This edition – October 2015

Section C - Lesson Plans

- Natural Science
- Senior Primary Phase

Rivers and their catchments: Examples of fieldwork lesson plans for Senior Primary Phase

This is a product of The Water Research Commission: Project No. K5/2350

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This edition – October 2015

SECTION C

RIVERS & THEIR CATCHMENTS

Some examples of Fieldwork Lesson Plans for the CAPS

SENIOR PRIMARY PHASE

GRADE 7: NATURAL SCIENCE

CONTENTS

Dear Educator: The model Fieldwork Lesson Plans in this section have been developed in compliance with the CAPS curriculum documents. They are simply examples of what is possible. Why not work with a colleague to see how they suit your local situation and make any changes that might be necessary?

WRC: Project No. K5/2350

Natural Science: CAPS Senior Phase
Model Fieldwork Lesson Plan: *The Wetland Biosphere*
Aim: Exploring the ecology of a local wetland

Natural Science	**Grade 7 : The (Wetland) Biosphere**
Duration: 4 hours (Sessions of Fieldwork)	**Term 1: Week 4 Requirements for sustaining life in a (Wetland) Biosphere**

THE CURRICULUM CONTEXT

From the CAPS Curriculum for Natural Science**:**

Activities in the Science curriculum should promote and sustain enjoyment and curiosity about the world and its natural phenomena.

BIODIVERSITY

From the Grade 7 Natural Science curriculum:

- **The Concept of the Biosphere**:

  Learners should develop an understanding of the biosphere as the space where life exists.

  - The lithosphere (soil and rocks)
  - Hydrosphere (water)
  - Atmosphere (gases)
  - All living organisms including plants, animals and, microorganisms
  - Dead organic matter

- **Biodiversity**
  - Classification of living things
  - Diversity of animals
  - Diversity of plants

This fieldwork study uses wetlands as an opportunity for learners to personally experience the fullness of the biodiversity of a wetland ecosystem. By participating in this fieldwork, the learners will be given the opportunity to encounter biodiversity in their own environment and to use personal observations and experiences to develop concepts regarding the ecology of species.

- **To meet the requirements of the curriculum more than one session of fieldwork will be necessary. The teacher will have to adapt to their local situation to ensure the time needed to complete the activities.**

WHAT IS A WETLAND?

A wetland is a place where the ground is wet throughout the year. It is characterized by soil with a high clay content. It inhabits plants that are adapted to growing in mud or water and animals that use wetlands as habitats for food, shelter and a place to breed. Wetlands are the places where streams rise. The small streams from many wetlands join together to form the rivers of South Africa. A good reason for learners to start to know more about them and why they are important.

INDICATOR SPECIES

Environmental Scientists use the term ‘Indicator Species’ for animal and plant species whose presence, absence or relative well-being in a particular ecological environment is an ‘indicator’ (sign) of the overall health of the ecosystem

STARTING WITH THE END IN SIGHT

Specific Aims	Concepts & Content	Integration
Specific Aim 1: *Doing Science* Learners should be able to complete investigations, analyse problems and use practical processes and skills in evaluating solutions. Using a combination of fieldwork and classroom activities the learners will be working with 4 important approaches to scientific investigations 1. Looking 2. Observing (noting what you are seeing) 3. Recording (in words or pictures) 4. Discussing (explaining what you have experienced) The learners should be able to do simple investigations that require some practical ability.	The learners will demonstrate an understanding of what constitutes a wetland (distinctive soil, plants and animals) and the role that each of these plays in the wetland ecosystem. • **Describing** conditions that sustain life in a wetland ecosystem • **Investigating** the components of their wetland ecosystem. • **Using different techniques** e.g. miniSASS can be used to assess the water quality of rivers/streams leading into or out of the wetland.	Extracts from the curricula of other Senior Phase learning areas that provide links with Natural Science: Aims of Social Science 1. Learners are curious about the world they live in 2. They understand the interaction between society and the natural environment 3. They think independently and support their ideas with sound knowledge 4. They care about their planet and the well-being of all who live on it Languages Skills Skill 1: Listening and speaking Skill 2: Reading and viewing Skill 3: Writing and presenting Visual Arts Senior Primary phase learners are encouraged to: • Use creative art as a tool to develop research skills. • Reflect through looking, talking, listening and writing about the visual world through the language of art elements and design principles Mathematics Aims to develop the following in the learner: • Critical awareness of how mathematical relationships are used in social and environmental relations • Confidence and competence to deal with any mathematical situation.
Specific Aim 2: *Knowing the subject content and making connections* Learners should have a grasp of scientific, technological and environmental knowledge and be able to apply it in new contexts.	Through fieldwork the learners will experience and begin to understand the connections between the different parts of the wetland ecosystem. Fieldwork creates opportunities for educators and learners to share stories that they may have about the animals and plants found in wetlands.	
Specific Aim 3: *Understanding the uses of Science* Learners should understand the uses of the Natural Sciences and indigenous knowledge in society as well as in the environment. Natural Science as a subject at school should produce learners who understand that science in school can be relevant to everyday life. Indigenous knowledge and different world views enrich our understanding of the connections between Science and Society.	The learners will use their observations as the basis for identifying any possible threats to the wetland water and suggest ways in which the local community can look after their wetland.	

