

Darwin Plus: Overseas Territories Environment and Climate Fund Annual Report

To be completed with reference to the "Writing a Darwin/IWT Report" Information Note: (<https://dplus.darwininitiative.org.uk/resources/reporting-forms-change-request-forms-and-terms-and-conditions/>). It is expected that this report will be a maximum of 20 pages in length, excluding annexes)

Submission Deadline: 30th April 2021

Darwin Plus Project Information

Project reference	DPR7P\100059
Project title	DPLUS100: Sustainable solutions for Sargassum inundations in Turks & Caicos 2019-2021
Territory(ies)	Turks & Caicos
Lead organisation	University of Greenwich
Partner institutions	The Turks and Caicos Island Government (TCIG) Department of Environment and Coastal Resources; The School for Field Studies, Centre for Marine Resource Studies, South Caicos; The Chartered Institute of Ecology and Environmental Management (CIEEM) UK Overseas Territories Special Interest Group (OTSIG).
Grant value	£94,618.00
Start/end dates of project	1/4/2019 – 30/9/2021 (note suspension 1/4/2020-30/9/2020)
Reporting period (e.g. Apr 2020-Mar 2021) and number (e.g. Annual Report 1, 2)	October 2020 – March 2021 Annual Report 2
Project Leader name	Dr Debbie Bartlett
Project website/blog/social media	
Report author(s) and date	Dr Debbie Bartlett

1. Project summary

The overall impact the project intends to achieve is that the macro-algae beach deposits have been assessed from environmental and socio-economic perspectives and the feasibility of viable, sustainable, management strategies benefiting the natural environment and reducing dependence on oil evaluated.

The situation leading to the drafting of this project is best described with reference to the text in the original application and relevant extracts are reproduced below in italics.

Sargassum drift on the beaches of Turks & Caicos is detrimental to the tourist-based economy.

This investigation of the issue will involve students/citizen scientists in assessing the extent and composition of macroalgae on the shoreline contributing to finding a solution while promoting biodiversity/environmental awareness.

The feasibility for exploiting the macroalgae, specifically the potential for anaerobic digestion for biogas and composting as an alternative to disposal as waste will be explored; this could reduce current dependence on oil as a fuel (Q12 in submission).

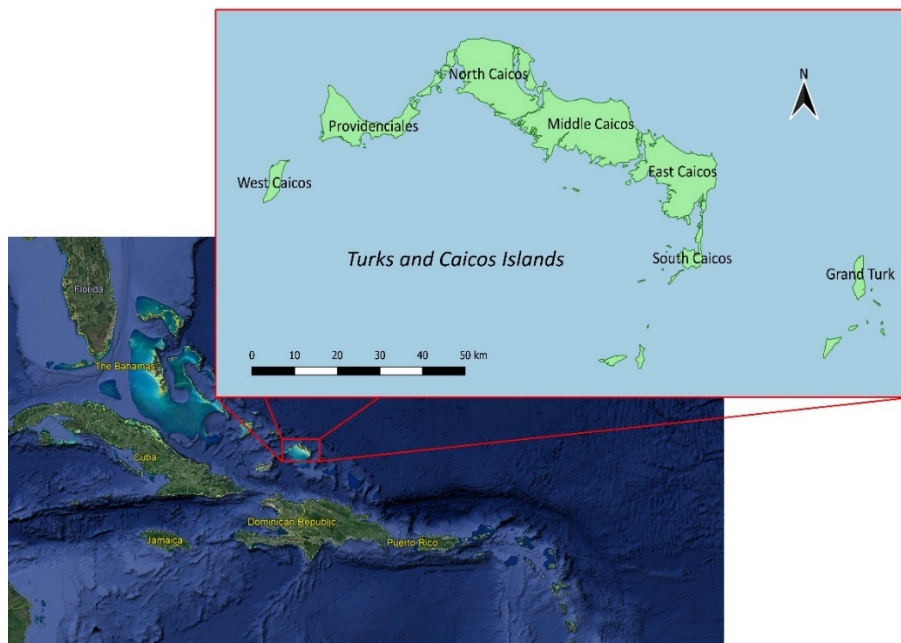


Figure 1 Showing the location of the Turks and Caicos Islands in the Caribbean Sea

The Turks and Caicos Island Government recognises the Sargassum invasion and negative impacts on tourism – the most economically important industry – fishing and socio-economic development. Several stakeholder meetings have been held on this issue with consensus sustainable management is needed.

The Environment Charter (2001) policy #7 is "to safeguard and restore native species, habitats and landscape features, and control or eradicate invasive species", As Sargassum is considered an invasive species threatening the biodiversity and sustainability of the TCI marine environment, potential solutions are required. This is reinforced by the National Tourism Strategy and Policy (2015), acknowledges that natural environment protection must be at the core tourism development.

Turks and Caicos is almost 100% reliant on imported fossil fuel, leaving it vulnerable to global oil price fluctuations. Processing Sargassum for energy generation is consistent with TCI Energy Policy (draft, 2017) to "promote the implementation of economically viable renewable energy, that will reduce the TCI's dependency on imported fossil fuels. It further states that greater use of economically viable renewable energy technologies that would stabilize the cost of electricity service in the TCI, and increase sustainability" (Q13 in submission).

2. Project stakeholders/partners

The bid was developed as a partnership with active collaboration and in response to demand from the host territory, as demonstrated in the partnership statement in the application form and included below.

