder structure

You can put your files in folders that help to organise your data. A folder is like a container, where you can collect files (or other folders) dealing with the same topic. A well thought-out folder structure makes it easy to find a file very fast.

All folders are placed on the hard disc. Try not to put all folders directly on the hard disc, because it becomes more and more difficult to overlook them. Instead, manage your files and folders in subfolders and bundle them by the same topic.

Figure: Example: The left structure is badly sorted; the right structure is well sorted. (You can open this view on your computer by right-clicking on the "Start"-Button and choosing "explore".)

Creating folders

New folders will be created by right-clicking on a blanc space in the Windows-Explorer and choosing "New" → "Folder". Otherwise you can choose from the toolbar "File" → "New" → "Folder".

Copy, cut and paste, delete

To organise files and folders you can use “cut” (take it away from it’s place) or “copy” (makes a one-to-one copy of a file). That can be done by right-click a file/folder and choose “Cut” or “Copy”. Insert the file(s) or folder(s) in another folder by right-click on a blanc space and select “Paste”. If you want to delete a file or a folder (Warning: There may be other files in it!), then right-click on it and choose “Delete”. It will be put in the “Recycle Bin”. You may restore it from the Recycle Bin or delete it for ever.


Making backups

It is recommended to make backups at times. Backup means to store a copy of your data on another place. It would be a great pity if you have a project and your precious files were deleted! You can copy files from time to time in a folder for backups that you can create on your hard disc. Furthermore, you can save your files on a CD, DVD or a memory stick. To save on a memory stick you can open “My Computer”, where you find the symbol for a plugged in memory stick, that looks like a symbol for a hard disc. Otherwise, if you like to store it on a CD or DVD, mark your files/folders, right-click on a selected one and choose “Send to”. Then choose your CD or DVD drive.

After this, open “My Computer” and right-click on the symbol for the CD/DVD drive. Choose “Write these files to CD”. Follow the dialog-boxes until the process has been finished Your files are now saved on the CD or DVD. Finally, you may check if the files were saved properly by open the CD/DVD under “My Computer”. Do not forget to label your CD/DVD properly. Write on the CD/DVD with a soft, permanent pen what you copied onto it, e.g.: “Photos plants and animals, 2007”

How to take good plant photos

a) Check your camera settings:

- choose close-up option (“plant”)
- choose high resolution
- do not flash, flash light often causes bright reflection on the leaves

Figure: Plant photos taken by para-ecologists during the training course

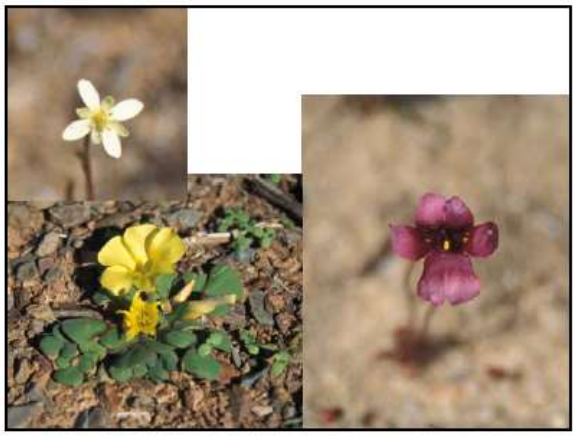





Figure: Typical examples of plant pictures that are not good for various reasons (find out by yourself which the problems are with the respective photo)

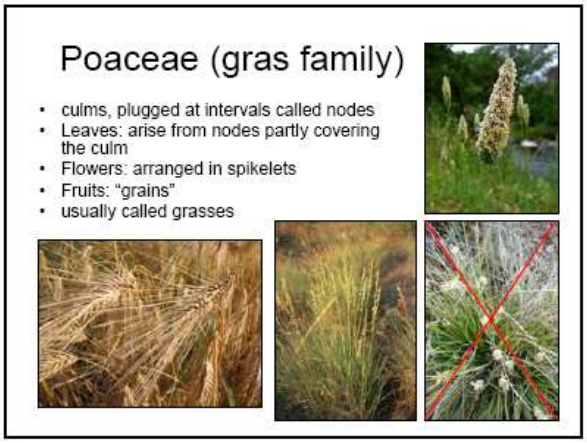
What is a species, a genus (plural: genera) and a family?

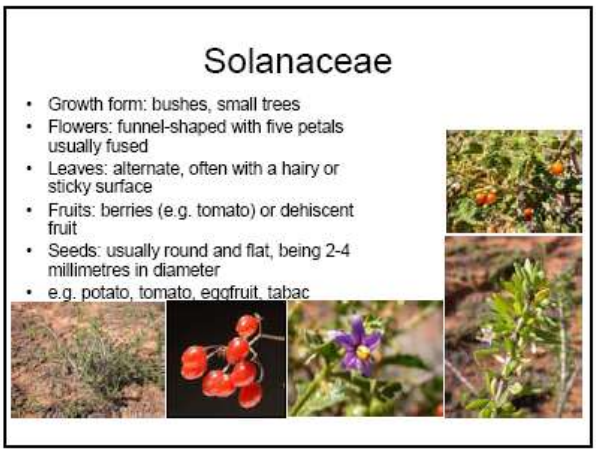
What is a species? (from reader 2004, see there for more information)

