

Country	Palau
Request ID#	2022000017
Title	Restoring damaged coral reefs in Palau with heat-tolerant corals
NDE	David Idip Senior GIS Analyst, Palau Automated Land and Resources Information System (PALARIS), Bureau of Budget and Planning Ministry of Finance Email: davididip@gmail.com
Proponent	Yimnang Golbuu CEO, Palau International Coral Reef Center Email: ygolbuu@picrc.org

Summary of the CTCN technical assistance

Coral reefs are central to the economy and livelihoods of Palau while providing risk reduction benefits. However, climate change is posing a serious threat to the survival of corals. Rise in sea surface temperature and ocean acidification as a result of climate change is causing coral bleaching events more frequent and severe.¹ Future projections also indicate that widespread coral bleaching will occur annually in Palau’s coral reefs by 2040.² This technical assistance (TA) will therefore support the deployment of heat-tolerant corals in Palau, which can address rising sea surface temperature and assist in building community resilience to climate change. The TA will also provide capacity building of Palau International Coral Reef Center (PICRC) and involve local communities as well as NGOs throughout the process, since coral reef restoration technology is still an emerging technology in Palau. The TA will be implemented for 12 months, and will include the following main activities:

- Develop a strategic coral restoration plan for Palau, responsive to climate change threats, in a consultative manner (including shorter-term/small-scale interventions, and long-term/broader-scale interventions, and corresponding monitoring framework)
- Test one technology - outplanting of heat-resisting coral fragments - to be used in the short term on 1 priority site (including the preparation of protocols, management plan and M&E monitoring, and mapping for potential scale up of this technology)
- Identification of capacity development gaps and development of a capacity building plan, including implementation of urgent capacity development flagship actions (to build capacity of PICRC and target community)

In the long run, climate financing may be leveraged to scale the technology in Palau and other Pacific Islands, while having PICRC as one of the leading institutions implementing restoration activities in the Pacific.

Agreement:

(If possible, please use electronic signatures in Microsoft Word file format)

¹ Miles et al. (2020) “Climate Change in Palau: Indicators and Considerations for Key Sectors. Report for the Pacific Islands Regional Climate Assessment.”

² van Hooidonk et al.(2016) Local-scale projections of coral reef futures and implications of the Paris Agreement.”

**National Designated Entity to the UNFCCC
Technology Mechanism**

Name: Mr. David Idip

Title: Senior GIS Analyst, Bureau of Budget and
Planning, Ministry of Finance

Date: 9 August, 2022

Signature:

Proponent (signature of the Proponent is
optional)

Name: Yimnang Golbuu

Title: CEO, Palau International Coral Reef
Center

Date: 9 August 2022

Signature:

UNFCCC Climate Technology Centre and Network (CTCN)

Name: Rose Mwebaza

Title: CTCN Director

Date: 09/08/2022

Signature:

1. Background and context

Coral reefs, some of the most diverse ecosystems on the planet, play a pivotal role in supporting people’s livelihoods in Palau. Coral reefs are at the centre of an ecosystem with significant socioeconomic benefits such as tourism and fishing, as well as hazardous risk reduction benefits.³ The economic benefit of coral reefs tourism has been estimated at USD 92.5 million per year and contributes to 43% of the Palau’s GDP.⁴ Furthermore, corals are home to fauna such as reef fish and giant clam, which are important source of food and income for local communities.⁵ Studies show that coral reefs can reduce wave energy by an average of 97%, which can help enhancing the resilience of coastal communities.⁶

However, coral reefs are threatened by climate change impacts. Increase in sea surface temperature as a result of climate change has led to bleaching of corals in many parts of the world.⁷ In the past 10 years, climate change and elevated sea surface temperature killed 14% of the world’s coral reefs.⁸ If ocean warming continues, projections estimate that widespread coral bleaching will occur annually in Palau by 2040.⁹

To address these challenges, Palau has established marine protected areas along the coast to conserve coral reefs under the Palau Protected Areas Act (2003), which provides the overall framework to protect corals.¹⁰ Yet, most corals are unable to cope with rising sea surface temperatures, which can increase the frequency of bleaching events.¹¹ This is likely to negatively affect the economy, but also make coastal areas more vulnerable to natural disasters, as corals are proven to provide risk reduction benefits.¹²

Conventional coral reef restoration technologies such as direct transplantation have low coral survival rates of 64% and may lead to damaging the existing environment.¹³ Thus, heat-tolerant corals can be introduced to restore damaged coral reefs as well as build resilience to climate change impacts. Lack of long-term commitment and local capacity has been a challenge in past coral reef restoration projects both in Palau and other Pacific countries.¹⁴ Therefore, this TA will help strengthen Palau’s capacity to manage and outplant the heat-tolerant corals and will deploy and provide capacity building of local stakeholders in Palau.

³ Miles et al. (2020) “Climate Change in Palau: Indicators and Considerations for Key Sectors. Report for the Pacific Islands Regional Climate Assessment.”