PROCESS SKILLS FOR FIELDWORK

Process Skills (Section 2.7 of the Natural Sciences Curriculum)

The teaching and learning of Natural Science involves the development of a range of process skills that may be used in everyday life, in the community and in the workplace. Learners should also develop the ability to think objectively and use a variety of forms of reasoning while they use these skills. Learners can gain these skills in an environment that taps into their curiosity about the world that supports creativity, responsibility and growing confidence.

The Curriculum lists 15 Process skills and each is important to consider when planning a fieldwork experience.

WHAT WILL WE NEED TO HELP US FIND ANSWERS?
(Planning the work. Working the plan)

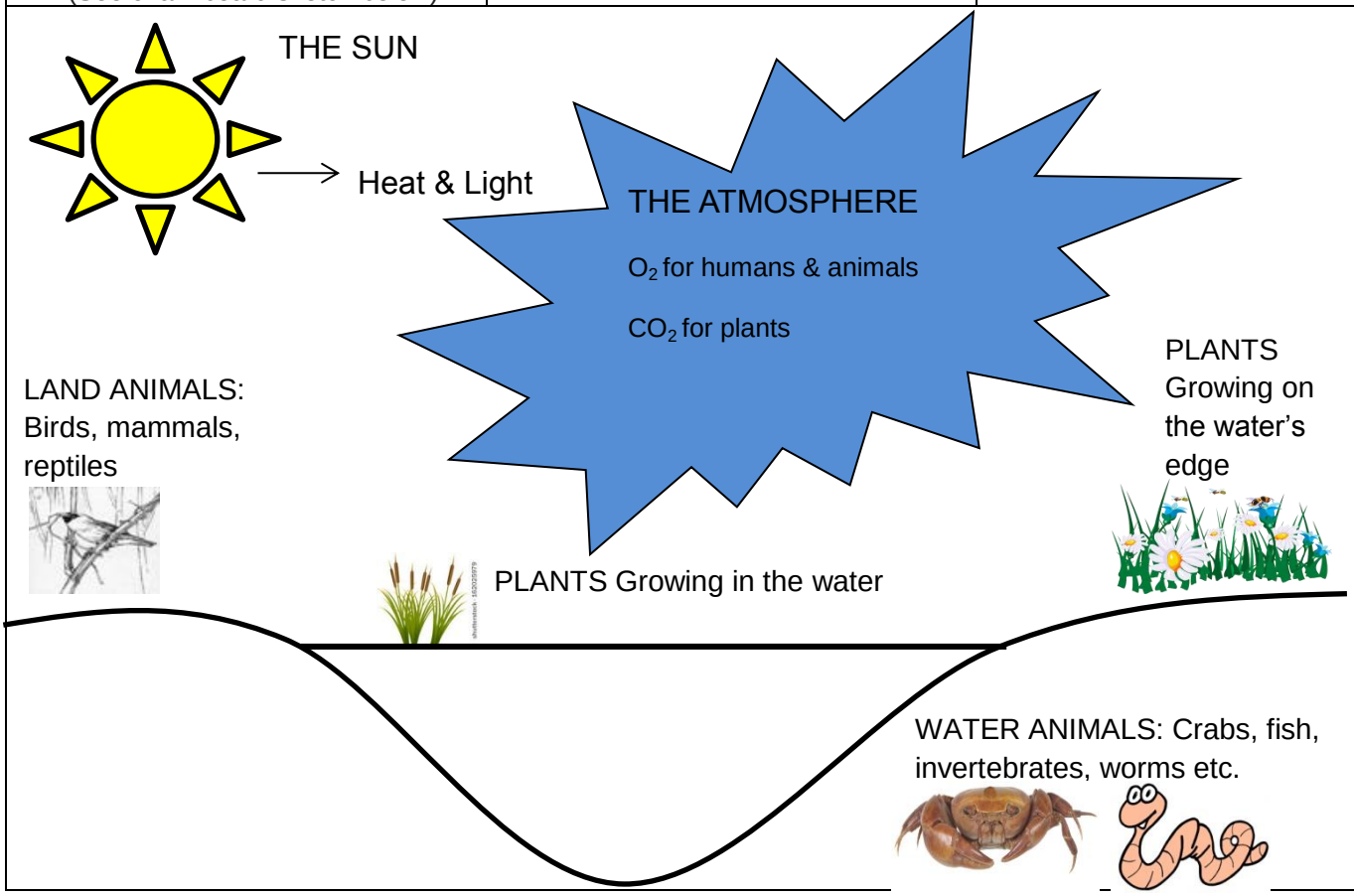
Prior knowledge:
At the start of Term One the learners will have learned about the biosphere and biodiversity and will know about the classification of living things. Use a chalkboard summary diagram of part of a wetland ecosystem showing:

- The sun
- The air
- The substrate (soil, mud)
- Plants and animals

(See chalk-board sketch below)

Looking forward:
The learners can look forward to finding out for themselves about each part of a wetland ecosystem.
The teacher will be referring back to this sketch once the fieldwork has been completed.

Prior planning:
To plan the learning program it is essential that you visit the study area beforehand.