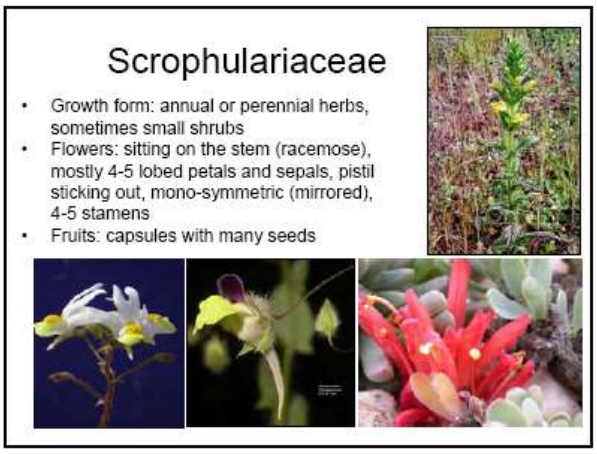
- plants / animals / fungi / bacteria etc. of one species look similar: with respect to flowers, fruits, leaves, shape of the plant etc.
- there are however, small differences between young and old plants / animals or plants / animals that grow in different habitats (for instance plants growing in the shade and or in the open sunlight)
- individuals that cross-pollinate or mate with each other successfully under natural conditions and produce fertile off-spring

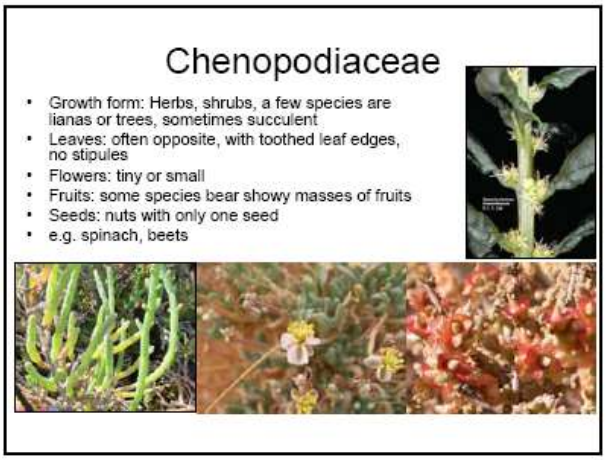
Several **species** that are closely related form one **genus** (plural = genera). Many genera that are closely related form one **family** (for instance the Aster-family = Asteraceae).

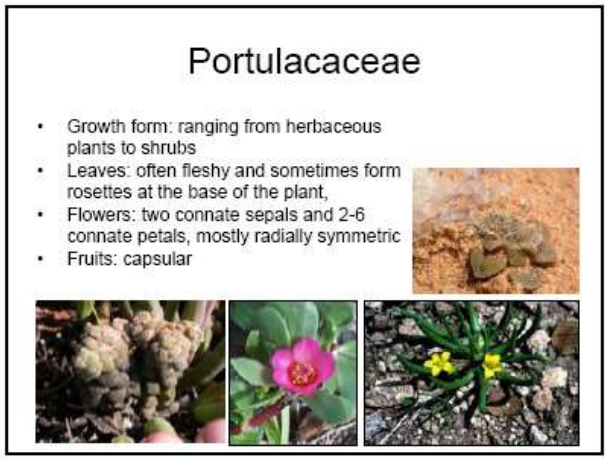
Figure: Six typical plant families in southern Africa (for further plant families see reader 2007):











How to do a vegetation relevé

To do vegetation relevés (plant opname) we use the Braun-Blanquet Method (to be pronounced: Brown-Blanke), named after a Mr Braun-Blanquet: We estimate the projected (bird's view) vegetation cover per plant species on a 10 m X 10 m relevé.

We write down all species occurring on that plot, the number of individuals per species (this year's seedlings and last years seedlings separated) and estimate the projected vegetation cover per plot.

This method can be used for vegetation monitoring: in that case you do the same type of relevé at the same plot every year.

Or it can be used for vegetation mapping: For this you do the relevés only once at different vegetation types of the area you would like to map. If one maps the vegetation, typically also soil samples are taken and analysed in order to find out which soil vegetation types occur on which soil type.

