



MASTS-SFC Saltire Emerging Researcher Scheme (MASTS-SERS)

Final Report

MASTS in association with the Scottish Funding Council supported the Saltire Emerging Researcher Scheme, which represented an important and exciting opportunity for Post Graduate Researchers (PGR) and Early Career Researchers (ECR) to engage in substantive collaboration with colleagues from Europe (EA, EEA and EFTA countries).

The scheme aimed to promote mobility between Scotland and European research partners with the aim of strengthening existing, and seeding future, research relationships. Participants are expected to demonstrate the impact of their exchange through the publication of novel research work, the formation of new collaborations and project/funding submissions, and the dissemination of their results.

As your exchange has now come to a close, we ask that you reflect on the exchanges and provide a report by filling in the form below. The reports will need to demonstrate the potential benefits of the grant for both the recipient and their collaborators. Please return this within four weeks of completing your exchanges to masts@st-andrews.ac.uk. When you do so, you are agreeing that your answers may be used to promote the activities of MASTS, including being used on the website and social media channels.

Please note that MASTS may also contact you, the participants, and/or your supervisors to gather additional post-exchange impact information. This information must be provided on request.

Contact information

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Host name	CUFR Mayotte
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Exchange overview

Title	Genetic mechanisms for acclimation and adaption to coral bleaching
Start date	01/03/2022
End date	01/08/2022
Project location(s)	Mayotte, FRANCE

Abstract (max 300 words)

Provide a brief summary of the exchange using language accessible to a non-specialist. Describe what the exchange objectives were, the activities that were carried out, and the subsequent outcomes. This may be published on the MASTS website.

This project aimed to carry an extensive collection of coral tissues across 5 sites during 4 months. In total 15 coral colonies per site were tagged (GPS) for the collection. The goal is to determine the effect of coral bleaching on the genetic aspect of the coral in Mayotte.

Coral bleaching is the loss of symbiotic algae (*Symbiodiniaceae*) from the coral – these algae provide 90% of the coral's energy, so without them the coral starves to death. Bleaching is triggered by environmental stressors including pollution, freshwater runoff from land and disease, but thermal triggers are the most significant cause of widespread coral bleaching (Kamenos & Hennige 2018; Schoepf et al 2020).

However, sub-lethal bleaching – where the coral bleaches but recovers – may act as a ‘safety valve’ that allows corals to survive periods of thermal stress (Suggett & Smith 2011). We know that corals that survive repopulate with different *Symbiodiniaceae* communities to those they hosted pre-bleaching (Kemp et al., 2014) – this change in *Symbiodiniaceae* community structure may be crucial in enabling acclimation and adaptation to ocean warming. Understanding coral-*Symbiodiniaceae* dynamics over time is critical for predicting how corals will cope in the future as temperatures continue to warm.

During this exchange I carried a complete fieldwork campaign with coral tagging with GPS, followed by coral tissue sampling using a syringe in order to lower the impact of our sampling on the coral colonies.

Next steps of this project will rely on the DNA extraction of the samples, their sequencing and analysis in order to answer our questions.

Impact (max 600 words)

Please demonstrate the impact of your exchange from your perspective, and that of your exchange partner. Describe what the wider benefits of the exchange were to you as participant, your own and host institutions, and the wider community.

This exchange had a significant impact on several aspects.

On the professional aspect, this exchange provided me the knowledge and unique skill set to continue my early career researcher. I had the occasion to learn, collaborate with talented, passionate researchers in Mayotte. This exchange also helped me to understand how to plan fieldwork under difficult and unpredictable conditions such as underdeveloped infrastructure (roadnet in small island, collapsed road,...) and difficult weather conditions (monsoon and windy season in tropical regions). I had the occasion to increase my knowledge of the coral reefs diversity and threats around them in Mayotte as I could observe on field the phenomenon of coral bleaching, get a global overview of how coral reefs are structured in Mayotte.

As person this exchange allowed me to continue to develop my openness to people and to other culture.

For the host institution, this exchange allowed us to develop a good relationship as we planned to collaborate together on other research projects in Mayotte.

