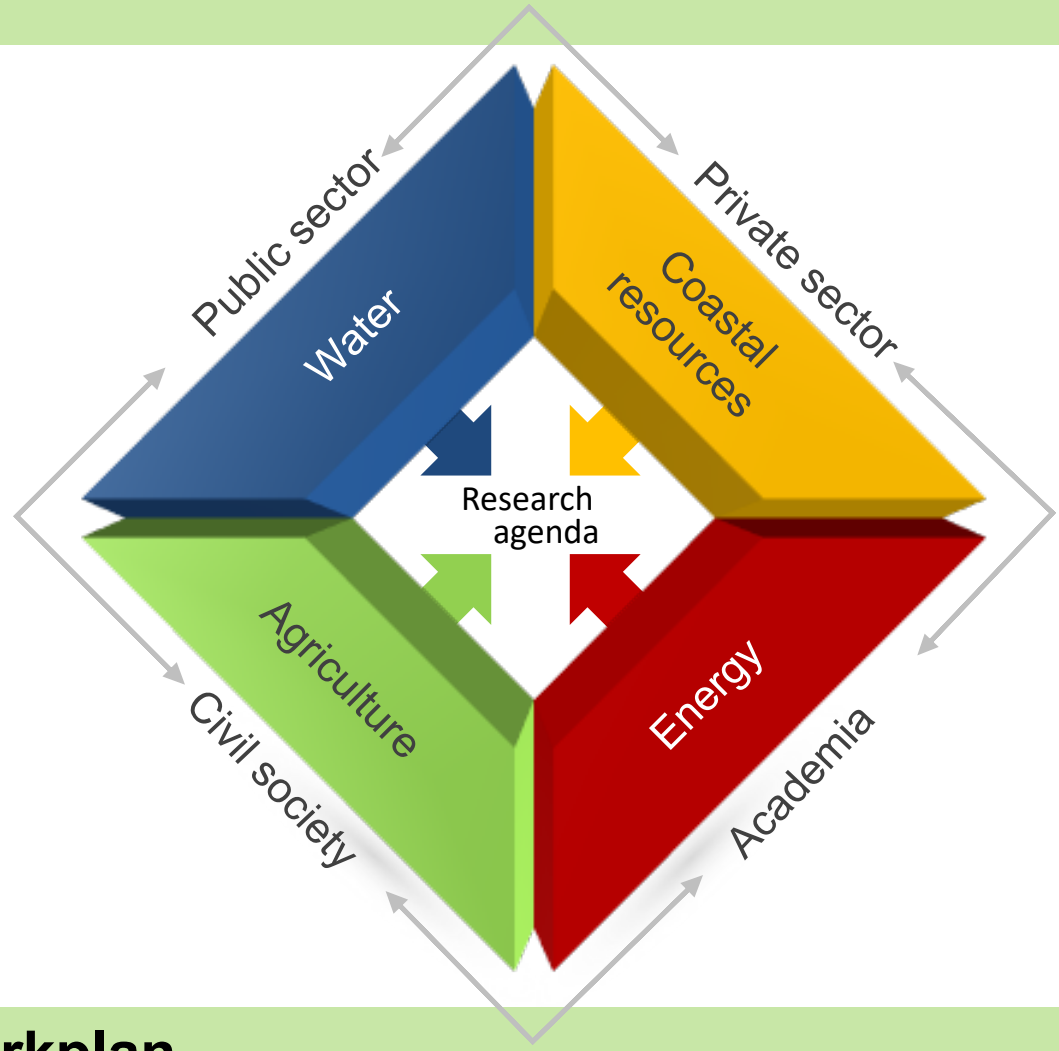
Developing a Climate Change Research Agenda in Jamaica 2020-2030



Workplan

September 22, 2020

The Climate Action Enhancement Package (CAEP)

CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

CATIE
Solutions for environment and development
Soluciones para el ambiente y desarrollo

NDC PARTNERSHIP

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1. Introduction

Although Jamaica is located among the countries emitting low greenhouse gas (GHG) emissions (around 3 tons per inhabitant), its energy matrix is highly dependent on fossil fuels, especially oil, which constitutes one of the main obstacles to advance in the fulfillment of their NDCs. Despite sustained efforts from the last decade, established in the National Energy Policy 2009–2030, which, among other things, stipulates the introduction of alternative technologies for the generation and use of energy, in 2017, just over 90% of the total energy supply came from fossil fuels, mostly oil and its derivatives. In the electricity sector, which accounted for 26% of total energy consumption, the main electricity generation source was fossil fuels (88.8%), although it should be noted that wind energy registered a significant increase going from 1% in 2007 to 6% of generation in 2017. Solar energy begins to spread, reaching a 1% share. In contrast, the hydro generation experienced a decrease in its share, from 5% to 3.5%.

The main obstacle preventing the adoption of environmentally friendly technologies in Jamaica is cost. In the case of energy generation, for example, the transition towards the use of renewable sources would be possible through the progressive acquisition of technology (especially wind and solar), but costs, including those associated with its adaptation to the current distribution infrastructure and energy storage, make it difficult to disseminate.

No less important problems arise from the consumption side, specifically related to the structure of the economy. In 2018, the contribution of services towards the GDP was 59.4%, while industry contributed 20.3% and agriculture 6.6%. However, energy consumption is distributed unevenly. In 2017, agriculture, while quite small, contributed just over a third (34%) of GHG emissions, followed by electricity (21%), land transport (14%), and the Bauxite alumina (12%). Within the industry sector, an increase is expected due to the expansion of the alumina production capacity.

One way to address these challenges is by consolidating technological research and development capacities. The aim is to identify and establish a minimum critical mass of researchers and technicians that will contribute to an adequate transfer and assimilation of acquired technology to achieve appropriate use and operation levels.

