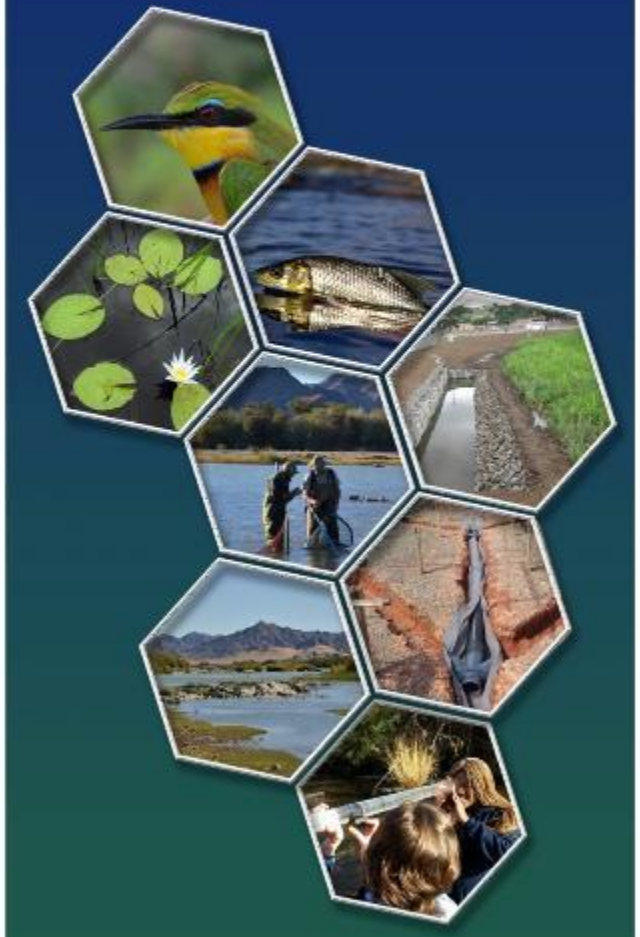
Community Roadshow: Introducing Citizen Science Tools To Hennops River Revival Community: A Madiba Month Gesture



29 July 2021

Citizen Based Water Quality Monitoring: why the wait to upscale is over

GroundTruth

WATER RESEARCH COMMISSION

Our collective challenge!
~ Amanzi Ethu

- Glaring gaps in real-time river health data availability, assimilation and State-of-River understanding
- How BIG is this resource that we are trying to measure/report on/manage?
- How many monitoring stations/technicians/laboratories etc. do we have?
- How many monitoring/management feet do we have on the ground?
- Is this enough to manage the precious resources?

  Decreasing monitoring networks, Innovation needs,

  Cost issues, Data gaps, lack of HR/resources - Dr Simphiwe Chabalala (DWS)
- Are we TRULY making a difference in terms of how our water resources are being managed/impacted upon – even as we speak?

The Data/Management Divide!