By partnering with the University of Mayotte, I have a direct route for (1) ensuring the research outcomes will influence local, national and Indian Ocean-wide coral reef management and (2) enabling local community engagement throughout the project. This project therefore directly addressed four of Scotland's National Outcomes: Education, Environment, Communities and International, which in turn directly contribute to the challenges identified by the UN Sustainable Development Goals including ocean conservation (Goal 14), climate change (Goal 13) and global partnerships (Goal 17).

Outputs (max 300 words)

Has this exchange resulted in clear outputs, such as the generation of a proposal, research results, or publication? Please provide brief details here. Do any of these outputs have relevance to larger programmes such as the UN SDGs, Blue Economy Action Plan etc?¹

This exchange focussed on the collection of samples in the region of Mayotte. This allowed us to do an extensive field sampling of coral tissue on 75 colonies across 5 sampling sites in Mayotte over a 4 months period (1 sampling session/month). In total 300 coral tissue samples were collected. This 4 months sampling was carried during the bleaching season in order to observe and quantify the effect of bleaching on the genetics variation within coral symbiosis. The next step of this project will focus on the DNA extraction of these samples to study the variation of the symbiotic community within corals over space (5 sampling sites) and time (4 months sampling). Once this step is done the sequencing of the DNA and their bioinformatics analysis will take over to answer the questions of our project. This step will be carry within Glasgow Polyomics Institute.

The Future (max 300 words)

How do you plan to ensure a sustainable collaboration in the longer-term and maximise opportunities and impact in the future? How will you carry forward the benefits now the exchange has been completed? Please outline five concrete plans for future collaboration as a result of your exchange.

This exchange offered me the opportunity to collaborate with other scientists and learn from them.

Mayotte and Glasgow scientists are particularly well-placed to now lead a multidisciplinary prong enabling world-leading inference (i.e. the combination of scleronological, physiological and bioinformatic approaches). We have implemented several objectives for the future with Mayotte scientists.

Plans for future collaboration from the exchange:

Development of monitoring project with Mayotte Marine Reserve

Multi-annual coral sampling campaign with the University of Mayotte

Writing of publication associated with Mayotte scientists

¹ All successful applicants will be expected to represent, promote and formally acknowledge the sponsors (MASTS, SFC & Scottish Government) during the course of their project and in any subsequent related outputs. All research outputs and any material used publicly must carry the funders' logos. The following acknowledgement should be used in all publications resulting from this funding. ["This work received funding from the Scottish Funding Council Saltire Emerging Researcher Scheme and the MASTS pooling initiative (The Marine Alliance for Science and Technology for Scotland) and their support is gratefully acknowledged. MASTS is funded by the Scottish Funding Council (grant reference HR09011) and contributing institutions"]

Collaboration with other international scientists also working on Mayotte's coral reefs
Writing of poster presentation for conferences

Any further comments (max 500 words)

Please use this space to provide any additional comments. These may include, but are not limited to; what you would do differently if you could take the exchange again; what contingency measures you had to use (if any); details of any unexpected benefits or problems; any significant variations in costs;

On a short notice, I would probably pay more attention on the costs of accommodation in Mayotte, as it is small island, the rental price is higher than in Europe. Living costs are also higher compare to Europe, on average 30% more expensive. This aspect could be quite problematic if it is not taken in consideration.

Final expense report

Item Number	Description	Cost per Unit	Number of Units	Total Amount (£)
1	Return economy flights x1: Glasgow to Dzaoudzi (Mayotte)	£401,87	1	£401,87
2	Accommodation: 6 months in Dembeni (Mayotte)	£166,67	6	£1000
3	Subsistence: 6 months in Dembeni (Mayotte)	£425,59	6	£2553,56
4				
Add more rows if needed				
Total				£3955,43
In-kind contributions				
	SCUBA facilities (equipments, vessels)	£300	10	£3000
	Scientific and technical field support (samples collection and preparation)	£100	10	£1000

	Laboratory access The Centre Universitaire de Formation et de Recherche de Mayotte (University of Mayotte)	£500	6 (months)	£3000
In-cash contributions				
	Frontiers in Marine Science (journal) workshop funding on coral bleaching	£15000	1	£15000
Grand Total (Total requested from scheme + In-kind + Cash)				£25955,43