



Caribbean Community  
Climate Change Centre



**ACCLIMATISE**  
building climate resilience

## Caribbean Community Climate Change Centre

### CCORAL development report

June 2015

(Modified from the 1st July 2013 Report)

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CCORAL development report

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### Climate & Development Knowledge Network



Climate & Development  
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This document is an output from a project funded by the UK Department for International Development (DFID) and the Netherlands Directorate-General for International Cooperation (DGIS) for the benefit of developing countries. However, the views expressed and information contained in it are not necessarily those of or endorsed by DFID, DGIS or the entities managing the delivery of the Climate and Development Knowledge Network\*, which can accept no responsibility or liability for such views, completeness or accuracy of the information or for any reliance placed on them.

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## 1. Introduction

We are in uncharted waters. Climate change is underway. Whatever we achieve in reducing emissions of greenhouse gases (GHG) we still face inevitable changes in our climate and in our social, economic and environmental systems. If we fail to reduce emissions, then the changes in these systems will be even greater.

Mitigation efforts to reduce emissions are vital if we are to keep climate change from surpassing a dangerous, and rapidly approaching, threshold. This has been called avoiding the unmanageable. However, the effects of climate change are already upon us and are growing rapidly. A significant reduction in emissions is essential, but, we must also prepare for and respond to the impacts – we must adapt to manage the unavoidable.

In the Caribbean, a region already characterised by high variability in the current climate, a changing climate represents an additional stress for society, economic sectors and natural environments. This changing risk profile will have an effect on the outcome of a wide range of decisions affecting individual, societal and economic well-being. In order to plan effectively for the future and to manage the increasing variability of the current climate, decision-makers must assess and be aware of these changing risks.

As our understanding of climate change improves it is becoming possible to gain an increasing confidence about some of the expected changes, for example with regard to increasing temperatures. However, our knowledge of the climate system is not perfect, resulting in uncertainty around the precise extent of future climate change. Furthermore, we cannot know how future emissions of greenhouse gas emissions will change and the scale of the effects they will cause. Uncertainty also stems from our incomplete understanding of the impacts of future climate on society, the environment, and economies.

Despite these uncertainties and regardless of the effectiveness of emissions reductions efforts worldwide, Caribbean governments must continue to make decisions to plan for the future. The Regional Framework for Achieving Development Resilient to Climate Change (Regional Framework) and the associated Implementation Plan (IP) are founded upon the principle of using risk management processes and tools to aid decision-making. Risk management processes can be used to manage our responses to aspects of climate variability and climate change that create or increase an existing risk. The **Caribbean Climate Online Risk and Adaptation Tool – CCORAL** has been designed to provide decision makers with access to the best currently available tools to enable a risk management approach to be used.

CCORAL has been developed to meet the needs of decision makers in the Caribbean. It is the product of extensive research, stakeholder consultations and expert knowledge. This accumulated knowledge informed the choices that led to the structure and content of CCORAL, which have been discussed in consultations and workshops with pilot-country stakeholders.

This report presents the rationale behind development of CCCORAL. It provides an overview of CCORAL's development process and overarching objectives before discussing key stages and steps of the framework, exploring the rationale of each in turn.

This development report was written to meet the needs and interests of experts who have an interest in understanding the technical considerations that underpin CCORAL. It explores the impetus that drove the development of CCORAL as well as providing justification, rationale and primary resources that informed it. Readers are encouraged to use this report as needed, either referring to specific sections or exploring it in its entirety.

## 2. Background

In July 2009, the *Liliendaal Declaration on Climate Change and Development* was issued by the 13<sup>th</sup> Meeting of the Conference of Heads of Government of the Caribbean Community (CARICOM). This Declaration provided a vision for transformational change in the region in response to the challenges of a changing climate. It makes a number of commitments, endorsements and specific declarations on the actions needed to affect change. Following from this, and at the request of the CARICOM Heads of State, '*Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009-2015)*' ('the Regional Framework') was prepared and published in 2009 by the Caribbean Community Climate Change Centre (CCCCC). The purpose of this document was to 'establish direction for the continued building of resilience to the impacts of global climate change by CARICOM states'.

In order to guide and help operationalise country commitments under the Regional Framework, an Implementation Plan<sup>1</sup> (IP) was developed by the CCCCC and endorsed by the CARICOM Heads of Government in March 2012. Based on a comprehensive period of consultation, 12 priority challenges and actions were identified in the IP to ensure delivery of the Regional Framework. One challenge was the need to develop a risk management ethos in decision making, i.e. to ensure use of risk management processes and tools in decision-making and manage the uncertainties. CCORAL was developed in response to this need.

### 2.1. Aims and objectives

The CCCCC developed terms of reference articulating two overarching aims for CCORAL:

1. Support climate compatible development in the Caribbean by enabling the implementation of key activities outlined in the Implementation Plan; and
2. Embed considerations of climate change across the Caribbean, through the development of a regional approach to risk management and the creation of a risk management ethos in decision making.

The objectives of CCORAL are as follows:

1. To provide an online support system, meeting user needs, for climate resilient decision-making in the Caribbean.

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<sup>1</sup> CCCCC (March 2012) *Delivering Transformational Change 2011-2012: Implementing the CARICOM 'Regional Framework for Achieving Development Resilient to Climate Change'*. Caribbean Community Climate Change Centre, Belmopan, Belize.