⁴ Spalding et al. (2017) “Mapping the global value and distribution of coral reef tourism”

⁵ National Environmental Protection Council (2019) “2019 State of the Environment Report – Republic of Palau”

⁶ Ferrario et al. (2014) “The effectiveness of coral reefs for coastal hazard risk reduction and adaptation”

⁷ Heron et al. (2017) “Impacts of Climate Change on World Heritage Coral Reefs : A First Global Scientific Assessment.”

⁸ GCRMN (2021) “Status of Coral Reefs of the World:2020”

⁹ van Hooidonk et al.(2016) Local-scale projections of coral reef futures and implications of the Paris Agreement.”

¹⁰ National Environmental Protection Council (2019) “2019 State of the Environment Report – Republic of Palau”

¹¹ van Hooidonk et al.(2016) Local-scale projections of coral reef futures and implications of the Paris Agreement.”

¹² Ferrario et al. (2014) “The effectiveness of coral reefs for coastal hazard risk reduction and adaptation”

¹³ Bostrom-Einarsson (2020) “Coral restoration – A systematic review of current methods, successes, failures and future directions”

¹⁴ Ibid.

2. Problem statement

The key issues that this TA aims to address are as follows:

- Corals reefs in Palau are threatened by **warming waters from climate change**, causing more frequent and severe **coral bleaching events**.¹⁵ If ocean warming continues, projections estimate that widespread coral bleaching will occur annually in Palau by 2040.¹⁶
- **14% of the world’s coral reefs** have died due to **climate change in the past 10 years**.¹⁷ This has resulted in a **decline in hard coral cover of at least 20% in the Pacific Ocean**.¹⁸
- Conventional coral reef restoration technology has a negative impact on the existing ecosystem and have **low coral survival rate** of 64% in average.¹⁹
- **Lack of knowledge and understanding** on coral reef restoration technology by the community, as well as **lack of continuity** has led to failed restoration attempts.²⁰

In this regard, heat-tolerant coral is an adaptation technology that can address rising sea surface temperature and assist in building climate resilience. The TA aims to support Palau in deploying the technology to restore damaged reefs and provide capacity building of local institutions. These activities will be supplemented by the development of a strategic coral restoration plan for Palau, which responds to climate change threats.

¹⁵ Miles et al. (2020) “Climate Change in Palau: Indicators and Considerations for Key Sectors. Report for the Pacific Islands Regional Climate Assessment.”

¹⁶ van Hooidonk et al.(2016) Local-scale projections of coral reef futures and implications of the Paris Agreement.”

¹⁷ GCRMN (2021) “Status of Coral Reefs of the World:2020”

¹⁸ Ibid.

¹⁹ Miles et al. (2020) “Climate Change in Palau: Indicators and Considerations for Key Sectors. Report for the Pacific Islands Regional Climate Assessment.”

²⁰ Bostrom-Einarsson (2020) “Coral restoration – A systematic review of current methods, successes, failures and future directions”

Deliverable 1:																		
i) Detailed work plan	X																	X
ii) Monitoring and evaluation plan	X																	X
iii) CTCN Impact Description	X																	X
iv) Closure and Data Collection report	X																	X
Output 2: Develop a strategic coral restoration plan for Palau, responsive to climate change threats																		
<i>Activity 2.1: Conduct a stocktake on coral restoration in Palau and a review of best practices</i>																		
The lead implementer with support from the national expert(s) will carry out the following studies:																		
<ul style="list-style-type: none"> - <i>Review of institutional/regulatory framework for coral restoration action in Palau</i> – this will entail a review of existing policies, regulations, institutional mandates, government strategies and plans related to coral restoration efforts, and will include preliminary meetings with relevant stakeholders to identify strengths and weaknesses of current policy and regulatory frameworks in providing for resilient coral ecosystems. - <i>Stocktake of coral conservation and restoration initiatives in Palau and stakeholder mapping</i> - this will entail a review of baseline studies (including an assessment of various factors²¹ that may affect the coral reefs and how they may change over time, including impact from human activity on the environment, using indicators such as historical change of land use, and population density) and relevant gender studies, a review of past, current and planned initiatives/efforts related to coral conservation and restoration, methods used (analyzing both successes and failures), as well as a detailed stakeholder mapping which will serve as a reference in the development of other activities of this TA. - <i>Review of best practices on coral restoration applicable to Palau’s context</i> - this will entail a review of good practices of coral restoration from other countries (including institutional and policy aspects, as well as methods/technologies used), and suggestions and recommendations on governance (including regulations, policies, institutional arrangements) and methods/technologies relevant to Palau’s context. - <i>Identification of barriers, challenges and opportunities</i> - a first report with a synthesis of initial findings regarding possible barriers, challenges and opportunities for coral restoration in Palau. 																		
<i>Activity 2.2: Set up the process for the participatory development of a strategic heat-tolerant coral restoration plan for Palau and kickoff meeting</i>																		

²¹ Initially, a list laying out factors that may affect the coral reefs should be prepared; these factors will be later evaluated to develop a strategic plan for sustainably managing coral reefs.

