Edition - October 2015

Section A - Introduction and Templates

A Fieldwork Toolkit for Intermediate Primary Phase, Senior Primary Phase and Further Education & Training Phase

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

WATER RESEARCH COMMISSION

GroundTruth
Water, Wetlands and Environmental Engineering

WESSA
PEOPLE CARING FOR THE EARTH

WRC: Project No. K5/2350

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Fieldwork Toolkit (First Edition)

(Focusing on Rivers and their Catchments)

Teachers: This is for you!

This toolkit contains a set of resources for teachers who are planning and conducting CAPS aligned fieldwork activities either in the school grounds or within walking distance of the school:

Natural Sciences - Intermediate Phase & Senior Primary Phase and Geography FET Phase.

Since their purpose is to encourage a sharing of ideas, why not get-together with others to discuss how they can be further developed to suit your circumstances?

- *Enabling transformative environmental learning through effective knowledge-informed field-work aligned with the CAPS assessment.*

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Fieldwork Toolkit

(First Edition October 2015)

(Focusing on Rivers and their Catchments)

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THE VALUE OF FIELDWORK IN TEACHING & LEARNING

Teachers (and parents of school-going children)

Consider these thoughts on learning and education:

- *"Education is the most powerful weapon you can use to change the world"* - Nelson Mandela.
- *"Education is not preparation for life. It is life itself*." - John Dewey (American philosopher & educational reformer).
- *"We learn through our interactions and communications with others. Learning takes place when meaning ascends from the abstract to the concrete as knowledge comes to us from others and we make it our own."* - Lev Vygotsky (Russian teacher & psychologist).
- *"The purpose of school learning is not to learn, but to learn how to think"* Anon

  - *What is your personal view on these statements?*
  - *How do they match your own view of education?*
  - *Would you add to or change any of these messages?*

The role of Fieldwork in the construction of knowledge

An increasing number of researchers are pointing to the critical role of fieldwork in the construction of knowledge. Referring to its value enables learners to learn together in a process known as 'co-production'.

This involves:

1. Covering experiences (ways of doing things)

2. Gaining facts (the acquisition of new information)

3. Social learning (ways of sharing information that benefits all who share in the process)

The school curricula for Natural Sciences, Life Sciences and Geography all include fieldwork. Fieldwork experiences can be small or large, within the school grounds or outside of them. These experiences encourage learners to cooperate together and make contributions to the planning and execution of the work and to grow as independent thinkers.

Citizen Science and Indigenous Knowledge

Environmental educators have for years been advocating citizen involvement as a 'game changer' for encouraging/pressurizing municipal managers and local authorities to take action to improve.

- **Citizen science:** is scientific research conducted, in whole or in part, by amateur or nonprofessional scientists. In past times this usually referred to adult members of society, but today it is acknowledged as a science that may involve 'citizens' of any age – from very young to very old.

- **Indigenous knowledge:** is knowledge acquired by our forebears. It often shows unique understandings of the natural environment and should be included, where appropriate, in our lesson plans.

Measuring the health of our rivers - The example of the miniSASS Toolkit

GroundTruth, WESSA (the Wildlife & Environment Society of South Africa), and Umgeni Water worked together to develop a simple macroinvertebrate scoring system whereby non-technical, private persons (including learners) can assess the health of local rivers by using a miniSASS (Mini Stream Assessment Scoring System). This scoring system uses a technique known as bio-monitoring – the monitoring of life. Uses observe the evidence (the existence/absence of macro-invertebrates in particular) to determine the condition or 'health' of the river they are working in. By learning to use simple identification keys, people of all ages (even children as young as 10) can easily identify thirteen taxa that live in local streams and rivers and to use this information to calculate a River Health Index that will tell them how polluted the river is.

Hilton-based company, GroundTruth, in partnership with WESSA, the Water Research Commission; and the Departments of Science and Technology, and Water and Sanitation have developed a miniSASS website (http://www.minisass.org/en/). This website provides information on how to do miniSASS, you can download all necessary information and you can upload your results to contribute to the growing picture of river health for South Africa. Why not go to this website to see this for useful information that will help you with your field-work?

The latest addition to the suite of miniSASS tools is the miniSASS phone App (for Android). With the App you can upload information, see other sites on the river you are working on and find new places to sample. The App can be downloaded from the Google Play store.

GET IT ON Google play

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SECTION A

FIELDWORK TEMPLATES®

FOCUS:

RIVERS & THEIR CATCHMENTS

For

Intermediate Primary Phase

Senior Primary Phase

Further Education and Training (Grade 10)

A template is a document with a format that can be used as the basis for planning. The templates in this section will provide guidelines for you, the teacher, to use when planning a fieldwork experience. Why not discuss each template with your colleagues so that you can make changes or improvements to suit your own school's situation?