Figure: Para-ecologists during the training session on vegetation relevés

Percentage for vegetation cover on 10 m x 10 m plots:

Coverage of half of the plot =	50%
Coverage of quarter of the plot =	25%
Coverage of 1 m x 10 m (1 m long strip along the outside line) =	10%
Coverage of 1 m x 1 m =	1%
Coverage of half a square meter (0.5 m X 1 m)	0.5%
Coverage of a quarter of a square meter (0.5 m X 0.5 m)	0.25%
Coverage of 10 cm X 1 m =	0.1%
Coverage of 10 cm X 10 cm (the smallest unit we write down)	0.01%
Coverage of 5 times 0.01 =	0.05%
Coverage of 10 times 0.01 =	0.1%

The Geographical Positioning System (GPS)

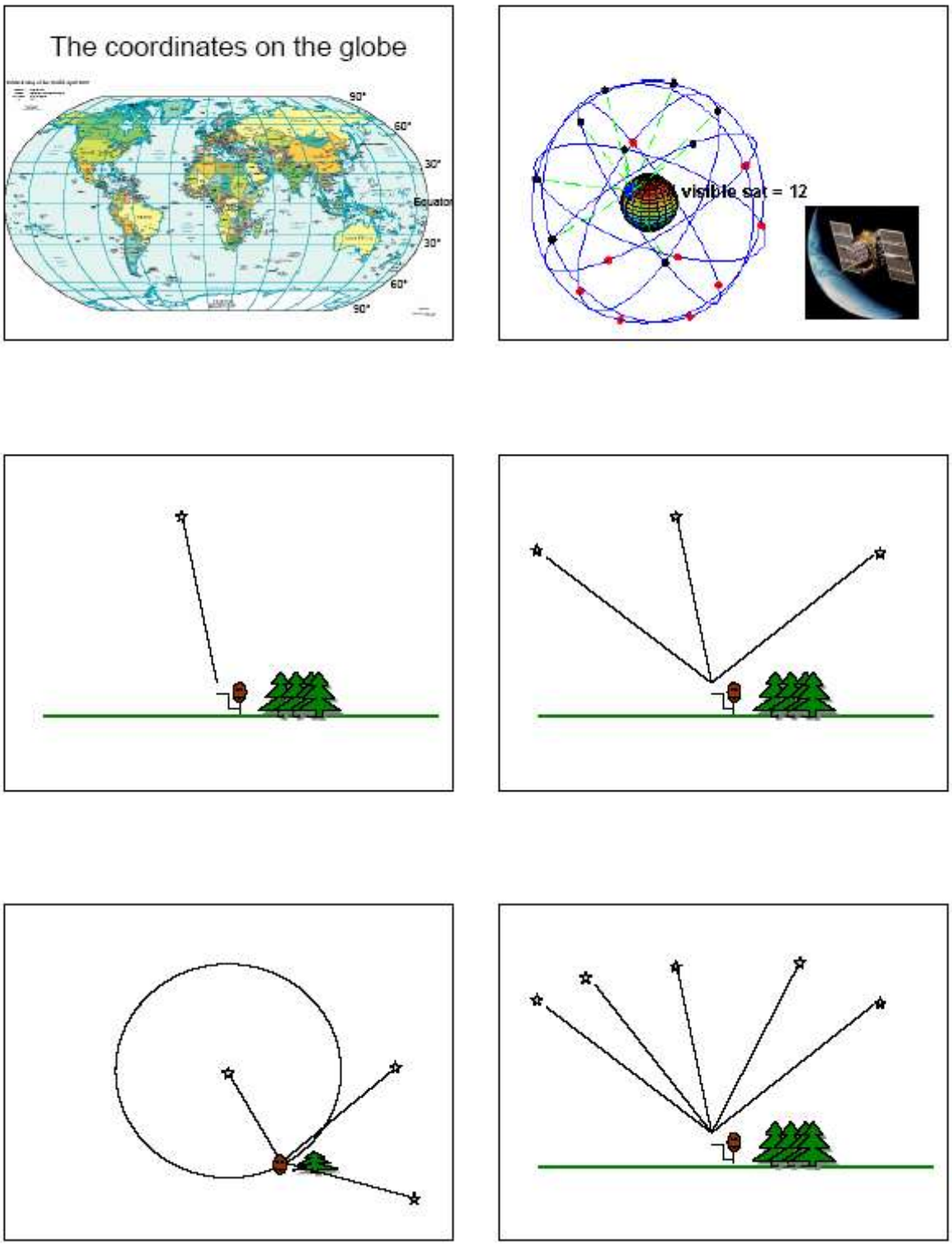


Figure: The GPS uses information which it gets from satellites that cruise around the globe. The more satellites are visible for the GPS, the more precise are the coordinates that the GPS gives.

The GPS communicates with numerous satellites that are surrounding our globe all the time. The more satellites the GPS can communicate with, the more precise is its reading. The GPS always gives the coordinates of the latitude (parallel to the equator, ranging from 0° - 90° degree, whereas 0° is the equator and 90° are the poles) and the longitudes (from pole to pole, also ranging from 0° - 90° degree)

Remember that the GPS readings can occur in different formats:

Typical format is

1) Degree, Minute, Seconds.seconds = hddd mm ss.s
(Example S 31° 18’ 03.49’, E 18° 33’ 34.43’’)

2) Degree, Minute.minutes = dd mm.mmm
(Examples: S 31° 18.3426’, E 18° 33.563’)

3) Degree.degree = dd.dddd
(Example: S 31.274378°, E 18.58380°)

Therefore, it is important to always give the symbols for degree, minute and second in order to make clear what kind of format you got.

You can set the format of the coordinates on your GPS by pressing PAGE until you get to MAIN MENUE, there you choose SET-UP and than NAVIGATION. Under navigation the first line is the option where you can choose between hddd mm ss.s or dd mm.mmm or dd.dddd.