The lead implementer, in close consultation with NDE and PP, and based on the analysis and stakeholder mapping conducted in Activity 2.1, will propose the participatory process for the development of the coral restoration plan and set up a core group of key stakeholders and experts (with attention to maintaining gender balance and an adequate representation of vulnerable groups), which will provide guidance at key stages of the development of the restoration plan. The activity will include:

- preparation of a participatory planning process document which will include, but not limited to, the layout of major stages of development of the coral restoration plan, scheduling of proposed consultations with the core group of stakeholders and broader consultations, and definition of stakeholders’ roles and responsibilities, and engagement of policy makers (in particular in mainstreaming recommendations and plan for coral restoration into existing policy, planning and institutional frameworks).
- a kickoff meeting of the core stakeholder group to receive inputs and agree on the design of the participatory planning process proposed, to receive inputs and validate the deliverables produced in Activity 2.1, and to set the vision, goals and clear objectives for the coral restoration plan and the monitoring framework.

Activity 2.3: Develop a draft of the strategic coral restoration plan

The lead implementer, in consultation with the core stakeholder group, NDE, PP and other stakeholders as needed, and building on the information gathered in Activity 2.1, will implement the participatory process designed and agreed to in Activity 2.2 to formulate the different components of the coral restoration plan, including:

- Setting goals, objectives and time frame, as well as frequency/timeline for revision of the plan
- priority areas for main restoration interventions
- formulating appropriate restoration alternatives regarding restoration methods to be adopted and respective location²² (giving due consideration to the balance between where restoration is most needed and where it is most likely to succeed), identifying both short/small scale interventions, and long term/broader scale interventions
- formulate the implementation and management plan and corresponding M&E framework (including indicators, baselines and targets/thresholds)
- describe roles and responsibilities of each stakeholder in the implementation process

²² At least two restoration methods to be tested and implemented in the first 3 years of the plan will be included (identified in consultation with NDE/PP).

<ul style="list-style-type: none"> - identifying resources required (including capacity development needs, and costing with detail for the first 3 years of the plan’s implementation) and possible sources of funding/financing options for the implementation of the restoration plan 												
<p>Deliverables 2:</p>												
<p>2.1: Report with a synthesis of initial findings of the stocktake and review of best practices on coral restoration – this report will include annexes with more detailed information on the studies listed in Activity 2.1.</p>		X										
<p>2.2: Document describing the participatory process to be followed in the development of the strategic coral restoration plan</p>		X										
<p>2.3: Report on the kickoff meeting of the core stakeholder group</p>			X									
<p>2.4: Draft of the strategic coral restoration plan (including M&E)</p>						X						
<p>Output 3: Test one coral restoration method - outplanting of heat-tolerant coral using fragments</p> <p>The lead implementer, in close consultation with the NE, PP and the core stakeholder group, will prepare and test one method - outplanting using fragments of heat-tolerant coral - on 1 priority site to be selected (including the preparation of protocols, management plan and M&E monitoring, and mapping for potential scale up of this technology). The set of activities under this output will be instrumental in building awareness and capacity of technical and communities for responding to the challenges faced by coral restoration efforts in Palau.</p>												
<p><i>Activity 3.1: Select the pilot site and prepare the protocols for testing the method of outplanting of heat-tolerant coral fragments</i></p> <p>The lead implementer, based on the findings from previous activities and additional data collection as needed, will:</p> <ul style="list-style-type: none"> - assess in 3-5 priority sites and select one site, in consultation with NDE, PP and key stakeholders/ experts, for testing the method of outplanting of heat-tolerant coral fragments. (The site will be selected based on several ecological criteria, considering factors that may affect the outplanting process.) - Prepare the protocols for the testing of this outplanting method at the selected site, including preparation of an implementation, management and M&E plan. It is noted that the time required to soundly evaluate successful rate of this outplanting method will be longer than the period of implementation of this TA, thus the management and M&E plan to be formulated for the testing of this method will be prepared with an appropriate timeline, and the lead implementer will ensure that appropriate roles and resources are defined for the plan so that it can be fully carried out by local institutions and the community after the conclusion of this TA, to ensure a sound evaluation of the potential for the use of this method in Palau. Notwithstanding, preliminary findings on the results of the testing as well as relevant recommendations will be produced within the timeline of this TA. 												