Another significant challenge, which merits the development of research capacities and its collaborative work with other actors, is estimating the impact of climate change on the country and the adaptation efforts necessary to face it. Jamaica is among various highly vulnerable countries and is already undergoing important changes in various climatic parameters. Strengthening the capacities for estimating these impacts and developing knowledge for the country's adaptation to them is a fundamental task.

Problem statement

Jamaica established in its NDC (2015) an annual decrease equivalent to 1.1 million TMA of GHG per year by 2030, which would represent 7.8% less generation of emissions compared to the Business as Usual (BAU) scenario. Additionally, it raises the possibility of expanding its scope to 10%, therefore subject to international technical and economic cooperation. However, the country presents certain inflexibility to modify its energy matrix due to its dependence on fossil fuels. Even when the introduction of alternative technologies is being promoted, especially in electricity generation, its contribution to the total energy supply is minimal.

On the other hand, according to the IPCC estimates, Jamaica is among the most vulnerable countries to CC. Approximately 90% of the country's $14 billion GDP is produced within its coastal zone, making its main economic sectors of tourism, industry, fisheries, and agriculture highly vulnerable to climate variability and change. The Global Climate Risk Index (GCRI) 2020 shows that for the period 1999 to 2018, Jamaica ranked 57 out of 180 countries.

To address the problems related to climate variability and change, it is imperative the definition of an R&TD agenda that considers two fundamental themes: improvement and technological development aimed at increasing energy efficiency and reducing GHGs, and the expansion of both the production and use of knowledge to address climate change impact-related issues. It is also imperative to consolidate R & T D capacities to guarantee an adequate transfer and assimilation of the acquired technology to assess the potential impacts related to CC and the development of knowledge on how to better adapt to such risks.

CTCN Technical Assistance (TA) intends to support the design of a multidisciplinary R&TD agenda that includes both activities to estimate the impact of CC and adaptation measures, as well as research and technological development activities necessary to contribute to the expanded achievement of NDC (for both mitigation and adaptation). During the TA, an effort will be made to identify and analyze existing capacities in universities, research centers, and the private sector, whose lines of work relate to support priorities related to CC, as well as the intervention needed to promote the development of technological capacities in productive activities. Two pilot projects will be identified, both of which must have public-private participation; additionally, the first draft of two concept notes for the pilot projects will be formulated to support fund mobilization.

Objectives of the CTCN Technical Assistance

Objective: Identify a multidisciplinary research and technological development (R&TD) agenda that incorporates collaboration with academia, R&TD centers, and the private sector to support the achievement of climate change targets in the key sectors identified in relevant policy frameworks, including NDC and the National Development Plan – Vision 2030.

Outcome: Identify a multidisciplinary research and technological development (R&TD) agenda that incorporates collaboration with academia, R&TD centers, and the private sector to support the achievement of climate change targets in the key sectors identified in relevant policy frameworks, including NDC and the National Development Plan – Vision 2030. Key stakeholders, including ministries in charge of key sectors, associated organizations, universities and research organizations, private sector, and gender focal points agree on an R&TD agenda that incorporates strategic, long-term, participatory, and transformational measures across key sectors that will drive climate-resilient and low carbon growth in Jamaica. The following outputs are expected from this TA:

- Output 1. Development of implementation planning and communication documents
- Output 2. Inception meeting with R&D stakeholders (academia, R&D centers, private sector) to identify country R&D priorities
- Output 3. Analysis of R&D sectors priorities vis a vis country climate priority (NDC, TNA, national plans)
- Output 4. Definition of a country research agenda and identification of main collaborations with academia and private sector able to implement the agenda, both at the national, regional, and international level

- Output 5. Selection of two pilot projects, one with academia, one with the private sector featuring high climate change benefit potential and preparation of two concept notes addressing the most appropriate financial mechanisms (activity to be further detailed in coordination with Government).

Coordination mechanism

The consultancy will be carried out in close collaboration and under the Climate Change Division's guidance from the Ministry of Economic Growth and Job Creation (MEGJC). The technical committee is composed of:

- Omar Y. Alcock – Senior Technical Officer - Climate Change Division, The Ministry of Economic Growth and Job Creation (MEGJC)
- Ajani Alleyne - Research and Development Officer, The Ministry of Economic Growth and Job Creation (MEGJC)
- Antoinette Brown - Logistics planner - Climate Finance Advisor – Office of the Prime Minister of Jamaica
- Anaitee Mills – Climate Finance Advisor – Office of the Prime Minister of Jamaica

Due to the project's participatory approach, all communication to the stakeholders will be channeled through the Climate Change Division, specifically with Anaitee Mills. The content of the invitations and material that will be used during workshops and bilateral meetings will be reviewed with the committee.

From CATIE, the main team will be composed by:

- Dr. Gracia Maria Lanza – Head of the Economic, Environment, and Sustainable Agribusiness (UEAAS)
- Dr. Mariana Cruz – Researcher – UEAAS
- Dr. Arlene López – Researcher – Agroforestry Unit

Other researchers from CATIE will participate in specific activities depending on the sectors prioritized and the analysis required. For coordination purposes, all communication and working dynamics, responsibility for delivering the products, and all associated aspects of the project should be managed with Dr. Gracia Lanza.

2. Methodology

This section presents a detailed step by step methodology to achieve each output of the technical assistance. It is important to mention that this work plan is the first output of the TA. As specified in the response plan, the work plan includes the monitoring plan with the expected impact as the basis for the closure report that will be submitted at the end of the technical assistance (March 2021).

The methodology to develop this technical assistance is presented in figure 1.