PREPARING FOR THE FIELDWORK

In the classroom divide the class into groups of four:

- Give each group one clear plastic/glass bottle (e.g. jam-jar) with a lid.
- Give each learner *Ecology Fieldwork Recording Sheet* (Example attached) and cardboard 'clipboard'.
- Give each group the appropriate identification key(s) - See previous section.
- Give each group a small plastic hand lens (funds permitting). Plastic hand lenses generally cost between R10 and R15 and are available from most toy shops.

AT THE WETLAND

Activity One: The air around the wetland

With the learners seated in a circle around you ask them to close their eyes and to think about their breathing. Ask the learners:

- What important gas is the air providing?
- What happens when you hold your breath?
- What animals are in the wetland – all breathing oxygen to stay alive?
- Confirm the process of animal respiration. (Oxygen is taken in and carbon dioxide is expelled.)

With open eyes:

- What about the plants? What gas do they need to stay alive?
- Confirm the process of plant respiration. The process of consuming carbon dioxide and expelling oxygen as a waste gas.

Activity Two: The soil and mud in the wetland

Get a bucket of clean water handy so that the learners can rinse their hands from time to time.
This simple experiment will help you compare the sand, silt and clay content of TWO soil samples – one from at the wetland and the other a distance from it.

What you will need:

- Two plastic or glass jars / bottles with screw tops with the labels removed - e.g. peanut butter jar (two jars per group).
- Plastic rulers (one ruler per group).

The Soil Shake Investigation (See diagram below)

- Divide the class into convenient chat-groups (e.g. 4)
- Give each group TWO jars – marked A and B (use a label or mark with a Koki)
- Each group is to sample two lots of soil:
  - One as close to the water's edge as possible (Sample A)
  - The second away from the wetland's edge. (Sample B)
- Each sample is placed it in the jar to a depth of about 1/3 of the jar.
- Each jar is then topped up with water and the lid firmly replaced.
- The water in each jar must be shaken well for a few seconds until the contents are well mixed.
- The jars are then placed on a log or stone where they can be easily viewed.
- While the class waits for the mixtures to settle they can go on to the next activity (Mud puddling)

Activity Three – Puddling (Soil or mud)

Farmers and other people interested in the soil sometimes use a simple puddling test to sample the wetland soil/mud.

In this activity:

- Each learner takes a small handful of soil/mud
- If the material is dry the learner closes her fist over the sample and plunges her hand into a bucket of water to wet the sample. She removes her fist and squeezes excess moisture out of the sample.

Puddling the sample

To get an idea of the sand, silt and clay content gently rub the sample between thumb and forefinger.

- If the sample is sticky this tells you that there is clay.
- If you can feel slippery parts this shows the presence of silt.
- The gritty parts of the sample show the presence of sand.

Following up on Activity Two

It is important that the learners do not disturb the soil-shake sample. They must study it at rest where they first placed it.
Each group must be close to their soil-shake sample so that they can interact with the teacher.

Discussion

With the whole class gathered the teacher should guide the learners with regard to their findings and discuss the importance of each part of the mud / soil sample:

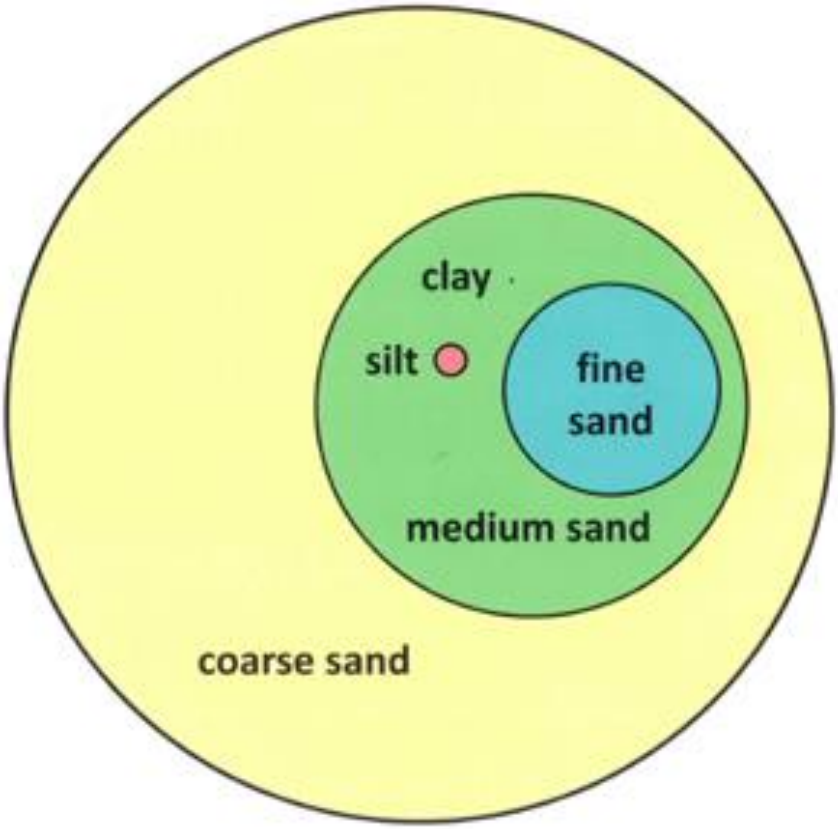
- What can they see floating on the surface in terms of the sand, silt and clay parts?

