

Data Management Guidelines

JRS-River Project

Data Management Procedure

I. Introduction

This Data Management Procedure outlines the steps and responsibilities to effectively manage, store, and secure data within **Gaea Seychelles** for the **JRS**-River project. The goal is to ensure data quality, data storage, data analysis and data accessibility, and support organizational operations.

II. Scope

This procedure applies to all employees at **Gaea Seychelles** who interact with or manage the company's data across all levels.

III. Definitions

- **Data Management:** The process of ingesting, storing, organizing and maintaining the data created and collected by an organization.
- **Personal Data:** Information that can be used on its own or with other information to identify, contact, or locate a single person, or to identify an individual in context.

IV. Responsibilities

- **Data Manager:** Oversees data management strategies, implements policies, and ensures compliance with data protection laws.
- **Project officer or when necessary external services:** Responsible for the technical implementation of data storage and security solutions.
- **Employees:** Must adhere to all data management policies and report any data breaches or inconsistencies.

V. Procedure

The following steps outline the core activities involved in data management:

1. **Identifying Data Requirements:**

    1. Determine the types of data **Gaea Seychelles-JRS River project** needs to collect based on operational requirements.
    2. Assess the volume of data to be managed.

Requirements:

1.1. JRS River project is collecting three sets of data primarily but not limited to the 15 selected rivers:
a) Freshwater Fish and Crustaceans Inventory for year 2024-2027.
b) Freshwater Macroinvertebrates occurrence through (MiniSASS sampling through citizen science and SASS sampling research methods for freshwater water quality).
c) eDNA Sampling (2 by sites upper course and lower course) data collected is Metadata, COI meta-barcoding once sequencing is conducted.
d) All GIS data gathered either through GPS point, line, polygon. (Could be collected through applications, GPS or others) we make use of Free open Quantum GIS Software

1.2. a) 15 sets of data sheets (*Annex.1*) and data collection is designed, collected, and managed using Open Foris Collect +Arena (*Annex.2*).

b) 15 Rivers MiniSASS record sheets (*Annex.3*) complete SASS has not started yet as we are in the process of creating a standard for Seychelles as some species families are not present in Seychelles i.e. Leeches and Stoneflies (having the highest sensitivity score at 17)

c) Data shared to us by NatureMetrics

2. **Collecting Data:**

2.1. Implement methods for data collection using best practices to ensure accuracy and reliability.

a) Currently we have a drafted Fish and Crustacean Electrofishing Protocol
b) We currently us the official guideline of the MiniSASS and SASS.
c) eDNA procedures are given directly from the eDNA lab (NatureMetrics) and is present on all their PCR and eDNA kits.
Comments: Gaea Seychelles intends to have protocols in place for the two other sampling method in B and C.

2.2 Basic data collection steps.

1. All data are initially collected with classic paper and pencil together with Collect.Survey Bio_Explo on Open Foris Collect (Free open access software)
2. Then entered in simple standard excel spreadsheet as a back up.
3. Depending on data type.
    a) Freshwater fish and crustaceans (prepared as occurrence data for GBIF) and shared to Paris History Museum as they are the main collaborator and field experts for this inventory.
    b) MiniSASS and SASS upload data directly to online data platform
    c) eDNA ensure format given is compatible either in .csv or. excel for basic interpretation (NatureMetrics has their own data management platforms for their clients)
    d) GIS Data stored as QGIS.projects **OR** csv files
4. All other data is translated to the GBIF backbone to update on GBIF Platform.

2.3 Ensure consent is obtained where necessary, particularly for personal data using our Gaea Seychelles Data Sharing Agreement (Annex.4). Our GBIF datasets are publicly available as we can track the users downloaded the data.

3. Storing Data:

3.1. Select appropriate data storage solutions based on security, accessibility, and compliance requirements.

3.2. Regularly evaluate data storage needs and scalability options.

- Data is stored and backed up on three drives.
    - Personal Computer >Drive D: Gaea
    - Google Drive Storage
    - External folder storage

4. Securing Data:

4.1. Implement security measures such as encryption, access controls, and regular security audits.

- Data sets security is placed e.g. excel files certain edition are permitted and others not.

4.2. Ensure that data handling and processing comply with relevant legal requirements.

5. **Maintaining Data Quality**:

5.1. Regularly conduct data audits and cleaning to maintain data accuracy and usefulness.

We work together with the data consultant who trained our Project officer to ensure data is indeed being well managed, we also consult GitHub for certain queries and lastly, we raise queries with Collect Arena, GBIF, MiniSASS. Org, GroundTruth and NatureMetrics when necessary.

5.2. Update outdated information and remove redundant data.

6.1 and *6.2* are a work in progress and objective we want to achieve (this process can be easily managed on GBIF platform, however internally on Arena Platform we do encounter bugs sometimes, however they are easily taken care of as we notify the Arene developers.