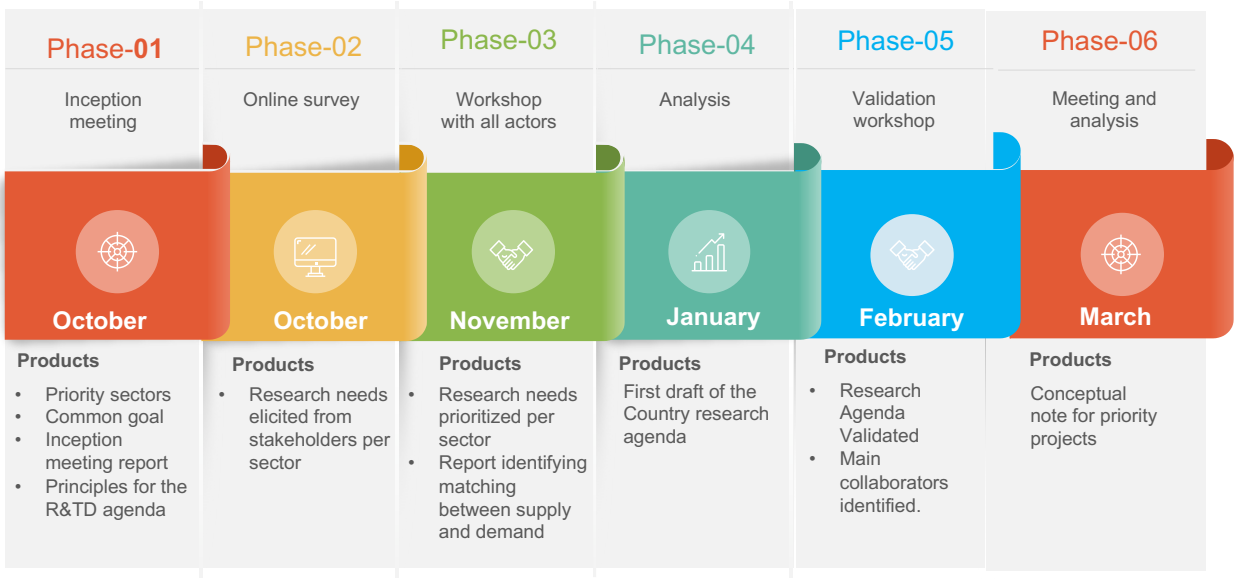

Figure 1. Phases and timeline of the technical assistance

For the development of this work plan, the team started the literature including, but not limited to:

- Climate Change Policy Framework for Jamaica
- Intended Nationally Determined Contribution of Jamaica 2015
- Updated of Nationally Determined Contribution of Jamaica 2020
- National Renewable Energy Policy 2009-2030. creating a sustainable future – 2010
- Technology needs assessment report 2020

Based on key elements from the above-mentioned documents and the outputs and activities listed in the response plan, the following section presents each phase's activities towards the achievement of the outputs. It is important to mention that equal representation of female and male researchers, as well as basic, physical, technological, and social science researchers, will be pursued throughout the process.

Phase 1: Inception meeting with relevant stakeholders to define priority sectors

Based on a workshop held on September 11 with the technical committee, an agreement was made related to the priority sectors. The committee recommended that before defining research needs, it was more appropriate to engage the stakeholders in the decision on the sectors in which we will be working on. Therefore, for the inception meeting, the team has defined the following objectives:

- **Objective 1:** To prioritize sectors in which the research agenda will be focusing. This objective was included because the committee held a meeting on September 11th and decided not to decide the focused sectors; but, instead, define priority sectors with the key stakeholders. Therefore, this is the first step moving forward on the development of the agenda.
- **Objective 2:** Define a common understanding/definition of the R & T D agenda, its objective, and visualize how it will look.
- **Objective 3:** Start the initial identification of key stakeholders – as the critical mass of researchers and technicians.

The main activities in preparation for the workshop are presented in figure 2.

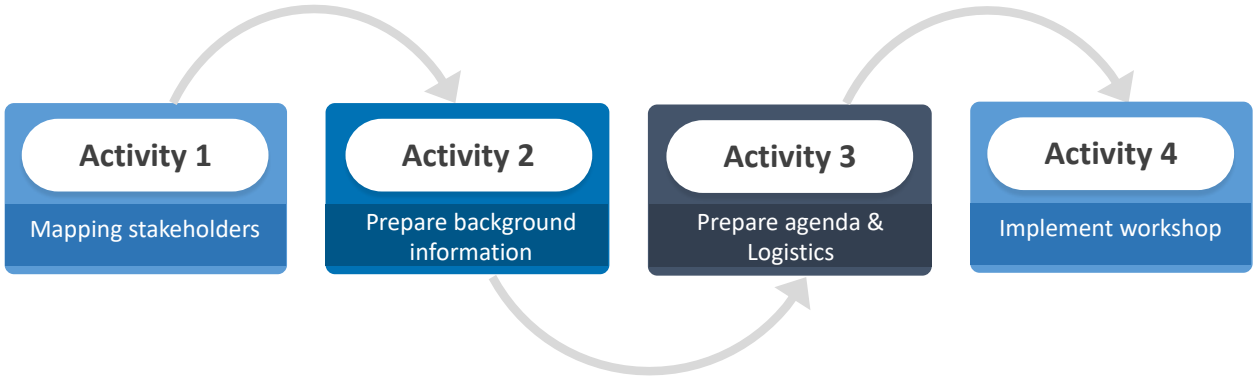

Figure 2. Activities required to develop phase 1 – prioritizing sectors successfully

- **Activity 1.** Mapping, in close collaboration with the NDE, relevant stakeholders to be linked to the TA and to be invited to the inception meeting.

  The initial mapping of stakeholders based on the participant list of the kick-off meeting of the CAEP, additional stakeholders were mapped from the revision of literature, mainly the Technical Needs Assessment (TNA), which presented the list of all stakeholders that participated in such process. The stakeholders (name, organization, and contact information) identified are presented in annex 1. In total, 195 stakeholders were identified: 86 from the public sector, 52 from the private sector, 23 from academia, ten from civil society, 23 from international organizations (16). The list will be validated with the committee to assess whether more stakeholders need to be involved in the initial workshop.