<p><i>Activity 3.2: Implement the protocols to test the chosen outplanting method</i></p> <p>After selecting the appropriate site, the lead implementer, in coordination with the PP, will acquire heat-resistant coral fragments to be used at the selected site. Coral fragments will be outplanted, in collaboration with local community/ies or NGOs, according to the testing protocols developed.</p> <p>Monitoring will follow after the outplanting to determine success rate (refer to note made in activity 3.1 above regarding the duration of monitoring activities). The lead implementer will keep close communication with the core group of stakeholders (engaged activities under the output 2) on progress being made on output 3.</p>												
Deliverable 3:												
<p>3.1: Report on preparatory activities for testing of outplanting heat-tolerant coral fragments – it should include the process for selection of the site for piloting the deployment of outplanting heat-tolerant coral fragments, the testing Protocols developed and the management and M&E plan)</p>			X									
<p>3.2: Brief document/brochure on the deployment of the outplanting heat-tolerant coral fragments, targeting a non-expert audience (e.g. community members to be involved in the testing of coral restoration action) – it should include a description of the activities, purpose, the important roles of the different stakeholders involved (including M&E), and the potential benefits and challenges it may entail for the target communities and for Palau.</p>			X								X	
<p>3.3: Progress reports on testing of outplanted coral fragments (including preliminary findings on success rate)</p>					X					X		
Output 4: Capacity building on coral restoration technology												
<p><i>Activity 4.1: Conduct capacity gap analysis and develop a flagship capacity development programme on coral reef restoration technology</i></p> <p>In coordination with activities under Output 2 related to the assessment of capacity needs for the implementation of the strategic coral restoration plan, this activity will focus on identifying flagship capacity development activities that can start immediately bridging identified capacity gaps on coral restoration technology.</p> <p>Preliminary discussions with NDE and PP indicate that building capacity of PICRC, and possibly of the selected community members, is urgently needed. Thus the lead implementer, building on the information from the gap analysis and additional information to be collected under this activity (e.g. using questionnaires and consultations), will design a flagship capacity development programme to include, at a minimum, the following activities: a training workshop on coral reef restoration methods, a hands-on training/mentoring program on the coral restoration method for outplanting of coral fragments, and a south-south knowledge sharing programme which will include an exchange with at least one international research institution/ center of excellence on coral reef restoration (to be determined in coordination with NDE and PP).</p> <p>The programme will be mostly aiming at building capacity of relevant PICRC staff but may involve other key</p>												

<p>stakeholders (participants to be selected in coordination with NDE and PP/PICRC).</p>																				
<p><i>Activity 4.2: Prepare and implement the capacity development training programme on coral reef restoration technology</i></p> <p>Based on Activity 4.1, the lead implementer will further detail and implement the training component of the flagship capacity development programme which will include, at a minimum, hands-on training sessions/ mentoring (undertaken in conjunction with relevant activities from outputs 2 and 3) and one workshop to ensure enhanced understanding of coral restoration technology.</p> <p>This activity will include, but not limited to, the preparation of a work plan with detailed scheduling for all the training activities and identification/selection of participants for each activity (including mentoring and training workshop) in coordination with NDE and PP, the preparation of training materials and evaluation forms, delivery of programmed training sessions/mentoring activities, conducting a training workshop, preparation of the training workshop report with results from this activity, preparation of a brief preliminary report on the mentoring activities, and one final synthesis report on the flagship capacity development programme for coral restoration covering all components (including the south-south knowledge exchange programme, activity 4.3).</p>																				
<p><i>Activity 4.3: Implement the south-south knowledge exchange programme</i></p> <p>The lead implementer will implement the south-south knowledge exchange programme as defined in Activity 4.2, which will include the organization of a visit to at least one international research institution/center of excellence on coral reef restoration in the Asia-Pacific region (to be determined in coordination with NDE and PP).</p> <p>Through this activity, PICRC will gain capacity to be a center of excellence in the Pacific nations.</p>																				
Deliverables 4:																				
<p>4.1: Flagship Capacity Development Programme document (the document will include a summary of the capacity gap analysis and details on all components of the programme)</p>																				
<p>4.2: Training workshop report (the report will include program, training materials, summary of the discussions including additional findings on capacity related challenges and opportunities)</p>																				
<p>4.3: Preliminary report on the mentoring activities</p>																				
<p>4.3: SS Knowledge Exchange visit report (the report will include identified opportunities of further SS exchanges and partnerships)</p>																				
<p>4.4: Synthesis report on the flagship capacity development programme (full report, including the mentoring programme component)</p>																				
Output 5: Finalizing the strategic coral restoration plan for Palau, responsive to climate change threats																				

<p><i>Activity 5.1: Update the draft strategic coral plan for Palau</i></p> <p>The lead implementer will revise the existing draft to integrate inputs/findings from all activities conducted under this TA (including those under outputs 3 and 4), with attention to highlighting how this strategic plan could be adopted/mainstreamed into existing institutional planning processes.</p>																							
<p><i>Activity 5.2: Broader consultation meeting to gather final inputs on the updated draft plan</i></p> <p>This consultation meeting will include all relevant stakeholders who have been involved in previous activities/consultations and may possibly include a component of policy makers or other critical stakeholders identified later in the process, but which may be crucial to the effective deploying relevant technologies identified in the strategic coral restoration plan for Palau.</p>																							
<p><i>Activity 5.3: Finalization of documents, integrating comments received from the round for consultations under this output, for endorsement of NDE, PP and relevant authorities.</i></p> <p>The leader implementer, with support from the national expert(s), will finalize all planning documents, integrating comments received from the round for consultations (activity 5.2), for endorsement of NDE, PP and relevant authorities.</p> <p>In addition, the lead implementer, with support from the national expert(s) and in close coordination with NDE and PP and key stakeholders, will prepare a policy brief on coral restoration in Palau, including a summary of the development of the strategic plan, and actionable recommendations to be taken forward.</p>																							
Deliverables 5:																							
5.1: Updated draft of the strategic heat-tolerant coral restoration management and monitoring plan for Palau																						X	X
5.2: Policy brief on coral restoration in Palau																							X
5.2: Summary report on the final consultation meeting																						X	
5.3: Final draft of the strategic plan submitted for endorsement of relevant entities																						X	X

4. Resources required and itemized budget:

Please provide an indicative overview of the resources required and itemized budget required to implement the CTCN technical assistance, including for M&E-related activities, using the table below. Important to note that minimum 1% of the budget should explicitly target gender specific activities related to the technical assistance (please see section 10 for further information on gender). Once the Response Plan is completed, a Response Implementation partner(s) will be selected by the Climate Technology Centre (CTC). A detailed activity-based budget for the CTCN assistance will be finalized by the CTCN and selected Implementer.

