This edition – October 2015

Section B - Lesson Plans

- Science and Technology
- Intermediate Phase

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

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

WRC: Project No. K5/2350

This edition – October 2015

SECTION B

RIVERS & THEIR CATCHMENTS

Some examples of Fieldwork Lesson Plans

For the CAPS

INTERMEDIATE PHASE

Dear Educator:

The model 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?

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Natural Sciences & Technology: CAPS Intermediate Phase
Model Fieldwork Lesson Plan: *A walk in a wetland*
(Learning through the senses)

Natural Science	**Grade 4 : Living and non-Living things**
Duration: 1 ½ hours	**Term 1:** Week 1 Living things and non-living things

STARTING WITH THE END IN SIGHT

From the CAPS Curriculum: *Science and Technology are activities that promote and sustain enjoyment and curiosity about the world and natural phenomena.*
This Lesson Plan combines a walk in a wetland with classroom picture-building that will encourage Grade 4 and 5 learners to use their senses of sight, scent, touch and hearing to find out more about a local wetland.

If your school is not within walking distance of a wetland why not create a chalkboard/large poster picture of one and use story-telling to unpack the elements that give it its character? (See examples below.)

CAPS Specific Aims	**Concepts & Content**	**Integration**
Specific Aim 1: *Doing science* Using a combination of fieldwork (for example a walk in a wetland area) and classroom activities (picture-building based on the fieldwork experience) 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) This means that learners plan and do simple investigations that need some practical ability. There are attitudes and values that underpin this ability. Respect and compassion for living things is an example of this.	The learners will be able to do simple investigations that require some practical ability. Learning what a wetland constitutes (Distinctive soil, plants and animals) and why they are important. The learners should be able to talk about the elements of the wetland.	**CAPS Connections** **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 what lives on it **Languages Skills** Skill 1: Listening and speaking Skill 2: Reading and viewing Skill 3: Writing and presenting **Visual Arts** Learners in the Intermediate phase observe photographs and pictures that are related to the natural world. They explore colours, shapes and textures that can be observed in nature. **Mathematics** Mathematics in this phase focuses on measurement and the recording of data.
Specific Aim 2: *Understanding and connecting ideas* The classroom activity will bring together the experiences of the walk in the wetland area in the form of a chalk-board picture. Using coloured chalks the teacher will show the main elements of the wetland environment. The teacher will then use an activity to encourage responses from the learners. **This is an aspect of Citizen Science whereby learners start to think and act as citizens in their community**. The main task of teaching is to build a framework of	They should be able to draw a picture of the wetland and: - Write sentences about each part of the wetland - Write a sentence to say why wetlands are important for both people and the environment. - Write a sentence to say how we can look after our local wetlands.	

knowledge for learners and to help them make connections between the ideas and concepts in their minds. This is different to learners just retaining facts. Discussion must relate to previously acquired knowledge and experience and connections must be made.		

THE WETLAND CONTEXT

A wetland is a place where the ground is wet throughout the year. It is characterized by soil with a high clay content. It also inhabits plants that are adapted to growing in mud or water and animals that use wetlands 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.

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

Prior knowledge: Since this fieldwork involves the 5 senses start by discussing these senses and how they help us to connect with our surroundings. **Indigenous knowledge**: During the walk and classroom discussion encourage the learners to share their own stories about the wetland.	**Looking forward:** Managing a fieldwork experience that will enable the learners to use their senses to find out for themselves about a local wetland.	**Prior planning:** To plan the learning program it is essential that you visit the study area before hand. **NB**: For each stopping point you will need to locate a site where the class can gather and participate.

The Fieldwork: Walking in the wetland

The teacher will walk with the learners along the edge of the wetland. At the beginning of the walk, tell the learners that you will be helping them to explore the wetland and that, together with you they will finding out more about wetlands:

- At the first convenient spot on the edge of the wetland. Stop and ask the learners to gather around you. Ask them to tell you what they **SEE?** As the learners respond guide them by asking questions with regard to the three most obvious elements:
  - Plants
  - Animals (e.g. birds, crabs, fish)
  - Soil (mud)

