



**ADOPT-A-RIVER INITIATIVE,**  
Training of Trainers Workshop,  
National Museums of Kenya,  
7<sup>th</sup> July 2015.

## **DATA COLLECTION AND MANAGEMENT**

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# Introduction to

## miniSASS

This is a simplified version of the South African Scoring System (SASS), an aquatic bio-monitoring tool that has been used in South Africa for over 30 years.



- It uses the composition of macro-invertebrates (small animals) in the river and is based on the sensitivity of the various animals to water quality. These animals are organized into groups, with each group having a specific sensitivity score.
- The **low cost, low technology** environmental education tool was developed by reducing the 90+ traditional SASS aquatic macro-invertebrate classes that are used to derive river health classes into 13 simple groups. This promotes simpler understanding and identification to produce citizen science data.



# Cont...

- The toolkit itself consists of, among other things a simple net and a site information sheet to record samples found in the river and to give ecological information about the site.
  - **High scores** indicate high sensitivity to pollution and **low scores** indicate high tolerance of pollution. A quantitative score of the system is translated into **health categories** ranging from Natural to Seriously Modified.
  - Support tools, such as field guides and the dichotomous key, assist identification and understanding of the bugs and worms found in the water and form part of the miniSASS tool kit.
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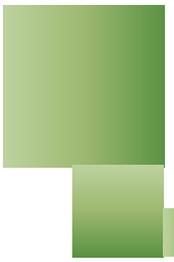


# Cont...

- miniSASS currently boasts a website, the most important feature of which is the **Interactive Google Earth Map** and **database**. The interactive map allows miniSASS users of all ages to explore their catchment, find their river and then upload their own miniSASS results.
  - This way, a public-access, interactive map of river health across a region or country can be developed, with results continuously contributed by users as citizen science.
  - Users can also explore all results, compare and contrast river health across catchments and in relation to land use activities, while connecting with others who are sampling rivers in their community.
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# miniSAS

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1. It is low cost, low technology
  2. Its simple and reliable
  3. Its user-friendly to non-experts
  4. It's very effective in promoting the level of understanding on the importance of river health and of the overall environment amongst learners.
  5. Its an effective way of ensuring that the next generation of consumers, river health monitors and potential polluters, and the next generation of leaders have a greater appreciation and understanding of aquatic ecosystems.
  6. The interactive nature of the Google Earth based miniSASS map promotes independent learning and information sharing among users/learners
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MiniSASS provides ***'eyes and ears on the ground'*** in terms of identifying water quality problems and raising red flags



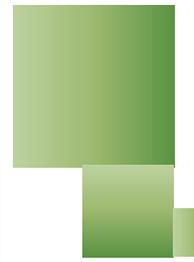
# Use of macro-

## invertebrates in bio-monitoring

- These are animals with no backbone and can be seen with the naked eye
- Aquatic macro-invertebrates have **different levels of sensitivity to change in the water conditions.**
- The more sensitive ones tend to either die or migrate when changes in the water conditions occur. Examples; Stone flies, Caddis flies and Mayflies.
- Others are more resilient and can withstand negative changes in the water conditions and thus will be found even in streams and rivers that have poor water quality. Examples; snails, flat worms and true flies.



# Why macro-invertebrates?

1. Different macroinvertebrates have different sensitivities to pollution. The higher their score, the more sensitive they are.
  2. They are generally easy to collect and identify.
  3. They are relatively sedentary which allows the source of pollution to be detected.
  4. They integrate the water quality conditions at a site, providing an overall measure of the “health” of a river.
  5. They can provide a picture of the historical water quality at a site.
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# Macro-Invertebrate groups used in miniSASS?

Flatworms, Leeches, Worms, Snails, Crabs  
and Shrimps, Stoneflies, Caddisflies,  
Damselflies, Dragonflies, Bugs and Beetles,  
Minnow Mayflies, Other mayflies and True  
flies.