Activities and Outputs	Input: Human Resources <i>(Title, role, estimated number of days)</i>	Input: Travel <i>(Purpose, national vs. international, number of days)</i>	Inputs: Meetings/events <i>(Meeting title, number of participants, number of days)</i>	Input: Equipment/Material <i>(Item, purpose, buy/rent, quantity)</i>	Estimated cost <i>Please accumulate the costing at Activity and Output level and provide an estimated costing range for each activity and the total Response Plan</i>	
					Minimum (USD)	Maximum (USD)
Output 1: Development of implementation planning and communication documents					5,200	5,850
Activity 1.1: <i>Formulation of i) Detailed work plan, ii) Monitoring and evaluation plan, iii) CTCN Impact Description, iv) Closure and Data Collection report.</i>	IE1: 4 days IE2: 3 days IE3: 1 day IE4: 2 days LE: 3 days GE: 1 day				5,200	5,850
Output 2: Develop a strategic coral restoration plan for Palau, responsive to climate change threats					62,625	68,750
		<i>International travel and DSA for 3 experts for 5 days USD 10,000</i>	<i>Stakeholder group consultation meetings USD 3,500</i>			
Activity 2.1: <i>Conduct a stocktake on coral restoration in Palau and a review of best practices</i>	IE1: 10 days IE2: 7 days IE3: 3 days IE4: 3 days LE: 14 days GE: 4 days				14,425	16,400
Activity 2.2: <i>Set up the process for</i>	IE1: 7 days IE2: 5 days				10,375	11,675

<i>the participatory development of a strategic heat-tolerant coral restoration plan for Palau and kick-off meeting</i>	IE3: 7 days IE4: 1 days LE: 6 days GE: 3 days					
Activity 2.3: <i>Develop a draft of the strategic coral restoration plan</i>	IE1: 15 days IE2: 15 days IE3: 10 days IE4: 10 days LE: 10 days GE: 7 days				24,325	27,175
Output 3: Test one coral restoration method - outplanting of heat-tolerant coral using fragments						
		<i>International travel and DSA (1 5-day visit for 3 experts; 1 5-day visit for 2 experts) + Domestic site visits USD 20,000</i>		<i>Lump sum for boat and car rentals (3 3-day trips); acquisition/ transport of heat-tolerant coral fragments; other related expenses USD 10,000</i>	61,350	65,050
Activity 3.1: <i>Select the pilot site and prepare the protocols for testing the method of outplanting of heat-tolerant coral fragments</i>	IE1: 7 days IE2: 7 days IE3: 5 days IE4: 7 days LE: 7 days GE: 2 days				12,575	14,025
Activity 3.2: <i>Implement the protocols to test the chosen</i>	IE1: 10 days IE2: 10 days				18,775	21,025

<i>outplanting method</i>	IE3: 6 days IE4: 10 days LE: 15 days GE: 2 days					
Output 4: Capacity building on coral restoration technology		<i>International travel and DSA (1 5-day visit for 2 experts) USD 6,000 + Lump Sum for SS Exchange visit (4-day visit for 4 people delegation from Palau) USD13,000</i>	<i>Capacity development training programme sessions (including hands-on training/ mentoring/ site visits and workshop) USD 15,000</i>		56,850	60,500
Activity 4.1: <i>Conduct capacity gap analysis and develop a flagship capacity development programme on coral reef restoration technology</i>	IE1: 2 days IE2: 2 days IE3: 7 days IE4: 2 days LE: 7 days GE: 3 days				7,325	8,250
Activity 4.2: <i>Prepare and implement the capacity development training programme</i>	IE1: 7 days IE2: 5 days IE3: 15 days IE4: 5 days LE: 10 days GE: 4 days				15,600	17,450
Activity 4.3 <i>Implement the south-</i>	IE1: 4 days				5,925	6,800

<i>south knowledge exchange programme on coral restoration</i>	IE2: 3 days LE :10 days					
Output 5: Finalizing the strategic coral restoration plan for Palau, responsive to climate change threats						
		<i>International travel and DSA for 1 expert for 4 days USD 3,500</i>	<i>Stakeholder consultation meeting USD 3,500</i>		23,450	25,625
Activity 5.1 Update the draft strategic coral plan for Palau	IE1: 4 days IE2: 2 days IE3: 1 days IE4: 1 days LE: 2 days GE: 1 days				4,175	4,725
Activity 5.2: Broader consultation meeting	IE1: 4 days IE2: 1 days IE3: 4 days IE4: 1 days LE: 5 days GE: 1 days				5,550	6,300
Activity 5.3 Finalization of documents for endorsement	IE1: 7 days IE2: 4 days IE3: 1 days IE4: 1 days LE: 3 days GE: 1 days				6,725	7,600
Estimated range of costing for the entire Response Plan					209,475	225,775

5. Profile and experience of experts

Based on the required Human Resources identified in section 4 (Resources required and itemized budget) please provide a description of the required profile of all involved experts for the implementation of the CTCN Response Plan.

