



SEYCHELLES' CONSERVATION
AND CLIMATE ADAPTATION
TRUST

SeyCCAT

"Investing in Seychelles' blue future"

SeyCCAT and Nekton are pleased to announce a special partnership and a Request for Research Proposals (RFRP)

The Deep Blue Grants Fund!

Our partnership provides a mechanism to fund **Seychellois researchers** to conduct innovative deep-sea research in Seychelles.

The aim of the Nekton Oxford Deep Ocean Research Institute ('Nekton') is to create a step-change in knowledge and understanding of the deep ocean to accelerate its sustainable governance. Nekton is an independent, not-for-profit scientific research institute based in Oxford and a UK registered charity.

Nekton's Indian Ocean Mission is a major global scientific collaboration and consists of multiple research cruises in distinct bioregions of the Indian Ocean. The first expedition is in Seychelles in 2019 and further expedition locations are being considered. The Mission combines four major activities – scientific research, capacity development, ocean governance and public engagement and ocean literacy - to deliver the greatest coordinated impact. The Mission will conclude with a State of the Indian Ocean Summit in April 2022.

The Seychelles Nekton Deep Ocean Expedition is a partnership between Seychelles and Nekton to undertake pioneering research, capacity development and public engagement to support the implementation of Seychelles Marine Spatial Plan (including 30% protection of the EEZ) and the sustainable development of the Blue Economy.

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The expedition will take place in March and April 2019 and consist of three distinct Legs. Leg 1 of the expedition is to Farquhar Islands; Leg 2 is to Aldabra, Leg 3 is to Amirantes. The expedition goals have been co-produced, in locations jointly agreed at a recent stakeholder workshop. Please see further details of science questions, expedition locations and timings in the Appendix below.

To learn more about Nekton please visit [www.nektonmission.org]

For this special Deep Blue Grants Fund research focussed call, we are seeking projects that align with either of the following strategic objectives.

- **Strategic Objective 1:** Support new and existing marine and coastal protected areas and sustainable use zones.
- **Strategic Objective 2:** Empower the fisheries sector with robust science and knowhow to improve governance, sustainability, value, and market options.

Successful projects proposals will need to meet one or more of the following criteria specified by Nekton:

- Include a training element to develop capacity in Seychelles for enhanced marine research or monitoring;
- Include a research question or survey approach which could be applied on a national or regional scale to provide additional data for policy and management decisions;
- Include collaboration with one or more Seychelles Nekton expedition scientists;
- Incorporate Nekton approaches or tools, such as GOSSIP (the General Ocean Survey and Sampling Iterative Protocol) and OCTOPUS (the Ocean Tool for Public Understanding and Science). For further details of these tools see the Appendix below.

The current expectation is that SeyCCAT and Nekton will award between four - six Seychelles research projects (maximum US\$ 20,000 / SCR 250,000 each) – to a maximum value of US\$ 80,000 / SCR 1M.

PLUS: One exceptional Seychellois researcher could also be awarded a new AFOX Marine Science fellowship to study in Oxford!

<http://www.afox.ox.ac.uk/afox-visiting-fellowships/>

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Grant Conditions/ Assumptions:

- Costs of being aboard the Seychelles Nekton expedition vessel at sea, where relevant, are covered and need not be applied for;
- Travel arrangements and associated costs for Seychellois participants to join and leave the expedition vessel are under discussion and subject to agreement. *Until these arrangements are finalised the possibility remains that costs of joining the vessel may not be covered.*
- Costs of participating in the expedition taxonomic workshop, where relevant, are also covered and need not be applied for;
- Participation in the expedition at sea is not necessary in applying for a grant;
- If participation in the expedition is part of the proposed research project / grant activity, participation is to be aligned with one of the three legs listed in the Appendix.
- Curation costs for specimens collected during the expedition will be addressed separately and are not covered under this grant call;
- Preparation of a project report and public presentation of project outcomes at an appropriate national forum/event is a requirement; and,
- All research findings and data arising from supported projects will be made available open access unless otherwise determined by MEECC, SeyCCAT and Nekton.

Apply for SeyCCAT Deep Blue Grants Research Funding now:

Each award (between four to six research projects will be funded) will be to a **maximum of US\$ 20,000/SR 250,000 each**. Please ensure you budget your project proposal accurately.

We will accept Deep Blue Grants Research Fund applications from individual Seychellois researchers. We require project proposers to have legally existed and operated in Seychelles for a minimum of one year.

Timeline:

- Deadline: submit projects through to **18th January 2019** – no later than 5PM Seychelles time.
- Successful applicants will be informed by **1st February 2019** to give time to prepare for their leg of the expedition. Leg 1 of the expedition is to Farquhar Islands; Leg 2 is to Aldabra, Leg 3 is to Amirantes, with dates given in the Appendix below.