2. To provide an online 'screening' tool to enable users to take a high-level view of potential climate impacts on their decisions.
3. To provide a system that guides users in how to routinely apply a comprehensive risk assessment and management process to decision making, wherever relevant.
4. To provide a signpost to relevant sources of information to help with climate resilient decision-making.
5. To increase knowledge and understanding among decision makers on the relevance of climate variability and climate change to their day to day jobs, thus embedding a consideration of climate resilience across the region.
6. To deliver the objectives above in line with user needs, as defined during project stakeholder consultations.

The CCORAL project was divided into three phases:

Phase 1 - development of an online risk management framework:

Phase 2 - regional training in Belize and Barbados: and

Phase 3 - country-specific training in the application of CCORAL across all CARICOM countries.

Phase 3.1 – Incorporation of water resource management tools into CCORAL

## **2.2. Additional considerations**

CCORAL allows decision makers in Caribbean governments, regional agencies<sup>2</sup>, NGOs/CSOs, universities and research institutions, the private sector, financial services and development partners to:

- Locate relevant 'tools' to help manage the additional risks from climate change; and
- Use CCORAL proportionally, recognising scale, cost and time pressures.

The initial project brief was to focus on government decision makers and particularly those in ministries of finance and planning, thereby meeting the priority challenge set by the IP. CCORAL is different from other climate risk management tools in that it has been designed specifically to meet the needs of a decision maker who needs to integrate considerations of climate variability and climate change into their existing activities.

To facilitate ease of use and ensure lessons learned are captured, users will be able to record their notes and comments in a 'workbook' feature and their decisions in a PDF report. The workbook and report can then be downloaded and added to a user's own project files.

CCORAL was developed to be user-friendly, minimising additional workload and costs for decision makers faced with pressures on time and capacity gaps. Key components of this proportionality include:

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<sup>2</sup> For a complete list of the relevant CARICOM mandated agencies see <http://www.caricom.org/jsp/community/institutions.jsp?menu=community>.

- A screening exercise which allows users to identify to what degree their activity/decision is climate-influenced, and whether it is a high priority for further investigation on climate impacts and adaptation. This reduces the burden on the user and provides an early exit point for those activities which are not high priority, given limited time and resources.
- Guidance on addressing climate impacts and adaptation that is fully integrated in the context of existing process within Caribbean governments. The success of CCORAL, taking on board the lessons learned from the CARICOM Caribbean Risk Management guidelines for Climate Change Adaptation Decision Making published in 2003, is dependent on ease of incorporation within day-to-day roles by non-climate change experts engaged in making decisions.
- Providing the user with a choice of undertaking a high-level overview approach or a detailed analysis.

Practical experience on adaptation is still evolving. CCORAL is intended to be an active, dynamic decision support system which will be updated in the future based on lessons learned from application in real-life decisions and the development of new tools.

### 3. Terminology

A coherent terminology promotes clarity of communication among experts in a field where key terms are often used with a variety of meanings. This is a confusing area for someone who is not a 'climate change expert'.

Definitions for CCORAL terminology were chosen according to international standards in the field, notably those established in reports from the Intergovernmental Panel on Climate Change (IPCC, 2007; IPCC, 2012). Other widely adopted resources that reflect best practice and provided terms included *Climate adaptation: Risk, uncertainty and decision-making* (Willows and Connell, 2003), and *Caribbean Risk Management Guidelines for Climate Change Adaptation Decision Making* (CARICOM, 2003).

Several critical terms are explored below. For the complete terminology and list of resources, please see the glossary online in CCORAL.

**Climate variability and climate change** - Climate varies naturally on a wide range of timescales and it is important to highlight the distinction between climate variability and climate change. Based on the IPCC (2007) detailed definitions (as outlined in the glossary):

- *Climate variability* refers to variations in the mean state of climate on all temporal and spatial scales beyond that of individual weather events. Examples of climate variability include extended droughts, floods, and conditions that result from periodic El Niño and La Niña events.
- *Climate change* refers to shifts in the mean state of the climate or in its variability, persisting for an extended period (decades or longer). Climate change may be due to natural changes or to persistent anthropogenic changes in the composition of the atmosphere or in land use.



Both climate variability and climate change contribute to the vulnerability of individuals, businesses, communities and regions and to social, economic and environmental systems on which they depend. As has been argued by a number of authors, the immediate imperative is to address climate variability in its present form as part of the continuum of change (e.g. Downing *et al.*, 1997; Washington *et al.*, 2006). However it is also critical to address the shift over time. CCORAL addresses both climate variability and climate change.

**Activity and decision type** - CCORAL uses the general terms 'activity' and 'decision' to refer to decision making process involving one of the following standard areas of national government intervention:

- national development planning,
- policy and strategy creation,
- national budget setting,
- legislation; and
- designing, approving and implementing programmes and projects.

In CCORAL, users select one of these activities or decisions to receive targeted guidance relevant to their situation.

#### 4. Comparison with existing tools

A full review of existing climate risk management (CRM) processes was conducted at an early stage of the project. This analysis evaluated almost 100 CRM tools, with the purpose of:

- providing a foundation for the development of a new CRM decision-making framework specifically design for the Caribbean,
- capture latest developments on CRM,
- reflect best practice around the world; and
- understand how other best-practice tools can inform and/or directly feed into CCORAL.

Tools were identified through the use of expert knowledge, requests to relevant organisations, targeted internet searches and supplemented by literature reviews<sup>3</sup>. Criteria for inclusion in the evaluation first included whether a tool was relevant to the Caribbean and relevant to existing Caribbean decision-making processes. To this end, there was an emphasis on tools originating in or designed for the Caribbean or analogous areas (e.g. small island developing states (SIDS), coastal regions, developing states, etc.). However, tools designed for a broader range of places and sectors were also evaluated in order to draw on best practice CRM processes from around the world.