# Data/Sample

## Collection

- Only 2 river types are recognized in miniSASS score interpretation i.e. **Rocky** and **Sandy** types.
- On the other hand, each river type may have **3 biological habitat types (biotopes)**, and when sampling, macro-invertebrates should be searched within all the 3 biotopes;
  1. Vegetation
  2. Rock
  3. Gravel/ Sand/Mud(GSM)
- The two rivers score differently under the **Ecological Category Table**, due to the different variety of habitats available.



# Sampling Procedure

- i. Disturb the stones, vegetation, sand e.t.c. with your feet or hands while holding the net in the current
  - ii. You can also lift stones out of the current and pick insects off gently with your fingers or forceps
  - iii. Do this for about 5 minutes while ranging across the river to different habitats (biotopes)
  - iv. Rinse the net and turn the contents into a plastic tray
  - v. Identify each group using the identification guide (chart showing different organisms inhabiting water bodies) given prior to the exercise. This can be used in combination with the dichotomous key.
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# Cont...

- vi. Mark the identified insects off on the identification guide
  - vii. Fill in the site information (Table 1) and add up the sensitivity scores to determine the average score on the scoring sheet (Table 2). To get the average sensitivity score from a sampling point, the sensitivity scores of the identified groups are summed up. The total sensitivity score is then divided by the number of groups identified.
  - viii. Wash hands when done
- 

# Information

## Table

Site Information Table

Date (dd/mm/yr)		
Collectors Name		
Rivers Name		
Site description		
GPS co-ordinate*	S	E
Comments/notes		

\* Coordinates as Longitudes/Latitudes OR as decimal degrees

# Table 2: Scoring Sheet

Groups	Sensitivity score
Flat worms	3
Worms	2
Leeches	2
Crabs or shrimps	6
Stoneflies	17
Minnow mayflies	5
Other mayflies	11
Damselflies	4
Dragonflies	6
Bugs or beetles	5
Caddisflies (cased & uncased)	9
True flies	2
Snails	4
<b>Total score</b>	
<b>Number of groups</b>	
<b>Average score</b>	

# Interpretation of the

## miniSASS score

- An ideal sampling site has rocky, sandy and vegetation habitats. However, not all habitats are present at any one given site. If a river lacks rocky habitats, the sandy type category is used to interpret the scores instead.
- Based on the average score obtained for the sampled site, its health can be determined. As indicated in Table 3 above, the higher the score, the healthier the site.
- Lastly, the groups will identify or suggest probable threats (physical, social or economic) to the river health and propose intervention measures.

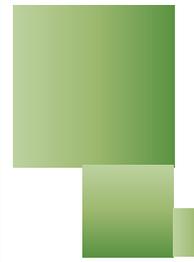
# Table 3: miniSASS Score Interpretation

Ecological category (condition)	River category	
	Sandy Type	Rocky Type
Unmodified (NATURAL condition)	> 6.9	> 7.9
Largely natural/few modifications (GOOD condition)	5.8 to 6.9	6.8 to 7.9
Moderately modified (FAIR condition)	4.9 to 5.8	6.1 to 6.8
Largely modified (POOR condition)	4.3 to 4.9	5.1 to 6.1
Seriously/critically modified (VERY POOR condition)	< 4.3	< 5.1



# Data

# Management

- The summarised data will be verified by the teacher or supervisor at school or community group leader and once deemed satisfactory send a copy to NEMA.
  - The results will be uploaded on miniSASS. The platform can tell the health of a river by indicating a clean river (good condition) as a 'green frog' and a polluted one (bad condition) as a 'red frog'. This map will be available to everyone.
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# Useful Links

miniSASS: <http://www.minisass.org/en/>

GroundTruth: <http://www.groundtruth.co.za/>

# Output: Sample 1



Explore the map

How to do miniSASS

Submit results

[Login](#) | [Register](#)  
[Reset Password](#)

Home

How To

Map

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Partners

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## Legend

### miniSASS Observations

- Unmodified (NATURAL condition)
- Largely natural/few modifications (GOOD condition)
- Moderately modified (FAIR condition)
- Largely modified (POOR condition)
- Seriously/critically modified (VERY POOR condition)
- No groups present
- Exclamation mark: unverified