6. Archiving or Disposing Data:

6.1. Follow established guidelines and legal requirements for archiving data or safely disposing of it.

1. Ensure all upkeep of field notes and physical papers are filed and labelled accordingly.
2. We aim to keep the data for as long as necessary as they are scientific data (unless scientifically published in a journal).

6.2. Ensure secure destruction of data to prevent unauthorized access post-disposal.

VI. Documentation and Reporting

Keep detailed records and logs of all data management activities. Regular reports should be submitted to **Gaea Seychelles**' Project Coordinator to ensure ongoing monitoring and adherence to this procedure.

VII. Amendments

This procedure is subject to periodic review and amendments to stay compliant with new laws and technologies that may arise. The updates must be approved by **Dr. Elvina Henriette** and communicated to all relevant staff and stakeholders.

VIII. Confirmation of Understanding

All employees handling data at **Gaea Seychelles** are required to confirm they have read and understood these procedures by signing the Data Management Compliance Form (In creation as we only have one main staff that manages the data, and this is addressed in her consulting contract).

V. Additional Reminders and Tips

- Conduct regular audits and assessments to evaluate compliance with data management procedures.
- Provide ongoing training and awareness programs to educate employees about their responsibilities regarding data handling and protection.
- Encourage a culture of accountability and transparency regarding data management practices within the organization.

Annex.1 Freshwater Fish and Crustaceans Collection form

Date:	Observer:	Island:	Lat:	pH:
Time:	Survey:	River:	Long:	Cond:
				Temp:

Anguillidae
Anguilla bicolor
Anguilla marmorata

Moringuidae
Moringua microchir

Aplocheilidae
*Pachypanchax playfairii**

Cyprinidae
Carassius auratus (int)

Poeciliidae
Poecilia reticulata (int)

Mugilidae
Crenimugil crenilabis
Planiliza macrolepis
Crenimugil buchanani
Crenimugil seheli

Ambassidae
Ambassis urotaenia

Kuhliidae
Kuhlia mugil
Kuhlia rupestris

Cichlidae
Oreochromis mossambicus (int)

Belontiidae
Trichogaster trichopterus(int)

Osphronemidae
Osphronemus goramy (int)

Kraemeridae
*Kraemeria cf samoensis Steindachner (*OOI)*

Microdesmidae
Parioglossus taeniatus
Parioglossus multiradiatus Keith*

Eleotridae
Eleotris fusca
Eleotris acanthopoma B
*Eleotris klunzingerii (*OOI)*
*Eleotris pellegrini (*OOI)*
*Eleotris valadei 2020*OOI*
Eleotris nsp (Praslin 2020) to be verified
*Ophiocara porocephala *OOI*

Gobiidae
Bathygobius meggitti
Glossogobius callidus
Glossogobius giuris
Psammogobius cf biocellatus
Mugilogobius fuscus
Mugilogobius mertoni
Redigobius bikolanus

Atyidae
Atyoida serrata
Caridina typus
Caridina natalensis
Caridina cf serratirostris nsp*
*Caridina similis**
Palaemon concinnus
Palaemon debilis

Palaemonidae
Macrobrachium idae
Macrobrachium equidens
Macrobrachium lar
Macrobrachium grosses pinces to be verified

Gecarcinucidae
*Seychellum alluaudi**

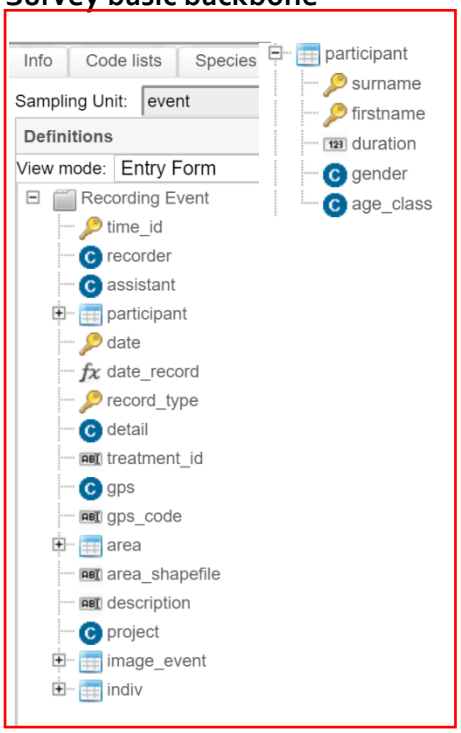
Grapsidae
Varuna litterata
Sesarmops impressum