- **Activity 2.** Prepare background information for the workshop using secondary data, such as published reports. This includes an initial mapping of the current main lines of research and activities carried out by identified R&TD stakeholders and an inventory of researchers and groups of researchers working in areas relevant to climate resilience and low carbon growth.

- **Activity 3.** Create an annotated one-day agenda specifying the dynamic to be followed during the meeting, including brainstorm and working group sessions, to ensure the country's R & T D priorities are fully identified and the guiding principles for developing the R&TD agenda. The methodology will also ensure equal representation of female and male researchers and basic, physical, technological, and social science researchers.

- **Activity 4.** Implement workshops and prepare a report with the identified R&TD priorities of the country.

During the workshop, the research agenda's definition and structure will be presented, encouraging participation in the definition, and visualizing the main outcome of the process.

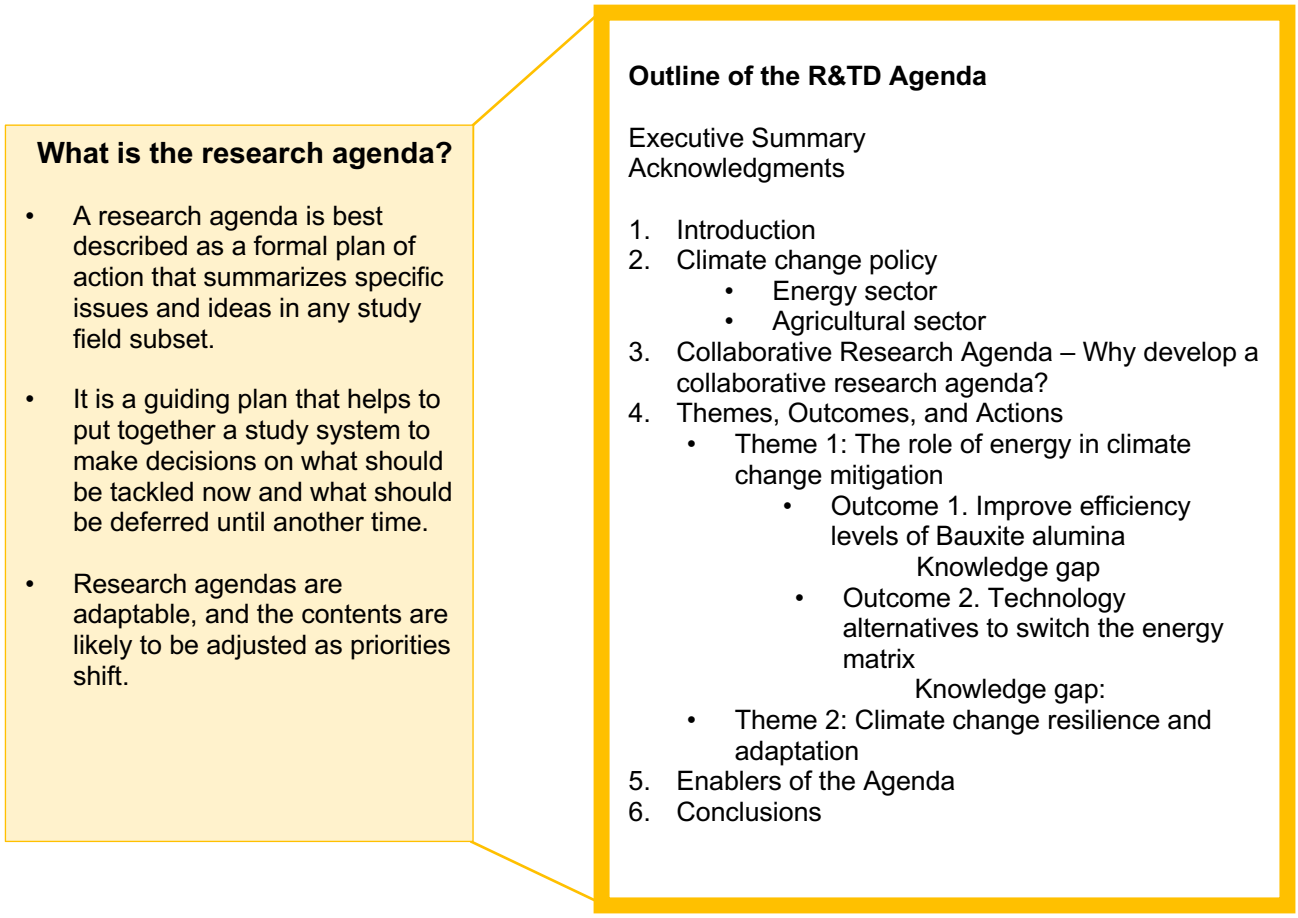

Figure 3. Ground concepts for the inception workshop as the basis for the common definition of the R&TD agenda

Phase 2. Online survey

- **Activity 1:** Design the survey, which will include general information of the participant, perceptions in terms of the culture of research, research activities within his/her organization (budget allocation, if possible), and research needs.
- **Activity 2:** validate the survey with the committee, making sure the questions are well understood.
- **Activity 3:** Distribution of the survey. The survey will be distributed via email, using the "SoGoSurvey" platform, this tool allows us to send reminders and send personalized invitations to participate. As mentioned before, the survey will be distributed using the official channel from the Climate Change Division. A period of two weeks will be given to fill out the survey by the stakeholders.

Phase 3. Inception meeting with relevant stakeholders to define priority research needs per sector

To carry out the prioritization of research needs, we will be using Q-methodology. The Q-methodology allows exploring how researchers, government, and managers can collectively address climate change issues.