Make sure your MAP DATA on the same page are on WGS 84.

Challenges and opportunities of scientific conferences

(copy from reader of course in 2006)

Presentations at conference where particularly interesting if

- I am familiar with the subject (farming methods, rainfall patterns, "my locality", a project I worked for, animals or plants I am particularly interested in)
- the subject is well presented and visualised (use of pictures and graphs)
- the presenter speaks in a way that I can follow easily (slowly, clearly, without a strong accent)
- no too many technical or scientific terms are used.

What do I do if I can't follow / don't understand?

- Ask the speaker at the beginning of the presentations to speak slower / clearer / harder (if it is a small group, such as in a workshop).
- Ask the person afterwards (if you are generally interested in the subject but could not follow). People are always happy if someone shows interest in their talks and like to explain and give more details if asked.

Please note: Don't worry if you can't follow all talks of a conference. This is normal and everybody experience it like that. Just try to relax and get ready for the next talk which might interest you more.

How to prepare and deliver effective presentations

1. Learn about your audience

In order to prepare an interesting presentation, you must know your audience:

- Find out what background they have, do they already know anything about the topic you will talk about?
- Do they all have a similar background?
- Which elements of your presentation will be particularly interesting to them?
- What connects your work with theirs?

2. Create a good structure

Think about a clear message you want to deliver and the points that support your message

- Explain why the audience should listen to you
- List the types of information you will be presenting to support your message
- Introduce your points with a clear link to your message
- Summarise and give an outlook regarding future activities

3. Make visual

Using visual aids (e.g. flipchart, slides) can help your audience to understand and remember your message:

- Try to visualise your main structural points and anything the audience needs to remember.
- Decide whether you need to use charts or graphs to show how numbers relate, a picture of a concept or words to precisely identify the actions or terminology the audience must understand.
- Use images for statements you want the audience to remember.
- When using words, keep your visual statements short and simple, 3 to 5 statements of identical grammatical structure are ideal.
- The flipchart or slide you are using should be easy to read and not too busy with too much information. When you introduce a visual aid you need to give the audience approx. 20 seconds to look at it and take in the information.

Never rely on your visual aids to guide you through your presentation, be prepared to deliver a clear message to your listeners without any assistance. The rule with any equipment is that you can never rely on it; overhead projector's bulbs have a tendency to fuse, flipcharts collapse, etc. Make sure you test your equipment before your presentation, but still be prepared to deliver your talk without it.

4. Maintain focus

Make eye contact

During your presentation you need to look at individuals in the audience.

- Make eye contact with one person at a time and vary between people sitting in the middle, front or in the back, on the left or the right side of the room.
- When reading a note or looking at your visual aid, stop talking, then look up, make eye contact and carry on.

Take your time

There is no rush. If you are nervous, taking your time will make you appear calmer.

- Take a moment to look at the audience before you start talking and concentrate on breathing so you don't get out of breath when you have started your presentation.
- Short breaks during your talk give the audience time to take in what you said or look at a visual and give you the time to collect your thoughts and concentrate on your next statement.

Focus on the audience

The main goal of your presentation is to make the audience understand you:

- Make sure they follow what you are saying. Can they hear and understand you?
- If they look confused, ask them whether they have any questions or comments!

Master difficult situations

Sometimes you might have to deal with trouble-makers:

- Treat negative comments as valuable and relevant, but maintain your eye contact away from this individual afterwards.
- If s/he persists, ask him/her to hold her comments until you have completed the presentation. Discuss the concerns one-on-one after your talk.

Enjoy yourself!

Try to see the presentation situation as a positive opportunity to tell the audience about your work and to receive interesting feedback from them.

- You don't have to be overly formal to come across as professional. It is always positive to try and be oneself, the audience will like you for being sincere.
- Smile every now and again when you look at individuals who are showing a positive response.

BIOTA Para-Ecologist Conference

in Nieuwoudtville
on the 1 May 2008, 15h-17h

Programme

Environmental studies

Albertus Kooitjie: Namib Desert and its environment

Reginald Christiaan: A scorpion survey in the Namaqualand

Vilho Mtuleni: Floods in Northern Namibia

Use of natural resources

Memory Dausas: the use of invasive species along the Kuiseb Rivier

Johanna Lot: Use of plants in the Kamiesberg area

Community development and awareness raising

Richard Isaacks: Community upliftment project

Donna Kotze: The eco Club in Nieuwoudtville

Robert Mukuya: Wiza Wetu-Film road show

Experiences from projects

Henri Cloete: Experiences at the working place in the Knersvlakte

Wynand Pieters: Experiences as a Para-ecologist in the Knersvlakte

What is biodiversity?

Biodiversity means biological diversity, that means the diversity on of living organisms.

The living environment (= humans, animals, plants, fungi, bacteria) with its

.. richness in species

.. richness in shapes and structures

.. richness in genes

.. diversity (richness) in processes and interactions

Drivers of biodiversity

What drives (causes) diversity?