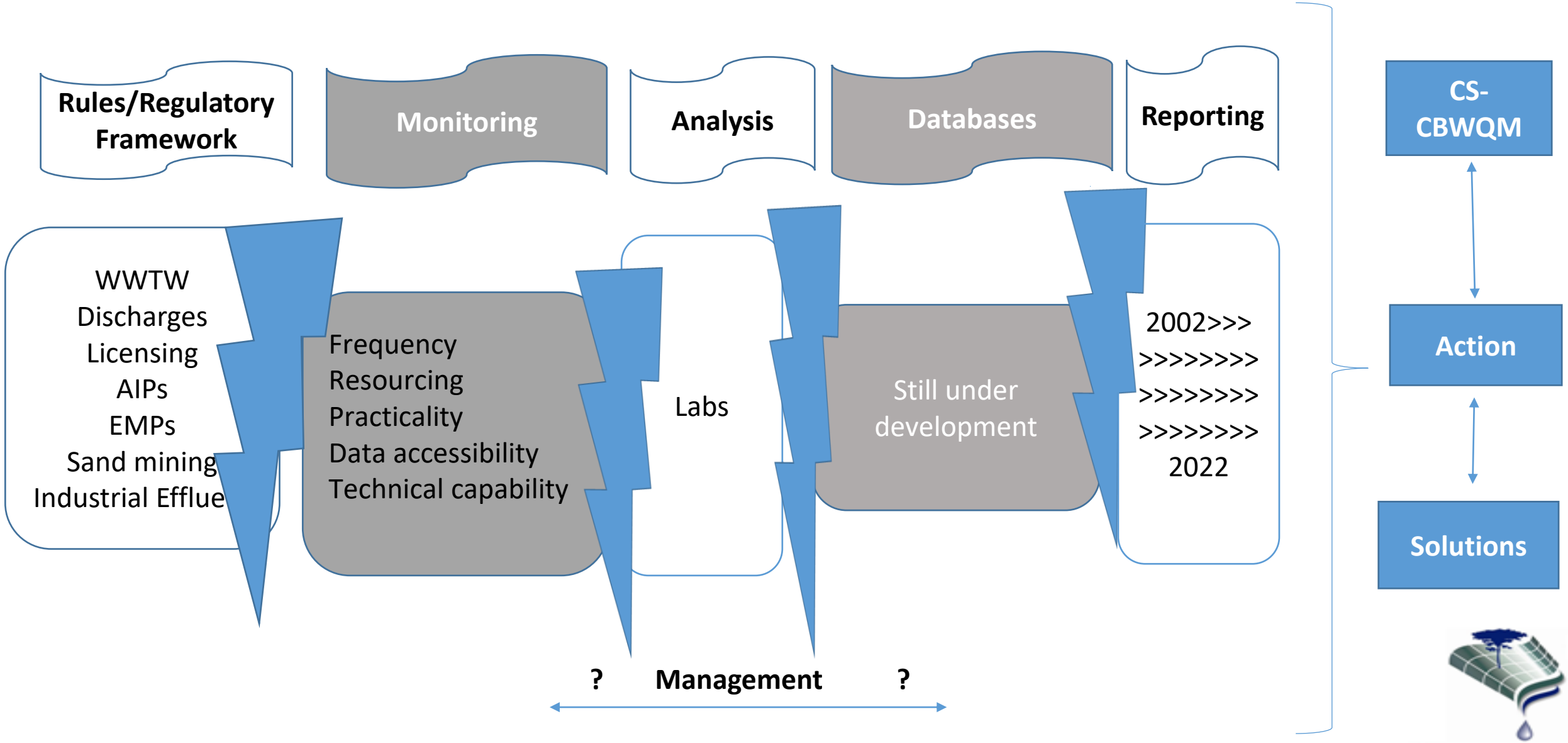
Our collective challenge!
~ how do we manage resources at their current state?

Pristine

Poor

?Management?

Our collective challenge!
~ multiple bottlenecks in the system



People are the problem & solution- Daily Maverick

"24% of these overflows and spillages are caused by maintenance issues like collapsed pipes and root growth. The remaining 76% are due to the illegal disposal of waste in sewers.
Pipes do not just block themselves-the one variable in this is people."

Comment by Brandon Vandor:
South Africa's rivers of sewage: More than half of SA's treatment works are failing
By Steve Kretzmann, Nompumelelo Mtsweni, Peter Luhanga and Nombulelo Damba
Daily Maverick, 26 April 2021

Measuring River Health

How healthy are these rivers? How can you tell?

Measuring River Health

What we look at...