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<sup>3</sup> These resource included:

"Climate Compatible Development Tools: A guide for national planning" (website: <http://climateplanning.org/>).

Hammill, A. and T. Tanner (2011), "Harmonising Climate Risk Management: Adaptation Screening and Assessment Tools for Development Co-operation", OECD Environment Working Papers, No. 36, OECD Publishing.

"Mainstreaming Adaptation to Climate Change in Agriculture and Natural Resources Management Projects: Guidance Notes" (2009) World Bank Climate Change Team: Environment Department.

Olhoff, A. and C. Schaer (2010). Screening Tools and Guidelines to Support the Mainstreaming of Climate Change Adaptation into Development Assistance – A Stocktaking Report. UNDP: New York.

Evaluation criteria were developed that reflected the goals of CCORAL as outlined in the terms of reference. Each tool was assessed by applying a combined qualitative/quantitative assessment against criteria under the follow categories:

- Format, accessibility and ease of use.
- Relevance to the Caribbean, SIDS and coastal states.
- Relevance to the IP.
- Aspects of climate decision-making addressed.
- Economic/costing information included.

A breakdown of elements that were considered is presented in Table 1.

**Table 1 – Information collected and evaluation criteria for CRM tools**

General information, format, accessibility and ease of use	Relevance to the Caribbean, SIDS, coastal states and CARICOM Implementation Plan	Economics/ costing information
<ul style="list-style-type: none"> <li>• Title</li> <li>• Objective</li> <li>• Organisation</li> <li>• Year</li> <li>• Target audience</li> <li>• Format</li> <li>• Source</li> <li>• Geographic coverage</li> <li>• Scale of use</li> <li>• Type of impact/ hazard</li> <li>• Sector(s) covered</li> <li>• Instruction provision</li> <li>• User training requirement</li> <li>• Expert knowledge requirement</li> </ul>	<ul style="list-style-type: none"> <li>• Developed for Caribbean</li> <li>• Developed for SIDS</li> <li>• For use in developing countries</li> <li>• Addresses key Caribbean sectors</li> <li>• Government-decision making context</li> <li>• Addresses sustainable development objectives</li> <li>• Addresses disaster risk reduction</li> <li>• Private sector role</li> <li>• Mitigation co-benefits</li> <li>• Awareness-raising/ knowledge transfer component</li> </ul>	<ul style="list-style-type: none"> <li>• Valuation approach</li> <li>• Decision rule</li> <li>• Treatment of uncertainty</li> <li>• Treatment of risk attitude</li> <li>• Treatment of equity/ distributional effects</li> <li>• Baseline</li> <li>• Boundary</li> <li>• Non-monetary valuation</li> <li>• Cross-sectoral linkages</li> <li>• Macroeconomic aspects</li> <li>• Co-benefits/trade-offs</li> <li>• Residual impacts</li> <li>• Reversibility flexibility</li> </ul>
<ul style="list-style-type: none"> <li>• Dependence on available data/information</li> </ul>	<p style="text-align: center;"><b>Aspects of climate-decision making addressed</b></p> <ul style="list-style-type: none"> <li>• Considers both current climate variability and change</li> <li>• Vulnerability assessment</li> <li>• Exposure assessment</li> <li>• Sensitivity assessment</li> <li>• Adaptive capacity assessment</li> <li>• Risk assessment</li> <li>• Opportunities identified</li> <li>• Adaptation assessment</li> <li>• Adaptation cost/ benefit analysis</li> <li>• Monitoring/evaluation component</li> <li>• Stakeholder involvement</li> <li>• Management of climate uncertainty</li> </ul>	<p style="text-align: center;"><b>Other</b></p> <ul style="list-style-type: none"> <li>• Gender analysis</li> </ul>

Although focused on CRM, several disaster risk management (DRM) tools for Caribbean countries or SIDS were also included in the evaluation due to their general complementarity or specific focus on regional points of concern. A limiting factor was that nearly all of the included tools were authored by either regional or international bodies. The absence of tools made by individual national governments from the Caribbean, other SIDS, or other governments was surprising, but may reflect the fact that CRM is an emerging field in which major international bodies are the first to dedicate large amounts of time and resources. This imbalance increased the share of non-Caribbean origin tools that were included.

The full evaluation of these CRM tools offered many key lessons learned that directly informed the development of CCORAL:

- **Clear definition of the user of a CRM framework** and associated tools will increase application of the framework.
- **Designing for user capacity is necessary:** An effective tool must consider questions such as: How long should the framework/tool take to use? What is the appropriate 'skeleton' on which to hang the framework? What is appropriate language? How can the tool be designed to meet external drivers for use?
- **Working with existing processes:** Management of climate impacts should be integrated into existing risk management and decision-making frameworks, minimising duplication of effort, the cost of learning new processes, and increasing the chance of uptake and adaptation.
- **The diminishing returns of greater detail:** More detail is not necessarily better, particularly in developing countries where resources (including money, data and/or manpower) may be limited and rapid action may be required. It is necessary to balance the benefits of more detailed, more complex CRM tools with the fundamental limitations facing decision-makers on the ground.
- **'Made in the Caribbean' advantage:** An investigation into international best practice of CRM helps lay a foundation for a Caribbean framework, but international insight only goes so far. Tools created with local perspectives in mind offer a better chance of accurately reflecting stakeholders' unique needs, of managing specific geographic challenges, of overcoming particular knowledge gaps and of coalescing into a thoughtful framework or purposeful tool for local implementation.
- **Unity of vision:** Most of the CRM tools evaluated contain diverse elements. The most successful approaches are those that articulate coherent, flexible visions of how the various components work together. UKCIP stands out in this regard, with a comprehensive portfolio of interlocking tools built upon a founding framework (Willows and Connell, 2003). This decision-making system is more than the sum of its parts, providing discrete, fully-fledged tools for users grounded within a structured approach. This type of approach (i.e. a comprehensive portfolio of interlocking tools built upon a founding framework) provides a model structure for a new Caribbean framework.
- **Flexibility vs. structure:** Flexibility allows users to modulate a tool to their needs. Structure encourages good practice and facilitates the introduction of new topics (e.g. climate science, risk management) to unfamiliar audiences. Striking an effective balance between these necessary attributes is a critical but challenging step in the creation of a tool.
- **Integrating vulnerability analysis approaches** are considered essential together with an economic/costing analysis.
- **Stakeholder engagement:** Stakeholders must be engaged early and frequently. They can provide unique guidance and necessary support, and play critical roles in stages such as risk prioritisation, implementation and monitoring and evaluation.
- **Development and adaptation:** Caribbean countries are developing countries. Minimising climate risks and building resilience has to be considered as part of a programme to meet the wider development challenge. Integrating the two present important opportunities to maximise investment, reduce duplication of effort and build long-term resilience.

- **Opportunity for leadership:** Many of the evaluated elements (M&E, CBA, etc.) have not reached maturity yet in their application in climate change adaptation, particularly in developing countries. There is an opportunity for the Caribbean to take a leadership role in articulating and bringing to maturity these many inchoate or in transition processes and bring them together as a nuanced suite of tools with a guiding regional focus.

CCORAL was built on lessons learned from this careful analysis of CRM instruments to contribute to a new, bespoke resource for Caribbean users. However, no tool is comprehensive, and a large number of good practice tools identified in this exercise were also collated into an extensive database that was presented in a searchable format for users of the framework. Best practice tools for 7 modules (see below) were also selected for recommendation at key intervention points (see below).

## 5. Users

CCORAL has been developed primarily for use by CARICOM governments, government agencies and CARICOM regional agencies<sup>4</sup>. Within these groups, the focus of CCORAL is on those involved in national development planning and finance in particular. However, CCORAL can be applied by any government employee, of any skill level, to support them in undertaking a climate resilient activity or making a climate resilient decision.

CCORAL is also open access and can also be used by other users, for example those in non-governmental organisation (NGOs), Civil Society Organisations (CSOs), universities, research institutions, the private sector, financial services and other development partners. The online tool allows these users to access CCORAL and its database of tools to carry out a full risk management process or use one or more of the seven modules, for example a vulnerability assessment. Users can also access all the links to information sources, climate modelling data, reports and existing studies which may support them in their work.

To meet the specific needs of different users, the homepage of CCORAL guides users to either begin the framework or jump immediately to sections of interest. All information is presented in the context of the country of interest (or the whole region if the user wants to take a regional perspective). If a user decides that they only wish to assess the links to country/regional resources, the framework is flexible enough that they may jump ahead to the resources that best fit their needs. CCORAL is also split into two sections for climate experts and non-experts, each with tailored resources and levels of detail to fit the different groups' needs.

By using CCORAL decision makers can demonstrate to funders, investors and development partners that climate resilience has been considered and integrated into relevant activities. Application of CCORAL can help users to identify decisions that minimise climate related loss, take advantage of any opportunities and build climate resilient development in their countries. This can support the creation of robust legislation, regulation, planning, policies, strategies, programmes, projects, budgets and, ultimately, more resilient and sustainable economies.

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<sup>4</sup> For a complete list of the relevant CARICOM mandated agencies see <http://www.caricom.org/jsp/community/institutions.jsp?menu=community>

## 6. Screening exercise

In consultation with stakeholders there was a repeated emphasis on the need for CCORAL to include a rapid, easy to use screening tool that would permit users to immediately understand if CCORAL was relevant to their work and worth an investment of time and resources on more detailed assessment. Several kinds of screening exercises were tested in consultations, presenting a best solution which is described below.

CCORAL's screening exercise was developed to identify if the user's activity/decision type may be climate-influenced and is low, medium or high priority for further assessment using CCORAL. It recognises that users and their organisations will not have sufficient resources or time to make use of the functionality provided by CCORAL for all their activities and will have to prioritise their efforts. This ensures that CCORAL is used when it is necessary, taking into account the user's time, expertise and other capacity constraints. Because of these constraints, the importance of not having every activity screened as highly influenced was stressed by stakeholders throughout consultations. The final version of the exercise described here, developed with the aid of stakeholders, contains a robust prioritisation process that highlights which activities are potentially climate influenced and in need of further assessment.

The screening exercise can be used to screen:

- A user's organisation's workplan (This is an ideal time to use the exercise to enable all organisational activities to be scored and then prioritise on the basis of available resources. The user might for example consider that they have sufficient resources to undertake risk assessments for the top 5 or 10 scoring activities); and/or
- Individual activities as and when they begin to be developed.

There is a further objective for the screening exercise and that involves raising awareness with decision makers regarding the importance of seeing activities through a 'climate change' lens. The questions asked in the exercise can be routinely used as an 'aide-memoire' for decision makers to use and apply to their roles and responsibilities to identify climate influences.