Activity 1. The online survey represents the Q-sort activity to develop the concourse of statements that represented research topics—categories of existing or emergent research—within each sector. First, a comprehensive list of statements will be generated from the literature review, then we will have compiled them with keywords solicited from the researchers in the online survey. These will then be consolidated into unique statements that will be grouped based on their similarity. Each group will be summarized into a representative Q-statement and presented to the committee for feedback before the workshop. A final list of 15 representative statements per sector, or Q-sample, will be established through this iterative process.

Activity 2. Create an annotated one-day agenda specifying the dynamic to be followed during the meeting.

Activity 3. Implement workshops and prepare a report with the identified R&TD priorities of the country.

First, each participant will undertake individual Q-sorts to minimize the influence of others. Each participant will be asked to read through each Q-statement and then respond to the following prompt: “How essential or unessential is research on [Q-statement] for [to be defined] in the next ten years?" Participants will place each Q-statement on a grid from +3 (essential) to –3 (unessential) to determine their prioritization. The sorting activity will take between 5 and 15 minutes. Once all participants had completed a Q-sort, we will create cumulative rankings for each statement. Summary statistics will be produced that highlighted Q-statements with the high and low agreement between participating managers and researchers.

Deliverables

- Inception meeting report with the methodology used and main conclusions.
- Report with the country’s identified R&TD priorities, the guiding principles for developing the R&TD agenda, and a preliminary list of researchers and groups of researchers working in areas relevant to climate resilience and low carbon growth.

Phase 4. Analysis of R&TD sector’s priorities vis a vis country climate priority

Activity 1: Compile and analyze existing climate change policy frameworks and strategies to encourage R & T D's institutionalization within key sectors.

The analysis will identify research in the climate change priority areas and actions, progress achieved so far, and challenges. Also, it will define a benchmark of institutionalization of R&TD, will define linkages with priority development problems to close the gap and find solutions based on science. The team will perform an in-depth literature review, starting with national guiding documents, for instance:

- Intended Nationally Determined Contribution (NDC) 2015
- Revised NDC 2020 (or draft document)

- National Development Plan – Vision 2030, with special attention to:
  - Goal 3 (Jamaica's economy is prosperous) Outcomes 10 (Energy Security and Efficiency) and 11 (A Technology Enabled Society), and
  - Goal 4 (Jamaica has a healthy natural environment) outcomes 13 (Sustainable Management and use of environmental and natural resources) and 14 (Hazard Risk Reduction and adaptation to Climate Change).
- Climate Change Policy Framework (2015)
- Third National Communication (2018)
- Technology Needs Assessment (2004): Special emphasis should be made in reviewing: (i) the criteria for mitigation and adaptation technologies for Jamaica, (ii) mitigation technologies requirements for Jamaica, (iii) adaptation technologies for the coastal zone and water resources sectors, and (v) barriers of technology transfer.
- Science and Technology for Socio-Economic Development Policy (2005)
- Draft TNA III components which may be available for review

The team will also carry out interviews with key stakeholders to triangulate information and gather more specific information. Meetings will be implemented to identify critical factors that will enable implementation. Specifically, the team will:

- Assess the effectiveness of the climate change policy frameworks currently adopted (if any) and the critical success (by sector).
- Assess the degree of institutionalization of R&TD within key sectors (for instance, is there a budget currently allocated to R&TD, what percentage does it represent from the overall budget per sector, is its permanent budget, is people trained doing research?).
- Assess current perceptions towards R&TD from key stakeholders (understanding of research agenda, importance, and relevance on the day to day activities,
- Identify the research topics, structures, capabilities, technologies, and skills needed to support the climate agenda.

Activity 2: Map and identify the most relevant past and current research projects linked to said priorities (based on the country R&TD priorities identified during the inception workshop).

Activity 3 Match country climate priorities with R&TD current capacities

Triangulate information generated through activities in phase 2 and 3, and develop a gap analysis. During the gap analysis, identify suboptimal or missing strategies, structures, capabilities, processes, practices, scientific knowledge, technologies, and skills needed to support the climate agenda.

Deliverable: Report identifying areas where there is good matching between the installed capacity of R&TD and the demand generated by the country, in order to achieve climate resilience and low carbon growth, as well as those areas where there are gaps to be addressed.

Phase 5. Definition and validation of a country research agenda

Activity 1: Develop a first version of the R&TD agenda. The document will contain:

- Guidelines principles, including the need to ensuring the alignment of the R&TD agenda with the goals established in the National Development Plan Vision 2030 Jamaica, the NDC, and other policy frameworks

- Presentation of the main findings of the matching between the installed capacity of R&TD and the demand generated by the country, in order to achieve climate resilience and low carbon growth, as well as those areas where there are gaps to be addressed
- Identification of the main areas of action to be covered by the R&TD agenda, including those that need further strengthening, as well as new research areas – in case they are needed
- Identification of capacity development and funding needs
- Identification of possible areas of collaboration with academia and the private sector to enable the agenda implementation
- Identification of communication channels between scientists and policy-makers. An attempt to measure the acceptance of in-country research from policymakers will be undertaken.

Activity 2: Plan and implement a workshop with the participation of the R&TD stakeholders involved in the TA, as well as with representatives from the donor community, to validate the R&TD agenda and get their support for its implementation.

- Presentation and validation of the R&TD agenda
- Prioritization of two pilot projects out of the list of ten

Activity 3: Preparation of the final version of the R&TD agenda incorporating feedback from the workshop, including the list of the ten pilot projects identified, highlighting the two identified as a high priority.