Department of Environment and Coastal Resources (DECR) Ministry of Tourism, Environment, Heritage, Maritime and Gaming (MTEHMG) Turks and Caicos Islands Government The Turks and Caicos Island Government (TCIG) Department of Environment and Coastal Resources have put together a team consisting of seven officers, spread across the different islands, to deliver this project on the ground. The team members, with their respective roles are listed and CVs demonstrating competence have been provided. The TCIG team have local experience and capacity to conduct the fieldwork necessary to provide information for the impact assessment and have strong links with local communities that will enable them to engage stakeholders, including teachers, students and citizen scientists, to engage in long term coastal survey and monitoring activities. The project will be overseen at the highest level by Lormeka Williams, Acting Director, with day to day supervision of activities the responsibility of Dr Eric Salamanca, Deputy Director. It is the latter who will be

responsible for liaising directly with the PI and producing quarterly reports of progress including evidence to draw down budget as appropriate.

DECR made commitments in the application with respect to staff time that would be committed to the project and the roles and responsibilities, however information was provided in the previous annual report, covering year 1 of this project, regarding difficulties in engaging with DECR once the project was approved. There have since been several staff changes, with Dr Eric Salamanca being replaced by an interim acting Deputy Director, Bryan Naqqui Manco, and Tyanne Henry taking over the role of project liaison. However, TCI seems to have been functioning under strict Covid-19 restrictions, including curfews, that have effectively preventing engagement over the last year.

The School for Field (SFS), a partner originally making in kind contributions, offering accommodation while the University of Greenwich team were on South Caicos, has had significantly greater involvement over the last six months. The installation of a freeze drier at the School (agreed in a Change Request) has enabled them to collect samples while monitoring deposition at Shark Bay, South Caicos, and send freeze dried samples to the University of Greenwich for analysis. This has not been without problems, due to the restrictions and curfews, and SFS has had no students over the period covered by this report but only a skeleton staff severely limiting activity.

Wider stakeholder engagement has been highly successful with this project linking to Caribbean wide initiatives on Sargassum. Both Prof Debbie Bartlett and Dr John Milledge have been contacted by many others working on Sargassum around the world and have presented at conferences and taken part in podcasts, all raising awareness of this project.

3. Project progress

3.1 Progress in carrying out project Activities.

Due to the Covid-19 pandemic, requiring shut down of the University laboratories and of activities on TCI from March 2020 a request was made for this project to be suspended for a 6month period. This was agreed and Year 2 started on 1st October 2020 and will end on 31st September 2021. This, the 3rd Half Year report, therefore, covers the period 1/10/20 to 31/3/21.

Final revisions to the logframe were made and agreed in December 2020 to reflect the adjustments necessitated by the pandemic and the budget revised accordingly. Reporting on progress against logframe activities is given below. Activities completed and reported on in the first annual report are greyed out.

Output 1 Integrated Ecosystem Service, Ecological/Environmental Impact and Natural Capital Assessment of the coastal zone

1.1 partner workshop & scoping exercise

1.2 Developing fieldwork protocol(s)

1.3 Field work is continuing with sample collection planned to continue until June, the latest it would be possible to complete lab analysis for th results to be written up by the end of the project in September 2021. A second visit to TCI by the University of Greenwich team and Mike Barker, consultant ecologist from the CIEEM UKOT SIG has been planned, originally for summer 2020 and then summer 2021 but it seems highly unlikely that this will now happen.

1.4 Collation of data/information. Data on the impact of Sargassum on tourism-based businesses on TCI was completed in year 1. The intention was to build on this collecting data on the impact on biodiversity, both of the inundations and of removal, during a second visit; this not seems highly unlikely to be possible.

1.5 Report drafting: two MSc thesis were completed in the first year with summary posters displayed at conferences and circulated. These will form the basis of the final report.

1.6 Collaboration with partners on draft report – this is planned for the next project period

1.7 Contribution to Final Natural Capital report – this refers to another Darwin+ project in TCI looking at Marine Spatial planning. The PI has attended online workshops for the Marine Spatial Planning project (September 29th & 30th and October 6th & 7th, from 9am – 12:30pm TCI time) during which a presentation on the DPLUS100 project and potential synergy between the two projects was given. Comments have also been submitted on the Workshop Report (circulated

13/12/21), the Data Gap Analysis from the MSP TCI Workshop Sept - Oct 2020 report (circulated 5/2/21; response submitted 8/2/21)

1.8 Raising awareness of the Caribbean wide Epicollect5 sargassum monitoring initiative. Engagement with the wider Sargassum community is ongoing and has involved attending and presenting at conferences, webinars, being interviewed for the Sargassum podcast as well as articles and web posts.

1.9 Ongoing shoreline survey/monitoring – this is ongoing despite disruptions over the last year due to on island Covid-19 restrictions and curfews, combined with lack of students at SFS, meaning this has fallen to SFS staff members alone.

Output 2 Education and awareness raising

2.1 Engaging students in field work

2.2 MSc students contributing background material/literature review

2.3 Developing educational materials

2.4 Workshops for teachers and students on South Caicos

2.5 Evaluation of material relevance to other OTs. The Identification sheets have been widely circulated. The PI has been in discussion with marinefronter.org, an organisation active in the Caribbean, involved in hosting the Sargassum podcast and publisher of school textbooks in indigenous/local languages.

2.6 Engagement with local/national press and media

Output 3 Characterisation of Sargassum spp

3.1 Development & testing of a collection protocol

3.2 Collection & dispatch of samples to the UK – substantially completed with further samples expected up till June

3.3 Characterise the Sargassum arriving at the beach – lab analyses are ongoing but have experienced periods of disruption when University laboratories were closed during periods of Covid-19 restrictions.

3.4 Assess the seasonal variability of Sargassum and effects of weather and time – it has not proved possible to carry out monitoring at more than one site and this has not been consistent due to Covid-19 restrictions and lack of students at SFS

3.5 Establish experimental methane potential of fresh and dried beach-cast Sargassum lab analyses are ongoing but have experienced periods of disruption when University laboratories were closed during periods of Covid-19 restrictions.