Download the **Deep Blue Grants Fund** concept template from our website (<https://seyccat.org/what-we-do/#how-to-apply>)

Or submit a message to info@seyccat.org **AND** belinda@nektonmission.org to request the application information.

Or call us on: [432 5806](tel:4325806).

We look forward to receiving your proposal!

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Science Plan

Patterns of biodiversity across geography and depth within the Indian Ocean

November 16th 2018

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1. BACKGROUND TO THE MISSION

Nekton

Established in 2015, Nekton's objective is to catalyse our scientific understanding of the ocean and its sustainable governance. Nekton Oxford Deep Ocean Research Institute ('Nekton') is an independent, not-for-profit research institute working in collaboration with the University of Oxford and is a UK-registered charity. Nekton operates across two major areas:

- **Innovations** including **OCTOPUS**, the Ocean Tool for Public Understanding and Science - a global ocean data portal, and GOSSIP (<https://octopus.zoo.ox.ac.uk/beta/>) - the first multidisciplinary marine research protocol.
- **Missions**: 1: NW Atlantic 2016-2018, 2: Weddell Sea 2019, 3. First Descent: Indian Ocean 2019-2022.

The expedition for Mission I was in 2016 to the W Atlantic Ocean and its main objectives were to investigate the state of the deep ocean around Bermuda, Sargasso Sea and the NW Atlantic and create a new standardised methodology for marine scientists around the world to assess the function, health and resilience of the deep

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ocean. This protocol (The General Ocean Survey & Sampling Iterative Protocol '**GOSSIP**': http://www.tos.org/oceanography/assets/docs/30-3_woodall.pdf) was amended by a group of internationally renowned scientists and is now published in the peer-reviewed journal '*Oceanography*' as an open-access article: Woodall et al (2018). Mission I has already led to eight published peer-reviewed papers, discovery of new species of algae, black coral and meiofauna crustaceans, the release of submarine STEM education programmes for 7-11 and 11-14 year olds, a mission reach of 750 million people globally and catalysed a number of policy related activities within the host nation and internationally.

2. SYNOPSIS

Mission II is a multidisciplinary collaborative research program that aims to explore the Indian Ocean from the surface to 500 m deep, in order to improve our understanding of the patterns of biodiversity, their environmental drivers and the impacts of human activities on these ecosystems. The Seychelles expedition is a co-produced project that has engaged with stakeholders over the last year. Many meetings (physical and remote) have been conducted, and in addition a science planning workshop was held with interested parties (16-17th October 2018). This will be the first of a multi-location mission within the region, thereby we will not only be documenting the marine ecosystems of Seychelles and their drivers, but will also investigate the connectivity of them between areas across the Indian Ocean. This is the first time in the Indian Ocean that this resolution of sampling effort will have occurred at the focal depths, and is therefore internationally important. The expedition will collect data on the benthos, demersal fish and zooplankton communities providing data that will be invaluable for scientists, policy makers and managers alike. The data from this research program will be shared with participants and stakeholders. In recognition that some data sets may be sensitive, the Ministry of Environment, Energy and Climate Change have been asked if they will determine which data sets can be available for open access. Reports and papers will be disseminated as joint peer-reviewed publications, and additionally information will be curated into actionable data sets and feed into the marine spatial planning of Seychelles.

3. EXPEDITION SPECIFICS

Geographic coverage

Nekton will undertake a research cruise within March and April 2019 around Seychelles, with post-expedition analysis continuing through 2021. The current working voyage plan is given below (Fig. 1), but this may change due to weather or other logistical constraints. The four locations are Farquhar group, Aldabra group 1 and 2 and Amirantes/Alphonse. At each of the locations, 5-7 sites have been identified, but only three locations and three sites within each location are planned to be visited during the expedition due to the time available at sea.

Locations were chosen by drawing up a shortlist from stakeholders using a pre-workshop survey and from participants at the workshop discussions. A number of criteria were presented to stakeholder group in order to make this decision (Table 1). The sites were chosen with specific regard to bathymetry, prevailing wind, previous research, stakeholders input and logistical considerations after consultation with stakeholders. These sites were circulated and agreed by members of the MSP process as a shortlist, and are given as Table 2.