What do our findings tell us?

- The organic material (pieces of leaves, sticks) floating on the top tells us that soil/mud has organic matter in it
- Soil/Mud Sand is important because it provides air spaces (oxygen) for soil animals
- Silt is important because it helps to support the plant
- Clay is important because it holds the nutrients that the plant needs (Nitrogen, Potassium, Phosphate and other plant foods)

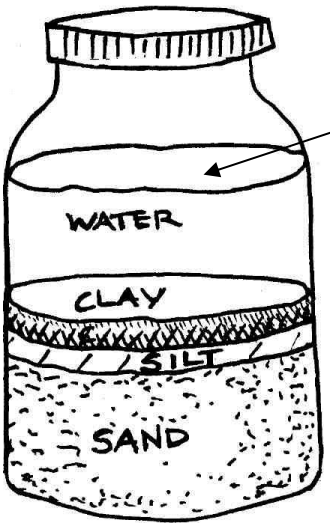
Discussion of the wetland ecosystem

- Decaying organic material from plants and animals breaks down to provide some of the plant food
- The substrate in the wetland (mud/sand) is very different to the soil of the surrounding area
- The plants have adapted to the wetland conditions (mud or sand)
- The next part of the fieldwork will look at the plants and animals in a wetland



This diagram shows the comparative sizes of soil/mud material. One sugar-crystal sized grain of coarse sand is the largest and one grain of clay is by far the smallest (just a dot in the diagram).

THE SOIL / MUD SHAKE INVESTIGATION



Organic matter floating on the surface (e.g. Leaves, sticks etc.)

Muddy water shows the presence of clay suspended in the water. The smallest particles may take weeks to settle.

The sample from the wetland will probably not have much silt or sand in it.

The sample from a distance from the wetland's edge will probably have more sand and less clay.

Activity Four: Ecological diversity in a wetland - The plants and animals

There are at least two reasons for surveying the diversity of the wetland:

1. To consider wetlands as habitats for plants and animals
2. To consider the variety(diversity) of animals and plants in a wetland

Recording observations:

Working in their groups the learners record their observations in the '*My Wetland Biosphere'* recording sheet - See attached example at the end of this document.

Habitats make happy homes:

Discuss with the learners the concept of 'habitat' (get their memories of it before assisting).

- *A habitat is the natural home of an animal, plant or other organism. It is a place in the environment where a species can live.*

Adaptation:

The living things that find habitats in wetlands are all adapted to the environment. By observing and recording their observations the learners should be guided to an understanding of adaptation. Discuss with the learners the concept of adaptation saying that once they have identified a plant or animal they will be discussing how it is adapted to the place where it was observed.

The plants:

In preparing for the fieldwork the teacher should identify as many different plant species as possible beforehand. Scientific names are not necessary, but wherever possible commonly used names should be applied (English as well as vernacular). For example: In the water there will be reeds, water lilies, green algae, bulrush, and at the water's edge the will be Sedge, bulrush, arum lilies.

- The learners should choose at least three plants growing in the water and three plants growing at the water's edge
- If the English names are not known to the group then an appropriate English name should be chosen.
- If a vernacular name is know it should be recorded.
- For each plant the learners should consult together to provide a way in which the plant is adapted to its habitat.

The animals:

The teachers' site visit before the fieldtrip will provide evidence that can be used in guiding the learners. Sightings or evidence (e.g. droppings, bird nests) of amphibians (frogs), crabs, leguaans, weaver birds and other animals.

In the "*My Wetland Biosphere*" recording sheet each learner must record the names of the animals and discuss as a group. They should also write a note about each species adaptation to the habitat it was recorded in.

Working in their groups the learners should look for sightings or evidence of not more then:

- Three bird species
- Two mammals species

The learners will use the identification key(s) chosen by the teacher to identify three animals living in the water. To do this each group should:

- Collect a full container of stream water from the wetland.
- Carefully lift up rocks and branches and inspect them for 'creep-crawly' animals.
- Any animal that is found should be gently removed with the end of a pencil or stick and placed in the container of water.

IDENTIFYING THE SPECIES & RECORDING THE RESULTS

When the groups have completed the sampling each group should find a dry spot to sit and identify the animals that they have found.

- The teacher then gives:
  - Each group of learners a copy of the river animal identification sheet – chosen from the three examples in Appendix One (*Water creatures identification sheet, River animals identification key* and *Water creatures information sheet).* If possible it is suggested that the teacher laminates these pages (this will protect them from wet fingers). The teacher should choose the most suitable key for the class and for the local wetland.
  - Each learner a cardboard 'clipboard' with its recording sheet: "*My wetland biosphere"* (A suggested copy of this page is included at the end of this Lesson Plan).
- Once they have found their animals the learners must use the information sheet(s) to identify them and then they should record the information on the *My Wetland Biosphere* recording sheet.
- When they have identified their sample of animals they should carefully return them to the place where they were found.