Output 4 Dissemination

4.1 Distribution of educational materials to other OTs – the Identification Sheets produced in year 1 have been widely distributed electronically and are widely available.

4.2 Technical report on suitability of Sargassum for potential biorefining biogas production and Management Options Appraisal for other uses – this will be completed at the end of the project as laboratory analysis is ongoing.

4.3 Webinar for professionals – the positive impact of Covid-19 has been the number of online conferences involving professionals on the topic of Sargassum. This project has been presented at a number with more planned.

4.4 UKOT hosted webinar – discussion has taken place with the CIEEM UKOT SIG regarding the hosting of a final webinar at the end of the project. planned for September 2021.

4.5 Open Access journal article drafting – one was completed in Year 1, none in this period but more are planned.

4.6 Conference presentation (potentially beyond the timeline). The positive impact of Covid-19 has been the number of on line conferences involving professionals on the topic of Sargassum; this project has already been presented at several and more are planned.

3.2 Progress towards project Outputs

3.2.1 Output 1: Integrated Ecosystem Service, Ecological/Environmental Impact and Natural Capital Assessment of the coastal zone. Specific focus will be on the tidal strand line and macroalgae, such as Sargassum spp, deposited as drift.

This is the output most at risk. Although fieldwork reports, including literature/historical information on macro-algae compiled in the form of 2 MSc theses and a baseline report on the impact of Sargassum on tourism related businesses were completed in year 1 (1.1) Covid-19 has had a significant impact. Lack of engagement with some partners was reported in the last Annual Report and Covid-19 restrictions in TCI combined with staff changes in DECR, and the lack of students at SFS have not helped with accessing further local data and information. Further, it is now clear that the UofG/CIEEM UKOT SIG team will not be able to visit TCI to carry out any research this summer.

In the revised logframe it was agreed that this output would be modified and that the PI would liaise with the DPLUS094 project team to see how this could contribute to the spatial planning project, approved subsequent to DPLUS100. Target date for this was 31/3/2021 and to date the PI has attended online workshops for the Marine Spatial Planning project (September 29th & 30th and October 6^h & 7th, from 9am – 12:30pm TCI time) during which a presentation on the DPLUS100 project and potential synergy between the two projects was given. Comments have also been submitted on the Workshop Report (circulated 13/12/21), the Data Gap Analysis from the MSP TCI Workshop Sept - Oct 2020 report (circulated 5/2/21; response submitted 8/2/21).

A paper on the community perspective of the Sargassum issue is in preparation and all available information will be collated into a final report but, although every effort will be made to cover the elements of this output, this will not be the report envisaged when the bid was drafted.

3.2.2 Output 2: Education and awareness raising of shoreline/coastal environment.

The first 3 indicators (2.1; 2.2; 2.3) for this output were achieved in Year 1, with evidence supplied with the Annual Report for 1/4/2019 – 31/3/2020. Indicator 2.4 is evidenced by “At least 3 local/national media reports on the project” and evidence of articles in the local paper, the ‘Times of the Island’ was provided in the first annual report. This has now been supplemented by the following:

- Article in the Guardian published on 30/6/20 and available at <https://www.theguardian.com/environment/2020/jun/30/how-do-you-deal-with-9m-tonnes-of-suffocating-seaweed-aoe>
- Presentations have been made at International conferences:
 - **Bartlett D** (2020) Sustainable solutions for Sargassum Inundations in Turks & Caicos: socio-economic and environmental aspects. Technical webinar on the Atlantic Sargassum Belt. European Algae Biomass Association 4th November 2020
 - **Milledge J** (2020) Sustainable solutions for Sargassum Inundations in Turks & Caicos: chemical characterisation. Technical webinar on the Atlantic Sargassum Belt. European Algae Biomass Association 4th November 2020
- A poster presentation was made during the UKOT Conservation Forum conference 2nd, 3rd, 9th and 10th March 2021 showing all elements of the project and requesting information on any environmental impacts observed by others on wildlife either as a result of inundations or of harvesting.
- There have been two episodes of the Sargassum Podcast focused directly on this project:
 - Episode 5 Turning Sargassum into biofuel? Dr John Milledge broadcast 1/2/21 Available at <https://anchor.fm/sargassum-podcast/episodes/Episode-5-Turning-Sargassum-into-fuel--With-Dr--John-Milledge-epmqns>
 - Episode 9 Nature based solutions and social impacts of Sargassum Prof Debbie Bartlett broadcast 1/3/21 Available at https://www.youtube.com/watch?v=wWl0bc_vXWM
- A case study on the project is featured on the Microbiology Society’s website as an example case study available at <https://microbiologysociety.org/our-work/75th-anniversary-a-sustainable-future/circular-economy/circular-economy-case-studies.html>

3.2.3 Output 3: Characterisation of macro-algae, such as *Sargassum* spp, deposited as drift to identify potential as biomass for fuel and other products.

When the project proposal was originally drafted, we were not aware that the Sargassum inundations was composed of a mix of two species and three morphotypes. After the initial samples were brought back to the UK and the initial analysis completed (reported in the 1st Annual report and the results published Milledge J J, Maneein S, Arribas López E & Bartlett D (2020) Sargassum Inundations in Turks and Caicos: Methane Potential and Proximate, Ultimate, Lipid, Amino Acid, Metal and Metalloid Analyses *Energies* 2020, 13(6), 1523; <https://doi.org/10.3390/en13061523>).

This made it clear that more samples would be required, and each batch would need to comprise 4 individual packets of freeze-dried material, one of each morphotype and one mixed as well as one beach dried, to try to ascertain whether composition is altered by weathering. Batches have been received in September 2020, October 2020, November 2020, December 2020 and February 2021, giving a total of 29 to date (3.1;3.2). At least one more batch is expected. and the final results (3.3), enabling consideration of potential commercial exploitation (3.4), will be published in the form of a scientific paper in a peer reviewed journal when the project is complete.