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Natural Science: CAPS Intermediate Phase

Template for Fieldwork: Focus on rivers and their catchments

Rivers of life

With increasing awareness of the issues facing water security in South Africa the template below contains Ideas for you and your colleagues to consider when planning fieldwork based on rivers and their catchments. It is a guide that will help you, the Intermediate Phase teacher to plan out-of-the-classroom fieldwork experiences that will not only bring the work to life for the learners but will also meet the requirements of the CAPS Curriculum.

The template and the Model Lesson Plans in Section B have been based on the CAPS curriculum. (For details of the extracts please refer to Appendix 2: Curriculum Contexts- Primary Phases)

The notes in this Lesson Plan will serve as a guide to you in the design and implementation of your own fieldwork. They may be used "as they are" or they may be adapted to suit your local environment. If you make any changes you will have to adapt the Fieldwork Record Sheet at the end of the notes to accommodate the changes.

- *Below is an example of planning that could be used when designing your own Lesson Plans. Why not sit with a colleague and go through each part carefully – adding your own thoughts on each? Since every school locality is different to the next why not consider ways in which the template may be adjusted to suit what's best for your school?*

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Natural Science: CAPS Intermediate Phase
Template for Fieldwork: Focus on rivers and their catchments

STARTING WITH THE END IN SIGHT

Duration: This is where you enter the time frame (e.g. 2 hrs.) Curriculum allocations of instructional times available: Intermediate Phase – 3, 5 hr/week. Senior Phase: 3 hrs/ week.	**Term/Week**: In which term and in which week will the fieldwork be done? (e.g. 'Term 2 week 6). **Grade**: This is where you enter the Grade level (e.g. Grade 6).

Specific Aims	**Concepts & Content**	**Integration:**
Enter the Specific Aims from the chosen Learning Area <u>For Example: (Intermediate phase):</u> **Specific Aim 1**: *Doing science.* Learners should be able to complete investigations, analyse problems and use practical processes and skills in evaluating solutions.	This means that learners plan and do simple investigations and solve problems that require some practical ability. There are attitudes and values that underpin this ability. Respect and compassion for living things is an example of this – learners should not strip leaves off bushes just to compare them; if they examine small animals they should care for them and release them unharmed in the place where they originally found them.	How does this Natural Science work integrate with other curricula? For example: ***<u>Integration with Technology</u>*** An appreciation of the history of scientific discoveries and technological solutions, as well as their relationship to indigenous knowledge and different world views. This enriches our understanding of the connections between Science, Technology and Society. **<u>Integration with *Social Science*</u>** SA 1: Are curious about the world they live in. SA 3: Understand the interaction between society and the natural environment. ***<u>Integration with Languages (Skills)</u>*** Skill 1: Listening and speaking Skill 2: Reading and viewing Skill 3: Writing and presenting **<u>Integration with Mathematics</u>** Mathematics in this Phase focuses on the measurement and the recording of data. **<u>Indigenous knowledge</u>** Finding examples of Indigenous knowledge that is appropriate to the content being investigated.
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 all contexts.	The main task of teaching is to build a framework of knowledge for learners and to help them make connections between the ideas and concepts in their minds. This is different to learners simply retaining facts. When learners do an activity, questions and discussion must follow and relate to the previously acquired knowledge and experience; connections must be made.	
Specific Aim 3: *Science, Technology and Society.* Learners should understand the practical uses of Natural Sciences and Technology in society and the	Science and Technology learnt at school should produce learners who understand that school science can be relevant to aspects of their lives outside of school. Issues such as improving water quality, growing food without damaging the land, and	

environment. They should obtain 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**).	building energy-efficient houses are examples of everyday applications. Similarly, Science and Technology can lead learners to a range of future career and job possibilities.	

WHAT WILL WE NEED TO HELP US FIND ANSWERS?

Prior knowledge: Work covered in the previous Grade(s) on this topic. Time spent with learners assessing their levels of understanding of related work covered in previous grades.	**Looking forward to:** For this Grade: Exciting the learners with regard to the investigation. Taking what the learners know to a new level. Discovering more about the topic.

The investigation: (This is the HOW, WHY, WHAT and WHERE of the fieldwork investigation).
HOW: How will the investigation be done? Group-work (Size of groups?) Individual work? (Combination of both?)
WHY: There may be a number of reasons why you are doing the investigation.
For example: Giving learners without access to a wetland (and even those who do have access to a wetland) an idea on how a wetland actually works. Raising awareness in terms of the need to conserve wetlands is the primary aim of World Wetlands Day.
WHAT: What the learners will have to do to gain the experience and knowledge that the Assessment will measure. Here the design of the fieldwork is important. Where will the fieldwork take place? How will the instructions be given? What resources will be used? (e.g. identification keys) What resources have to be prepared? (e.g. outline maps) How will the work be assessed? Etc.
WHERE: Large class sizes may present challenges to teachers with regard to fieldwork management. The model lesson plans have examples of fieldwork that are closely integrated with work done in the classroom. This integration should enable the learners to see the linkages between all the elements of the study.