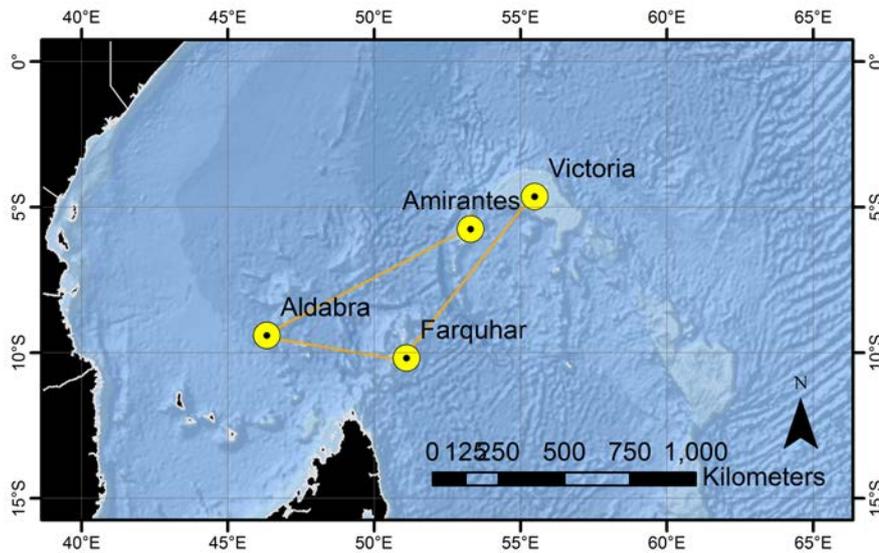


Figure 1: A map showing the survey locations (Farquhar group, Aldabra group 1 and 2 – here shown for ease as Aldabra - and Amirantes/Alphonse) and the location for mobilisation/demobilisation (Victoria). The line indicates the indicative voyage plan.

| Scoring Criteria | Score | Criteria details |
|------------------|--------|--|
| Discovery | 1 to 5 | Likelihood of improved understanding of marine ecosystems |
| Human | 1 to 5 | Likelihood of encountering human impacts on the ocean |
| Local | 1 to 5 | Likelihood of furthering local research and benefit |
| Content | 1 to 5 | Likelihood of generating quality content to amplify ocean literacy and prioritisation |
| Location | 1 to 5 | Likelihood of productive location (partnerships, geography, transit time, topography, risk of inclement weather) |

Table 1: Criteria that were used to determine priority location.

| Date (indicative) | Location | Activity | Site i/d | Description | Position |
|----------------------------|-----------------------------|----------------------------|--------------|---------------------|---------------------------------|
| 1- March 2019 | Victoria, Seychelles | Mobilisation | Mobilisation | | |
| 1-3 March 2019 | Victoria – Farquhar Islands | Transit | | | |
| 3-14 March (12 days) | LEG 1: Farquhar Islands | Science / Media / Partners | Far NI1 | North Island | 080° half way down |
| | | | Far NI2 | North Island | 110° near Manaha Island |
| | | | Far SI1 | South Island | 120° N end of island |
| | | | Pro I1 | Providence Island | 270° S of anchorage |
| | | | Pro B1 | Providence Bank | 290° S of anchorage |
| | | | Pro SP1 | Saint Pierre Island | 050° (but any bearing looks OK) |
| 15 March 1 day | Farquhar-Aldabra | Transit | | | |
| 16-22 March (7 days) | LEG 2: Aldabra | Partner Event | TBD | | |
| 23 March-2 April (11 days) | | Science / Media / Partners | Ald S1 | Aldabra Island | 180° west end * |
| | | | Ald S2 | Aldabra Island | 170° middle of island * |
| | | | Ald S3 | Aldabra Island | 150° east end * |
| | | | Ass E1 | Assumption | 100° middle of island |
| | | | Ass W1 | Assumption | 290° middle of island |
| | | | Cos M1 | Menai | 340° at N end of island |
| | | | Cos IN1 | Ile du Nord | 320° middle of island |
| | | | Cos IN2 | Ile Nord-Est | 040° S middle of island |
| | | | Cos GP1 | Grand Polyte | 090° south end |
| | | | Ast E1 | Astove | 040° middle of island |
| Ast W1 | Astove | 300° S middle of island | | | |
| 3-4 April (2 days) | Aldabra to Amirantes | Transit | | | |
| 5-16 April (12 days) | LEG 3: Amirantes | Science / Media / Partners | DeR W1 | Des Roches | 190° west end |
| | | | Poi E1 | Poivre /Ile du Sud | 090° N of Ile du Sud |
| | | | MaL NE1 | Marie Louise | 120° west side |
| | | | Den NE1 | Desnoeufs | 120° west side |
| | | | Alp W1 | Alphonse | 280° west side |
| | | | Alp N1 | Alphonse | 030° north side |
| 17-18 April | Amirantes to Victoria | Transit | | | |
| 18 April | Victoria | Demobilisation | | | |

* Correspond to SIF monitoring sites 8 and 12 on the south side and site 3 on the north.