Plants

- Microscopic plants that fis
  invertebrates feed on

- Riparian Vegetation

Animals

- Fish

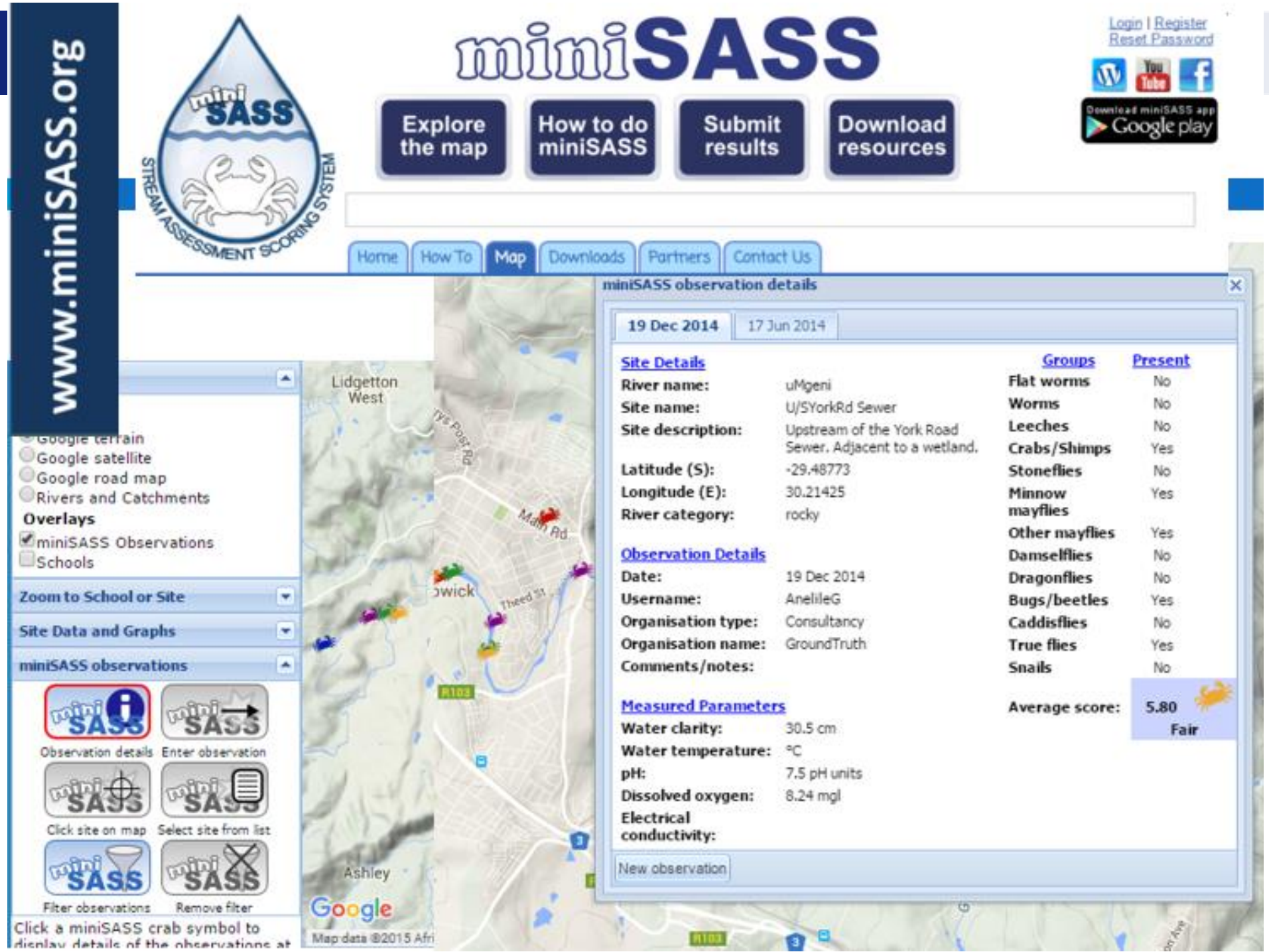
- Macroinvertebrates

What kind of data: Citizen Science vs Lab Samples

River health parameters (Technical/core science)	River health parameters (Citizen Science)
E.coli	CS *E.coli* kit
YSI rod-Turbidity	Clarity tube
SASS 5	mini SASS
YSI rod-Velocity	Velocity plank

Why do we use macroinvertebrates?