3.2.4 Output 4: Research outputs developed and shared with other British Overseas Territories experiencing 'golden tides'.

The Sargassum issue is now a concern across not just the British Overseas Territories but across the Caribbean and beyond. There has been an explosion of interest and activity since this project proposal was drafted. This means there have been multiple opportunities for engagement, and we are in close contact with researchers across the Caribbean via SargNet, a real benefit that was not anticipated when the application was written (it was initiated in May 2019) and ID sheets have been circulated (4.1 – 1st Annual report). The positive impact of Covid-19 and the interest in the Sargassum issue has given many opportunities to communicate information about this project to others working on different aspects and this two-way communication increases the impact of this project and we benefit from other's findings (see list in 3.2.2).

An article published in the CIEEM journal, 'In Practice', has directly linked into the UK Overseas Territories Special Interest Group discussions are underway regarding this group hosting a webinar to communicate project results in September 2021 (4.4)

It was originally envisaged in the proposal that DECR would, as part of their contribution to the project, set up and host a Sargassum Management Options Appraisal workshop towards the end of the project (4.6). It seems unlikely that this will happen, partly due to Covid-19, but Draft Sargassum Policy Guidelines for TCI have been produced and circulated for comment. The PI and SFS have both commented on this draft and the next version is expected (however it is unclear where these originated according to B Naqqi Manco, who has replaced Dr Eric Salamanca and is currently Acting Assistant Director of Research & Development).

3.3 Progress towards the project Outcome

Outcome: Students will have engaged in STEM activities and the potential for macro-algae as a biomass fuel evaluated

The Indicators relating to the project outcome are discussed individually below.

3.3.1 Monitoring of deposited sargassum has been carried out to provide data on quantity and seasonality.

It was originally envisaged that monitoring of several locations would be carried out by DECR officers on different islands and by School for Field Studies (SFS) staff and students over a 12-month period to provide data to complete by 30/6/21. Since March 2020 there have been no students and only a skeleton staff at SFS so monitoring has been restricted to one location (Shark Bay, South Caicos) and periodically interrupted due to curfews and movement restrictions. Monitoring has been carried out, but this has not been as extensive or consistent as envisaged. While the situation regarding Covid-19 is likely to improve and it is anticipated

there will be students at SFS over summer 2021 but there is no possibility of producing the kind of systematic, robust data on quantity of Sargassum arriving in TCI or determine seasonal variation in biomass intended to inform evaluation of commercial exploitation.

3.3.2 4 workshops with students have been held.

3.3.3 50 students have engaged in STEM activities including measuring and taking samples

Evidence of these activities with students was provided in the 1st Annual report, meeting these targets. Substantially more engagement with students, Over the last year Covid-19 have prevented the further achievement against this target that was anticipated, involving SFS even if there had been no further uptake of education outreach by DECR staff. It is likely that students will be involved in the collection of the final series of samples.

3.3.4 A technical report on the monitoring and collection of Sargassum

As explained above (3.3.1) this will not be as robust as planned but records have been kept and records are available to enable production of this report. Consideration is being given to whether this should be combined with other reports rather than being a standalone document.

3.4 Monitoring of assumptions

The most important assumption made was that the partners, particularly DECR who instigated this project, fully involved in drafting the proposal and who committed significant on-island staff time to carrying out the activities would actually do so. Lack of engagement may be due to staff changes and internal agendas, but this came as somewhat of a shock and that, combines with Covid-19 related restrictions has significantly affected this project.

Output 1 Assumptions: historical records – particularly regarding past levels of drift and availability of data from local partner (1.1) and that local partners would provide data (1.2). Past data did not exist, compromising setting a baseline, however anecdotal data was gathered and included in the Impact Report, completed in Year 1. The trend across the Caribbean Sea is being generated by SargNet and so this is no longer critical. Input from local partners has, in the last six months, been limited to input from SFS whose role in the project is now significantly greater than originally anticipated.

Output 2 Assumptions: engagement of local schools and colleges was to be led by the DECR Education officer. However, she appeared to be on a year long sabbatical when we visited in summer 2019 so it was not possible to establish contact. Schools on South Caicos showed interest and hosted workshops but engagement by SFS with these beyond the first year of this project has been restricted due to covid-19 (2.1). Interest from local/national media has been demonstrated (2.4 – see 3.2.2 for evidence)

Output 3 Assumption: was that suitable representative samples can be collected and transported to the UK. It was originally envisaged that these would be collected by DECR officers on the different islands, but this did not happen. A change request was made and approved to enable a freeze drier to be brought and installed at SFS enabling samples to be collected and dispatched from there. This means samples are coming from just one location so arguably not as representative as envisaged, but it has enabled a time series to characterise the material landing at a specific site (see 3.2.3 for more detail).

Output 4 Assumptions: one of the benefits of the explosion of interest in Sargassum combined with meetings and conferences moving online means that we have already had a number of opportunities to present this project at conferences and gained from interaction and exchange of information with others working on different aspects of Sargassum (4.3). It is clear that there is real interest in the final results as, although much research is being undertaken, we are best placed to carryout chemical characterisation and evaluation of viable commercial use.

The assumption related to the holding of a Management Options Appraisal workshop which required a) an appropriate forum to convene such a workshop and b) personnel in TCI available to run it. The obvious hosts would be DECR staff and if Covid-19 restrictions remain in place this would need to be virtual – with the advantage of widening participation from all the

islands. It seems unlikely that this will take place within the timeframe of this project although draft management guidelines for Sargassum have been circulated (see 3.2.4) which may result in some progress towards this output.