Deliverables
- Research agenda validated – including the list of pilot projects as an appendix
- Report identifying main collaborators with academia and the private sector to implement the agenda

Phase 6. Preparation of the first draft of two concept notes

As a result of stakeholder engagement, a list of priority research areas will be identified and presented in the deliverable of phase 5. Considering that the research agenda lays out an action plan on which are the priority research ideas, the two conceptual notes will be developed on those two priority projects agreed with key stakeholders. The following are the activities to develop the concept notes:

Activity 1: Based on the selected/potential sources of financing agreed with the NDE, propose and agree on the format of the concept note.
Activity 2: Prepare two draft concept notes
Activity 3: Consult the concept notes with the NDNA and prepare the final draft

Deliverable: Two draft concept notes for two pilot projects, one with academia and one with the private sector, featuring high climate change benefit potential

3. Timeline

The timeframe to develop this technical assistance is of 8 months. The process started in August with administrative arrangements to conduct the work. In September, the focus was on finalizing the work plan (this document) and carefully reviewing all national instruments that guide the CAEP. The team participated in the kick-off meeting of the CAEP on August 11, and then, the terms of reference for the national consultants were advertised. All planning documents, including the CTCN M&E Plan and the impact statement, are included in this work plan.

Table 1 shows the expected delivery date of the outputs, as agreed on the response plan. Nonetheless, it includes an additional output, output 4, as requested from the Scientific Advisory Committee.

Table 1. Deliverables timetable

Description	Months							
	2020					2021		
	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March
Output 1: Development of implementation planning and communication documents	X	X						X
Output 2: Inception meeting with relevant stakeholders (academia, R&TD centers, and private sector) to identify national R&TD priorities successfully carried out			X					
Output 3: Analysis of R&TD sector's priorities vis a vis country climate priority (NDC, TNA, adaptation, national plans)				X				
Output 4. Draft of the R&TD agenda for initial revision by the scientific committee					X	X		
Output 5: Definition of a country research agenda and identification of main collaborations with academia and the private sector that can implement the agenda, both at a national, regional and international level, including the selection of two pilot projects							X	
Output 6: Preparation of a first draft of two concept notes based on the most appropriate financial mechanism, one with academia and one with the private sector, featuring high climate change benefit potential and preparation								X

4. Budget

The total budget to implement this technical assistance is of US$70,000. The detailed budget is presented in table 2.

Table 2. Budget per output

Activities and Outputs	Input: Human Resources (Title, role, the estimated number of days)		Input: Travel (Purpose, national vs. international, number of days)			Inputs: Meetings/events (Meeting title, number of participants, number of days)	Estimated cost US$
Output 1: Development of implementation planning and communication documents							**US$9,500**
Activity 1.1 Detailed work plan for all activities	CI-1	7					$2,660
	CI-2	2					$760
Activity 1.2. Monitoring and evaluation plan with specific, measurable, achievable, relevant, and time-bound indicators	CI-1	4					$1,520
Activity 1.3. A two-page CTCN Impact Description formulated in the beginning of the technical assistance and update/revised once the technical assistance	CI-1	4					$1,520
Activity 1.4. A Closure and Data Collection report completed at the end of the technical assistance	CI-1	5					$1,900
	CI-2	3					$1,140
Output 2: Report with national R&TD priorities identified							**$17,440**
Activity 2.1: Mapping R&D stakeholders to be invited to the inception meeting	CI-1	4					$1,520
	CI-2	3					$1,140
Activity 2.2: Prepare background information for the workshop, including and initial mapping of the current main lines of research and activities	CN-2	0.25					$575
	CN-1	0.25					$575
	CI-2	0.2					$76
Activity 2.3: Create an annotated one-day agenda specifying the dynamic to the meeting, including brainstorm and working group sessions	CI-1	3					$1,140
	CI-2	1					$380
	CN-2	0.5					$1,150
Activity 2.4: Implement workshop and prepare report with the identification of the country R&D priorities.	CI-1	4					$1,520
	CI-2	3					$1,140
	CN-1	0.4					$920
	CN-2	0.5					$1,150
			International	2	4	Bilateral meetings	$3,420
						Workshops	$2,734
Output 3: Analysis of R&D sectors priorities vis a vis country climate priority (NDC, TNA, national plans)							**$14,800**
Activity 3.1: Compile and analyze existing climate change policy frameworks	CI-1	3					$1,140
	CI-2	3					$1,140
	CN-1	0.3					$690

Activities and Outputs	Input: Human Resources		Input: Travel	Inputs: Meetings/events	Estimated cost US$
	(Title, role, the estimated number of days)		*(Purpose, national vs. international, number of days)*	*(Meeting title, number of participants, number of days)*	
and instruments within different sectors. T	CN-2	0.5			$1,150
Activity 3.2 Map and identify the most relevant past and current research projects linked to said priorities. Simultaneously, identify individual or group of researchers linked to such projects	CI-1 CI-2 CN-1 CN-2	4 4 0.5 0.5			$1,520 $1,520 $1,150 $1,150
Activity 3.1 Match country climate and development priorities with R&D current capacities	CI-1 CI-2 CN-1 CN-2	4 4 0.5 0.5			$1,520 $1,520 $1,150 $1,150
Output 4: Definition of a country research agenda and identification of main collaborations with academia and private sector able to implement the agenda, both at national, regional and international level					**$16,450**
Activity 4.1: Develop a first version of the R&D agenda	CI-1 CI-2 CN-2	4 3 0.5			$1,520 $1,140 $1,150
Activity 4.2: Plan and implement workshop with the participation of the R&D stakeholders involved in the TA to validate the R&D agenda	CI-1 CI-2 CN-1	2 2 0.5			$760 $760 $1,150
Activity 4.3: Preparation of the final version of the R&D agenda incorporating feedback from the workshop.	CI-1 CI-2 CN-1 CN-2	4 5 0.4 0.1		Workshop to validate the R&D agenda.	$1,520 $1,900 $920 $230 $5,400
Output 5: Selection of two pilot projects, one with academia, one with private sector and preparation of two concept notes addressing the most appropriate financial mechanisms					**$11,810**
Activity 5.1: Propose and agree on the format of the concept note with the DNA	CI-1 CI-2	3 2			$1,140 $760
Activity 5.2: Prepare two concept notes	CI-1 CI-2 CN-1 CN-2	4 5 0.6 0.4			$1,520 $1,900 $1,380 $920
Activity 5.3: Consult the concept notes with the NDE and prepare the final versions	CI-1 CI-2 CN-2	4 4 0.5			$1,520 $1,520 $1,150
				Total	**$70,000**

5. Monitoring & Evaluation (M&E) Plan and Impact Statement Form

The M&E Plan and Impact Statement is designed based on the Technical Assistance Response Plan and it will be the basis for CATIE to complete the Closure Report at the end of the assistance (March 2021). We used as reference the Closure report to identify relevant quantitative and qualitative indicators as applicable.

