Environmental Science Education Programme

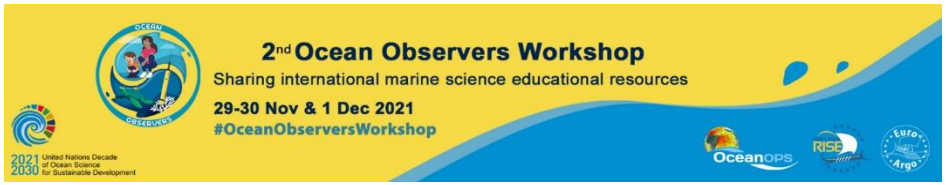
"Towards supporting the development of another…"

Adopt a float for science skills advancement -
a classroom initiative

Thomas Mtontsi

National Research Foundation -

South African Environmental Observation Network



Environmental Science Education Programme

- Objectives -

- Knowledge and Science skills development
- Integration into School Science curriculum
- Understanding, awareness and interest about our Oceans

Interactions - Scientists, Learners, Educators and Students

"He climbs highest who helps another up"
Zig Ziglar

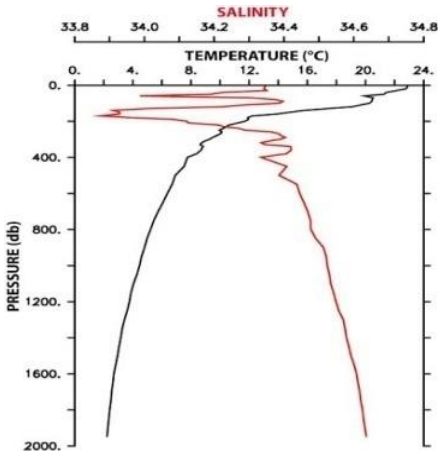
Environmental Science Education Programme