4. Project support to environmental and/or climate outcomes in the UKOTs

It is difficult to determine the impact of this project on the basis of work carried out to date. There is significant environmental and socio-economic impacts, both of the sargassum drift and of removing it but both are challenging to quantify and require more investigation. The Impact Report (completed in Year 1) has highlighted the complexity of the Sargassum issue, with both positive and negative attributes for both floating rafts and shoreline deposition. It was hoped that evidence of environmental impact, both of deposition and removal, would be investigated during the planned second visit to TCI in summer 2020. This was cancelled due to Covid-19 travel restrictions. A poster presentation was made during the UKOT Conservation Forum conference 2nd, 3rd, 9^h and 10th March 2021 showing all elements of the project and requesting information on any environmental impacts observed by others on wildlife either as a result of inundations or of harvesting. The environmental impact will be considered in the final report.

If the laboratory investigation reveal that it is possible to use the Sargassum to produce biogas and that this data can inform realisation of commercial biogas production, then this will have positive climate outcomes. Currently all power generation is currently derived from diesel shipped into TCI. This would be consistent with TCI Energy Policy (draft, 2017) to promote the implementation of economically viable renewable energy that will reduce the TCI's dependency on imported fossil fuels. Results will be shared via open access papers and initial results are already being shared across the area affected by Sargassum via conference/webinar and podcast presentations.

5. OPTIONAL: Consideration of gender equality issues

N/A

6. Monitoring and evaluation

Monitoring and evaluation has fallen to UofG and, as previously explained there have been issues with this project. Despite this significant progress has been made and, assuming that the request for activity to be considered as suspended until normal working can be resumed post Covid 19 and the end date moved back, we expect to deliver the outcomes in the application although some of the originally proposed activities made need to be amended.

7. Lessons learnt

The partnership has not worked in the way anticipated as the commitments made by DECR during the drafting of the proposal have not been realised. Input from DECR has been extremely limited, compromising some aspects of this project however SFS staff have stepped up and contributing significantly than their commitment in the bid document. In retrospect when the project was approved all the partners should have been asked if anything had changed, whether they still had the capacity to deliver commitments made in the application and – importantly – if they wanted to continue with the project. While a delay between submission and approval is the norm, in this instance we were told the application had been rejected with this decision later reversed. This checking process will be incorporated in future.

Considerable time was spent in the first year trying to negotiate a partnership agreement or MOU and it has not proved possible to get DECR to sign, although the other partners have done so. While the UofG standard paperwork may be considered over complex (it is drafted by lawyers to meet every eventuality) it would have been helpful to set up some kind of agreement before beginning work on this project rather than assuming that commitments made – and signed off - in the application remained valid.

Applications are always written on the basis of best available information and this is always inadequate – obvious as the requirement for more in-depth knowledge is the justification for funding. This almost always means that outputs, outcomes and activities need to be revisited and adjusted. In this case we did not know there were three different types of Sargassum requiring samples to be sorted to separate them, additional surveys to determine if the proportions of these were constant and four times the amount of lab work originally envisaged. Each morphotype has to be characterised separately and as a mixture, as this is how they arrive on the beach. A significant gap in knowledge is whether the proportions are constant or vary and the extent to which this varies across different sites and through the seasons.

8. Actions taken in response to previous reviews (if applicable)

The logframe has been revised, agreed and is attached as Appendix 2

9. Other comments on progress not covered elsewhere

The impact of Covid 19 means that the 2020 monitoring and sampling season has been compromised. The sargassum inundations seem to be seasonal with deposition increasing in June/July when travel to the islands is not possible, there are no SFS students and the UofG laboratories are closed so there can be no analysis.

While many of the activities that were to be undertaken by DECR have been picked up by SFS this means that all the monitoring and sampling is from one island, South Caicos, rather than across all of the islands. While this probably has little impact on the overall outcome it is unfortunate, particularly with respect to awareness raising. It seems unlikely that integrated educational activities (teacher workshops; guided walks) will take place and without DECR hosting the Sargassum Task Force/Management Options Appraisal this may not be realised. However this project is feeding into wider initiatives by sharing information and guidelines are being produced for the whole of the area affected by Sargassum.

10. Sustainability and legacy

The sustained legacy of this project may be best realised in conjunction with SargNet activities as there is interest from other research organisations and project across the region affected by Sargassum. When the application was drafted, it was not possible to foresee that over summer 2019 interest in Sargassum would become so widespread and high profile. There is a lot of interest in the chemical characterisation and in the results of this project are eagerly awaited by others working on finding solutions to the Sargassum issue across the affected region.

11. Darwin identity

Support from the Darwin Initiative has been explicit in all presentations at conferences, webinars, and podcasts on this project with the logo displayed.

On TCI there is widespread awareness as this programme, as it is a significant source of funding for DECR and there are a number of active Darwin projects on the island.

12. Impact of COVID-19 on project delivery

Covid-19 restrictions have affected work in the UK as during lockdown the University laboratories were closed and when they reopened priority was given to essential projects. Monitoring and sample collecting was similarly affected. The ability to freeze dry samples prior to dispatch has meant that there is not deterioration during storage, but the periods of lab closure have meant that processing – and so laboratory costs – have not been spread evenly across the claim period, affecting the allocated budget in the short term, although this will not affect final results.

The most significant additional impacts were reported in the first annual report and led to agreement for this project to be suspended for 6 months, April to October 2020.

There cancellation of travel of the UK team to TCI in summer 2020 has affected data collection for the proposed Environmental Impact Assessment Report.

Although travel restrictions will result in an underspend on the travel and subsistence budget line it is anticipated that, with restrictions easing, this will be offset to some extent by increasing the capacity for further monitoring, sample collection, and laboratory processing costs.