### Schools

- Primary
- Intermediate
- Combined
- Secondary

### Layers

Zoom to School or Site

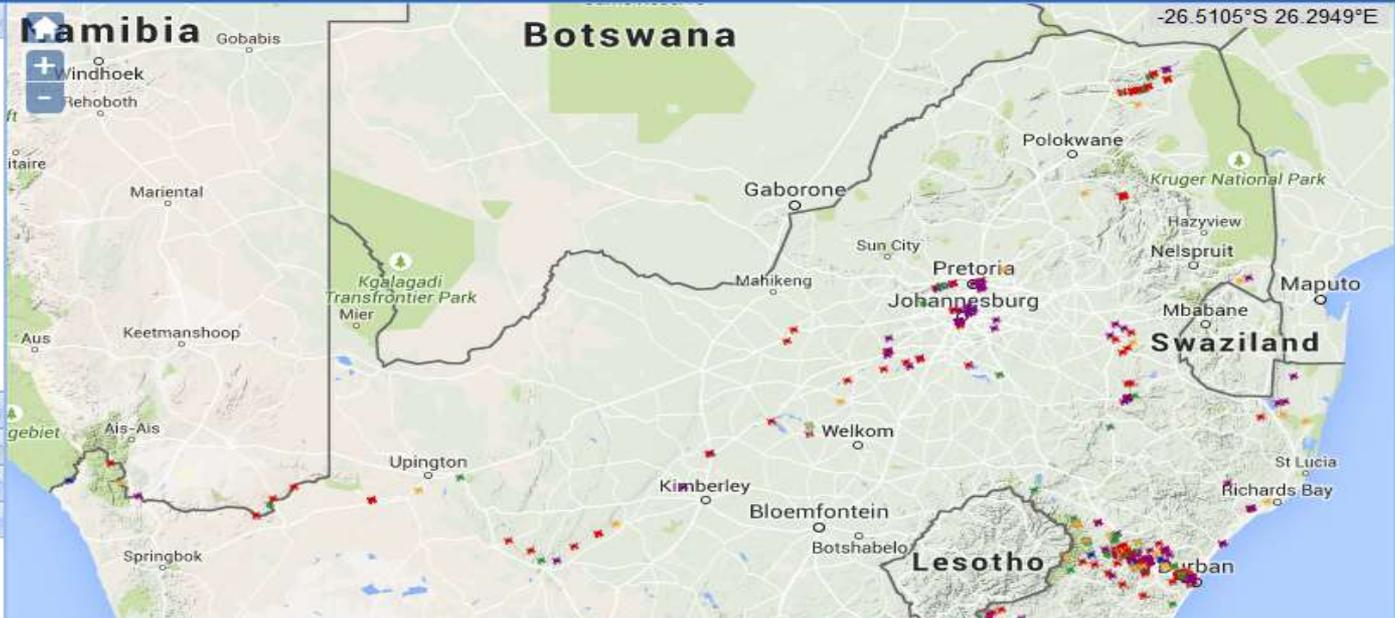
Site Data and Graphs

miniSASS observations

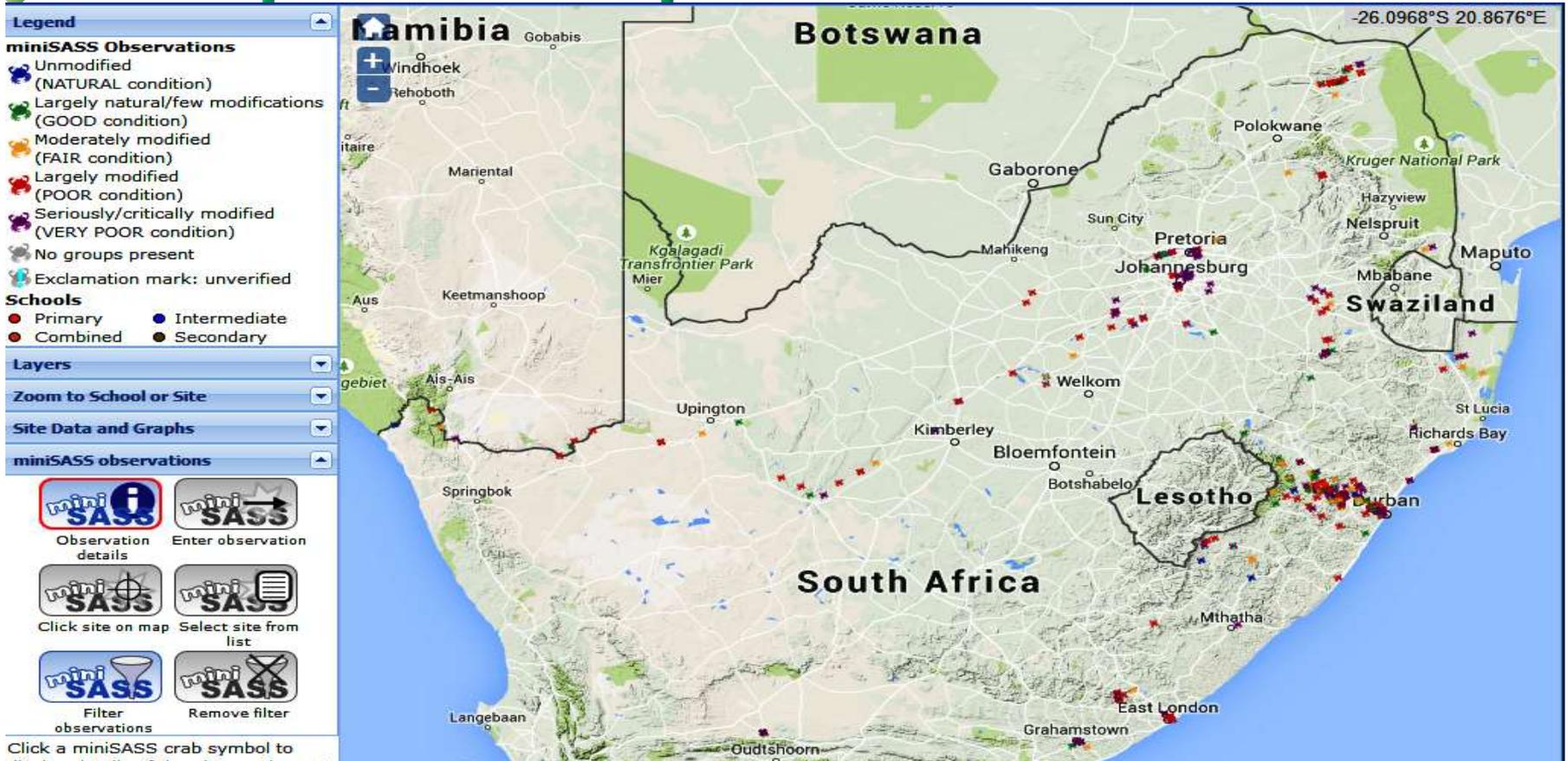


Observation

Enter observation



# Output: Sample 2



# Output: Sample 3

**Legend**

**miniSASS Observations**

- Unmodified (NATURAL condition)
- Largely natural/few modifications (GOOD condition)
- Moderately modified (FAIR condition)
- Largely modified (POOR condition)
- Seriously/critically modified (VERY POOR condition)
- No groups present
- Exclamation mark: unverified

**Schools**

- Primary
- Intermediate
- Combined
- Secondary

**Layers**

**Zoom to School or Site**

**Site Data and Graphs**

**miniSASS observations**

- Observation details
- Enter observation
- Click site on map
- Select site from list
- Filter observations
- Remove filter

**miniSASS observation details**

**23 Jun 2014**

**Site Details**

**River name:** Mzimvubu  
**Site name:** N2 Bridge  
**Site description:** Next to the N2  
**Latitude (S):** -30.85026  
**Longitude (E):** 29.06873  
**River category:** rocky

**Observation Details**

**Date:** 23 Jun 2014  
**Username:** Chantal  
**Organisation type:** Other  
**Organisation name:** University Student  
**Comments/notes:** Was surprised how clean the river was. Many locals collect water from the river for their households and their animals.