The screening exercise is based around 10 questions which are adjusted to reflect the unique context for each country. These questions do not require any prior knowledge or expertise regarding climate change. Users answer the 10 questions with a yes or no response, with each yes response scoring 1 point (except question 10, which scores 3 points).

Question 10 is heavily weighted because of the relative importance of national development planning in each of the countries and its critical role in building resilience. The IP emphasises the importance of building resilience as an integral element of wider national development planning activities. It is anticipated that over time the questions will need to be reviewed to reflect a growing understanding of climate influenced activities and priorities in the region.

After answering all 10 questions, CCORAL tallies the scores for the users and automatically assigns a priority level to their activity depending on their answers:

- **Low Priority** - This may be a climate-influenced activity but is low priority. Given limited time and resources, it is not necessary to continue using CCORAL for this activity. However, check the CCCCC clearing house and related resources to see if

there is any readily available information that might generally assist you with your activity (e.g. an existing climate vulnerability study for your sector).

- **Medium Priority** - This is a climate-influenced activity and a medium priority. It is advised that you continue using CCORAL, unless time and/or resources do not permit this. If it is not possible to continue using CCORAL, it is advised that you check the CCCCC clearing house and related resources to see if there is any readily available information that might assist you with your activity.
- **High Priority** - This is a climate-influenced activity and a high priority. It is strongly recommended that you continue using CCORAL for this activity.

Extensive feedback from stakeholders in the four pilot countries had a major influence in the final version of the screening tool. Recommended improvements made include:

- A simpler and less subjective set of questions with yes/no answers.
- The scoring system is more flexible and allows for prioritisation. Users can rank on basis of score from 10 questions and then compare different activities on the same scale.
- Increased number of possible outcomes for different types of users.
- Greater clarity on when to use: either at start of planning year, or on individual project.
- A tougher evaluation process means that fewer activities are likely to screen high (which would overload resources).

Each of the questions of the screening exercise presented below is accompanied by a description of its justifying rationale:

**Question 1) Is your activity located in/ relevant to an urban, coastal or marine area, or any other environmentally sensitive or protected area?** – Different geographical locations in the Caribbean are exposed differently to climate variability and change. These areas were identified in the consultations as generally of highest vulnerability to climate change across the Caribbean. Which areas are included are modified in each country's specific version of the exercise to reflect local geography, priorities and vulnerabilities.

**Question 2) Will the effects of the activity last longer than 10 years?** – Effects or outcomes of an activity refer to physical artefacts, functional processes, systems and other results, intended or otherwise. The intent of this question is to differentiate between activities with short and long term effects. Activities with longer-term outputs or effects will be exposed to an increasing range of climate change variability. Though significant climate change is not expected in 10 years, limited resources in many Caribbean countries can mean that activities with an intended life of 10 years may in fact be maintained significantly longer, and thus should be considered in the context of climate risk. Increasing climate variability is already occurring in the Caribbean. Across regional and international literature, decisions with lifetimes of 20 years or more are broadly considered long enough for the impacts of climate change to begin to have significant impacts. Decisions lasting 10-20 years may experience some impacts of climate change and increasing climate variability, whereas decisions with lifetimes of less than 10 years the impacts of a changing climate may be more difficult to identify and stresses due to climate variability may be more dominant.

**Question 3) Does the activity/decision involve the tourism, agriculture, forestry, fisheries, water, energy or health sectors?** – ‘Involvement’ of one of these sectors refers to the sector being the core sector for your activity, and/or being significantly involved in consultation for your activity. These are the main sectors identified in the Regional Framework, but they are changed to suit country circumstances in different country-versions of the screening tool.

**Question 4) Are existing similar activities already experiencing impacts due to adverse weather effects?** – Climate change is already occurring across the Caribbean, often manifested through adverse or unpredictable weather. Such early impacts provide a warning flag of additional or increased impacts in coming years.

**Question 5) Is the activity, once it is implemented, irreversible and inflexible (i.e. it cannot be reviewed and adjusted periodically)?** – Certain activities are inherently less adaptable to change. For example, new port infrastructure comes at a high cost and with structures that are difficult to modify or adjust to a changing climate. Activities with outputs that are inflexible should be given increased attention.

**Question 6) Does the activity focus on vulnerable population groups as a primary target?** – IPCC First Assessment Report defines climate vulnerability as “the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes” (IPCC, 2007). Vulnerability is defined by combination of factors, such as exposure to climate impacts, sensitivity and adaptive capacity. Research identifies a number of socio-economic characteristics shaping population sensitivity and adaptive capacity, which contribute to overall vulnerability to climate variability and change (see synthesis report by Cutter *et al.*, 2009):

- Low income groups
- Females
- Children and elderly
- Poor health and disabled
- Low education level
- Unemployed

If the activity/decision has vulnerable groups as a primary target it should be given increased attention.

**Question 7) Will this activity contribute to improving disaster risk management?** – Increasing climate variability, as part of a changing climate, will influence disaster risk management (DRM). An activity that contributes to improving DRM should be given increased attention regarding climate risk.

**Question 8) Is the activity focussed on the provision or dependent upon the availability of nationally or locally critical infrastructure?** – Examples of critical infrastructure include transportation, energy, water, ICT, hospitals, schools, etc. Critical infrastructure, due to its socio-economic importance for each country, as well as being long lived, should be thoroughly assessed for all kinds of risks, including an assessment of climate risk.