Action Steps

Back in the classroom

Note-making

- Discuss the findings with the learners by referring back to your original chalkboard diagram and asking the learners to help you place examples of THEIR findings on the diagram
- Discuss with the learners examples of adaptation to specific niches in the wetland. Use examples from both the learners' observations as well as your own research
- Discuss the role of wetlands in providing water for streams and rivers below the wetland
- Once done allow time for each learner to complete the '*My Wetland Biosphere'* record sheet

Taking action

- Ask the learners for their ideas regarding improving community awareness in terms of the importance of wetland conservation (sources of water, conservation of species, soil conservation, places for school fieldwork, etc.)
- Ask the learners to design a poster that will encourage their community to protect the local wetland. The poster should show the diversity of life in a wetland and indicate what ecological services the wetland provides (they can work individually or in their groups).

FIELDWORK RECORD KEEPING: *Exploring the ecology of a local wetland* (one per learner)

Example of a FIELDWORK RECORD KEEPING sheet follows:

FIELDWORK RECORD KEEPING: *Exploring the ecology of a local wetland* (one per learner)

	MY NOTES: WHAT I LEARNED TODAY
The sun	
The air around the wetland	
The sand/mud	

	Species (Seen or found signs of)	Adaptation to the wetland habitat
Plants (In or above the water)		
Plants (At the water's edge)		
Birds in the wetland		
Mammals		
Frogs (or tadpoles)		
The insects (Any number)		
Other animals (e.g. reptiles)		

In addition to the English name of the plant or animal if you know the local name you should write in here. If finding species is difficult the teacher should assist in identifying possible species.

On the reverse side of this page design a poster picture that encourages people to respect wetlands (It should give reasons)

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The Wetland Biosphere

(Exploring the ecology of a local wetland)

Example of a Rubric for assessing the learner's performance

Natural Science (Grade 7)

The Assessment will be based on observations of learner participation in the field as well as on an assessment of the "*My Wetland Biosphere*" individual recording sheets.

Learner's Name …….. Class: ……..

RUBRICS (Place the mark in the appropriate box)				
Learning Outcome used in the lesson In the table the use of his/her gender descriptions are inter-changeable.	**4 Marks: Learner's performance has exceeded the Assessment expectations for the grade.**	**3 Marks: Learner's performance has satisfied the Assessment expectations for the grade.**	**2 Marks: Learner's performance has partially satisfied the Assessment expectations for the grade.**	**1 Mark: Learner's performance has not satisfied the Assessment expectations for the grade.**
1. The learner demonstrates through the poster picture an understanding of the importance of the wetland biosphere.				
2. The learner participates well in the experiments leading to a recognition of the four soil components of humus (organic matter), clay, silt and sand.				
3. The learner chooses names and describes at least three wetland plants.				
4. The learner is able to use simple identification keys to identify and record three wetland animal species				
5. In the table "My Wetland Biosphere" the learner shows an understanding of the concept of adaptation.				
TOTAL OF MARKS (OUT OF 20)				

WRC: Project No. K5/2350

Natural Science: CAPS Senior Phase
Model Fieldwork Lesson Plan: *The Wetland Biosphere*
(How healthy is my wetland stream)

Natural Science	**Grade 7 : The (Wetland) Biosphere**
Duration: 2 hours	**Term 1: Week 4 (Wetland) Biodiversity**

THE CURRICULUM CONTEXT

From the CAPS Curriculum for Natural Science:

Activities in the Science curriculum should promote and sustain enjoyment and curiosity about the world and its natural phenomena.

Following on the previous fieldwork whereby the learners explored the living and non-living parts of a wetland ecosystem – this fieldwork study now focuses on an investigation of the health of a wetland stream - the aquatic part of the ecosystem.

The study consolidates the learners' knowledge of ecosystem functions and reinforces the need for learners to 'think citizen science' when in a natural environment.

BIODIVERSITY

The Grade 7 Natural Science curriculum has two sections in the strand "Life and Living": *The Biosphere* and *Requirements for Sustaining life.* Within the section on the Biosphere the suggested activities include:

1. **Identifying:** living organisms found in each sphere
2. **Classifying:** living things
3. **Describing:** conditions that sustain life.

As part of the requirements for sustaining life learners will research how living things are suited (adapted) to the environment in which they live.

This fieldwork study has four purposes:

1. It provides learners with fieldwork experiences that brings them into direct contact with the biodiversity in a local wetland environment
2. It enables learners to use identification keys to identify aquatic animal species
3. As part of the requirements for sustaining life learners will research how living things are suited (adapted) to the environment in which they live
4. It enables learners to use personal observations and experiences to investigate a local environmental issue – that of water quality in the local wetland

WHAT IS A WETLAND?

A wetland is a place where the ground is wet throughout the year. It is characterized by soil with a high clay content as well as plants that are adapted to growing in mud or water and animals that use wetlands as habitats for food, shelter and a place to breed. Wetlands are often places where streams rise. The small streams from many wetlands join together to form the rivers of South Africa. A good reason for learners to start to know more about them and why they are important.

INDICATOR SPECIES

Environmental Scientists use the term 'Indicator Species' for animal and plant species whose presence, absence or relative well-being in a particular ecological environment is an 'indicator' (sign) of the overall health of the ecosystem.