- They are easy to collect and identify
- Different macroinvertebrates have **different sensitivities to pollution**.
- They don't move around a lot so they allow us to find the pollution source.
- They integrate the water quality conditions at a site, providing an overall measure of the health of the river.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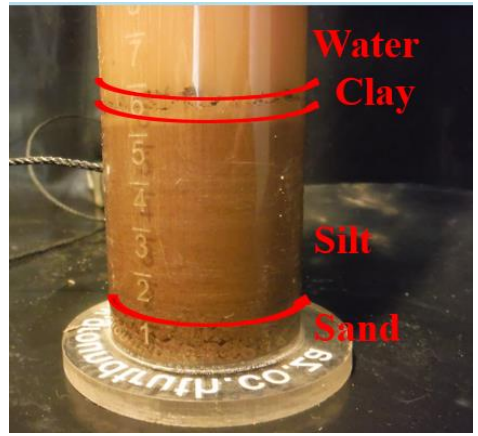
Observation details
Enter observation
Click site on map
Select site from list
Filter observations
Remove filter
Click a miniSASS crab symbol to display details of the observations at
Lidgetton West
Ashley
Google
Map data ©2015 Afri
miniSASS observation details
19 Dec 2014
17 Jun 2014
Site Details
River name: uMgeni
Site name: U/SYorkRd Sewer
Site description: Upstream of the York Road Sewer. Adjacent to a wetland.
Latitude (S): -29.48773
Longitude (E): 30.21425
River category: rocky
Observation Details
Date: 19 Dec 2014
Username: AnelileG
Organisation type: Consultancy
Organisation name: GroundTruth
Comments/notes:
Measured Parameters
Water clarity: 30.5 cm
Water temperature: °C
pH: 7.5 pH units
Dissolved oxygen: 8.24 mgl
Electrical conductivity:
Groups
Present
Flat worms No
Worms No
Leeches No
Crabs/Shimps Yes
Stoneflies No
Minnow mayflies Yes
Other mayflies Yes
Damselflies No
Dragonflies No
Bugs/beetles Yes
Caddisflies No
True flies Yes
Snails No
Average score: 5.80
Fair
New observation

The Water Clarity Tube

- Monitor river, stream, wetland, dam and Waste Water Treatment Works water clarity
- 1m long, 50mm external diameter tube constructed of 3 mm thick clear Perspex
- Measures water column visibility in aquatic ecosystem (cm)

The Clarity Tube – SDG6b 1 - Water & Sanitation management

- Determining clarity, TSS and turbidity



- Modified water clarity tube = particle size assessment

There are discharge limits for TSS for WWTW effluent (GLVs = 25 mg/L & Special Limit Value = 10 mg/L)

- Tied up with the Suspended Solids are NUTRIENTS = Eutrophication
- CBWQM – "<u>operational</u> dimension" of reporting & into governance

Transparent Velocity Head Rod (TVHR)

Measure water velocity and stream/river discharge

Use of principals of:

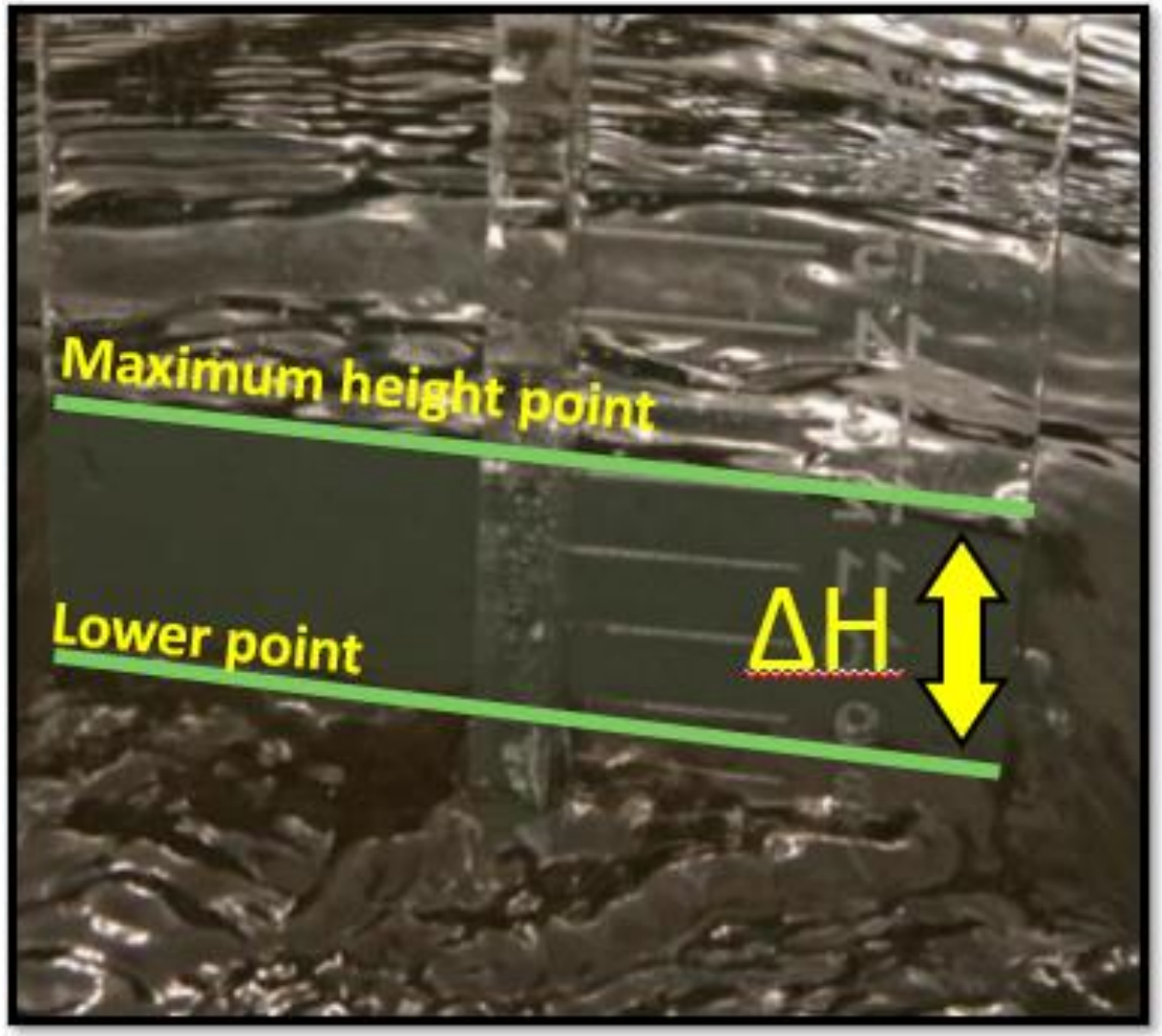
POTENTIAL ENERGY = KINETIC ENERGY

Resolve equations to link height to velocity

Equation:

Discharge = Area x Velocity ($m^3.s$)

Transparent Velocity Head Rod (TVHR)