**Question 9) Will this activity result in an investment of more than 5% of your Ministry’s/organisation’s annual capital and operational expenditure?** – Large investments should be thoroughly assessed for all kinds of risks, including an assessment of climate risk. This



percentage will be set and tested through country discussions; different values can be selected for each country. The % figure can be changed.

**Question 10) Will the activity deliver or make a significant contribution towards achievement of a priority national development plan objective?** – The IP identifies integration of climate change considerations into wider sustainable development planning and specifically National Development Planning as a priority challenge. Delivering low carbon, climate resilient economies can only be achieved if this integration is successful. The IP also recognises that failure to integrate will mean that National Development Planning objectives will not be met. For this reason, the exercise assigns 3 points to this question (while each of the others receive only 1 point).

### 6.1. Comparison to existing screening tools

A number of climate screening tools exist to assess risk, vulnerability or impacts, and some of these provided points of influence or inspired elements of CCORAL's screening tool. These tools were identified through research, expert knowledge and a review of screening tools (Hammill and Tanner 2011). This section contains a brief summary of some of these tools, highlighting how CCORAL screening tool compares and is related to them.

The Asian Development Bank's 2009 Risk Screening Tool<sup>5</sup> models an approach where users can quickly identify if the screening tool is of use to them and if not, a route to exit early; users that stay in follow a list of screening questions related to sector, geography, population groups and goals. This overall structure showed up frequently in different tools, and a version of which was developed for this screening exercise.

Significant variety can be seen in the level of complexity each tool presented to users. Excessive complication was a common problem among other tools. Conversely, GTZ provided an example for how a screening tool can be streamlined for ease of use by combining similar criteria and limiting the number of questions<sup>6</sup>. Our approach has been to find a balance between excessive complexity and a competent, accurate but user-friendly tool.

The UK Defra's Green Book provides a Summary and Issues Filter<sup>7</sup> that flags too many activities, but does helpfully suggest that those projects that do pass remain under the eye of a monitoring and evaluation programme to assess any changes in their status. The Caribbean screening exercise was built with the limited resources of many national governments in mind, and provides both a level of robustness and a prioritisation mechanism to empower decision-makers to accurately discriminate between activities and optimally spend resources.

Our selection of criteria for screening was first guided by our understanding of climate risks and the current context in the Caribbean. This list was assessed against the criteria included in the other tools, which inspired some additions or simplifications to our criteria, such as how to address vulnerable populations or national priorities.

<sup>5</sup> See <http://www.scribd.com/doc/116189020/Guidelines-for-Climate-Proofing-Investment-in-Agriculture-Rural-Development-and-Food-Security>

<sup>6</sup> See <http://www.iisd.org/pdf/2011/5kg706918zvl.pdf>

<sup>7</sup> See <http://archive.defra.gov.uk/environment/climate/documents/green-book.pdf>



While the screening exercise adapts good practice elements from existing tools, CCORAL’s version has many unique elements combined especially for Caribbean users and their requirements as expressed during consultations.

## 7. Activity/ decision types

CCORAL allows users to integrate climate variability and climate change into their typical decision making processes and activities. Guidance is provided on how climate vulnerability, risk, adaptation, monitoring and evaluation and awareness raising can be integrated into each activity/decision type. It should be emphasised however that CCORAL does not replace existing procedures for making decisions – it is designed to integrate into and be complementary to the process of decision making.

The consultations with the pilot countries confirmed the importance of designing CCORAL so that it recognises the way in which decisions are made by Caribbean governments. Specific guidance was provided in CCORAL on integrating climate resilience into the following primary activity/decision types:

- National Planning.
- Policy and/or strategy.
- Legislation.
- Programme and/or project.
- Budget preparation/ evaluation.

Information gained from the pilot countries shows that there is limited evidence of standard or codified approaches to these kinds of decision making among Caribbean countries. In view of this, the project team produced default processes for the five types of activity/decision type listed based on resources (summarised in Table 2) and confirmed for general applicability in the Caribbean during the in country consultations

**Table 2. Sources of primary information for default decision-making processes.**

Decision-making process	Sources of information
Budgets	<ul style="list-style-type: none"> <li>• OAS, n.d.</li> <li>• UNICEF, 2004</li> <li>• Crandall and Kidd, 2010</li> <li>• Osorio, 2013 (pers. comm.)</li> </ul>
Legislation	<ul style="list-style-type: none"> <li>• Government of the Republic of Suriname, n.d.</li> <li>• Crandall and Kidd, 2010</li> <li>• Taylor, N. 2013 (pers. comm.)</li> </ul>
Strategy/Policy	<ul style="list-style-type: none"> <li>• CDKN, Ecofys and IDS, 2012</li> <li>• Crandall and Kidd, 2010</li> </ul>
Planning	<ul style="list-style-type: none"> <li>• PIOJ, 2012</li> <li>• CCCCC, 2012</li> </ul>
Projects/ Programmes	<ul style="list-style-type: none"> <li>• PIOJ, 2012</li> <li>• CCCCC, 2012</li> </ul>

In addition to addressing standard activities/decision-types, CCORAL can be used ‘retrospectively’, for example to review an infrastructure project and assess if the risks driven by climate variability and climate change were adequately considered and managed in the design, construction and operation of the assets.

### 7.1. Intervention points to activities/ decision types

A unique characteristic of CCORAL is that it uses intervention points to link users to climate risk management modules (described in the next section) relevant to their decision making process. This approach is not found in most other risk management tools, but was a necessary element of CCORAL since it is designed to integrate into a user’s decision making process, rather than as a stand-alone process. Intervention points are identified in CCORAL for each of the five activities/ decision types.