For example: Aquatic invertebrates and fish have commonly been surveyed as indicators of water quality of streams and rivers (the health of aquatic ecosystems). If a site has populations of so-called "sludge worms" or tubificids for example, this usually suggests that water quality has been degraded by inputs of sewage or other oxygen-consuming organic matter. Sludge worms can tolerate virtually anoxic water (water with almost no oxygen), in contrast with most of the animals of unpolluted environments, such as mayflies and stoneflies which require well-oxygenated conditions.

MiniSASS is a tool developed by environmental scientists to monitor the health of a river/stream and measure the general quality of the water in that river/stream. It uses the composition of invertebrates (small animals) living in rivers and is based on the sensitivity of the various animals to water quality.

In this fieldwork learners can get the chance to look for indicator species in a river/stream and can use the miniSASS scoring system to decide how healthy that river/stream is.

STARTING WITH THE END IN SIGHT

Specific Aims	Concepts & Content	Integration
Specific Aim 1: *Doing Science* Learners should be able to complete investigations, analyse problems and use practical processes and skills in evaluating solutions. Using a combination of fieldwork and classroom activities the learners will be working with 4 important approaches to scientific investigations 1. Looking 2. Observing (noting what you are seeing) 3. Recording (in words or pictures) 4. Discussing (explaining what you have experienced) The learners should be able to do simple investigations that require some practical ability.	The learners will demonstrate an understanding of what constitutes a wetland (distinctive soil, plants and animals) and the role that each of these plays in the wetland ecosystem. • **Describing:** conditions that sustain life in a wetland ecosystem • **Describing:** the components of the wetland ecosystem. • **Sampling:** the animal life in the water and using the miniSASS sampling technique to **identify** aquatic organisms found in rivers/streams around the wetland (to analyse the quality of water that may be flowing into the wetland) . Using this data to **assess the health** of the rivers/streams in the surrounding areas and the impact that this may have on the wetland.	Extracts from the curricula of other Senior Phase learning areas that provide links with Natural Science: ***Aims of Social Science*** 1. Learners are curious about the world they live in 2. They Understand the interaction between society and the natural environment 3. They think independently and support their ideas with sound knowledge 4. They care about their planet and the well-being of all who live on it ***Languages Skills*** Skill 1: Listening and speaking Skill 2: Reading and viewing Skill 3: Writing and presenting ***Visual Arts*** Senior Primary phase learners are encouraged to: • Use creative art as a tool to develop research skills • Reflect through looking, talking, listening and writing about the visual world through the language of art elements and design

Specific Aim 2: *Knowing the subject content and making connections* Learners should have a grasp of scientific, technological and environmental knowledge and be able to apply it in new contexts.	Through fieldwork the learners will experience and begin to understand the connections between the different parts of the wetland ecosystem. Fieldwork creates opportunities for educators and learners to share stories that they may have about the animals and plants found in wetlands.	principles ***Mathematics*** Aims to develop the following in the learner: • Critical awareness of how mathematical relationships are used in social and environmental relations • Confidence and competence to deal with any mathematical situation
Specific Aim 3: *Understanding the uses of Science* Learners should understand the uses of Natural Sciences and indigenous knowledge in society and the environment. Science learnt at school should produce learners who understand that school science can be relevant to everyday life, indigenous knowledge and different world view. This should enrich their understanding of the connections between Science and Society. **This is an aspect of Citizen Science whereby learners start to think and act as citizens in their community**.	The learners will use their observations as the basis for identifying any possible threats to the wetland water and suggest ways in which the local community look after their wetland.	

PROCESS SKILLS FOR FIELDWORK: HEALTH OF THE LOCAL STREAM

Process Skills (Section 2.7 of the Natural Sciences Curriculum)

The teaching and learning of the Natural Sciences involves the development of a range of process skills that may be used in everyday life, in the community and in the workplace. Learners also develop the ability to think objectively and use a variety of forms of reasoning while they use these skills. Learners can gain these skills in an environment that taps into their curiosity about the world, and that supports creativity, responsibility and growing confidence.

The Curriculum lists 15 Process skills and each is important to consider when planning a fieldwork experience.

The Scientific Process (Process Skill 15): is a skill that is needed to investigate things about the world. Using steps in the process skill learners can act scientifically to find out about the world and solve problems.

The process skills from the Curriculum that are relevant to this wetland field-study are listed below. This list is adapted for use in the Marking Rubric for this Fieldwork.

Process	Response
Step 1: Identify and describe the issue under investigation.	Is the stream healthy? Is the stream a suitable habitat

What is it you want to find out?	for water organisms?
Step 2: Form a hypothesis (scientific theory). A hypothesis is an idea, answer, or prediction about what will happen and why.	Hypothesis: The stream is in a healthy state and provides a suitable habitat for a range of water organisms.
Step 3: Design an activity or experiment to test your idea or prediction to see if you were right.	Conduct a miniSASS investigation to discover the range of organisms present in the stream.
Step 4: Observe and record your observations in a table. What were the results of your activity?	Record your findings in a table. Use the miniSASS scoring system to measure the health of the stream.
Step 5: Make inferences about the observations recorded and then make some conclusions. What did you find out? Do your results support your hypothesis? What did you learn from this investigation?	