  Telling the story: Habitats make happy homes: Just as each learner has a home – the wetland is a home to all the plants and animals. Here the plants can grow in places that they like to grow and the animals have a place where they can find food and are safe from enemies and raise their families.
- Walk on a little further. Stop and ask the learners to close their eyes and listen carefully to what they **HEAR?**. As the learners respond guide them with questions (e.g. the sound of wind blowing, water running, birds calling, and frogs calling).
  Telling the story: Birds have ears behind and below their eyes that are covered by soft feathers. Some birds (e.g. owls) have feathers that look like human ears; they use sound to find their prey.
  Mammals have ears just like people, they need good hearing to detect enemies and find their prey.
- Walk on a little further. Stop and ask the learners to sniff the air. What can they **SMELL?** As the learners respond guide them with questions.
  Telling the story: Mammals use their noses to find food and to detect enemies.
- Lastly gather the learners around a spot where there is damp soil or mud. Ask the learners to squish the soil/mud between thumb and forefinger. How does it **FEEL?** What does it smell like? What colour is the soil / mud?
  Telling the story: The soil/mud provides a place where plants can grow and gives them plant-food. Just like we need to eat every day - plants get the food that they need from the soil/mud in which they are growing. The dark colour of the mud shows that there is organic matter (similar to compost) in the soil/mud.

Rounding off the wetland walk

Before going back to the classroom remind the learners that the river walk was just the first part of finding out about wetlands and that the rest of the story will be explored back in the classroom.

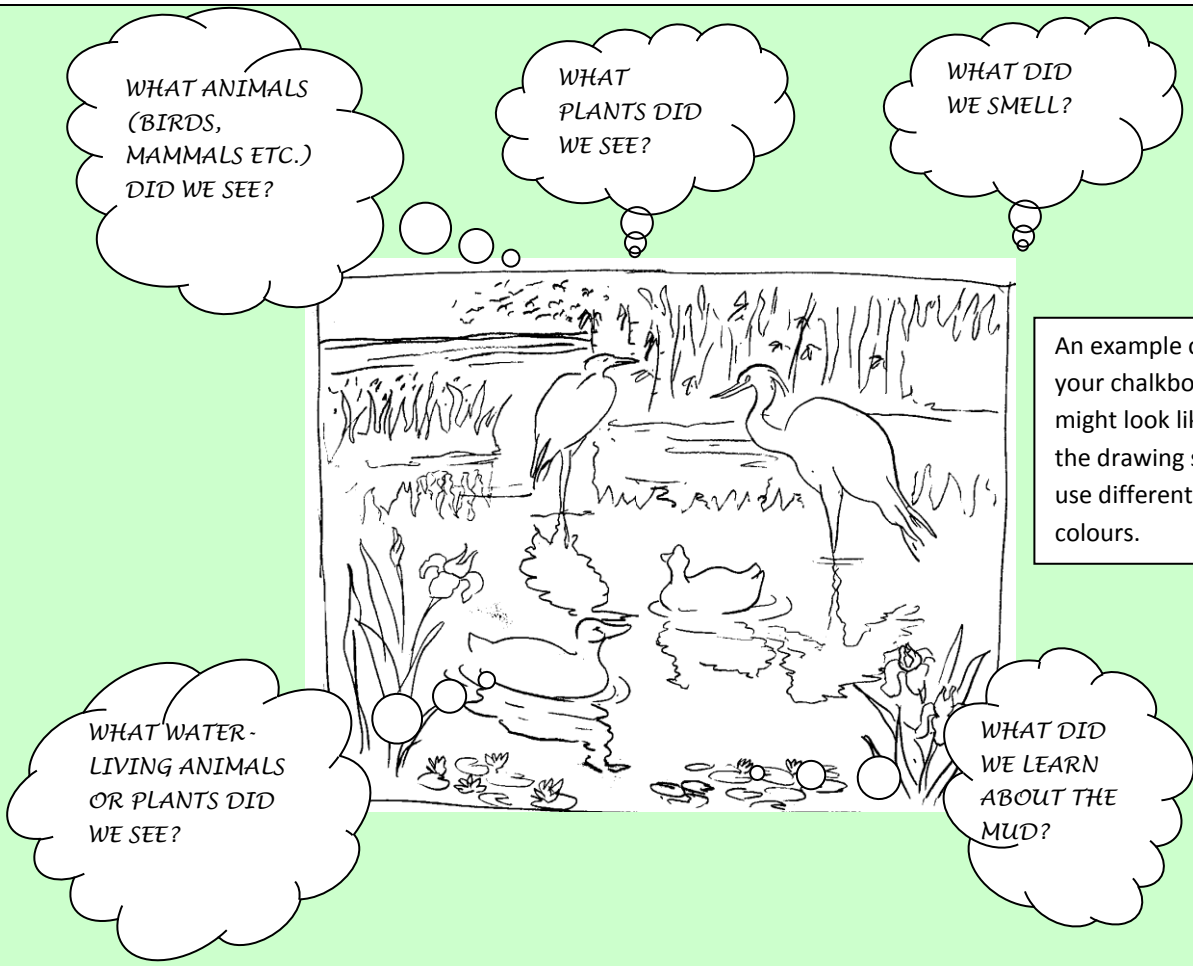
The Fieldwork: Walking in the wetland – Back in the classroom:

When next you have a Natural Science lesson with the same class use a chalk-board sketch similar in style to the one below to re-live their experiences.

Resources: Decide on and prepare any resource sheets that are required for the lesson. (e.g. Wetland reference map, pictures of wetland plants and animals). Have clear instructions as to how the learners will work.

- Activity One: If you have access to photocopying machine, copy the sketch and give a copy to each learner. If not give each learner a clean sheet of paper (preferably without lines) and ask them to copy the sketch that you have on the board.
- Activity Two: Refer to the example of a chalkboard picture below. Talk about each of the bubbles in the example. As you go ask the class to share what they saw or experienced for each. Each learner should write a sentence on what they saw or experienced at each of the four stopping points.
- Activity Three: Explain to the learners why wetlands are important to both people and animals.
  - People: Wetlands are the places where all our rivers start. They help to give us all the water that we need
  - Animals: Wetlands provide habitats (homes) where animals can live safely.

Ask the learners to write down two reasons why wetlands are important from what they have learned.



An example of what your chalkboard picture might look like. Keep the drawing simple and use different chalk colours.

Support resources for river health fieldwork

Appendix One has examples of information sheets on some of the animals that might occur in the wetland near you (The *Water Creatures Information Sheet, River Animals Information Sheet* and the *River animals identification Key*). You may find these useful if the learners see any wetland animals while on their walk.

If you have access to the Internet, the miniSASS Project has developed the miniSASS website and data base (Google miniSASS or visit www.miniSASS.org). The website allows miniSASS users of all ages to explore their catchments and find and sample their own rivers, then upload their miniSASS results to the website. In this way schools can participate in a regional program of record-keeping with the results constantly being uploaded on an interactive google map of river health right across Southern Africa.

As 'citizen scientists' learners and teachers can compare and contrast their own observations with other results across catchments while connecting with others who are sampling rivers in their own communities.

Why not connect with miniSASS and start your school participating in looking after the health of your own river?

ASSESSMENT: MEASURING SUCCESS

Rubrics

At this level of the Primary Phase assessment Learner activities may be assessed using rubrics according to criteria that you establish for each activity.

An example of an Assessment rubric for this fieldwork is attached. You will see that there are **FIVE** sets of activities, each with its own marking rubric.

Specific Aim 1: *Doing science*

Activity One: The learner must draw a picture depicting a wetland.

Activity Two: Each learner must write a sentence on the ANIMALS they saw or heard in or close to the wetland (Birds, crabs, mammals etc.).

Activity Three: Each learner must write a sentence describing ONE PLANT that they saw growing in the water.

Activity Four: Each learner must write a sentence on the mud that they saw in the wetland (Colour, characteristics etc.).

Specific Aim 2: *Understanding and connecting ideas*

Activity Five: Each learner must write a sentence on the importance of wetlands for people and for plants and animals.

- For people: Wetlands are the places where all our rivers start. They help to give us all the water that we need.
- For animals: Wetlands provide habitats (homes) where animals can live safely.

Details of the suggested marking rubrics for this fieldwork appear below, check for yourself how suited they are to your own situation.

Example of a Rubric for assessing the learner's performance

Natural Science (Grades 4 and 5)

***A walk in a wetland* (*Learning through the senses*)**

See following page

Example of a Rubric for assessing the learner's performance

Natural Science (Grade 4)

***A walk in a wetland* (*Learning through the senses*)**

Learner's Name ……Class:…….