In discussion with others why not write down other ideas on a separate sheet of paper?

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 participating in looking after the health of your own river?

ASSESSMENT: MEASURING SUCCESS

Learner organization:

Learners will work in small groups.
For example: In groups of four to six.

Each group will use the information supplied by the teacher to draw up a plan (consulting with the teacher where necessary) and to allocate tasks to individuals (or pairs)

NB: The effectiveness of the group work will depend on the preparation that goes into the fieldwork.

Rubrics
Learner activities may be assessed using rubrics according to criteria that you establish.
Four levels of achievement for each of the outcomes are usually used in the assessment.

For example:
Level 4: Learner's performance has exceeded the requirements for the Learning Outcome.
Level 3: Learner's performance has satisfied the Learning Outcome for the grade.
Level 2: Learner's performance has partially satisfied the Learning Outcome for the grade.
Level 1: Learner's performance has not satisfied the Learning Outcome for the grade.

(***Each of the Model Lesson Plans has an example of an assessment rubric.***)

Examples of the activities for which the learners will be assessed.

1. Unpacks the instructions and study any resources that are provided.
2. Gathers together the equipment listed.
3. Completes the tasks that have been set.
5. Writes up the results of the tasks.
6. Draws conclusions from the results.
7. Communicates the findings to the rest of the class.

(**You may wish to alter this list to suit your requirements.)**

Type of assessment: formative and summative
Form of assessment: Investigation (performance task); using a rubric (Discussed above).

Resources: Decide on and prepare any resource sheets that will be required. (E.g. outline maps, tables or diagrams to be completed) as well as clear instructions as to how the learners will work.

Examples of assessment rubrics for Intermediate & Senior phase fieldwork may be found in Section B

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Geography: CAPS Further Education & Training Phase
Template for Grade 10 Fieldwork
Focus on rivers and their catchments

Rivers of life

This template contains Ideas for you and your colleagues to consider when planning your fieldwork.
It is a Guide that will help you, the Grade 10 Geography teacher to conduct out-of-the-classroom fieldwork experiences that will not only bring the work to life for the learners but will also meet the requirements of the CAPS Curriculum.
In Grade 10 fieldwork is compulsory and this template and the examples that follow will give you some ideas regarding the planning and execution of this fieldwork.
Remember that the template provides the outline for a lesson plan. The Model Fieldwork Lesson Plans (Section D) provide examples of how you might use the template for designing, implementing and evaluating your own fieldwork.

- *Why not get-together as a team of fieldwork teachers to plan what's best for your school?*

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LESSON PLAN TEMPLATE

FIELDWORK IN THE CAPS CURRICULUM – FURTHER EDUCATION AND TRAINING

A cross-curricula approach with a focus on **Grade 10 Geography**[1]

LESSON PLAN TOPIC: This is where you enter the topic for the Lesson Plan. The topic is chosen from the Curriculum document. For example "***Water resources***" (Term 4: ***Sustainable use of water in South Africa****.)*

Learning Area: Geography	Grade: 10
Duration: This is where you enter the time frame (e.g. 2 hrs) The Geography Curriculum allocation of instructional times available for Grade 10 Geography is 4 hrs per week.	Term / Week: In which term and in which week will the fieldwork be done? The Geography Curriculum stipulates that there should be 4 hrs of fieldwork and practical work in Term One.

THE GEOGRAPHICAL APPROACH: STARTING WITH THE END IN SIGHT

Geography as the study of place

Geography is a field of study that looks at all the elements that give a place its unique character. Every place has a unique combination of ecological, social and political elements that give it its character.

Geography as an Environmental Science – Patterns and interactions

In order to understand the Geography of different places we study the **environmental** elements that give different places their character, their patterns of distribution and the interactions between them. For example the climate, relief and human activities affect the character of places.

Geography's role in environmental management (For details see Appendix Two of this document)

Geography has an invaluable role in enabling citizens make sensible decisions affecting the health of their environments. Work with the learners to reflect on these aims. What is the value of each for community-based learning? (Focus on making Geography more relevant to the individual circumstance of each learner.)

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

Noting the skills to be developed: (For details see Appendix Two of this document)

An essential part of any Geography lesson is the skills that may be required to complete any tasks. These include mastery of Mapwork (Topographical maps, Aerial photographs & orthophoto maps), Geographical information systems, Fieldwork, Reporting and Sharing. None of these skills can be taken for granted and time should be taken to ensure that the learners have the skills to participate in the fieldwork.