Table 2: List of proposed survey sites within the four locations chosen for exploration.

Equipment and deployments

Aboard the vessel the follow equipment will be deployed, and further equipment may be accommodated.

- 2 X 300 m Triton submersibles
- 1 X 500 m Remote Operated Vehicle (ROV)
- 1 X Multibeam system
- Multinet
- Neuston net

Scientific framework

Benthic and demersal biodiversity.

To date there are no benthic biological data from the surface to 500 m depth from anywhere in the Indian Ocean. As with all locations the records for biodiversity in Seychelles increase in line with sampling and survey effort, (e.g. six new records of fish in D'Arros from SCUBA surveys; Daly et al, 2018). Currently, much of the focus of benthic surveys have been within SCUBA depths and often around the Inner Islands (but see monitoring data given in Gudka 2018, and cruises of *Nansen* Groeneveld & Koranteng, 2017). In order to understand the patterns of biodiversity and how these change with location and depth we will use video data collected from transects taken at each depth contour from SCUBA teams, submersibles and the ROV, and ground truth observations with specimens collected. Transects will be 20 mins long at 0.2 knots, and triplicate transects will be run at each depth. At 30 and 300 m, where equipment types changes, additional transects will be run to ensure comparison between gear types. Transect surveys will be recorded using stereo and single camera systems with lights and lasers to make a full inventory of fish and benthos. In addition, at specific locations there will be photo mosaic surveys to capture detailed benthic habitat data such as rugosity. All specimens will be collected via divers or manipulators arms (Fig. 2) and will be specifically sampled to avoid damage to neighbouring organisms.



Figure 2: A Hydrolek 6-Function Manipulator arm and sample basket on the front of the submersible Nemo.

Pelagic community composition and diurnal/nocturnal vertical migration of zooplankton faunas.

Zooplankton communities from coastal waters are poorly described and previous studies around Seychelles have been limited to those of chaetognaths (Furnestin and Ducret, 1976), copepods (Marques, 1976) and hydromedusae (Bouillon, 1978), and a more comprehensive survey of the eastern waters (Gallienne et al, 2004). No additional zooplankton studies from around the Outer Islands have been found. Therefore, the stratified design proposed here to sample these organisms will greatly add to the currently existing data. A multinet and neuston net will each be deployed at each site to assess the zooplankton communities. Three replicates day and night (six total) will be collected by neuston net using a 20 min deployment with the vessel moving at 0.5 knots. In addition, a multinet will be deployed at each site during the day. The actual depths sampled by multinet will be adaptive to account for the depth of the deep scattering layer (DSL), and the DSL will be assessed using the ADCP. Moreover, gelatinous taxa will be quantitatively assessed using a 'jelly quadrat'. This will demark a cube of water so that abundance measures can be made from submersible and ROV descents and ascents.

Assess the environmental drivers of biological communities.

Environmental data from Seychelles waters appears limited, although data is known from external agencies such as NOAA (pers. corr. UniSey) and from remote sensing (e.g. McClanahan et al, 2007). For the current expedition sensors for environmental parameters will include light, salinity, depth, temperature and could include oxygen and pH. These will be fitted to the SCUBA teams, submersibles and ROV during deployments. In addition,

parameters such as oxygen, pH, chlorophyll and macronutrients could be measured by sampling water at specific depths via niskin bottles or similar water collection devices. The shape of the seafloor will be mapped by multi-beam and the direction and amplitude of the currents will be documented via the ADCP unit. Together these provide a comprehensive set of chemical and physical parameters that will be assessed as environmental drivers.

Document human activities and their impacts on the ocean.

Although some islands are remote, Seychelles is not without the impacts of human activities. For example, it has suffered a number of coral bleaching events, most notably 1998 with 75-90% live coral cover loss to Inner Islands (Harris et al, 2014) and 'significant effects' to Outer Islands coral ecosystems (Graham et al, 2007), with further bleaching to Inner and Outer Islands in 2016 (Bijoux et al 2017). In addition, anthropogenic debris has been reported as washing up on the beaches of the Outer Islands (Duhec et al, 2015), and projects such as the Aldabra Clean-Up Project (SIF, 2018) have been initiated to reflect this challenge. Finally the impacts of fishing have been documented for decades (Jennings et al, 1995), as have the consequences of fisheries related gear such as drifting FADs (Balderson and Martin, 2015). The video transects collected using the SCUBA team, submersibles and ROV will be screened for signs of human activity e.g. litter/ ghost fishing gear, coral bleaching and fishing marks. In addition any activities witnessed during the expedition will be documented (e.g. fishing, vessels transiting). These data will be combined with the environmental drivers and biological data in a multivariate analysis to assess impacts of human activities on the environment.

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