WHAT WILL WE NEED TO HELP US FIND ANSWERS? (Planning the work. Working the plan)

Prior knowledge: At the start of Term One the learners will have learned about the biosphere and biodiversity and will know about the classification of living things. Use a chalkboard diagram to revise with examples of bio-diversity: the variety of plant and animal life in the world or in a particular habitat.	**Looking forward:** The learners can look forward to finding out for themselves about the biodiversity of their local wetland by using a simple sampling technique of the organisms in the water.	**Prior planning:** To plan the learning program it is essential that you visit the study area beforehand.

PREPARING FOR THE FIELDWORK: ECOLOGICAL INVESTIGATION

Resources and fieldwork equipment

Teachers can provide each group of learners with a 'clip-board' made by placing a bulldog clip on an A4 size cut up cardboard box (obtainable from any grocery store).

- The learners will go bare-footed into the stream water. To protect them from possible pollution use strong plastic bags held up with elastic bands.
- Take fresh water and liquid soap into the field so that the learners can wash their hands after they have collected their specimens.

IN THE CLASSROOM:

Use a chalk-board to outline the purpose of the field-work

- To find out whether or not the local stream is polluted.
- To look for water animals that will help us to decide.

Organising the work

- Divide the class into chat-groups. (e.g. 4 learners per group)
- To add fun to the work each group can decide on a name for themselves. (e.g. Mayflies, Dragon Flies, Mosquitoes etc.)
- Give each group one container (e.g. a plastic ice-cream container), a small plastic cup and a pencil
- Provide a small plastic hand lens (Funds Permitting) -1 per group. Plastic hand lenses generally cost between R10 and R15 and are available from most toy shops.

AT THE STREAM

Instructions:

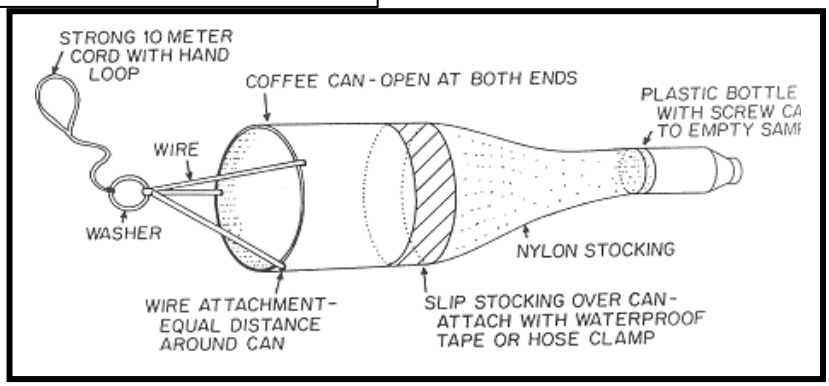
- Each group must collect a full container of stream water from the wetland
- Learners in the group must carefully lift up rocks and branches and inspect them for 'creep-crawly' animals
- Any animal that is found should be gently removed with the end of a pencil or stick and placed in the container of water
- Learners can explore the stream and collect as many creepy-crawlies as they can in 15 minutes
- If they see animals (such as tadpoles) which they are unable to catch they must make a note of this on their recording sheet

After 15 minutes of sampling each group must find a comfortable spot to identify the animals that they have found. The teacher gives each group the two information sheets for identifying their animals: ***River animals identification key*** and ***River animals information sheet*****.** If possible it is suggested that you laminate these pages. This will protect them from wet fingers.

Two additional sampling activities for those with an opportunity to do more:

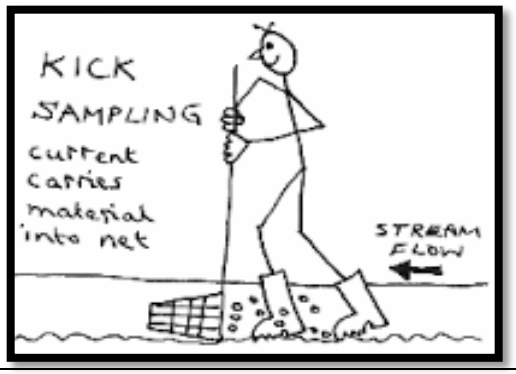
1) Using a home-made sampling net: If you have a small class or if you would like one or two groups of learners to use this sampling technique you can use a home-made sampling net (See diagram below). The net is pulled gently through the water to catch any swimming animals. They will be caught in the small plastic bottle from where they can be placed into the container full of water.

10 meters of thick string with a hand-loop



Tin cut open at both ends

Small plastic bottle with screw top. Cut out the bottom and fasten the stocking on with tape. To empty the bottle simply unscrew the top.



2) Kick-sampling the bottom of the stream: The stream current carries material into the net.

Alternatively you can use a homemade net in a flowing stream and, while you shuffle your feet to disturb the sand and mud on the bottom of the stream, allow the water to carry disturbed water animals into the net.

WHAT WAS LEARNED FROM THE INVESTIGATION? (Recording the Results)

RECORDING THE RESULTS

When the groups have completed the sampling each group should find a dry spot to sit and identify the animals that they have found. The teacher then gives each learner a cardboard 'clipboard' with its recording sheet: "*How Healthy is my stream?"* – printed back-to-back (See Section F).