Sesarmidae
*Scandarma nsp**
Parasesarma plicatum

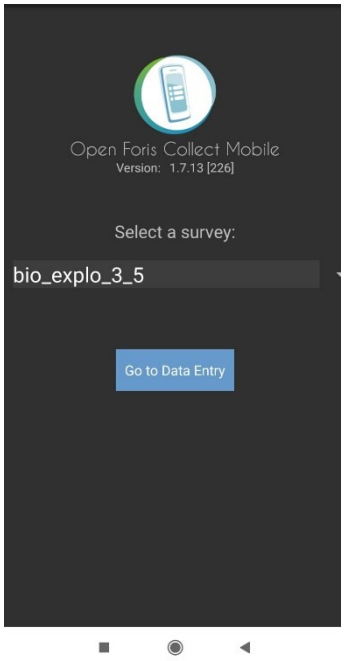
Tide:
Cloud Cover (%):
Canopy Cover(%):
River Micro Habitat desciption:
River bank:
Species observation:
Contaminants:
Possible threats:

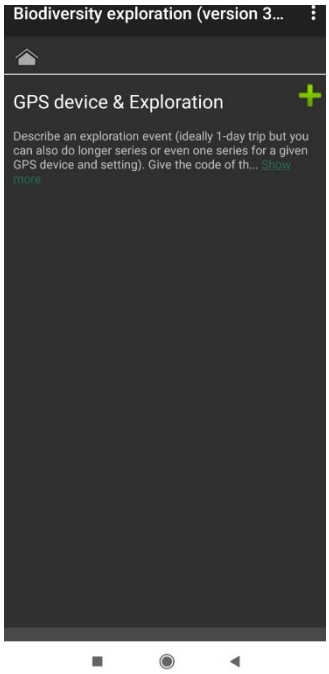
Annex. 2 Bio_ explo survey (backbone and mobile application *some slides)* and Collect &Arena interface