- Climatic conditions
- Diversity of different soil types
- Topography (the structure of the landscape)
- Disturbance (intermediate disturbance – not too strong and not too little) can also create new habitats e.g., for species that are depended on open spaces. Such disturbances can be caused by animal activities (termite mounds = heuweltjies, elephants etc.), floods, fires etc.

What is an endemic species?

A species which occurs only in a certain area. When speaking about endemics, it is important to point out to which area a species is endemic to (e.g., Knersvlakte, Namaqualand, Succulent Karoo, Southern Africa, Africa, southern hemisphere …).

There are certain areas in the world that house many endemic species, they are called centres of endemism. Examples are Knersvlakte, Richtersveld, Kamiesberg area, Nieuwoudtville area.

Insects and other *goggas*

What do we know about insects?

- The only invertebrates, which have wings.
- They have three pairs of legs.
- The body is divided into three body parts (head, thorax and abdomen).

Examples of these are: beetles, ants, termites, crickets etc.

Scorpions and spiders are not classified as insects they lack the above mentioned characteristics. The most distinct one is that they lack three pair of legs.

What role does the insects play in life?

Ecological importance.

- Insects form part of the food chain.

- They break down dead plant and animal materials into organic matter (decomposers).
- Insects are also well known plant pollinators.
- Insects can be used as an indicator.
- They are can be used as a biological control agent by farmers.
- They are responsible for changing landscapes like the termites.
- They can also transmit diseases (e.g. mosquitoes transmit Malaria).

Economic importance

- food for human (e,g honey or they can be consumed like the mopany worms).
- The bushmen can use the insects as a poison for their arrows.

How do people in your community control pest?

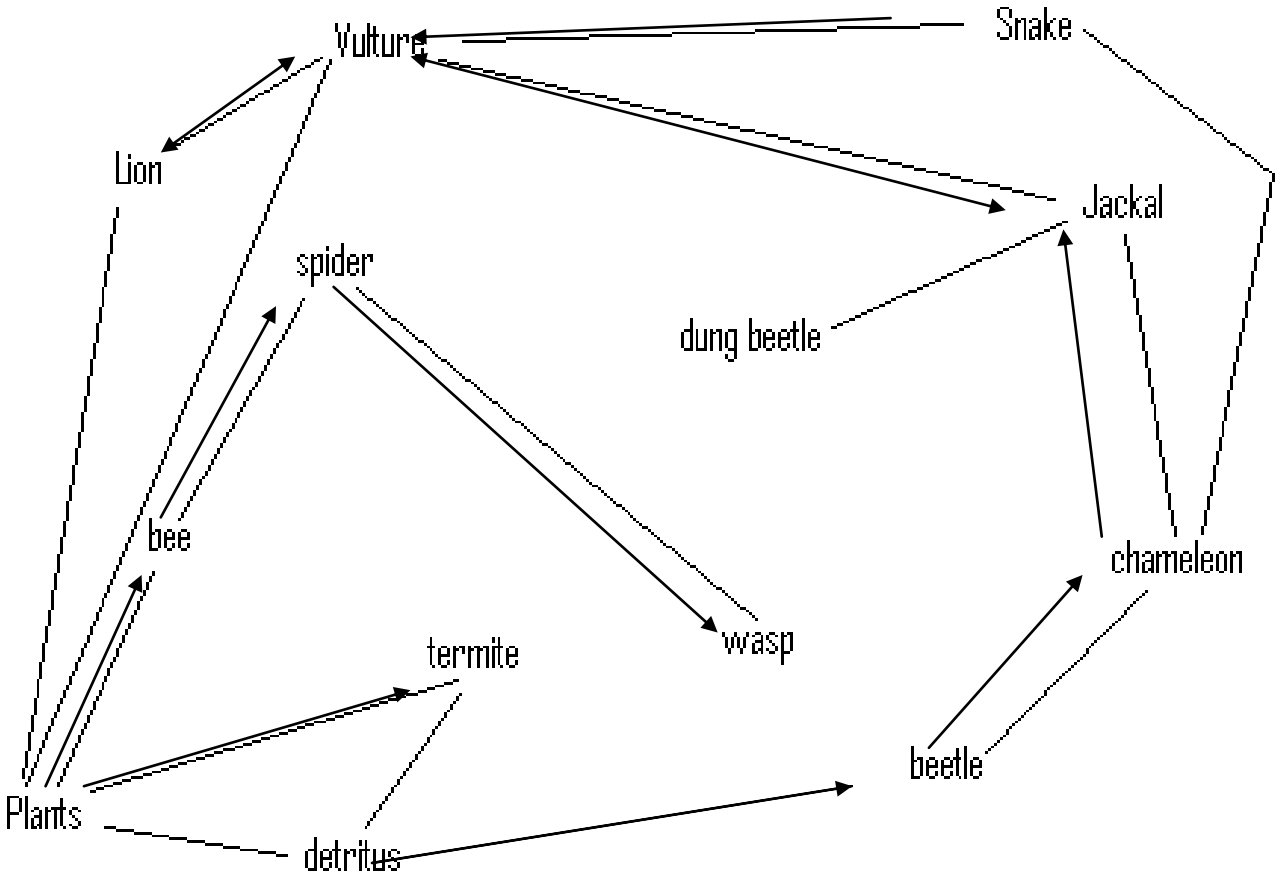
- they use chemicals.