## 8. Climate risk management modules

Upon being presented with critical intervention points in their activity or decision type, CCORAL users are directed to relevant climate risk management modules. These modules are represented by best practice tools identified in the evaluation of existing tools presented in above.

‘Tools’ is a term used in CCORAL to represent the many guidelines, frameworks, methodologies and practical resources available to aid decision makers. The tools are categorised according to which modules they support. Each of the modules are summarised and defined below, with explanations given of the importance of each within the larger framework:

**Context** - Establishing context involves articulating objectives and setting in motion the internal procedures and mechanisms that form the foundation necessary for successfully going through a risk management framework. Major steps include assigning a team, delegating responsibility, setting goals, articulating motivation, identifying likely obstacles and planning how to manage them.

Context also refers to establishing a baseline of current conditions, from which change, both positive and negative, can be measured. For example, establishing context can include assessing current and historical climate variability as manifested in the frequency and severity of weather disasters. Context is about understanding the wider economic, social and environmental processes and their relevance to the activity being undertake. No decision is taken in a vacuum and to ensure that the consequences of a changing climate are fully understood, we need to recognise and account for the current and future changes in other systems.

Some of the provided Context tools in CCORAL are closer to systematic collections of contextual information than flexible frameworks. However, these are crucial resources for accurately establishing context.

**Vulnerability assessment** - Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and

extremes (IPCC, 2007). A vulnerability assessment is primarily conducted through a calculation of sensitivity, exposure and adaptive capacity.

Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate variability, climate change and / or weather disasters (IPCC, 2007). The effect may be direct or indirect, and different receptors (e.g. communities, sectors) vary in their reaction. Exposure is the nature and degree to which a system is exposed to significant climate variations (IPCC, 2007). As such, exposure is the magnitude, rate, character and geographic differentiation of climate variability, climate change and weather disasters that a system or assets are exposed to. Assessing exposure involves consideration of both current (or baseline) climate and future climate. Adaptive capacity is the ability of a system to adjust to current climate variability or change, either through moderating damage or taking advantage of opportunities. Determinants of adaptive capacity might include economic resources, technology, information and skills, infrastructure, institutions, education, equity and political capital.

The form and format of vulnerability assessments varies considerably between tools, but the best provide both rigour and clarity in an easy to use format, usually in the form of simply calculated vulnerability scores based on exposure and sensitivity scores, often including adaptive capacity as well.

**Risk assessment** - Risk is assessed through an evaluation of the consequences and likelihood of an event, cognisant of associated uncertainties. Since risk-based approaches deal with uncertainty they are increasingly common in climate change adaptation. Criteria and procedures can often vary between risk assessment methodologies. A number of qualitative and quantitative approaches are used, which can be grouped under two broad categories: the top down approach that assesses likely impacts, and the bottom-up approach that looks beyond biophysical measures to see how vulnerability and adaptive capacity define risk. Choosing one method depends on the kinds of sectors or users risk assessments are targeted at, the goals of the project as well as which resources are available.

**Adaptation option identification** - Adaptation options are solutions that can be applied in response to identified vulnerabilities. They can be identified in a variety of ways, including by reviewing adaptations previously applied locally, through consultations with stakeholders, consultations with experts or from the literature. Another approach is found in many generic climate risk management tools, which will provide lists of common adaptation options organised by geography, sector or impact, from which users of the tool can begin to choose options or add their own.

**Adaptation option appraisal** - Comparing, critiquing and prioritising adaptation options allow decision makers to select best options given their specific context and available resources. The style of appraisals can vary, and include qualitative and quantitative assessments. Qualitative considerations include having users consider the differences between hard and soft adaptations (e.g., given flooding, hard adaptation would involve extensive engineering, while soft adaptation could be ecosystem or institutional-based). Quantitative appraisals of adaptation options often take the form of cost/benefit analysis (CBA) or multi-criteria analysis (MCA). MCA integrates different broad objectives and related decision criteria in a quantitative analysis without assigning monetary values to all factors.

MCA's benefit of being participatory and inherently less data-intensive make it preferable in certain areas, while data-driven CBA is generally more rigorous and is common in regulatory appraisals. Another relevant quantitative approach is Real Options Analysis, which takes into account future uncertainty about the attributes that determine the value of a project. This import from the world of business finance is well-suited to accounting for uncertainty tied to forecasting future impacts of climate variability and change.

Under both qualitative and quantitative methods, it is helpful to recognise that there are different criteria for appraising adaptation options, including:

- No-regrets options – adaptations are worthwhile regardless the extent of future climate change;
- Low regrets options – costs are of adaptations low while benefits are relatively high;
- Win-win options – adaptation options have desired benefits but are also likely to have positive externalities in other sectors or systems; and
- Flexible options – involves incremental or soft adaptations instead of large-scale adaptations, limiting risk and investment. (UKCIP “Identifying adaptation options”)

Assessing adaptation options is meant to be an on-going process of improvement, incorporating new technology, evolving best practice and lessons learned.

**Monitor and evaluate (M&E)** - M&E plans help ensure the success of projects by observing their application, usage and contribution. M&E is of particular use when building resilience to the uncertain and unforeseen impacts of climate change, where evaluation should be continuous as long-term changes unfold. M&E for adaptation is in an early stage of development, with what exists relying heavily on M&E from broader sustainability initiatives as well as development planning literature.