Experts required	Brief description of required profile
Project Manager (IE1)	<p>The project manager shall have the following expertise and experience:</p> <ul style="list-style-type: none"> - Master's degree or above (or equivalent experience) in climate change, environmental conservation, coastal ecosystem management, disaster risk management, or an affiliated major. - International experience in leading and managing projects and teams of experts from different cultural backgrounds and fields of expertise - At least 7 years of international experience of working with various countries' national and local governments, local stakeholders and authorities on climate change issues or coastal ecosystem management. Coral Reef restoration experience valued. - International project experience with a focus on technology transfer, project management - Previous experience in Palau or Pacific Small Island Developing States will be valued. - Excellent written and communication skills in English are required.
International expert in coral reef restoration technology (IE2)	<p>The international expert in coral reef restoration technology shall have the following expertise and experience:</p> <ul style="list-style-type: none"> - Master's degree or above (or equivalent experience) in coral reef research, ecosystem restoration or an affiliated major. - At least 5 years of experience in coral reef science and restoration, or related field is required. - Experience in being a lead author of academic papers on coral restoration for at least 5 papers. - At least 3 reference projects demonstrating experience in designing and deploying coral restoration technology using a wide range of methods (including the use of coral fragments and sexual reproduction method with artificial substratum). - Previous experience in Palau or Pacific Small Island Developing States will be valued. - Excellent written and communication skills in English are required.
International expert in Planning, Capacity Building and Skills Development (IE3)	<p>The international expert in planning, capacity building and skills development shall have the following expertise and experience:</p> <ul style="list-style-type: none"> - Master's degree or above (or equivalent experience) in coral reef research, ecosystem restoration or affiliated major. - At least 5 years of proven experience in participatory planning processes and capacity building related to coral reef management and restoration, or related field is required. - Previous experience on different methods of coral reef restoration will be valued. - Experience in stakeholder engagement processes is required. - Previous experience in Palau or Pacific Small Island Developing States will be valued.

<p>International expert in management and monitoring (IE4)</p>	<ul style="list-style-type: none"> - Excellent written and communication skills in English are required. <p>The international expert in management and monitoring shall have the following expertise and experience:</p> <ul style="list-style-type: none"> - Master’s degree or above (or equivalent experience) in coral reef research, ecosystem restoration, environmental sciences, or an affiliated major. - At least 3 years of practical experience in coral reef management, in particular experience related to monitoring of coral restoration projects. - Previous experience on coral reef restoration using different methods (including the use of coral fragments, sexual reproduction method with artificial substratum). - Previous experience in Palau or Pacific Small Island Developing States will be valued. - Excellent written and communication skills in English are required.
<p>Local expert in Coral Reef Restoration (LE)</p>	<p>The local expert in coral reef restoration shall have the following expertise and experience:</p> <ul style="list-style-type: none"> - Bachelor’s degree or above (or equivalent experience) in marine science, environment or an affiliated major. - A minimum of 5 years of relevant experience in coral reef restoration and coordination activities in Palau. - Previous experience in working with PICRC will be desirable - Previous experience in working with local government in Palau is an asset. - Excellent written and communication skills in English are required. - It is expected that the local coral reef restoration expert will be based in Palau
<p>Gender Expert (international/local) (GE)</p>	<p>The gender expert shall have the following expertise and experience:</p> <ul style="list-style-type: none"> - Bachelor’s degree or above (or equivalent experience) in gender studies or other discipline with focus on the field of gender issues in a developing country context. - At least 5 years of experience in gender mainstreaming in climate change adaptation and mitigation. - Preference given for experience in gender studies in Palau or Pacific Island Developing States - Experience in stakeholder engagement processes is valued - Excellent written and communication skills in English are required.

6. Intended contribution to impact over time

Once heat-tolerant coral reefs restoration technology is identified and introduced in Palau, it will contribute in enhancing the capacity of communities to increase their resilience to climate change. Studies show that coral reefs can significantly reduce wave energy, which is essential as the frequency of natural hazards like storms and floods is expected to rise.²³ This has the potential of improving climate resilience of approximately 12,000 people living in Koror.²⁴ Moreover, heat-tolerant coral reefs can help improving the Palauan economy, which is heavily dependent on coral reef tourism that contributes to 43% of Palau's GDP²⁵. Thus, heat-tolerant coral reefs have the potential of contributing to sustainable development of Palau, especially in coastal areas.

The successful deployment of heat-tolerant coral reefs restoration technology in Palau can lead to the dissemination of the technology in other Pacific nations. With PICRC as the leading institution of restoration activities, heat-tolerant corals can be implemented in other Pacific nations to address coral bleaching and climate change impacts. This can overall contribute in building community resilience to climate change to more than 90,000 people living in the Pacific.