RUBRICS (Place the mark in the appropriate box)				
Learning Outcome used in the lesson	**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.**
Activity One: Copying the sketch of the wetland. Each learner must reproduce a picture of the wetland environment				
Activity Two: Each learner must write a sentence on the ANIMALS they saw or heard in or close to the wetland (Birds, crabs, mammals etc.).				
Activity Three: Each learner must write a sentence describing ONE PLANT that they saw growing in the water.				
Activity Four: Each learner must write a sentence on the mud in a wetland (Colour, characteristics etc.).				
Activity Five: Each learner must write a sentence on the importance of wetlands for people, plants and animals. ❖ For people: Wetlands are the places where all our rivers start. They help to give us all the water that we need. ❖ For animals: Wetlands provide habitats (homes) where animals can live.				
TOTAL OF MARKS (OUT OF 20)				

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Natural Science: CAPS Intermediate Phase
Model Fieldwork Lesson Plan: *Ecosystems and Food Webs* (Investigating a Wetland Ecosystem)

Natural Science	**Grade 6**
Duration: 2 hours	**Term 1:** Weeks 9 and 10

STARTING WITH THE END IN SIGHT

CAPS 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 ecosystem investigation will provide an opportunity for learners; to work together in small groups, to work in a sample space and to apply a scientific sampling approach to an ecological study.	**Ecosystems and Food Webs (in a wetland ecosystem)** **From the CAPS Curriculum** **Grade 6 Term 1: *Investigating a local ecosystem*** Select a wetland ecosystem on/near the school grounds. • Roughly measure an area of 5m x 5m square (See Fieldwork notes below). • Draw and write about three plants and three animals that are found there. Describe: - Food, water, amount of sunlight and shelter available for each species. - The feeding relationships (food webs) for each.	**CAPS Connections** **Natural Sciences** Link with the Term 2 section on "*Mixtures & Water Resources"* ***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*** Learners in the Intermediate phase observe photographs and pictures related to the natural world. They explore colours, shapes and textures that can be observed in nature. ***Mathematics*** Mathematics in this Phase focuses on measurement and the recording of data
Specific Aim 2: *Understanding and connecting ideas* Learners should have a grasp of scientific, technological and environmental knowledge and be able to apply it in various contexts.	The ecosystem investigation will provide an opportunity for learners to work together in small groups to find out for themselves how animals and plants in the wetland ecosystem relate to each other.	
Specific Aim 3: *Science, Technology and Society* Learners should understand the practical uses of Natural Sciences and Technology in society and the environment. They should have values that make them caring and creative citizens. **This is an aspect of Citizen Science whereby learners start to think and act as citizens in their community**.	The learners will be able to describe ways in which society has changed wetland environments. The learners will identify any possible threats to the wetland ecosystem being studied and suggest possible ways to overcome them.	

- ***Did you know***

  For the teacher: The word 'ecology' comes from two Greek words 'oikos' which simply means home and 'logos' which means 'the study of'. Ecology is simply the study of a place that is 'home' to all that live there (Plants, animals, fungi, microbes, and all!).

Support resources for river health fieldwork

The *miniSASS project*, a joint initiative of the Hilton based GroundTruth organization, WESSA (the Wildlife and Environment Society of South Africa) and the Water Research Commission, has produced a number of easy-to-use bio-monitoring resources for assessing the health of rivers.

Examples of these appear in Appendix One - Identification Keys.

For teachers with access to the Internet the miniSASS Project has developed the miniSASS website and data base (google "miniSASS" or visit www.miniSASS.org). The website allows miniSASS users of all ages to explore their catchments and find and sample their own rivers; then upload their miniSASS results to the website. In this way schools can participate in a regional program of record-keeping with the results constantly being uploaded on an interactive google map of river health right across Southern Africa.

As 'citizen scientists' learners and teachers can compare and contrast their own observations with other results across catchments while connecting with others who are sampling rivers in their own communities.

Why not connect with miniSASS and start your school participating in looking after the health of your own river?

THE WETLAND CONTEXT

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 also 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 learn more about them and why they are important.

WHAT WILL WE NEED TO HELP US FIND ANSWERS?

Prior knowledge In Grade 4 the learners will have learned about: *Living and non-living things, What plants need to grow* and the *Habitats of animals*. In Grade 5 the learners will have learned about: *Plants and animals on Earth, Inter-dependence, Food-Chains,* and *Rocks & Soil.* Using a board picture/diagram of a wetland, revise what the learners should already know.	**Looking forward to:** Exciting the learners with regard to the investigation. Taking what the learners know to a new level. Discovering more about the topic but this time focusing on a local wetland ecosystem.	**Prior planning:** To plan the learning program it is essential that you visit the study area before hand and to locate and consider the best site for the fieldwork to take place. **NB:** You will need to locate a site that will accommodate the whole class, presuming that each quadrate will involve 4-6 learners.