Other hand-outs:

- The two information sheets (attached to this document): ***River animals identification key*** and ***River animals information sheet.*** If possible it is suggested that you laminate these pages. This will protect them from wet fingers.
- **The sensitivity scoring information sheet (below):** This scoring sheet shows 13 examples of water invertebrates most likely to be found in the wetland. The animals are listed in terms of their ability to tolerate polluted water – from the larvae of true flies (most tolerant) to the larvae of stoneflies (least tolerant).

The learners will work together to allocate sensitivity scores to each GROUP of animals found and each learner will fill in their results on the recording sheet.

Deciding on the stream-water quality

Once the group has completed the table "*How healthy is my stream*" they can use the sensitivity scores to measure the health of the stream. Each group pf learners must:

1. Add up all of the sensitivity scores in Table A
2. Divide the total of the sensitivity score by the number of groups identified
3. Check the score against the information in Table B

The result is the average score for the stream and the learners can then discuss the health of the stream.

ACTION STEPS

Back in the classroom

Discuss the findings with the learners.

- If the stream water is relatively clean then ask the learners, working in their groups, to design a poster that will encourage the community to conserve the wetland environment.
- If the wetland is showing signs of pollution then ask the learners to design a poster telling the community about the pollution and encouraging households to combat the pollution at a personal level.

MAKE A CONTRIBUTION AT A NATIONAL LEVEL

To make a regular contribution to a developing picture of river quality in South Africa schools should their results to minisass@ground-truth.co.za.

This edition – October 2015

FIELDWORK RECORD KEEPING: *how healthy is my wetland stream*? (One per learner)

Class: …… My Group's name: ……..

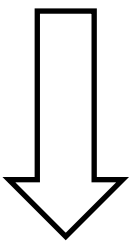
My Name: …….

The Task: To sample the aquatic invertebrates in a local river/stream using miniSASS to assess the water quality (whether or not it may be polluted). If it is polluted; to what extent is the pollution affecting the invertebrates in the stream?

TABLE A

	GROUPS	NUMBER FOUND	SENSITIVITY SCORE
1	Flat Worms		3
2	Worms		2
3	Leeches		2
4	Crabs or Shrimps		6
5	Stoneflies		17
6	Minnow mayflies		5
7	Other mayflies		11
8	Damselflies		4
9	Dragonflies		6
10	Bugs or Beetles		5
11	Caddisflies (cased & uncased)		9
12	True flies		2
13	Snails		4
	TOTAL SCORE		
	Number of Groups		
	Average Score - miniSASS Score (Divide Total score by the number of groups you sampled) →		

Although an ideal sample site has rocky, sandy, and vegetation habitats, not all habitats are always present at a site. If your river does not have rocky habitats use the sandy type category below to interpret your scores.



WRC: Project No. K5/2350

Table B: Interpretation of the miniSASS score (Sandy stream bottom / Rocky stream bottom)		
Ecological Category (Condition)	**River Category**	
	Sandy Type	**Rocky Type**
NATURAL condition (Unchanged / Untouched – Blue)	> 6.9	> 7.9
GOOD condition (Few modifications – Green)	5.9 to 6.8	6.2 to 7.2
FAIR condition (Some modifications – Orange)	5.4 to 5.8	5.7 to 6.1
POOR condition (Lots of modifications – Red)	4.8 to 5.3	5.3 to 5.6
VERY POOR condition (Critically modified – Purple)	> 4.8	> 5.3

Findings

- In this space each learner must record the findings, describing the condition of the stream.

The research of the ……Group found that …… Stream is

……

……

……..

This edition – October 2015

MY FIELDWORK DRAWINGS

Name of invertebrate:

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This edition – October 2015

Class: ……..... Learner's Name ……..

The Wetland Biosphere

(How healthy is my wetland stream?)

Example of a Rubric for assessing the learner's performance

Natural Science (Grade 7)

WRC: Project No. K5/2350

RUBRICS (Place the mark in the appropriate box)				
Learning Outcome used in the lesson (In the table the use of his/her gender descriptions are inter-changeable.)	**4 Marks: Learner's performance has exceeded the Assessment expectations for the grade.**	**3 Marks: Learner's performance has satisfied the Assessment expectations for the grade.**	**2 Marks: Learner's performance has partially satisfied the Assessment expectations for the grade.**	**1 Mark: Learner's performance has not satisfied the Assessment expectations for the grade.**
1. The learner performs all the fieldwork tasks with careful consideration.				
2. The learner gains useful experiences of sampling by looking in different habitats to collect as many water animals as possible;				
3. The learner uses the miniSASS technique to identify each macroinvertebrate from a local river/stream and records the results in the Report Table provided by the teacher.				
4. The learner uses the Sensitivity Test provided by miniSASS and the miniSASS scoring system to assess the health of the chosen river/stream and records the results in the Report Table.				
5. If the sampled indicator species suggest water that is free of pollution: The learners, working in their groups, must design a poster that will encourage the community to conserve the wetland environment ➢ Group mark for each learner				
Alternatively:				
5. If the wetland is showing signs of pollution then ask the learners to design a poster that would inform the community about the pollution and which would encourage households to combat the pollution at a personal level. ➢ Group mark for each learner				
TOTAL OF MARKS (OUT OF 20)				