- Format -

School Based Monitoring

Educator Support

SAEON Kids monitoring Teams



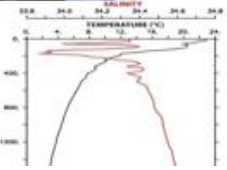
Learner Support

Environmental Science Education Programme

- "From face to face" "playing in virtual/online space" -

School Based Monitoring

Learner Support



2020 - 2021

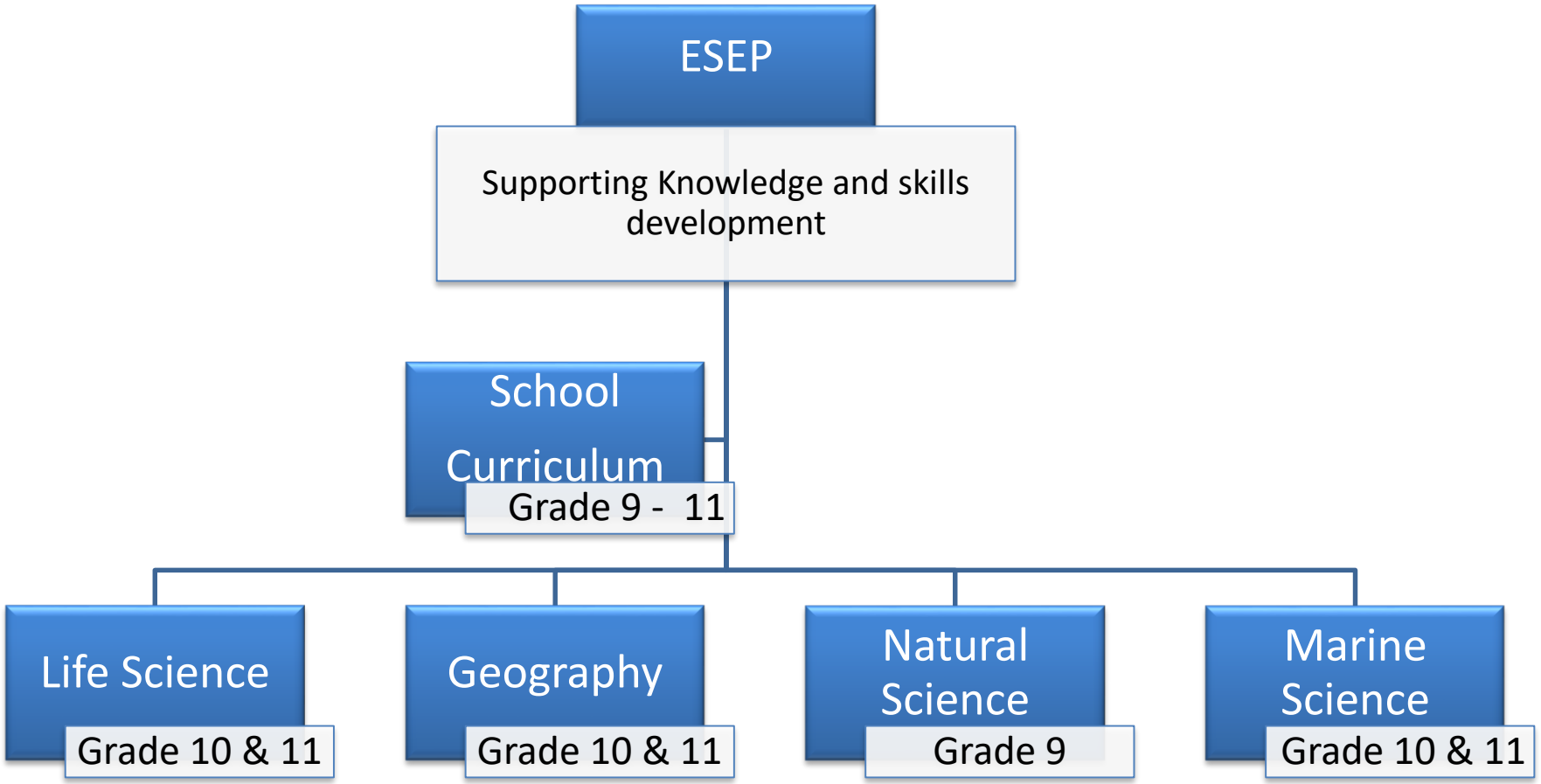
Making use of online or virtual Space

- Learner virtual Science Camps for grade 9 – 11
- Educator Workshops / webinar
- Building Marine Science Exhibits for the Cofimvaba Science Centre
- Online teaching resources
- Online science competitions such as an in-house iNaturalists

Educator Support

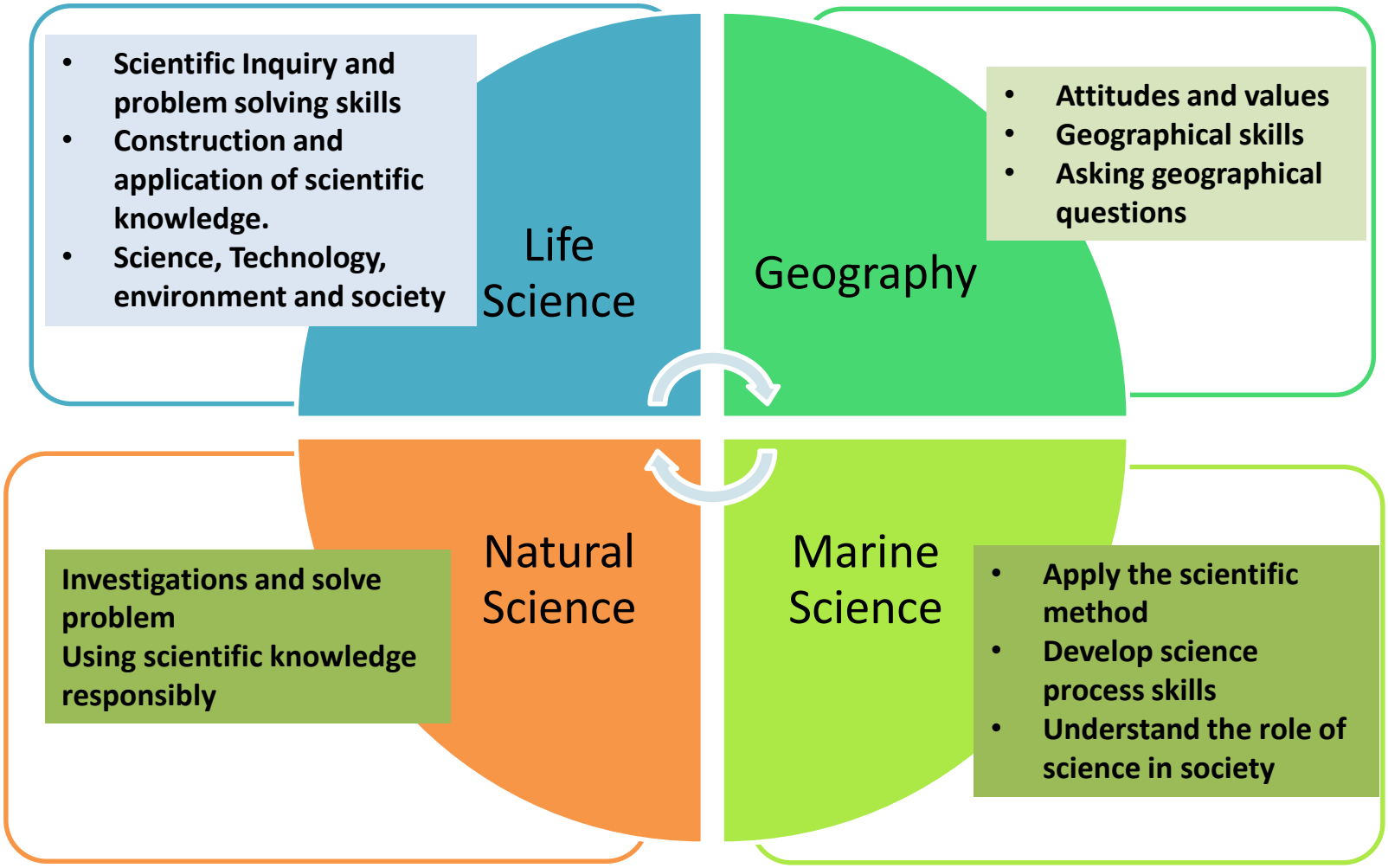
Environmental Science Education Programme