Resources and Equipment per learner:

- Hand lens: Funds permitting provide a small (plastic) hand lens (1 per group). Plastic hand lenses generally cost between R10 and R15 and are available from most toy shops
- Note pad or small note book (Each learner)
- Recording sheets where observations can be recorded, a set for each learner (See example below).
- Four 'pegs' (short lengths of stick) that each group of the learners can use to mark off the four corners of the study quadrant. A 'quadrant' is a square marked off on the ground, it defines the area of the research).
- A length of string 5m long, tie two knots 5 m apart at each end of the string. This will make measuring easy and accurate.
- A choice of one or more of the resources mentioned under "Support Resources" (above). One page/set pert group.

The Fieldwork: Investigating a local ecosystem in the classroom

- Revise what the learners have experienced in previous grades and prepare them for what's to come (See section above).
- Divide the class into groups of 4 or 6 (depending on class size). We suggest that you do NOT appoint a leader for each group, rather let them work out the management for themselves.
- For each group handout, there needs to be a hand lenses and the 5 meter length of string.

At the wetland on the edge of the water.

- Each group should mark of a quadrate, using the 5 m length of string to place the pegs as accurately as possible (teacher to demonstrate how this might be done).
- In their quadrate each group will identify **3 different species kinds of plants and 3 different species of animals** by describing each and giving each a name.
  For example:
  Plants:
  - Grass plant – Creepy Grass (the name they might choose), Description: Short and bright green
  - Reeds – Description: Tall reeds with feathery flowers
  - Algae: Green water weed

  The animals:
  - A weaver bird
  - A crab
  - A black ant
- Each group will write what they have observed in terms of the characteristics of each plant and animal according to the template provided (below).

EXAMPLE OF A BLANK RECORDING TABLE follows on the next page

EXAMPLE OF A BLANK RECORDING TABLE (HAND-OUT PER LEARNER)

My Name: …… Class: ……

A WETLAND ECOSYSTEM			
Finding out about the plants and animals in a sampling square 5m X 5m			
Plants we have found	**What did the plant look like?**	**Where was the plant growing?**	**An interesting fact about the plant.**
• (Plant One)			
• (Plant Two)			
• (Plant Three)			

Animals we have seen	**Where was the animal in my study area?**	**What did the animal look like?**	**What was the animal doing?**	**An interesting fact about the animal**
• (Animal One)				
• (Animal Two)				
• (Animal Three)				

THIS IS AN EXAMPLE OF WHAT A COMPLETED RECORD SHEET MIGHT LOOK LIKE:

A WETLAND ECOSYSTEM			
Finding out about the plants and animals in a sampling square 5m X 5m			
Plants we have found	**What did the plant look like?**	**Where was the plant growing?**	**An interesting fact about the plant.**
• (Grass)	A grass plant creeping along the ground. With thin leaves, each shaped like a spear.	This grass was growing on a sunny patch of open ground.	This grass covered most of our study area.
• (Algae)	It looks like seaweed growing in the wetland water	Where there are small pools of water.	A slippery plant that feels slimy
• (Reeds)	Reeds	Most reeds were growing in water. Some were at the water's edge	Weaver birds have made nests in the reeds

ANIMALS THAT WE SAW				
Animals we have seen	**Where was the animal in my study area?**	**What did the animal look like?**	**What was the animal doing?**	**An interesting fact about the animal**
• (Weaver bird)	The weaver bird was flying from reed to reed.	It was bright yellow with a black face	It was flying from nest to nest making a sizzling noise.	The female birds were also seen. They were brown in colour.
• (Crab)	The crab was close to the water's edge	It was brown in colour, it had two large claws and eyes that were on the end of little stalks.	It was putting small balls of mud in its mouth.	There were crabs of different sizes
• (Black ant)	There were many ants running about in the study area.	Small black ants with shiny bodies.	Running around looking for food.	When two ants met they stopped to touch noses together.