Basic Information	
Title of response plan	Identification of a climate change research agenda to include collaboration with academia
Technical assistance reference number	Activity A396 of the Objective 1. NDC Revision and Raising Ambition, NDC Partnership Climate Action Enhancement Package (CAEP).
Country/ countries	Jamaica
NDE focal point and organization	Ministry of Economic Growth and Job Creation Ms. Una May Gordon Principal Director, Climate Change Division +1 876 633 7354 unamay.gordon@megjc.gov.jm
Sector(s) addressed	
Technologies supported	N/A
Implementation period and total duration	8 months
Total budget for implementation	US$70,000
Designer of the response plan	The Tropical Agricultural Research and Higher Education Center (CATIE)
Implementer of response plan	The Tropical Agricultural Research and Higher Education Center (CATIE)

Table 3 presents the indicators to measure progress for each output, it proposes one of the core impact indicators related with funding leverage as a result of the technical assistance.

Table 3. Outputs, indicators, results and method of data collection

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection
Output 1: Development of implementation planning and communication documents	Number of tools and technical documents strengthened, revised or developed	One document	Documents
Activity 1 A detailed work plan of all activities,	Number of tools and technical documents strengthened, revised or developed	One document	Document

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection
Based on the work plan, a monitoring and evaluation plan A two-page CTCN Impact			
Output 2: *Inception meeting with relevant stakeholders (academia, R&TD centers, and private sector) to identify national R&TD priorities successfully carried out*	Number of participants in climate technology RD&D events (men and women)	At least 45 participants in total	List of participants
Activity 2.1 Mapping, in close collaboration with the NDE, relevant stakeholders to be linked to the TA .	The number of tools and technical documents strengthened, revised, or developed.	One document	Document
Activity 2.2: Prepare background information for the workshop using secondary data, such as published reports.	The number of tools and technical documents strengthened, revised or developed.	One document	Document
Activity 2.3: Create an annotated one-day agenda specifying the dynamic to be followed during the meeting,	The number of tools and technical documents strengthened, revised or developed.	One document	Document
Activity 2.4: Implement workshops and prepare a report with the identified R&TD priorities of the country.	The number of tools and technical documents strengthened, revised, or developed. Number of climate technology RD&D related events	At least 15 stakeholders from the public, private, civil society, and academia participate in the workshops.	Registry of participants Document

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection
Output 3: *Analysis of R&TD sector's priorities vis a vis country climate priority (NDC, TNA, adaptation, national plans)*	Number of policies, strategies, plans, laws, agreements, or regulations proposed, adopted, or implemented as a result of the TA	One document	Document
Activity 3.1: Compile and analyze existing climate change policy frameworks and strategies to encourage the institutionalization of R&TD within key sectors.	The number of tools and technical documents strengthened, revised, or developed.	One document	Document
Activity 3.2: Based on the country R&TD priorities identified during the inception workshop	The number of tools and technical documents strengthened, revised, or developed.	One document	Document
Activity 3.3: Match country climate priorities with R&TD current capacities	The number of tools and technical documents strengthened, revised, or developed.	One document	Document
Output 4: Definition of a country research agenda and identification of main collaborations with academia and the private sector that can implement the agenda, both at a national, regional and international level, including the selection of two pilot projects	The number of tools and technical documents strengthened, revised, or developed.	One document	Document
Activity 4.1: Develop a first version of the R&TD agenda.			
Activity 4.2: Plan and implement a workshop with the participation of the R&TD stakeholders involved in the TA	Number of participants in training organized by proponents and implementing partners	45 stakeholders participating in the process	Registry in the workshop

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection
Activity 4.3: Preparation of the final version of the R&TD agenda incorporating feedback from the workshop, including the list of the ten pilot projects identified, highlighting the two identified as a high priority.	**Anticipated** number of collaborations facilitated or enabled as a result of technical assistance. Number of RD&D collaborations Number of private sector collaborations	The R & TD agenda signed by public and private sector, academia and civil society.	Letters of understanding to perform research
Output 5: Preparation of the first draft of two concept notes	**The anticipated** amount of funding/investment leveraged (USD) as a result of TA (disaggregated by the public, private, national, and international sources, as well as between anticipated/confirmed funding)	Two projects that have leverage public/private funding for its implementation.	Concept notes approved for funding.
Activity 5.1: Based on the selected/potential sources of financing agreed with the NDE, propose and agree on the format of the concept note.	The number of tools and technical documents strengthened, revised, or developed.	One document	Document
Activity 5.2: Prepare two draft concept notes	The number of tools and technical documents strengthened, revised, or developed.	One document	Document
Activity 5.3: Consult the concept notes with the NDNA and prepare the final draft	The number of tools and technical documents strengthened, revised, or developed.	One document	Document