- School Science Curriculum -



Environmental Science Education Programme

- School Science Curriculum -



The Marine Science Curriculum statement…

Please see curriculum statement

- Oceanography
- Human and the Oceans
- Marine Ecology
- Marine Biology

31 Topics to choose from

Topic No	Grade 10 Term 1
1	Introduction to Marine Sciences
2	Scientific Inquiry
3	History of Marine Sciences Research and Ocean Discovery
4	Life Processes and the Chemistry of Life
5	Cell Biology
6	Origin of Planet Earth
7	Interior of the Earth
8	Geological time
Hours Term 1 Gr 10	
Grade 10 Term 2	
9	Topography of the Ocean Floor and Ocean Basins
10	Plate tectonics
11	The Ocean Planet - Physical Properties of Water
12	Energy Transmission in Water- Heat
13	Energy Transmission in Water- Light and Light Absorption
14	Introduction to Evolution and Evolution Mechanisms
15	Basic Classification
16	Evolutionary trends, Body plans, symmetry and life patterns
17	Plankton
18	Protists
Hours Term 2 Gr 10	

Your Topic page

See next slide!?

- **Topic *Number and name***
- The recommended ***term*** in which it should be taught
- The number of recommended ***hours*** which should be taken to teach the topic.
- The ***Depth,*** indicating ***level of detail***.
- The ***Key Content Concepts***
- Suggested practical's and ***investigations*** and
- ***Resources***, which can be referred to.

Nutrient Cycles

Term 3		Strand – Ecology		
Time	**Depth**	**Key Concepts**	**Investigations**	**Resource**
4 hours	**The Depth of this topic is to introduce the components of an ecosystem and understand some of the complex interactions between them. While some concepts will be dealt with separately, it is important for learners to combine them when looking at specific ecosystems.**	**Ecology** **An ecosystem** is defined as a **community of organisms that interact with each other and the particular physical environment in which they live**. **Ecologists** study ecosystems in detail. 1. An ecosystem is linked by a flow of energy and materials through the non-living (**abiotic**) as well as living (**biotic**) sections of the system. 2. The biotic components include organisms from several **trophic levels**: a. **Producers** – **autotrophs**, mainly phytoplankton and seaweeds. b. **Consumers – heterotrophs** (**herbivores, carnivores, omnivores, detritivores**) that ingest other organisms, using various feeding strategies (eg grazing, browsing, hunting, scavenging and filter feeding). c. **Decomposers – saprophytic** heterotrophs (mainly bacteria and fungi) break down organic compounds after organisms die. This releases nutrients for use again by primary producers. 3. **Feeding relationships** in an ecosystem can be indicated as **food chains or webs**, or graphically as **food pyramids** of **number, biomass or energy**. 4. **Inorganic nutrients** (eg carbon, nitrogen and oxygen) are **cycled** through ecosystems in a **nutrient cycle** (*Detail is provided in sections on nutrient cycle.)* 5. **Energy** is **converted to food** by producers and **passed along the food chain**, with each level **converting some of the energy** to other forms in order **to stay alive**, until eventually the energy (food) is **used up**. Thus we refer to – and can graphically represent – **energy flow** through an ecosystem. 6. Several **interactions occur between organisms** in an ecosystem, including **inter- and intraspecific competition, and predation.** 7. **Symbiotic relationships** also occur **(parasitism, commensalism and mutualism).** *(Unpack these terms and concepts with marine examples – eg parasitic isopods and fish tapeworms, remora and shark, pilot fish and shark, cleaner wrasse, and clown fish and anemone. Discuss **coevolution** as an extension of symbiosis.)* 8. Five South African marine ecosystems are studied: **the open ocean, rocky shores, sandy shores, kelp forests and estuaries.**	Video clips are fine for this section, as a rocky shore habitat will be investigated in detail	Internet YouTube