**Measured Parameters**

**Water clarity:** cm  
**Water temperature:** °C

**Groups Present**

Groups	Present
Flat worms	No
Worms	No
Leeches	No
Crabs/Shimps	No
Stoneflies	Yes
Minnow mayflies	Yes
Other mayflies	Yes
Damselflies	No
Dragonflies	No
Bugs/beetles	No
Caddisflies	Yes
True flies	Yes
Snails	No

**Average score:** 8.80  
**Natural**

# Output: Sample 4

**Legend**

**miniSASS Observations**

- Unmodified (NATURAL condition)
- Largely natural/few modifications (GOOD condition)
- Moderately modified (FAIR condition)
- Largely modified (POOR condition)
- Seriously/critically modified (VERY POOR condition)
- No groups present
- Exclamation mark: unverified

**Schools**

- Primary
- Intermediate
- Combined
- Secondary

**Layers**

Zoom to School or Site

Site Data and Graphs

miniSASS observations

Observation details | Enter observation

Click site on map | Select site from list

Filter observations | Remove filter

Click a miniSASS crab symbol to

**Namibia** | **Botswana** | **Swaziland**

**miniSASS observation details**

04 Mar 2015

**Site Details**

**River name:** Orange

**Site name:** Old man's diff

**Site description:** 10km downstream of prieska, at base of cliff, next to dry flashflood tributary

**Latitude (S):** -29.58089

**Longitude (E):** 22.70019

**River category:** rocky

**Observation Details**

**Date:** 04 Mar 2015

**Username:** triwaters

**Organisation type:** NGO

**Organisation name:** Triwaters Tour

**Comments/notes:** 1 centre pivot (irrigation) just upstream, grassy bank, wide shallow river, moderate flow, tried very hard to find more macro invertebrates.

**Groups Present**

Groups	Present
Flat worms	No
Worms	No
Leeches	No
Crabs/Shimps	No
Stoneflies	No
Minnow mayflies	Yes
Other mayflies	Yes
Damselflies	No
Dragonflies	No
Bugs/beetles	Yes
Caddisflies	No
True flies	No
Snails	No

**Average score:** 7.00 **Good**

New observation

# Output: Sample 5

The screenshot displays a web-based environmental monitoring application. The main map shows southern Africa, with a focus on the Orange River region. A detailed observation window is open, providing the following information:

**03 Mar 2015**

**Site Details**

- River name:** Orange
- Site name:** 30km us Prieska
- Site description:** Grassy bank surrounded by tall reeds. Sampling site is located at the base of hill, below rapids.
- Latitude (S):** -29.58194
- Longitude (E):** 22.88742
- River category:** rocky

**Observation Details**

- Date:** 03 Mar 2015
- Username:** triwaters
- Organisation type:** NGO
- Organisation name:** Triwaters Tour
- Comments/notes:** upstream of intensive centrepivot irrigation. Eucalyptus trees, legacy diamond mining, and indigenous vegetation

**Measured Parameters**

Groups	Present
Flat worms	No
Worms	Yes
Leeches	Yes
Crabs/Shimps	No
Stoneflies	No
Minnow mayflies	Yes
Other mayflies	Yes
Damselflies	No
Dragonflies	No
Bugs/beetles	Yes
Caddisflies	No
True flies	Yes
Snails	No

**Average score:** 4.50   
**Very Poor**

The interface includes a legend for miniSASS observations (Unmodified, Largely natural/few modifications, Moderately modified, Largely modified, Seriously/critically modified, No groups present, Exclamation mark: unverified) and schools (Primary, Combined, Intermediate, Secondary). It also features navigation tools like 'Zoom to School or Site', 'Site Data and Graphs', and 'miniSASS observations' with icons for details, map, list, filter, and remove filter.



THANK  
YOU