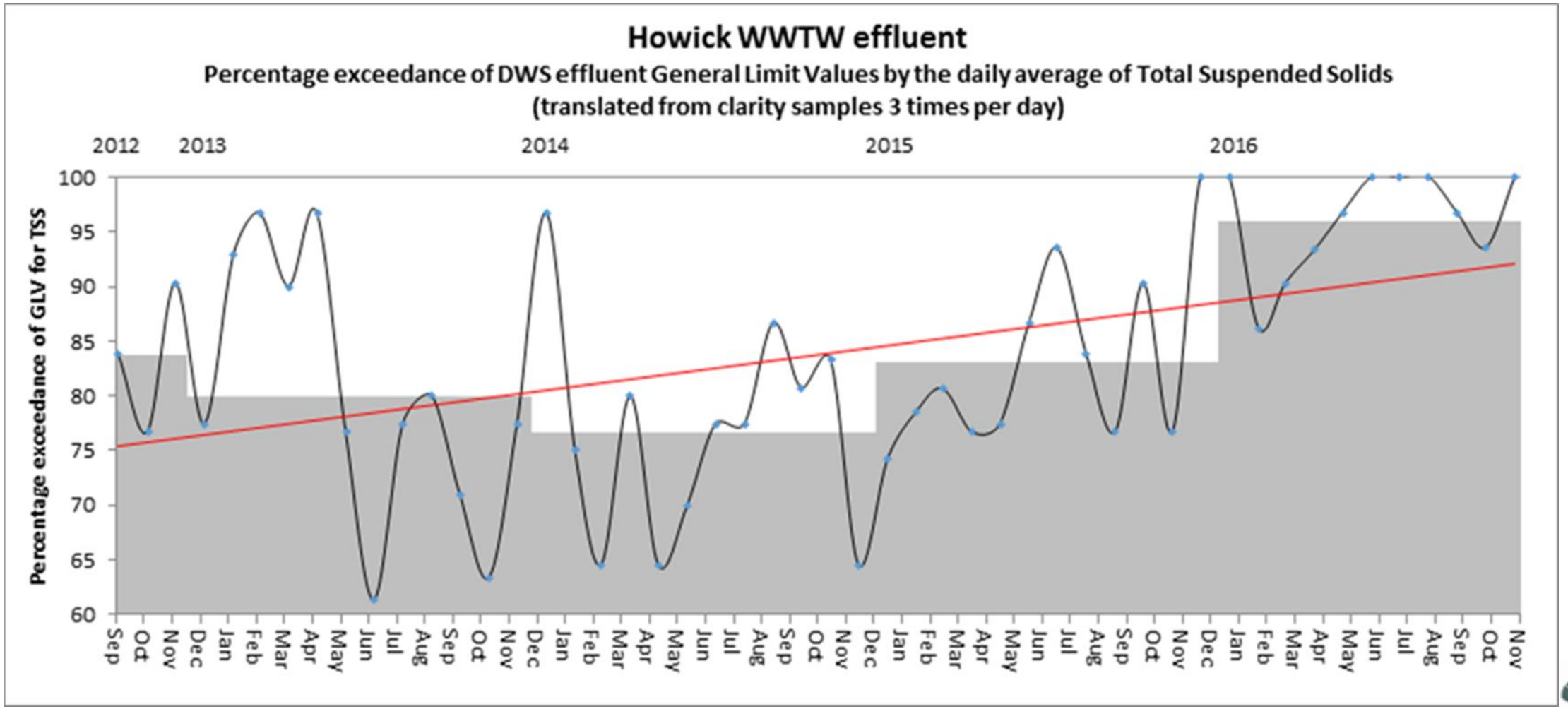
7 *Table of velocities*

ΔH (cm)	Velocity (m/s)	ΔH (cm)	Velocity (m/s)	ΔH (cm)	Velocity (m/s)
0.5	0.12	5.5	0.80	10.5	1.17
1.0	0.24	6.0	0.84	11.0	1.20
1.5	0.33	6.5	0.88	11.5	1.23
2.0	0.41	7.0	0.92	12.0	1.26
2.5	0.48	7.5	0.96	12.5	1.29
3.0	0.54	8.0	1.00	13.0	1.32
3.5	0.60	8.5	1.03	13.5	1.34
4.0	0.65	9.0	1.07	14.0	1.37
4.5	0.70	9.5	1.10	14.5	1.40
5.0	0.75	10.0	1.13	15.0	1.43

What have we learnt from Citizen Science? ~ HWWTW Case Study

- Easily accessible scientific ‘Evidence’ of the Howick WWTW performing PROGRESSIVELY poorly since 2012!
- Citizen Science vs Lab: Paired samples show increasing confidence in using clarity as a fairly reliable indicator of Howick WWTW performance as a TSS measure
- Catalyst for strengthening engagements & soliciting action from water authorities

HWWTW "Performance Trends"



Community of Practise :Events

Mandela day 2017 – TBA, Amani Nature Reserve, Tanzania

GROUNDTRUTH

What now?
~Advancing the scope of application for CS

- Why has scaling up of citizen sciences into Water Quality Management framework been seemingly slow?
- How do we change this beyond the scope of community projects?
- Increasing need to actively integrate CS into the various components of the Department's Water Monitoring Plans & partner Programmes i.e:

- Water Quality/ River Bio-monitoring
- Surface Water Monitoring (Gauging Stations)
- Data management Strategy

Citizen Science is Innovation
~Add Ubuntu & Society takes the lead

Multiple SDGs attained: Baynespruit at work SDG 6 & 17

Enviro-Champs & Communities

River Rovers

Local farmers, schools, churches, taxi association, sports groups, media, research

Businesses & Private organisations co-fund

NGOs

Amanzi Ethu Nobuntu

Government: Municipalities, Local leadership Departments

Key outputs:

Data, Data, Data

Community Awareness

Township economy boost

Youth Employment

CBO & SME support

IRWMC Objectives & Citizen Science

Terms of Reference	Citizen Science
6. Aim Platform for data acquisition and management - ***Hot spot monitoring & incident mapping***	• Affordable and readily available quantified methods for data acquisition • Easy to implement in schools and communities • Effective and efficient data collection results in more detailed monitoring

Baynespruit oil spill incident management