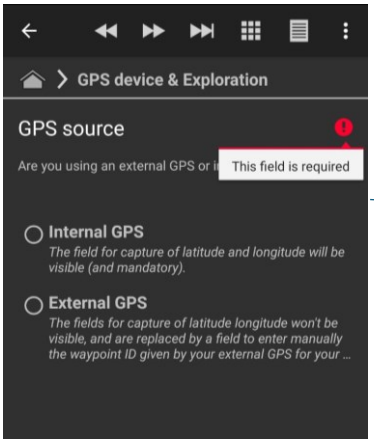
Survey basic backbone

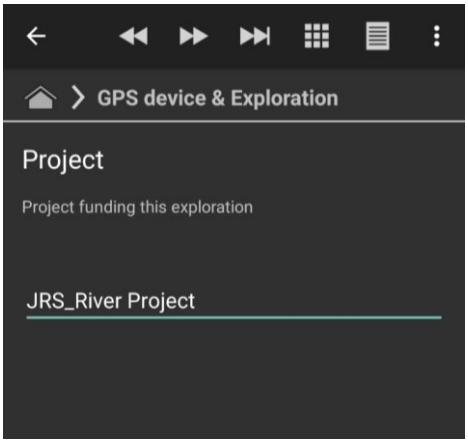


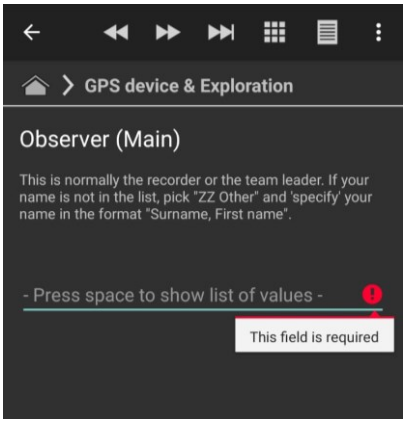
Survey on phone

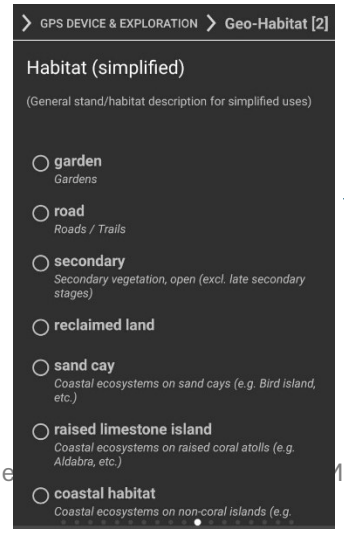


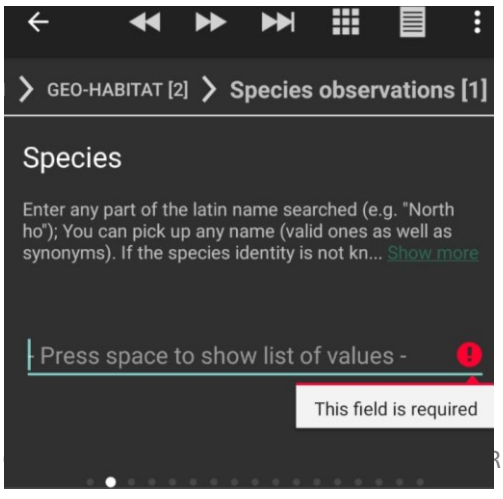


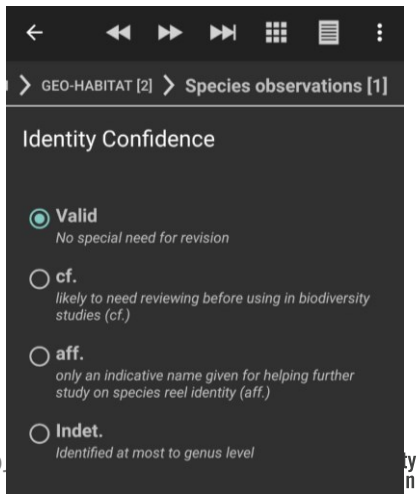




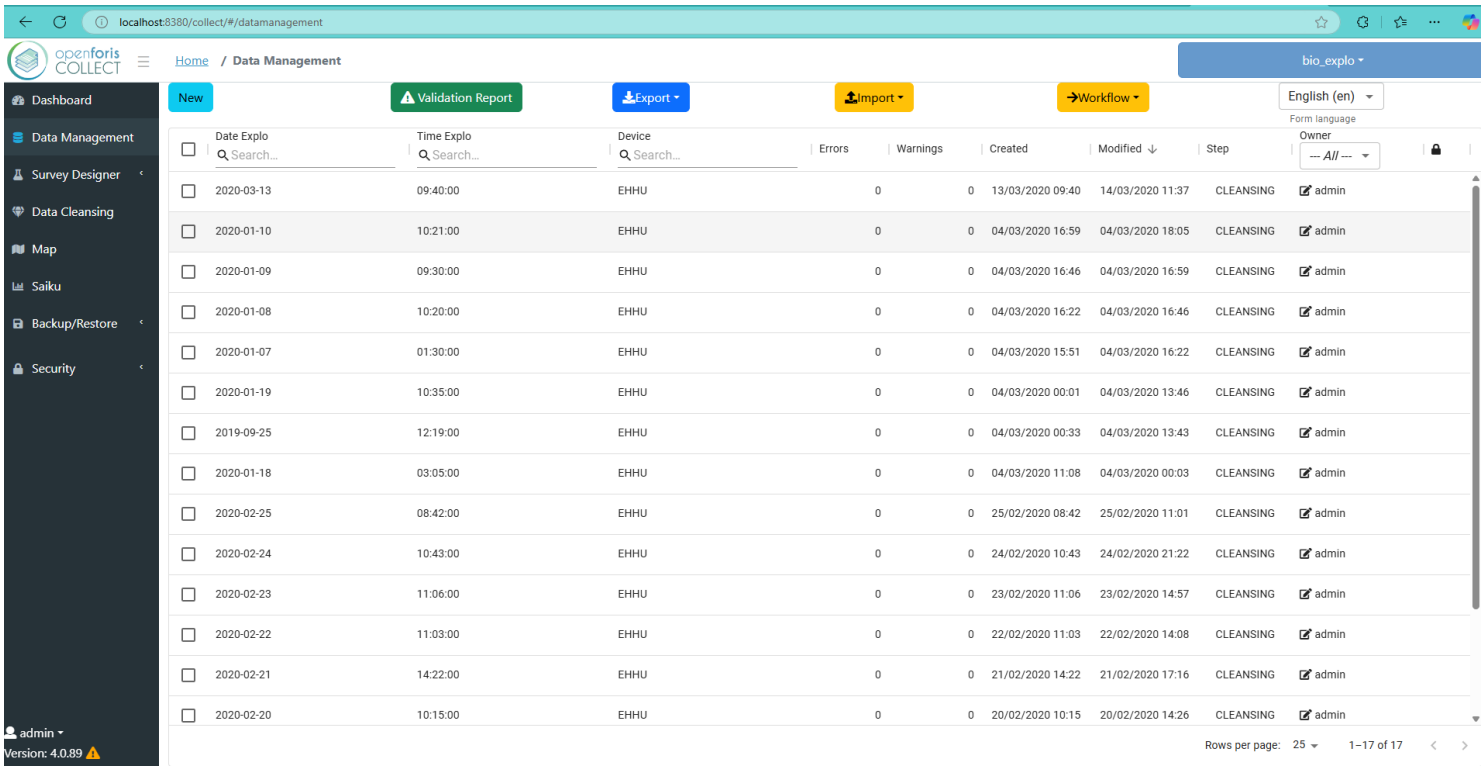




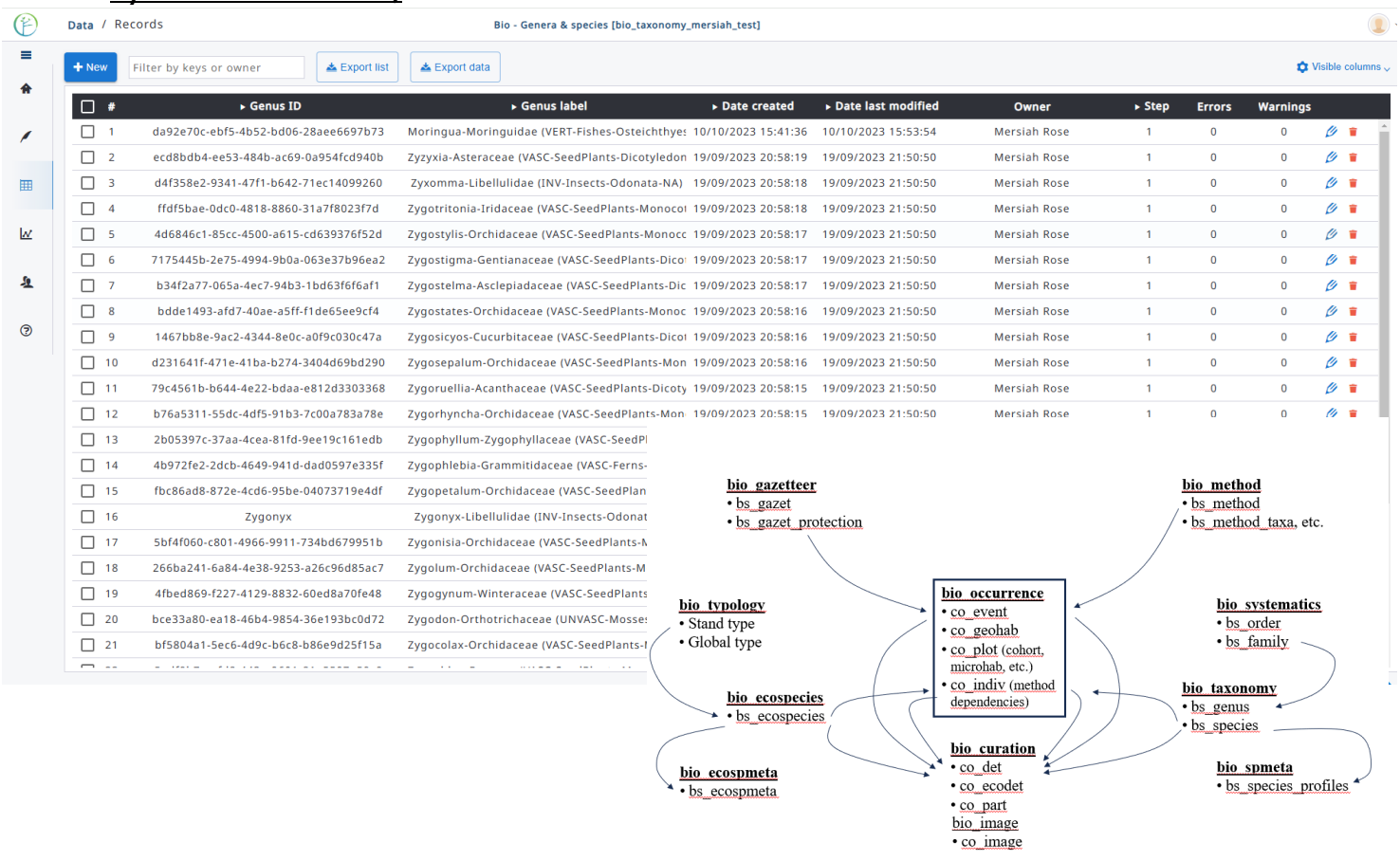




Open Foris Collect data management interface (data collection survey)



Collect Arena for Data management (data model explained in further diagram provided by Dr. Bruno Senterre)



Annex.3 MiniSASS and SASS record sheets

SASS record sheets

SASS Version 5 Score Sheet

Version date: Sept 2005

Date (dd:mm:yr):	8/10/2010
RHP Site Code:	
Collector/Sampler:	
River:	Umsunduzi
Level 1 Ecoregion:	South Eastern Uplands
Quaternary Catchment:	U20C
Site Description:	
Temp (°C):	
pH:	
DO (mg/L):	
Cond (mS/m):	
Riparian Disturbance:	
Instream Disturbance:	

		(dd.ddddd)
Grid reference (dd mm ss.s) Lat:	S	
Long:	E	
Datum (WGS84/Cape):		
Altitude (m):		
Zonation:		UPPER