The advantage in the increase of virtual events to share information about the sargassum issue across the whole region affected has been a real bonus and benefit to several aspects of this project.

13. Safeguarding

Please tick this box if any safeguarding violations have occurred during this financial year.

If you have ticked the box, please ensure these are reported to ODA.safeguarding@defra.gov.uk as indicated in the T&Cs.

The University is committed to supporting and promoting the welfare of staff, students and visitors and is committed to the provision of a safe environment conducive to work, study and the enjoyment of a positive experience for all members of its community. To this end it has a comprehensive safeguarding policy available [here](#). The School for Field Studies similarly has safeguarding policies available [here](#) and both organisation conduct detailed risk assessments prior to any activities taking place.

14. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2020 – 31 March 2021)

Project spend (indicative) in this financial year	2020/21 D+ Grant (£)	2020/21 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others (Please specify)				
TOTAL				

The restrictions to activity relating to sample collection and processing have been explained in detail in the preceding sections. However there has been more activity focused on outreach and information exchange than anticipated, again explained in detail in th appropriate sections

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2020-2021 – if applicable

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
<p>Impact: The macro-algae beach deposits have been assessed from environmental and socio-economic perspectives and the feasibility of viable, sustainable, management strategies benefiting the natural environment and reducing dependence on oil evaluated</p>		<p>Ongoing – however Covid19 restrictions have prevented travel to – and within - TCI and so limited data collection, particularly on environmental impacts, and restricted determination of biomass deposition and seasonality.</p>	
<p>Outcome: Students will have engaged in STEM activities and the potential for macro-algae as a biomass fuel evaluated</p>	<p>0.1 monitoring of deposited sargassum has been carried out to provide data on quantity and seasonality</p> <p>0.2 4 workshops with students (2) have been held</p> <p>0.3 50 students have engaged in STEM activities including measuring and taking samples</p> <p>0.4 a technical report on the monitoring and collection of Sargassum</p>	<p>This is ongoing but has not been as systematic as anticipated (see 3.3.1). Affected by Covid-19 movement restrictions on TCI</p> <p>Completed in Year 1</p> <p>Completed in Year 1</p> <p>N/A</p>	<p>It will continue until June</p> <p>SFS students likely to be involved in final sample collection</p> <p>Planned by September 2021 but will not be as technical as envisage (see 3.3.4). The possibility of combining reports is being considered</p>
<p>Output 1. Integrated Ecosystem Service, Ecological/Environmental Impact and Natural Capital Assessment of the coastal zone. Specific focus will be on the tidal strand line and macroalgae, such as Sargassum spp, deposited as drift.</p>	<p>1.1 Fieldwork reports, including literature/historical information on macro-algae compiled in the form of 2 MSc theses</p> <p>1.2 Ecosystem service assessment & Ecological/Environmental Impact Assessment focusing on the socioeconomic and environmental impacts of Sargassum deposits</p>	<p>Completed in Year 1</p> <p>Covid-19 has had a significant impact. Covid-19 restrictions in TCI combined with staff changes in DECR, and the lack of students at SFS and that the UofG/CIEEM UKOT SIG team will not be able to visit TCI to gather information is likely to restrict full achievement of this output.</p>	

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
	1.3 Project report, to include evaluation of the impact of Sargassum on the marine and coastal environment Natural Capital developed from the preceding documents.	The final report will include this as far as possible with the limitations explained in 3.2.1	
Activity 1.1 partner workshop & scoping exercise		Completed – in year 1	N/A
Activity 1.2 Developing fieldwork protocol(s)		Completed – in year 1	N/A
Activity 1.3 Field work		Collection of samples substantially completed in the first 18 th months	Planned to continue with last samples due for dispatch in June
Activity 1.4 Collation of data/information		Completed – in year 1	N/A
Activity 1.5 Report drafting		2 MSc thesis completed in year 1	Final report drafting and circulation among partners for comment
Activity 1.6 collaboration with partners on draft report		N/A	Final report drafting and circulation among partners for comment
Activity 1.7 contribution to Final Natural Capital report		Collaboration in Marine Spatial Planning Workshops	There is uncertainty regarding the next steps
Activity 1.8 raising awareness of the Caribbean wide Epicollect5 sargassum monitoring initiative		Involvement with the wider Sargassum community via participation in events, conferences, webinars and podcasts	Ongoing
Activity 1.9 Ongoing shoreline survey/monitoring		Substantially completed in the first 18 th months but with periods when this was limited due to Covid-19 restrictions/curfews	Planned to continue with last monitoring planned for June
Output 2 Education and awareness raising of shoreline/coastal environment	2.1 Engagement of at least 50 students in project activities	Completed – in year 1 Completed – in year 1	

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
	<p>2.2 Recruit 2 Greenwich post graduate students to use this project for their research</p> <p>2.3 Produce identification sheets to enable identification of the different sargassum morphotypes and 1 leaflet</p> <p>2.4 At least 3 local/national media reports on the project</p>	<p>ID sheets completed in year 1; further educational materials planned</p> <p>Completed – with podcasts and web case studies as well as other media</p>	
Activity 2.1. Engaging students in field work		Completed – in year 1	N/A
Activity 2.2. MSc students contributing background material/literature review		Completed – in year 1	N/A
Activity 2.3 Developing educational materials		Completed – in year 1	N/A
Activity 2.4 Workshops for teachers and students on South Caicos		Completed as far as was possible – in year 1	N/A
Activity 2.5 Evaluation of material re relevance to other OTs		<p>The ID sheets produced in year 1 and widely circulated have obvious relevance in any area where Sargassum is washing ashore.</p> <p>The PI has been in discussion with marinefronter.org, an organisation active in the Caribbean, involved in hosting the Sargassum podcast and publisher of school textbooks in indigenous/local languages.</p>	Further collaboration, hopefully leading to production of an educational resource on Sargassum, in at least two languages, is planned.
Activity 2.6 Engagement with local/national press and media		Completed – in year 1	N/A