7. Relevance to NDCs and other national priorities

Palau's Intended Nationally Determined Contribution (INDC) identifies ocean warming and ocean acidification as major concerns heavily impacting coral reefs of the country, which is crucial to Palau's economy, culture, and livelihoods. Moreover, in Palau's National Communication (NC), conserving coral reefs is considered as part of the overall strategy for climate change adaptation and sustainable development. Specifically, the NC recommends establishing marine protected areas and integrating coastal zone management as some of the ways to reduce climate change impacts on coral reefs. These points are also stressed in Palau's Climate Change Policy, a landmark policy that incorporates Palau's National Appropriate Mitigation Actions (NAMA) and National Adaptation Plan (NAP).

In Palau's Climate Change Policy, coral bleaching and loss of vulnerable marine species and habitats, as well as decreased resilience of coral reef systems are identified as priority risks that need to be addressed. The policy emphasizes the need to build resilience to temperature change and ocean acidification in marine ecosystem/fisheries by protecting and improving coral sites. The climate change policies and national priorities of Palau show that restoring coral reefs and enhancing its resilience to climate change impacts are essential for the country's sustainable development. Therefore, deploying heat-tolerant corals is significant and necessary, as it has the potential to address the needs and challenges articulated in Palau's climate change policies.

8. Linkages to relevant parallel on-going activities:

This TA will build on the initiative supported by the Japanese government (Ministry of the Environment, MoEJ), and will further help Palau strengthen its planning, management and monitoring capacity for coral restoration efforts, as well as to gain a greater understanding and generate knowledge about the feasibility of specific methods for coral restoration, in particular the one being piloted through this TA – outplanting of heat-tolerant coral using fragments. Furthermore,

²³ Ferrario et al. (2014) "The effectiveness of coral reefs for coastal hazard risk reduction and adaptation"

²⁴ UN World Population Prospectus (2019)

²⁵ Spalding et al. (2017) "Mapping the global value and distribution of coral reef tourism"

an initiative being planned with MoEJ support to test heat-tolerant coral restoration using advanced sexual coral reproduction method with artificial substratum is expected to follow this TA. This upcoming initiative would be conducted in alignment with the strategic coral restoration plan to be developed during this TA, and would further contribute to developing in-country capacity for the adoption, customization and scale up of appropriate technologies to restore damaged coral in Palau and the region.

9. Anticipated follow up activities after this technical assistance is completed:

The coral reef restoration process requires a total of five years, and several years is still required after the TA for monitoring and evaluation. There is still the need for further research to be done to understand the feasibility (success rate) of deployment for different coral restoration technologies while at the same time there is a critical need for urgent action and engagement of local communities in coral restoration efforts. The development of a strategic plan for coral restoration that responds to the climate challenges Palau, to be supported by this TA, is very timely as there is the need to coordinate different efforts that are currently being undertaken or are planned to be undertaken in the near term (e.g. efforts by JICA and others), involving different methods for coral restoration, and to set up the appropriate management and M&E frameworks necessary for a successful recovery of the coral reef, and mainstream these instruments in relevant national planning frameworks. For example, JICA is now preparing a project on integrated coastal zone management, which does not explicitly include coral reef conservation activities. However, given the importance of coral reef conservation to coastal ecosystems, monitoring and evaluation activities may be incorporated in the scheme as a follow up activity. It is expected that the results of this TA can later serve as input to the development of a roadmap to be used as a guide in deploying the coral reef restoration technology in other Pacific nations. GCF financing may be leveraged to scale-up the technology in the country and to other Pacific Islands. The GCF NDA of the requesting country has been engaged in the design of this plan and will continue to be involved in the process leading to an official agreement for accessing GCF funding. Other Pacific Islands will later also be engaged throughout the process.

10. Gender and co-benefits:

<p>Imbedded in design of the activities:</p>	<p>The TA will ensure the equal representation of women and men as well as participation of gender focal points and associations that promote gender equality and empowerment of women and other vulnerable groups throughout the process. Furthermore, a gender-sensitive training curriculum and materials will be developed to encourage participation of women and other vulnerable groups. There will also be emphasis on gender balance on the actual training sessions and meetings. In this regard, a gender expert will be consulted throughout the implementation of the TA to mainstream gender in each activity.</p>
<p>Gender and co-benefits intended as result of the activities:</p>	<p>Deploying heat tolerant coral has the potential of improving ecosystem resilience and enhancing biodiversity in the coastal areas of Palau. Restoring coral reefs and enhancing biodiversity can help women gain more income opportunities as women play a significant role in harvesting invertebrates near the coastal areas. According to a study, women tend to dominate nearshore invertebrate fisheries such as clams and sea cucumbers, with 85% of the survey respondents who were engaging in harvesting invertebrates</p>

	were women. ²⁶ Moreover, coral reefs provide valuable compounds that have potential use for medicine, and 90% of currently available drugs with marine origin are from coral reefs. ²⁷ Thus, restoring damaged coral reefs has the possibility of improving the well-being and socioeconomic status of Palauan communities.
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11. Main in-country stakeholders in implementation of the technical assistance activities:

Using the table below, please list and describe the role of in-country stakeholders, participants and beneficiaries who will be involved in or directly consulted during implementation of the assistance.