Routine or Project? (circle one)		
Project Name:	SASS Training Course	
Flow:		Medium
Clarity (cm):		43
Turbidity:		Medium
Colour:		Light Brown

Biotopes Sampled (tick & rate)	Rating (1 - 5)	Time (min)
Stones In Current (SIC)	3	2
Stones Out Of Current (SOOC)	3	1
Bedrock	3	1
Aquatic Veg	1	
MargVeg In Current	3	
MargVeg Out Of Current	2	
Gravel	2	
Sand	1	
Mud	3	
Hand picking/Visual observation	Y	

Taxon	QV	S	Veg	GSM	TOT
PORIFERA (Sponge)	5				
COELENTERATA (Cnidaria)	1				
TURBELLARIA (Flatworms)	3				
ANNELIDA					
Oligochaeta (Earthworms)	1			A	A
Hirudinea (Leeches)	3			A	A
CRUSTACEA					
Amphipoda (Scuds)	13				
Potamonautidae* (Crabs)	3	A	1		A
Atyidae (Freshwater Shrimps)	8	B	B	B	B
Palaemonidae (Freshwater Prawns)	10				
HYDRACARINA (Mites)	8				
PLECOPTERA (Stoneflies)					
Notonemouridae	14				
Perlidae	12	A			A
EPHEMEROPTERA (Mayflies)					
Baetidae 1sp	4	A			A
Baetidae 2 sp	6				
Baetidae > 2 sp	12				
Caenidae (Squaregills/Cainflies)	6	A			A
Ephemeridae	15				
Heptageniidae (Flatheaded mayflies)	13				
Leptophlebiidae (Prongills)	9				
Oligoneuriidae (Brushlegged mayflies)	15				
Polymitarcyidae (Pale Burrowers)	10				
Prosopistomatidae (Water specs)	15				
Teloganodidae SWC (Spiny Crawlers)	12				
Tricorythidae (Stout Crawlers)	9				
ODONATA (Dragonflies & Damselflies)					
Calopterygidae ST,T (Demoiselles)	10				
Chlorocyphidae (Jewels)	10				
Synlestidae (Chlorolestidae)(Sylphs)	8				
Coenagrionidae (Sprites and blues)	4		A		A
Lestidae (Emerald Damselflies/Spreadwin	8				
Platycnemidae (Stream Damselflies)	10				
Proteneuridae (Threadwings)	8				
Aeshnidae (Hawkers & Emperors)	8				
Corduliidae (Cruisers)	8				
Gomphidae (Clubtails)	6				
Libellulidae (Darters/Skimmers)	4	A			A
LEPIDOPTERA (Aquatic Caterpillars/Moths)					
Crambidae (Pyralidae)	12				

Taxon	QV	S	Veg	GSM	TOT
HEMIPTERA (Bugs)					
Belostomatidae* (Giant water bugs)	3				
Corixidae* (Water boatmen)	3			B	B
Gerridae* (Pond skaters/Water striders)	5				
Hydrometridae* (Water measurers)	6				
Naucoridae* (Creeping water bugs)	7				
Nepidae* (Water scorpions)	3				
Notonectidae* (Backswimmers)	3				
Pleidae* (Pygmy backswimmers)	4				
Veliidae/M...veliidae* (Ripple bugs)	5				
MEGALOPTERA (Fishflies, Dobsonflies & Alderflies)					
Corydalidae (Fishflies & Dobsonflies)	8				
Sialidae (Alderflies)	6				
TRICHOPTERA (Caddisflies)					
Dipseudopsidae	10				
Ecnomidae	8	B			B
Hydropsychidae 1 sp	4				
Hydropsychidae 2 sp	6				
Hydropsychidae > 2 sp	12				
Philopotamidae	10				
Polycentropodidae	12				
Psychomyiidae/Xiphocentronidae	8				
Cased caddis:					
Barbarochthonidae SWC	13				
Calamoceratidae ST	11				
Glossosomatidae SWC	11				
Hydroptilidae	6				
Hydrosalpingidae SWC	15				
Lepidostomatidae	10				
Leptoceridae	6				
Petrothrincidae SWC	11				
Pisulidae	10				
Sericostomatidae SWC	13				
COLEOPTERA (Beetles)					
Dytiscidae/Noteridae* (Diving beetles)	5				
Elmidae/Dryopidae* (Riffle beetles)	8	A			A
Gyrinidae* (Whirligig beetles)	5				
Haliplidae* (Crawling water beetles)	5				
Helodidae (Marsh beetles)	12				
Hydraenidae* (Minute moss beetles)	8				
Hydrophilidae* (Water scavenger beetles)	5				
Limnichidae (Marsh-Loving Beetles)	10				
Psephenidae (Water Pennies)	10				