Grade 10 Marine Science Educator Training Manual

What to do!?

- Select a topic e.g. Salinity
- Background Content on topic
- Include illustrations, pictures, video, etc.
- Develop an activity to help understanding
- A PowerPoint presentation

A typical lesson plan can be a helpful approach…

Resources links – Examples of Activities

- Activities (Argo Floats on Rise Articulate)

https://rise.articulate.com/share/o4pL00ldfVXxUz72YaJyZZYq3JMg9Ak-#/lessons/w39djH5LEOMWkT0kUo8RAtlWQDrpjD25

- Activity 3 (Argo Float on google form)

https://rise.articulate.com/share/o4pL00ldfVXxUz72YaJyZZYq3JMg9Ak-#/lessons/MXanr32Z0AaXsajJfEDhYEEKtPHf6bUc

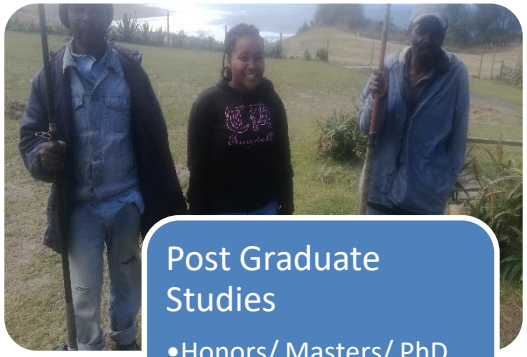
Environmental Science Education Programme
- Tracking, Impact & Support-

High school (grade 9 – 11)

- Matric Results
- HL pass requirements
- (bachelors, distinctions etc..)

Institution of Higher Learning

- First Qualification
- Science Field;
- Marine Science / Oceanography



Post Graduate Studies

- Honors/ Masters/ PhD
- Internships / Volunteering / PDP
- References / recommendations

Tania Duba

Tania Lab based observations on data collected at sea for a high school project.

Pursued a career in Marine Sciences

Currently a PHd PDP hosted at SAEON Egagasini Node and Supervised by Prof Juliet Hermes

Graduated MSc

2020

Tania Lab – Ocean Chemistry

Entered Eskom Expo for young Scientists

International Conference with NRF-SAEON Egagasini Team members

Sivuyisiwe Mbede

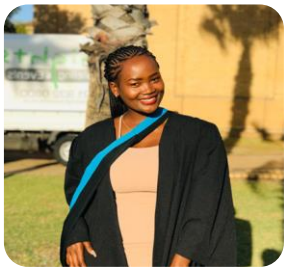
- A member if the NRF – SAEON Egagasini node Monitoring team. A programme of the Science Engagement portfolio.

NRF – SAASTA Volunteer

DSI – Ntional Youth Service Programme - 2020

Hosted by the NRF – SAEON Egagasini

Interacting with educators during a teacher workshop.



CPUT Marine Science Diploma and Advance Diploma Graduate

Attended the DSI budget Vote and exhibited for NRF – SAEON

Part of the NRF Science Engagement

Currently studying BSc Hon in Oceanography at UCT and supervised by Prof Juliet Hermes

Pozisa Nqenqa

As a NRF-SAEON Kid entered Cape Town Eskom Expo for young Scientist and a Bronze medal winner

Studied and Completed Diploma in Marine Science with CPUT - 2020

Currently a SAASTA Volunteer hosted by the NRF – SAEON Egagasini Node

Environmental Science Education Programme

- Joseph Duda -

- Grade 12
- Sophumelela High School
- SAEON Kid / School based monitoring Team
- Project: Determine the distribution of plankton from offshore to inshore

Thank you!!

Thomas Mtontsi
Science Engagement
NRF – SAEON Egagasini Node
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