In country stakeholder	Role in implementation of the technical assistance
Palau Coral International Reef Center (PICRC) – Project Proponent	PICRC is Palau’s research institute on coral reefs that was established in 2001 with Japanese grant aid. PICRC primarily conducts research on Palau’s coral reefs as well as the surrounding ecosystem, enhance public awareness, and promote capacity building in Palau. PICRC will be heavily involved in the reef restoration process and will be the main beneficiary of capacity building activities in the technical assistance.
Ministry of Agriculture, Fisheries, and the Environment	The Ministry of Agriculture, Fisheries and the Environment is responsible for developing, managing, and protecting the natural resources of Palau. The ministry will be involved in the coordination of TA activities.
Palau Automated Land and Resource Information System Office, Ministry of Finance (National Designated Entity)	Focal point of the country to CTCN. Provides oversight to the implementation of the TA.
Ministry of Finance (National Designated Authority)	Focal point of the country to GCF.
Palau Conservation Society (PCS)	PCS is a non-governmental organization based in Palau, which aims at conserving Palau’s natural heritage and resources for local communities. PCS will be participating in the execution and implementation of the coral reefs monitoring plan.

12. SDG Contributions:

Instructions: Please complete the grey section below for **a maximum of three SDGs** that will be advanced through this TA. A complete list of SDGs and their targets is available here:

<https://sustainabledevelopment.un.org/partnership/register/>.

Goal	Sustainable Development Goal	Direct contribution from CTCN TA (1 sentence for top 1-3 SDGs)
1	End poverty in all its forms everywhere	
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	
3	Ensure healthy lives and promote well-being for all at all ages	
4	Ensure inclusive and equitable quality education and promote life-long learning opportunities for all	
5	Achieve gender equality and empower all women and girls	

²⁶ Palau Gender and Natural Resources 2020 National Report (2021)

²⁷ International Coral Reef Society (2020) “Coral Reefs and Human Health”

6	Ensure availability and sustainable management of water and sanitation for all	
7	Ensure access to affordable, reliable, sustainable, and modern energy for all (consider adding targets for 7)	
	7.1 - By 2030, ensure universal access to affordable, reliable and modern energy services	
	7.2 - By 2030, increase substantially the share of renewable energy in the global energy mix	
	7.3 - By 2030, double the global rate of improvement in energy efficiency	
	7.a - By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	
	7.b - By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support	
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Heat-tolerant corals can contribute to the tourism sector of Palau, which is worth 43% of its GDP.
9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	
10	Reduce inequality within and among countries	
11	Make cities and human settlements inclusive, safe, resilient and sustainable	
12	Ensure sustainable consumption and production patterns	
13	Take urgent action to combat climate change and its impacts	<i>All TAs should indicate relevance to Goal 13 and at least one target below (13.1 to 13.b).</i>
	13.1 - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	Heat-tolerant corals can contribute in enhancing the community's resilience to climate-related hazards and natural disasters, especially in coastal areas.
	13.2 - Integrate climate change measures into national policies, strategies and planning	
	13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	The technical assistance will contribute to improving the institutional capacity of PICRC in regard to coral reef restoration technology.
	13.a - Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	
	13.b - Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	
14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Deploying heat-tolerant corals will assist conserving coral reefs, which in turn will lead to sustainable development.
15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	
17	Strengthen the means of implementation and revitalize the global partnership for sustainable development	

13. Classification of technical assistance:

Please indicate primary type of technical assistance. Optional: If desired, indicate secondary type of technical assistance.

<i>Please tick off the relevant boxes below</i>	<i>Primary</i>	<i>Secondary</i>
<input type="checkbox"/> 1. Decision-making tools and/or information provision	<input type="checkbox"/>	<input type="checkbox"/>

<input type="checkbox"/> 2. Sectoral roadmaps and strategies	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> 3. Recommendations for law, policy and regulations	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 4. Financing facilitation	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 5. Private sector engagement and market creation	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> 6. Research and development of technologies	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 7. Feasibility of technology options	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> 8. Piloting and deployment of technologies in local conditions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 9. Technology identification and prioritisation	<input type="checkbox"/>	<input type="checkbox"/>

Please note that all CTCN technical assistance contributes to strengthening the capacity of in country actors.

14. Monitoring and Evaluation process

Upon contracting of the implementing partners to implement this Response Plan, the lead implementer will produce a monitoring and evaluation plan for the technical assistance. The monitoring and evaluation plan must include specific, measurable, achievable, relevant, and time-bound indicators that will be used to monitor and evaluate the timeliness and appropriateness of the implementation. The CTCN Technology Manager responsible for the technical assistance will monitor the timeliness and appropriateness of the Response Plan implementation. Upon completion of all activities and outputs, evaluation forms will be completed by the (i) NDE about overall satisfaction level with the technical assistance service provided; (ii) the Lead Implementer about the knowledge and learning gained through delivery of technical assistance; and (iii) the CTCN Director about timeliness and appropriateness of the delivery of the activities and outputs.