Taxon	QV	S	Veg	GSM	TOT
DIPTERA (Flies)					
Athericidae (Snipe flies)	10				
Blepharoceridae (Mountain midges)	15				
Ceratopogonidae (Biting midges)	5				
Chironomidae (Midges)	2	A	A		B
Culicidae* (Mosquitoes)	1				
Dixidae* (Dixid midge)	10				
Empididae (Dance flies)	6				
Ephydridae (Shore flies)	3				
Muscidae (House flies, Stable flies)	1	1			1
Psychodidae (Moth flies)	1				
Simuliidae (Blackflies)	5		A		A
Syrphidae* (Rat tailed maggots)	1				
Tabanidae (Horse flies)	5				
Tipulidae (Crane flies)	5				
GASTROPODA (Snails)					
Ancylidae (Limpets)	6	A			A
Bulininae*	3				
Hydrobiidae*	3				
Lymnaeidae* (Pond snails)	3				
Physidae* (Pouch snails)	3		A		A
Planorbinae* (Orb snails)	3				
Thiaridae* (=Melanidae)	3			1	1
Viviparidae* ST	5				
PELECYPODA (Bivalvles)					
Corbiculidae (Clams)	5	B			B
Sphaeriidae (Pill clams)	3				
Unionidae (Perly mussels)	6				
SASS Score					
No. of Taxa					
ASPT					

Other biota:

Comments/Observations:

Procedure:

Kick SIC & bedrock for 2 mins, max. 5 mins. Kick SOOC & bedrock for 1 min. Sweep marginal vegetation (IC & OOC) for 2m total and aquatic veg 1m². Stir & sweep gravel, sand, mud for 1 min total. * = airbreathers

Hand picking & visual observation for 1 min - record in biotope where found (by circling estimated abundance on score sheet). Score for 15 mins/biotope but stop if no new taxa seen after 5 mins.

Estimate abundances: 1 = 1, A = 2-10, B = 10-100, C = 100-1000, D = >1000 S = Stone, rock & solid objects; Veg = All vegetation; GSM = Gravel, sand, mud SWC = South Western Cape, T = Tropical, ST = Sub-tropical

Rate each biotope sampled: 1=very poor (i.e. limited diversity), 5=highly suitable (i.e. wide diversity) Rate turbidity: V low, Low, Medium, High, Very High

MiniSASS record sheet

SITE INFORMATION TABLE	
River name:	Date (dd/mm/yr):
Site name:	Collector's name:
GPS co-ord Lat(S): Long(E):	School/organisation:
Site description: e.g. downstream of industry	Notes: e.g. weather, impacts: flow, etc.
pH: Water temp: °C Dissolved oxygen: mg/l Water clarity: info at www.minisass.org	

GPS co-ordinates as degrees, minutes, seconds (e.g. 29°30'25" S / 30°45'10" E) **OR**
as decimal degrees (e.g. 29.50694°S / 30.75277°E) If you don't have a GPS, upload your results at **www.minisass.org**, find your site on the map, click to upload your result and the co-ordinates are saved for you!

Scoring

1. On the table, circle the sensitivity scores of the identified organisms.
2. Add up all of the sensitivity scores.
3. Divide the total of the sensitivity scores by the number of groups identified.
4. The result is the **average score**, which can be interpreted into an ecological category given below.

Interpret the miniSASS score:

Although an ideal sample site has rocky, sandy, and vegetation habitats, not all habitats are always present at a site. If your river had no rocky habitats that were sampled, use the **sandy type** category to interpret your scores.

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
TOTAL SCORE	
NUMBER OF GROUPS	
AVERAGE SCORE (miniSASS Score)	

Average Score = Total Score ÷ Number of groups

Ecological category (Condition)	River Category: Sandy Type	River Category: Rocky Type
NATURAL CONDITION (Unchanged/untouched – Blue)	> 6.9	> 7.2
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

Now, upload your results at www.miniSASS.org or use the miniSASS App (download from the miniSASS website) or send a scan of this page to info@minisass.org!

www.minisass.org
Version 3.0 – September 2015

miniSASS is used to monitor the health of a river and measure the general quality of the water in that river. It uses the make-up of macro-invertebrates (small animals) living in rivers and is based on the sensitivity of the various animals to water quality.

NOTE: miniSASS does NOT measure the contamination of the water by bacteria and viruses and thus does not tell us if the river water is fit to drink.

Equipment list

- Net (see www.minisass.org)
- white container / tray / ice-cream box
- magnifying glass
- pencil
- shoes/gumboots
- hand wash / soap



Method

The best sites have rocks in moving water (**rocky type** rivers). Not all sites have rocks, but may be largely sandy (**sandy type** rivers).