PLANTS THAT WE SAW		
1 (Name)	2 (Name)	3 (Name)

ANIMALS THAT WE SAW		
1 (Name) (In the primary phase, encourage creative drawings. Keep them as simple as possible.). *We found a crab in our square. It had a brown body and white claws.*	2 (Name)	3 (Name)

THE FOOD WEB FROM MY STUDY AREA

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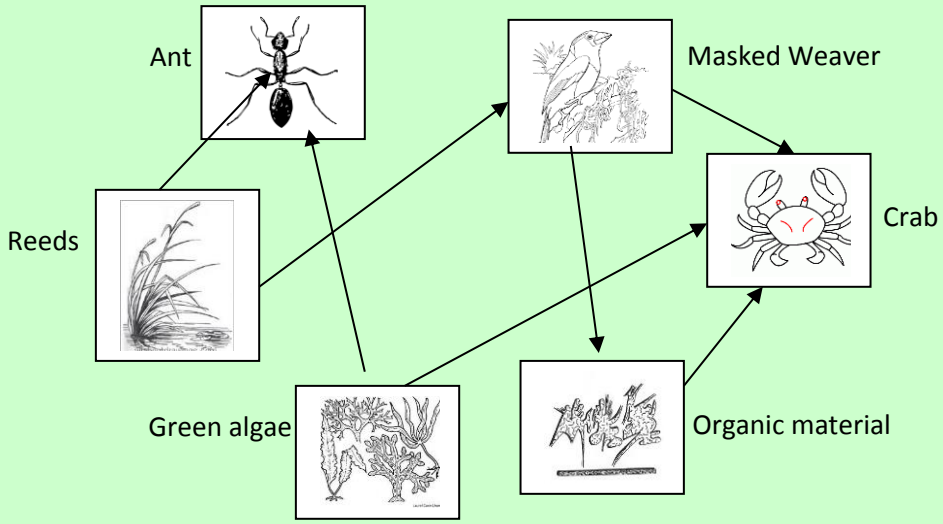


The arrow shows the flow of food →

For example: The crab eats organic material, Green Algae and dead birds
The ant eats leaves from Reeds and Green Algae
The Masked Weaver eats the seeds of reeds and grasses

Rounding off the wetland lesson

Before going back to the classroom, remind the learners that the fieldwork investigation was just the first part of finding out about wetlands and that the rest of the story will be explored back in the classroom.

The Wetland investigation – Back in the classroom:

When next you have a Natural Science lesson with the same class use a chalk-board sketch of the study area to focus on examples of plants that occur in the area.

Feedback: Starting with the findings of one group, add to your chalk-board sketch the details of their investigation. Draw the parts of the food-web that the learners have identified. Ask members of that group to say what they have written for each part.

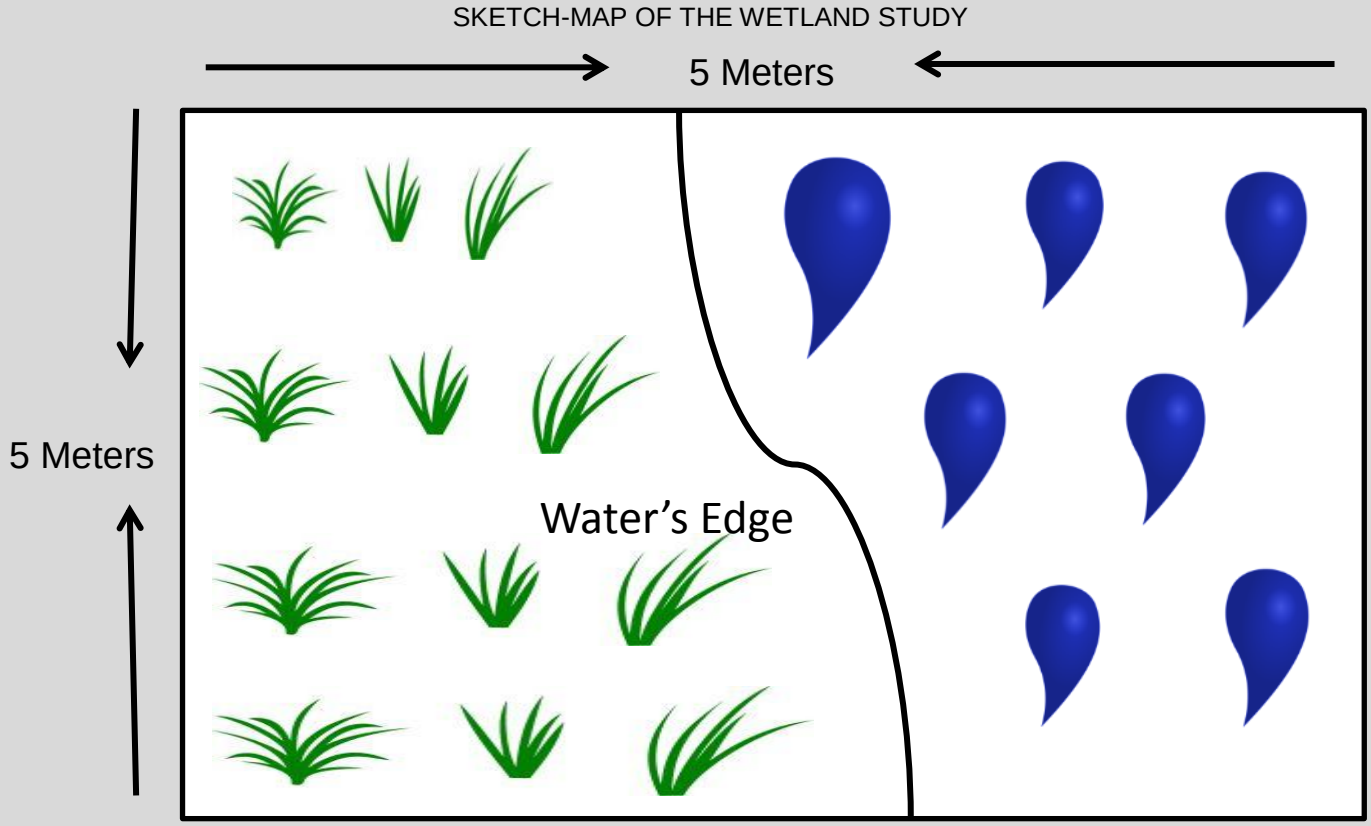
Go on to the next group and repeat the process – adding to the chalk-board diagram as you get more information from the class.