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
		Additional articles and webposts have been completed this year	Ongoing – any opportunity for publicity will be actioned
Output 3. Characterisation of macro-algae, such as <i>Sargassum</i> spp, deposited as drift to identify potential as biomass for fuel and other products.	<p>3.1 10 samples dispatched from Turks and Caicos</p> <p>3.2 10 samples received by University of Greenwich</p> <p>3.3 chemical characterisation completed</p> <p>3.4 experimental methane potential established</p>	<p>Completed</p> <p>Completed – more expected</p> <p>Ongoing but on target</p> <p>This will be completed at the end of the next period</p>	
Activity 3.1 Development & testing of a collection protocol		Completed – in year 1	N/A
Activity 3.2 Collection & dispatch of samples to the UK		Substantially completed but ongoing	Further samples expected up till June
Activity 3.3 Characterise the Sargassum arriving at the beach		Lab analyses are ongoing but have experienced periods of disruption when University laboratories were closed during periods of Covid-19 restrictions	Further analyses will be conducted on samples expected up till June
Activity 3.4 Assess the seasonal variability of Sargassum and effects of weather and time		It has not proved possible to carryout monitoring at more than one site, and this has not been consistent due to Covid-19 restrictions and lack of students at SFS	Monitoring will continue at least until June
Activity 3.5 Establish experimental methane potential of fresh and dried beach-cast Sargassum		Lab analyses, including for methane potential, are ongoing but have experienced periods of disruption when University laboratories were closed during periods of Covid-19 restrictions	Further analyses will be conducted on samples expected up till June

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
Output 4 Output 4 Research outputs developed and shared with other British Overseas Territories experiencing 'golden tides'.	4.1 Circulation of Identification sheets via the SargNet website and to all other projects on request, 4.2 Open access journal article on feasibility for sustainable management of macroalgae such as <i>Sargassum</i> spp. 4.3 Conference presentation 4.4 UKOT hosted webinar 4.5 Technical report on potential for sustainable end use such as biogas generation 4.6 Management Options Appraisal workshop attended by >20 people	Completed Initial article published – final results and evaluation will be completed when analysis is complete, by the end of the project Several have taken place (see 3.2.2) and more are planned Planned for September 2021 (see 3.2.4) Will be completed when lab work is completed (by September 2021) At risk of non-completion (see 3.2.4)	
Activity 4.1 Distribution of educational materials to other OTs		Completed – in year 1	N/A (although additional material is planned)
Activity 4.2 Technical report on suitability of Sargassum for potential biorefining biogas production and Management Options Appraisal for other uses		N/A	This will be completed at the end of the project as laboratory analysis is ongoing.
Activity 4.3 Webinar for professionals – OTSIG (including preparation)		the positive impact of Covid-19 has been the number of online conferences involving professionals on the topic of Sargassum. This project has been presented at several to date.	Likely to be more conference presentations in the next period
Activity 4.4 UKOT hosted webinar		N/A	Discussion has taken place with the CIEEM UKOT SIG regarding

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
			the hosting of a final webinar at the end of the project.
Activity 4.5 Open Access journal article drafting		Completed in Year 1 N/A	N/A Further papers planned
Activity 4.6 Conference presentation (potentially beyond the timeline)		The positive impact of Covid-19 has been the number of online conferences involving professionals on the topic of Sargassum; this project has already been presented at several conferences.	Likely to be more conference presentations in the next period

Annex 2: Project’s full current logframe as presented in the application form (unless changes have been agreed) - if applicable

N.B. if your application’s logframe is presented in a different format in your application, please transpose into the below template. Please feel free to contact Darwin-Projects@ltsi.co.uk if you have any questions regarding this.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: The macro-algae beach deposits have been assessed from environmental and socio-economic perspectives and the feasibility of viable, sustainable, management strategies benefiting the natural environment and reducing dependence on oil evaluated			
Outcome: Students will have engaged in STEM activities and the potential for macro-algae as a biomass fuel evaluated	1.1 monitoring of deposited sargassum has been carried out to provide data on quantity and seasonality 1.2 4 workshops with students (2) have been held 1.3 50 students have engaged in STEM activities including measuring and taking samples 0.4 a technical report on the monitoring and collection of Sargassum	0.1 ongoing monitoring of Shark Bay, South Caicos by SFS staff and students carried out for 12 months (completed by 30/6/21) 0.2 photographic records, records of student numbers 1.4 student feedback and samples submitted for characterisation (30/6/21) 0.4 report submitted (by 30/9/21)	
Output 1 Integrated Ecosystem Service, Ecological/Environmental Impact and Natural Capital Assessment of the coastal zone. Specific focus will be on the tidal strand line and macroalgae, such as Sargassum spp, deposited as drift.	1.1 Fieldwork reports, including literature/historical information on macro-algae compiled in the form of 2 MSc theses completed in year 1) 1.2 Ecosystem service assessment & Ecological/Environmental Impact Assessment focusing on the socioeconomic and environmental impacts of Sargassum deposits 1.3 Project report, to include evaluation of the impact of Sargassum on the marine. And coastal environment	1.1 2 MSc theses submitted (by 30/9/19) 1.2 Draft ESS/EcIA Report submitted to the DPLUS094 project team for comment and to identify how this could contribute to the spatial planning project as well as providing a robust evidence base to strategic environmental opportunities (by 31/3/2021) 1.3 Final project report submitted to TCIG by 30/9/2021	1.1 The availability of historical records – particularly regarding past levels of drift 1.2 Availability of data from local partners