Indigenous knowledge: Finding examples of Indigenous knowledge that is appropriate to the content being investigated.

Why not discuss the approach to Geography teaching and learning with a colleague? Is there anything that you could add to this discussion?

Outcomes and Assessment Standards for other subject, e.g. *English* and *Arts and Culture,* are included with the Model Fieldwork Lessons

THE CHALLENGE OF LARGE NUMBERS OF LEARNERS

Many schools with large numbers face challenges when it comes to conducting fieldwork. In addition to equipment costs, the cost of transporting learners to suitable fieldwork venues is often a major stumbling block.
The Model Lesson Plans in Section C have some suggestions in this regard. Examples of inexpensive low-tech

Equipment and learner-supported learning are provided.

Why not use these to develop your own with special relevance to your own school environment?

THE AIMS OF GEOGRAPHY

During Grades 10, 11 and 12 learners are guided towards developing the knowledge, skills and attitudes listed below. FET Geography seeks to:

1. Explain and interpret both physical and human geographical processes
2. Describe and explain the dynamic interrelationship between the physical and human worlds
3. Develop knowledge about where places are, and the nature of a range of different places at different scales
4. Practice essential transferable skills – literacy, numeracy, oracy and graphicacy
5. Promote the use of new technologies, such as Information Communication Technology (ICT) and Geographical Information Systems (GIS)
6. Develop a commitment towards sustainable development
7. Create awareness and sensitivity to inequality in the world
8. Foster empathy, tolerance and fairness
9. Make and justify informed decisions and judgments about social and environmental issues.

Your lesson plans should reflect an understanding of these. When you are preparing your fieldwork notes why not create a boxed 'tick-list' so that you can keep an eye on this?

When designing a fieldwork experience you should provide opportunities for each and every learner in your class to achieve a level of competency for each aim.

Section C has examples of fieldwork. Why not study these with a colleague and make suggestions as to how they may suit your local environment?

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.

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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 participating in looking after the health of your own river?

DESIGNING THE FIELDWORK EXPERIENCE

Prior knowledge	**Looking forward to:**
Work covered in the previous Grade(s) on this topic. Spend time with the learners assessing their levels of understanding of related work covered in previous grades.	For this Grade: Exciting the learners with regard to the investigation. Taking what the learners know to a new level. Discovering more about the topic

The investigation: (This is the HOW, WHY, WHAT and WHERE of the fieldwork investigation.)

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WHERE: Large class sizes may present challenges to teachers with regard to fieldwork management. The model lesson plans have examples of fieldwork that is closely integrated with work done in the classroom. This integration should enable the learners to see the linkages between all the elements of the study.

In discussion with others why not write down other ideas on a separate sheet of paper? Asking the right questions (See *Section 2.2.4 of the CAPS FET Geography curriculum).*

CLASS PREPARATION

The amount of time that you spend preparing the learners for the fieldwork will help to determine the value of the fieldwork for them. The quotes below emphasize this:

- "Success is where preparation and opportunity meet "
- "By failing to prepare you are preparing to fail."

Why not prepare a bullet list of important points that you can go over with the learners? For examples of these please refer to Lesson Plans in Sections B and C.

ASSESSMENT – MEASURING SUCCESS

Assessment Standards *(Starting with the end in sight):*
Section 4.3.2 of the CAPS curriculum has the full details of assessment standards for Grade 10 fieldwork. Section (A) on Page 51 lists the assessment tasks that are applicable to Fieldwork in Geography. The learner should be competent in the following;

- conducting fieldwork, recording and interpreting findings
- working with concepts, data, procedures related to GIS
- conducting and writing up research
- writing paragraphs and essays
- evaluating arguments and expressing and supporting a point of view

Points to consider when designing assessment tasks:

- The purpose of the assessment tasks is to assess the learner's ability to apply in an integrated way, knowledge, skills and a range of competencies.
- It is helpful to design assessment tasks around specific issues in familiar or unfamiliar contexts to enhance the interest and enthusiasm of learners.

The rubric for assessing each part of the fieldwork project should be discussed and negotiated with the learners before they start the task. This will enable learners to have a clear vision of what is expected of them.

ASSESSMENT	
Type of assessment: formative and summative **Form of assessment:** Investigation (performance task); using a rubric. (Discussed above. For examples please see Model Lesson Plans))	**Resources:** Decide on and prepare any resource sheets that will be required. (E.g. Outline maps, tables or diagrams to be completed) as well as clear instructions as to how the learners will work.
Examples of assessment rubrics for Grade 10 fieldwork may be found in Section D