NB. > most chemicals are not species selective, in other words they do not only kill the target insects, but also the none targeted once. In a long run this will cause environmental problems.

How can we distinguish an ant from a termite?

Ants	**Termites**
Ants also have a narrow, pinched waist.	Termites' waists are thicker and less distinct.
Ants' antennae are elbowed	Termites' antennae are straight
Ants have 3 body parts (head, thorax and abdomen)	Termites have just two body parts (head and abdomen).
Long legs	Short legs

How organisms depend on one another for survival (food web)



The soil acts as a store for all the nutrients that living organisms require. Plants are the primary producers. Energy flows from one animal to another by eating each other.

When one of the above animals is removed from the food chain, it create a problem to the whole ecosystem leading to the ecosystem collapsing.

Overall introduction of the S10 (now called S-B1).

- Tenebrionids along the rainfall gradient.
- Why tenebrionids? Good indicators.
- Link it with other factors such as land uses.

Introduction to methods used:

- Pitfall traps
- State when it should be emptied.

State the problems encountered (Namibians)

- - Transportation, this makes it difficult to empty

Introduction to data:

- Sorting
- Introduce procedures (hand outs)

biota traps	
jan	
feb	open
mar	close
apr	
may	
jun	open
jul	close
aug	
sep	
oct	open
nov	close
dec	


Beetle


Wasp


Spider


Termites


No idea


Termite


Beetle


Fly


Bug


Fly


Ant

What are termites?

- Insect Order: "Isoptera"
- They are NOT Ants!!! (The term "white ant" is from a scientific point of view wrong)
- Closely related to cockroaches
- Number of species in Namibia: 41
- Number of species in the world: 2700

Two common species

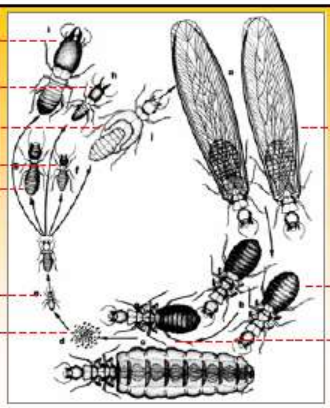
Hodotermes mossambicus

- "Harvester termite"

Macrotermes michaelseni

- Cultivate a fungus

Life cycle



Nutrition

- Termites eat anything that contains cellulose: e.g. wood, leaves, bark, humus, soil, herbivore dung
- "Lower" termites: possess intestinal protozoa that assist in the breakdown of cellulose
- "Higher" termites: produce enzymes to break down cellulose
- Macrotermitinae (where Macrotermes and few other genus belong to): cultivate fungus gardens, which aid in the digestion of cellulose

Macrotermitidae: Role of the fungus

- Worker eat dead grass and wood
- They do not digest this material but give it to their fungus gardens
- The fungus digests the cellulose
- The termites eat the fungus
- Workers feed the larvae, soldiers and the queen with the fungus

Some facts

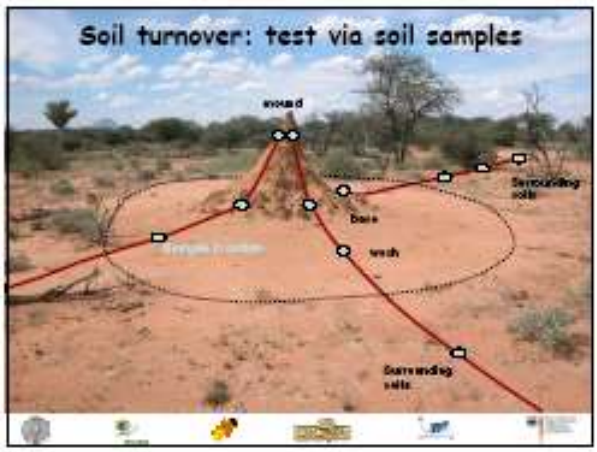
- Termites mounds appear some years after the founding of a colony, so that there are many young colonies being in a invisible subterranean stage
- If a Macrotermes colony dies, often other termite species will inhabit the abandoned termite mound
- A termite colony of Macrotermes-species consists of about 1 million termites
- The biomass of termites can exceed the biomass of ungulates (hoofed animals) in savannas

Role of termites for ecosystems

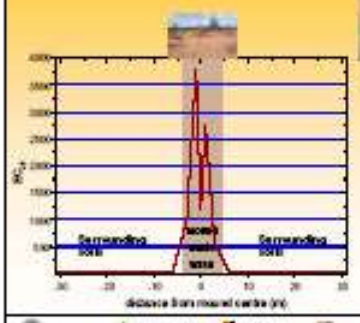
- Important food for many mammals, birds, other insects and humans
- Termites are main decomposer in arid areas => they make nutrients which are stored in dead plant material available for the system
- They make ~0.76m tunnels per m² in the soil. Through these tunnels and their openings to the soil surface, rainwater can run deeper in the soil and the moisture can be stored longer in the soil
- They enhance soil turnover and bring nutrient enriched soil material from deeper soil layers up to the soil surface