	Natural Capital developed from the preceding documents		
Output 2 Education and awareness raising of shoreline/coastal environment	<p>2.1 Engagement of at least 50 students in project activities</p> <p>2.2 Recruit 2 Greenwich post graduate students to use this project for their research</p> <p>2.3 Produce identification sheets to enable identification of the different sargassum morphotypes and 1 leaflet</p> <p>2.4 At least 3 local/national media reports on the project</p>	<p>2.1 Photographic evidence, student projects and staff statements (30/9/21)</p> <p>2.2 Research proposals submitted and accepted as appropriate by 30/4/19</p> <p>2.3 3 ID sheets and 1 leaflet circulated to partners, approved and disseminated by 31/3/2020</p> <p>2.4 printouts, tape or video recordings submitted to PI by 31/3/21</p>	<p>2.1 Schools/colleges are interested in this project</p> <p>2.4 That there is sufficient interest from local/national media</p>
Output 3 Characterisation of macro-algae, such as <i>Sargassum</i> spp, deposited as drift to identify potential as biomass for fuel and other products.	<p>3.1 10 samples dispatched from Turks and Caicos</p> <p>3.2 10 samples received by University of Greenwich</p> <p>3.3 chemical characterisation completed</p> <p>3.4 experimental methane potential established</p>	<p>3.1 postal records</p> <p>3.2 incoming postal records (by 30/6/21)</p> <p>3.3 & 3.4 technical report submitted to TCIG (by 30/9/21)</p>	That suitable representative samples can be collected and transported to the UK
Output 4 Research outputs developed and shared with other British Overseas Territories experiencing 'golden tides'.	<p>4.1 Circulation of Identification sheets via the SargNet website and to all other projects on request,</p> <p>4.2 Open access journal article on feasibility for sustainable management of macroalgae such as <i>Sargassum</i> spp.</p> <p>4.3 Conference presentation</p>	<p>4.1 Uploaded to the SargNet website by 31/3/20</p> <p>4.2 Confirmation of acceptance by 31/3/20</p> <p>4.3 Presentation listed in proceedings and available online (4/11/20)</p>	That an appropriate conference is being help within the time frame of the project

	<p>4.4 UKOT hosted webinar</p> <p>4.5 Technical report on potential for sustainable end use such as biogas generation</p> <p>4.6 Management Options Appraisal workshop attended by >20 people</p>	<p>4.4 20 attending or viewing within two months (by 31/9/21)</p> <p>4.5 Shared via OT Government network and/or SargNet (by 30/9/21)</p> <p>4.6 Sign in sheets, photographs, and workshop report</p>	<p>That there is a) an appropriate forum to convene such a workshop and b) personnel in TCI available to run it</p>
<p>Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)</p>			
<p>Output 1 Integrated Ecosystem Service, Ecological/Environmental Impact and Natural Capital Assessment of the coastal zone</p> <p>1.1 partner workshop & scoping exercise</p> <p>1.2 Developing fieldwork protocol(s)</p> <p>1.3 Field work</p> <p>1.4 Collation of data/information</p> <p>1.5 Report drafting</p> <p>1.6 collaboration with partners on draft report</p> <p>1.7 contribution to Final Natural Capital report</p> <p>1.8 raising awareness of the Caribbean wide Epicollect5 sargassum monitoring initiative</p> <p>1.9 Ongoing shoreline survey/monitoring</p> <p>Output 2 Education and awareness raising</p> <p>2.1 Engaging students in field work</p> <p>2.2 MSc students contributing background material/literature review</p> <p>2.3 Developing educational materials</p> <p>2.4 Workshops for teachers and students on South Caicos</p> <p>2.5 Evaluation of material re relevance to other OTs</p> <p>2.6 Engagement with local/national press and media</p> <p>Output 3 Characterisation of Sargassum spp</p> <p>3.1 Development & testing of a collection protocol</p>			

- 3.2 Collection & dispatch of samples to the UK
- 3.3 Characterise the Sargassum arriving at the beach
- 3.4 Assess the seasonal variability of Sargassum and effects of weather and time
- 3.5 Establish experimental methane potential of fresh and dried beach-cast Sargassum

Output 4 Dissemination

- 4.1 Distribution of educational materials to other OTs
- 4.2 Technical report on suitability of Sargassum for potential biorefining biogas production and Management Options Appraisal for other uses
- 4.3 Webinar for professionals – OTSIG (including preparation)
- 4.4 UKOT hosted webinar
- 4.5 Open Access journal article drafting
- 4.6 Conference presentation (potentially beyond the timeline)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: .			
Outcome:			
Output 1 Add more outputs as necessary	1.1 1.2 1.3. etc.	1.1 1.2 1.3. etc.	
Output 2	2.1 2.2	2.1 2.2	
Output 3	3.1	3.1	

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)			

Annex 3 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

This may include outputs of the project, but need not necessarily include all project documentation. For example, the abstract of a conference would be adequate, as would be a summary of a thesis rather than the full document. If we feel that reviewing the full document would be useful, we will contact you again to ask for it to be submitted.

It is important, however, that you include enough evidence of project achievement to allow reassurance that the project is continuing to work towards its objectives. Evidence can be provided in many formats (photos, copies of presentations/press releases/press cuttings, publications, minutes of meetings, questionnaires, reports etc.) and you should ensure you include some of these materials to support the annual report text, ideally cross referenced in the report itself.

If you are attaching separate documents, please list them here with an Annex reference number so that we can clearly identify the correct documents.

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	
Have you involved your partners in preparation of the report and named the main contributors	
Have you completed the Project Expenditure table fully?	
Do not include claim forms or other communications with this report.	