1. Whilst holding a small net in the current, **disturb** the stones, vegetation, sand etc. with your feet or hands.
2. You can also lift stones out of the current and gently **pick** organisms off with your fingers or forceps.
3. Do this for about **5 minutes** whilst **ranging across the river to different habitats** (biotopes).
4. Rinse the net and turn the contents into a plastic tray. **Identify** each group of organisms using the identification guide (see insert: start with the dichotomous key, then use the identification guide for more information).
5. Fill in the site information and **mark** the identified organisms off on the scoring sheet (back page).
6. **Add up** the sensitivity scores and determine the **average score**.
7. Interpret your miniSASS score.
8. Remember: **WASH** your hands when done!

https://www.youtube.com/channel/UCub24hwrLi52WR9C24uTbaQ

Don't have a net? Make your own – it is easy!

Take any piece of wire, for example an old clothes hanger, and bend it into the shape of a net. Then tie the netting (which can be any porous material) to the wire with a piece of string. Alternatively cut the bottom out of an ice cream container and staple netting to the bottom. Now you have a net!!

Annex.4 Gaea Seychelles, Data-Sharing Agreement

Gaea Conservation Network Seychelles (Gaea Seychelles)
Centre for Environment and Education, Anse Royale, Seychelles
+248 2502784 gaea@gaeaseychelles.sc www.gaeaseychelles.sc

Data Sharing Agreement

Between:

Gaea Seychelles (hereinafter referred to as the "Provider")

And:

[Client/Department Name] (hereinafter referred to as the "Consumer")

Effective Date: [Date]

Purpose

This access defines the terms, conditions, and commitments for data access and usage by the Consumer from the Provider. The goal is to ensure reliable and secure access to the data, meeting the Consumer's requirements while maintaining data integrity.

Data Access

2.1 Availability

The Provider commits to maintaining data availability at a rate of 99.9% during project duration, defined as [24 months].

2.2 Response Time

The Provider will strive to ensure that data access requests from the Consumer will have an average response time of 2 weeks maximum.

2.3 Data Quality

The Provider will ensure that data accessed by the Consumer meets the following quality standards:

- Accuracy: 95%
- Completeness: 90%
- Consistency: 95%

Security

3.1 Authentication

Access to data will be secured through the use of strong, one-time authentication through email links, not limited to include username and password verification in conjunction with an authentication mechanism depending on sensitivity of data and partners authorisation. This layered approach ensures that only authorized users with valid credentials can access the data.

3.2 Encryption

SAMPLE

t

All data transferred between the Provider and the Consumer will be logged and signed off by both the provider and consumer. This is to guarantee the confidentiality and integrity of data during transit, safeguarding it against unauthorized access or interception.

Data Usage

4.1 Permitted Usage

The data provided by the Provider may only be used for the following Authorized Purposes: (can be amended depending on usage)

- e.g. Data Analysis: Consumers may use the data solely for statistical and analytical purposes related to [Project/Use Case].
- e.g. Reporting: Consumers may use the data to generate reports for internal decision-making and reporting to [Relevant Parties].

Any other use of the data is strictly prohibited without prior written consent from the Provider.

4.2 Compliance

The Consumer agrees to comply with all applicable data protection and privacy regulations, including but not limited to the Data Protection Act 2023, and any other Relevant Regulations relevant to the handling and processing of the data.

Support and Maintenance

5.1 Reporting Issues

The Consumer shall report any issues or outages related to data access to the Provider. The Provider will acknowledge the issue within [Acknowledgment Time] and work to resolve it within [Resolution Time].

5.2 Monitoring

The Provider will maintain continuous monitoring of data access services to ensure optimal performance and availability. This monitoring includes real-time data access tracking, in-field survey monitoring data, and proactive measures to address any potential issues promptly.

Scalability

The Provider will take proactive measures to ensure that data access services can handle increased demand or data volume. Any necessary scalability changes will be communicated to the Consumer in advance.

Termination and Penalties

Termination of this agreement may occur under specific circumstances, as defined in the Termination Conditions section of this data sharing agreement. Non-compliance with this data sharing agreement including breaches of data usage, security, or other terms, may result in penalties as specified in the Penalty Clause of this agreement. Penalties may include, service suspensions, or other actions deemed appropriate by the Provider.

Review and Amendment

SAMPLE

This data sharing will be reviewed annually or as needed (especially with comments by project's partners). Amendments to this data sharing agreement require mutual agreement and will be documented in writing.

Signatures:

Provider:

Authorized Signature: _____

Printed Name: _____

Date: _____

Consumer:

Authorized Signature: _____

Printed Name: _____

Date: _____

This Data sharing agreement is subject to periodic review and modification. Any changes will be communicated to the Consumer in advance.

MPLE

To be continued.....