Once you have had a report-back from all of the groups, get the class to copy both the pictures and to complete the record sheets.

Citizen Science: Once the class has completed the tasks in the feedback session - discuss with them their responsibilities with regard to the wetland eco-environment. Allow each group to work together to list at least TWO threats to the wetland and what suggestions they may have to overcome these threats.

Each learner should then record their answers.

EXAMPLE OF A CHALK-BOARD SKETCH



ASSESSMENT: MEASURING SUCCESS

Rubrics
At this level of the Primary Phase assessment, learner activities may be assessed using rubrics according to criteria that you establish for each activity.
An example of an assessment rubric for this fieldwork is attached. You will see that there are **FIVE** sets of activities, each with its own marking rubric.

Specific Aim 1: *Doing science*

- **Activity One:** Each learner will participate in the group by writing full sentences on the ecology of the three plant species – by completing the sections in the record sheet
- **Activity Two :** In their quadrant each learner will participate in the group by observing and identifying three different species of wetland animals
- **Activity Three:** Each learner will participate in the group by writing full sentences on the ecology of the three animal species – by completing the sections in the record sheet.
- **Activity Four:** Each learner will complete the drawings of plants and animals in the spaces provided.

Specific Aim 2: *Understanding and connecting ideas*

The activities under Specific Aim 1 will provide opportunities for learners to make the connections between different parts of the ecosystem.

Specific Aim 3: *Science, Technology and Society*

- **Activity Five:** Each learner will participate in the group to describe some ways in which society has changed the environment.
- The learners will identify TWO possible threats to this wetland ecosystem and will suggest possible ways to overcome them.

This is an aspect of Citizen Science whereby learners start to think and act as citizens in their community.

This edition – October 2015

Example of a Rubric for assessing the learner's performance
Natural Science (Grade 6)
Ecosystems and Food Webs (Investigating a Wetland Ecosystem)

Learner's Name …….. Class: ……..

RUBRICS (Place the mark in the appropriate box)				
Learning Outcome used in the lesson	**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.**
Activity One: Each learner will write full sentences on the ecology of the 3 plant species – by completing the sections in the record sheet				
Activity Two: In their quadrant each learner will observe and identify 3 different species of wetland animals				
Activity Three : Each learner will write full sentences on the ecology of the 3 animal species – by completing the sections in the record sheet				
Activity Four: Each learner will draw the animals and plants in the spaces provided.				
Activity Five: Each learner will identify TWO possible threats to this wetland ecosystem and will suggest possible ways to overcome them.				
TOTAL OF MARKS (OUT OF 20)				

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