Termites enhance soil turnover

Soil turnover: test via soil samples



Soil turnover: results



highly increased electrical conductivity in mound, base and wash

-> mounds are a source of salts & nutrients

Some background information on Climate Change

Climate Change

Causes, processes and possible effects

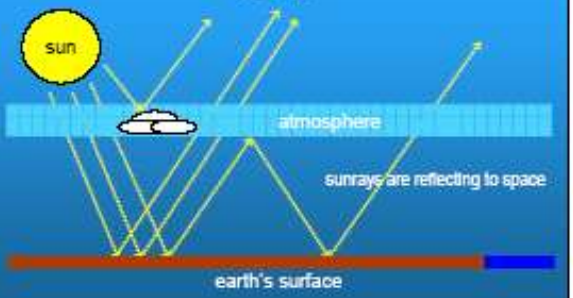
What is Climate Change?

"A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

from Article 1 of the UNFCCC
(United Nations Framework Convention on Climate Change)

2

How does the greenhouse effect work?



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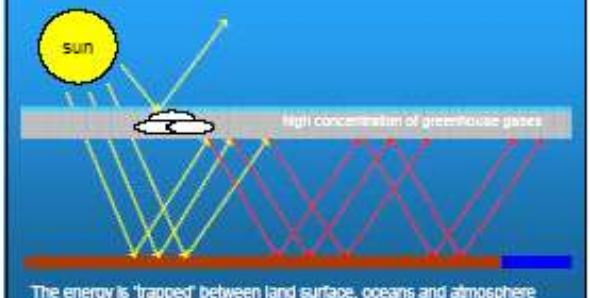
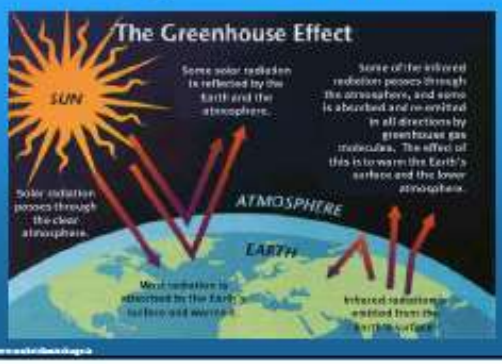
The greenhouse effect



The energy is 'trapped' between land surface, oceans and atmosphere and the temperature is heating up....

4

The greenhouse effect



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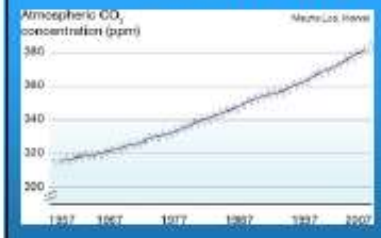
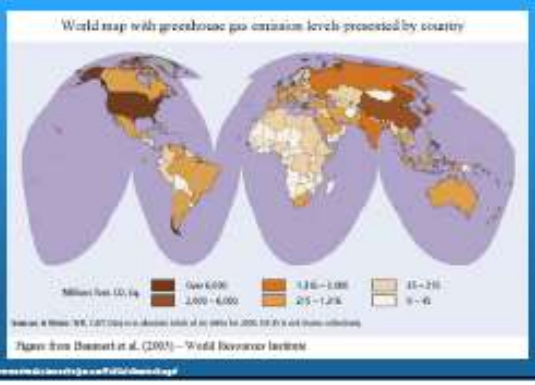
Heating up the earth?



There are different greenhouse gases, that induce global warming (vapor, methane, nitrous oxides). One of the most influential is CO_2.

6

Main CO_2 emitters



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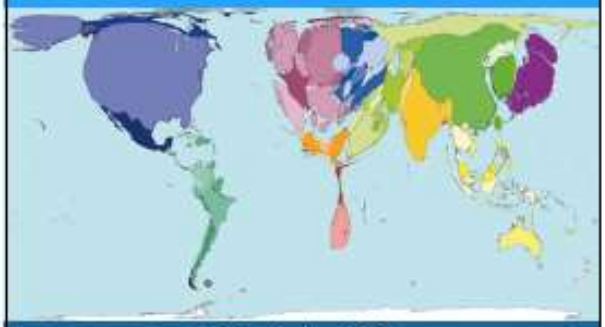
Main CO_2 emitters



CO_2 emissions 2000

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Examples of CO_2 sources

forest fires

coal and oil burning

volcanic eruptions

9

Examples of CO_2 sinks

oceans

soils

forests

10

Induced by human or nature?

Computer models are helpful to understand the causes of climate change.