6. Impact Statement

Impact Statement	
Challenge	The main obstacle preventing the transition towards the use of renewable sources is cost, including those associated with its adaptation to the current distribution infrastructure and energy storage, which makes it difficult to disseminate. One way to address these challenges is through the consolidation of technological research and development capacities - developing a minimum critical mass of researchers and technicians - that contribute to an adequate transfer and assimilation of acquired technology, to achieve appropriate levels of use and operation.
CTCN assistance	▪ Development of a Collaborative Research and Technology Development Agenda. ▪ Developing a minimum critical mass of researchers and technicians contributes to an adequate transfer and assimilation of acquired technology, to achieve appropriate levels of use and operation.
Anticipated impact	Jamaica will benefit from the TA support by improving its knowledge about the state of the art of its current capacity for R&TD and how it matches the demand generated by the country, in order to achieve climate resilience and low carbon growth. The work to be developed during the implementation of the TA will enable Jamaica to organize its process for establishing and implementing a long-term R&TD agenda that will contribute to the implementation of the NDP-Vision 2030 and the NCST. It will also strengthen already established coordination mechanisms in R&TD. Another contribution over time is the prioritization of R&TD actions and the identification of gaps that need to be addressed in the key sectors. By setting priority actions, the Government can have a prioritized portfolio of projects ready to be submitted to financing institutions in case of a specific call for proposal. Finally, the TA will enable technology transfer; therefore, this CTCN TA offers a major opportunity towards the realization of climate strategies and resilient, low carbon development goals of the country.
Anticipated co-benefits from the TA	As the TA will explore enabling factors, it will provide insights into the barriers to undertaking research, which could be internalized by participant institutions and potentially influence the (re) definition of their R & T D agendas and resource mobilization.
Gender aspects of the TA	As a result of the TA activities, the following co-benefits are intended: ▪ Aim to provide equal opportunity for female and male R&TD researchers in decision-making related to climate technology selection. This will include involvement in planning consultation meetings and other project planning processes. ▪ A better coordination between the Gender Focal Points (GFPs) and the Climate Change Focal Points regarding R&TD issues, which will promote a more equitable distribution of costs and benefits derived from the adoption of new technologies.
Anticipated contribution to NDC	Since the TA will contribute to the definition of an R&TD agenda that considers both improvement and technological development aimed at increasing energy efficiency and reducing GHG emissions, as well as the expansion of both the production and use of knowledge to address climate change impact-related issues and adaptation actions, the TA will provide valuable inputs to the

actions related to the NDC. Given that the TA will enable Jamaica to organize its process to establish and implement a long-term R&TD agenda, it will provide inputs to support Jamaica´s technology needs assessment (TNAs) being carried out in 2020.

International finance and investment, technology, and capacity-building will be needed to achieve the ambitious intended contribution. The TA will support efforts to mobilize international finance and investment by identifying pilot projects and produce a draft concept note for two of them.

The TA could also provide valuable inputs to strengthen Jamaica's Renewable Energy NAMA and the Water Sector NAMA, which is currently seeking financing. The TA is relevant and will contribute to advance the Climate Change Policy Framework for Jamaica, specifically towards the following objectives:
1. To mainstream climate change considerations into national policies and development planning and to build the country's capacity to implement climate change adaptation and mitigation activities.
4. To improve communication at all levels on climate change impacts as well as adaptation and mitigation related opportunities.
5. To mobilize climate financing for adaptation and mitigation initiatives.
6. To encourage the private sector to embrace climate change imperatives and promote the development and implementation of technologies and processes that contribute to climate change adaptation and mitigation initiatives.

The narrative story

Jamaica is a member of the Small Island Developing States (SIDS) group. SIDS contributes less than 1% of the world's greenhouse gas emissions while remaining exceptionally vulnerable to the negative effects of climate change (CC). In 2013, Jamaica's total GHG represented 0.02% of global GHG emissions. However, the country experiences the negative impacts of CC not only in terms of its natural and social capital but also in its economic development.

Jamaica´s energy matrix shows a distinct dependence on fossil fuels, which makes it challenging to move forward in complying with the NDC's goals. However, the transformation of the energy matrix faces many challenges. For electricity generation, the adoption of environmentally friendly technologies, for example, during the generation and storage of energy, is limited by the high costs involved in acquiring equipment, limiting its diffusion and facing grid integration problems. This situation creates a need to consolidate research and technological development (R&TD) capacities to guarantee adequate transfer assimilation and deployment of the acquired technology, in order to achieve an appropriate mastery of them.

The other major problem that merits urgent research contributions is assessing the impacts of climate change and identifying adaptation options to address them. Jamaica is located among the countries of highest vulnerability and experiences important changes in various climatic parameters. It is imperative that the capacities to assess the potential impacts related to climate change risks are strengthened.

The CTCN technical assistance (TA) will support Jamaica's efforts in achieving its NDCs, as well as Climate Change Policy Framework (CCPF), specifically by contributing to the definition of an R&TD agenda that considers two fundamental themes: (i) improvement and technological development

aimed at increasing energy efficiency and reducing GHGs, and (ii) the expansion of both the production and use of knowledge to address climate change impact-related issues, as well as adaptation actions.

Contribution to SDGs

- SDG 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, following their respective programs of support. The TA will support the identification of an R&TD agenda which will facilitate the expansion of the use of upgraded technology by key sectors
- SDG 13.1 - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries: The TA will support the identification of an R&TD agenda which will facilitate resilience strengthening in the country
- SDG 13.3 (b) Promote mechanisms for raising capacity for effective climate change-related planning and management in the least developed countries and small island developing States, including focusing on women, youth, and local and marginalized communities. TA will build and support current planning mechanisms such as the TNA and the update of the NDA.

Reference to knowledge products

The team envisioned the use of the following documents:

- Policy brief: technologies for averting, minimizing and addressing loss and damage in coastal zones
- Innovative approaches to accelerating and scaling up climate technology implementation for mitigation and adaptation
- Enhancing financing for the research, development, and demonstration of climate technologies

Annexes

Annex 1. List of stakeholders identified

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