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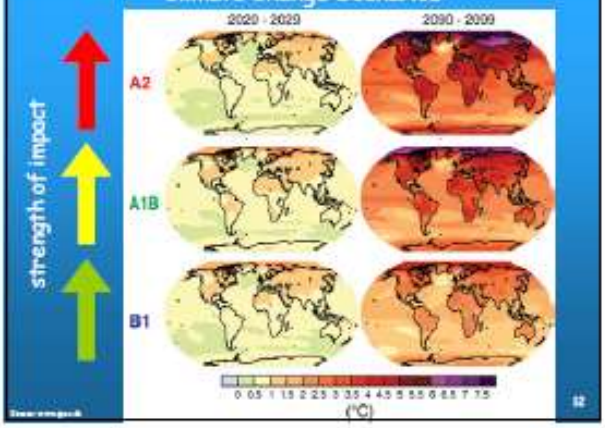
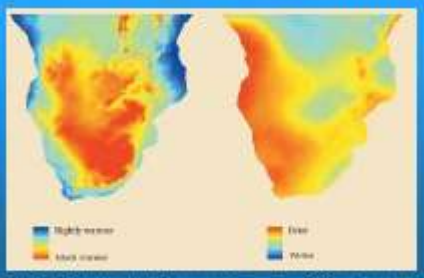
Climate Change Scenarios



12

What could happen in South Africa?



The HADCM3 climate model of changes in temperature (left) and precipitation (right) for 2050 (relative to conditions between 1961 and 1990)

13

Consequences of Climate Change

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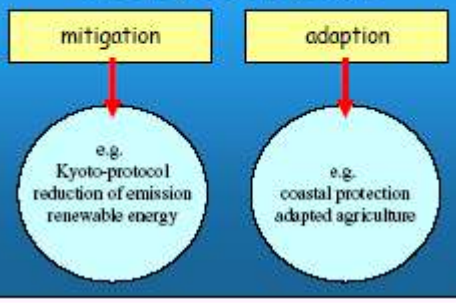
How to deal with Climate Change?

There are two overall strategies:



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A brief summary

- Human influence on climate is regarded as to be sure
- Greenhouse gases play an important role in Climate Change
- Climate forecasts are difficult to model and have a high uncertainty
- Local impacts are very hard to predict

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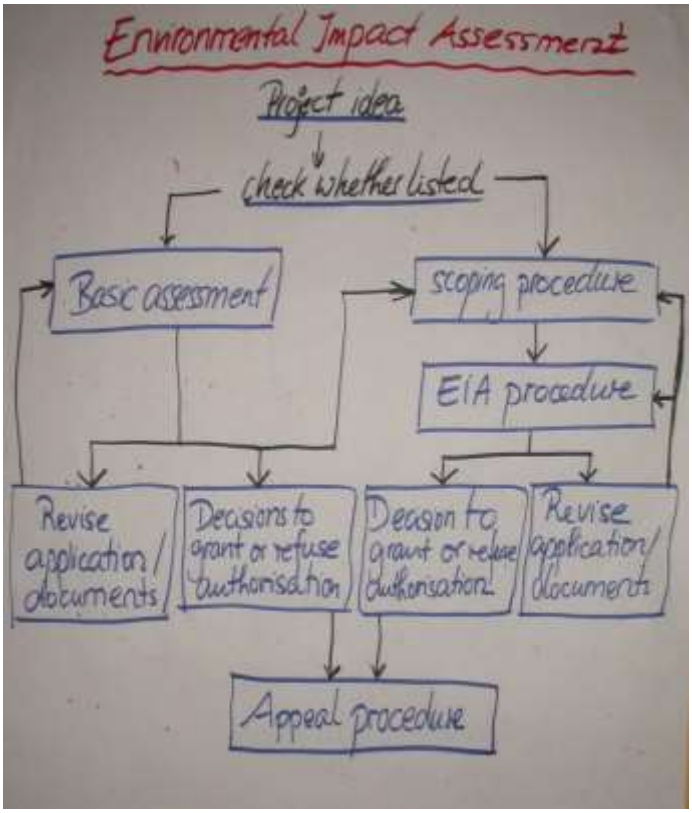
Environmental Impact Assessment

The Environmental Impact Assessment Regulation from 2006 (implemented by the South African Ministry for Environmental Affairs and Tourism) regulates the process that has to be followed if a project or development is planned that might have an impact on the environment (e.g., mining, building of wind parks or nuclear power stations). The regulation aims to provide sufficient information for an informed decision and at the involvement of the interested and affected public.

Parties involved:

- Applicant
- Environmental Impact Practitioner
- Interested and affected parties
- Competent authorities (Minister, MEC or Departments)
- Minister or MEC

Depending on the type of project and potential effect on its environment, either the procedure of basic assessment or of the scoping and EIA has to be followed.



During the scoping procedure, the issues, potential impact and potential alternatives are to be identified. During the Environmental Impact Assessment procedure, the issues, potential environmental impact of the project, potential alternatives and their significance and mitigation measures are investigated and analysed. Both steps are conducted by the Environmental Impact Practitioner, a practitioner in the field of ecology and nature conservation. During both steps, scoping and EIA procedure, the interested and affected parties must be involved.

The competent authorities will make their decisions based on the EIA report. The applicant can appeal to the MEC or the Minister if he or she is not satisfied with the decision.

Figure: Simplified diagram showing the procedures for an Environmental Impact Assessment