**Awareness raising** - Awareness raising refers to a collection of methods used for increasing consciousness of a particular issue. Such efforts aim to increase buy-in, involvement, understanding and/or approval from stakeholders through the spread of information. Often occurs at the beginning of a project, but can be present at stage as relevant. Awareness raising also is a vital part of the adaptation pathway approach, wherein adaptation is viewed as part of a long-term, social process where changes in attitudes and actions accrue and lead to fundamental change.

## 9. Climate risk management resources

CCORAL is presented in various formats and structures to meet the differing needs of users. These varying levels of detail and approaches are described below.

### 9.1. High-level climate risk management

This high-level risk management approach is suggested for users with limited time or resources. This approach was designed to be undertaken within approximately 60 minutes and recognises that pressures on time and resources may not allow a full analysis. Designed to be as simple as possible while holding to best practice, this step helps users still capture enough information to build an understanding of climate variability and change into their activity/decision. The recommended approach was developed using best practice and provides:

- The basic components of the activity/decision – the ‘decision stage’, the ‘user aims’, the ‘process/ analysis’.
- Key questions that users should be asking themselves at relevant stages – or ‘intervention points’ - of their overarching activity/decision. These questions will allow the user to establish how the climate might affect their activities and how they might address any impacts.
- A limited selection of concise and good quality sources of information that users are encouraged to read and use to answer questions posed.

### 9.2. Pre-selected comprehensive climate risk management tools

Some users may find that their activity merits further attention through a comprehensive climate risk management process. Building from an extensive analysis of existing CRM tools, CCORAL presents to users 3 tools that encompass critical modules within a comprehensive framework. In addition to including modules that include a vulnerability assessment, adaptation option identification, adaptation option appraisal and other key modules, these 3 tools listed below were chosen for their adherence to attributes representing the primary goals of the framework:

- High quality.
- Reputable provenance.
- General ease of use.
- Relevance to the Caribbean.
- Relevance to developing areas.
- No charge for use.

Table 4 summarises the relative merits and scope of these comprehensive frameworks.

**Table 4. Summary table for choosing end-to-end climate risk management tools**

Comparison of climate risk management tools*								
Tool (click title for link)	Author organisation	Decision-making processes	Focus or approach	National scale	Disaster risk reduction	User friendly and accessible to non-experts**	Costing/financing information	Case studies

<b><u>CEDRIG: Climate, Environment and Disaster Risk Reduction Integration Guidance</u></b>	Swiss Agency for Development Cooperation	project programme strategic	disaster risk reduction integration		✓	✓	✓	
<b><u>Caribbean Risk Management Guidelines for Climate Change Adaptation Decision Making***</u></b>	CCCCC	projects programmes legislation	Caribbean	✓		✓	✓	
<b><u>Climate Proofing for Development (part 2) (part 3)</u></b>	GIZ	all processes	development	✓		✓	✓	✓

\* These tools are all considered ‘end to end’ instruments, in that they contain vulnerability, risk, adaptation option identification and adaptation options appraisal. All are also of high quality, from reputable sources, freely available and intended for use in developing countries. It is advisable not to repeat steps in these tools (notably early screening exercises) which have already been undertaken using CCORAL.

\*\* The criterion ‘User friendly and accessible to non-experts’ refers to an instrument that uses non-technical language, is very easy to follow and clearly presented.

\*\*\*While representing good practice, the Caribbean Risk Management Guidelines include a section on ‘Risk Perception’ that is considered to be outdated and recommended to not be utilised when using the guidance.

### 9.3. Comprehensive climate risk management

Users whose activities are screened as high priority or who are already working on climate change may require a full risk management process. These users are presented with CCORAL’s comprehensive toolbox of climate risk management tools to undertake more in-depth analyses. This stage may require additional technical support from, for example, a consultant, research institution, the CCCCC or a regional agency. The time taken to undertake this stage is specific to the area of interest and could take anything from 1 day to 12 months.

In addition to reviewing the CRM tools described in a previous section, these users are presented with high quality reference materials available through the various links provided on the country and regional pages, including:

- CCCCC clearing house providing climate model data, reports (the clearing house is being expanded and will provide the main resource for any user interested in the Caribbean region), and a database of approx. 300 current climate-related projects in the region, and
- Links to other relevant sites including country specific resource links to:
  - government websites holding climate relevant resources (including general baseline and climate data, reports, national communications, climate strategy documents),
  - other country relevant sites (including for example research institutions, universities, and international organisations operating in the country)
- Links to mandated CARICOM regional agencies holding relevant information, including for example the University of the West Indies (UWI), the Caribbean Institute of Meteorology and Hydrology (CIMH), the Caribbean Disaster Emergency Management Agency (CDEMA).

These handpicked resources were chosen for their quality and geographic relevance. Users are also given access to the CCORAL toolkit database and a list of comprehensive, pre-selected tools described below.

#### 9.4. Climate risk management toolkit database and capacity icons





CCORAL contains a resource database of nearly 80 tools. These were selected from the over 100 tools initially evaluated in a process discussed above. These tools are organised according to key criteria derived from the initial tool evaluation. These criteria include:


Title	Source	Accessible to Non-Experts
Organisation	Geographic Coverage	User Friendly
Description of Objective	Sector	Subject to Payment
Year Published	Decision Making Process	Language Availability
Target Audience	Case Study Availability	
Module Type	Comprehensive/End to End	

A comprehensive typology of primary economic sectors present in Caribbean countries does not exist in the public domain. In its place, the project team compiled a new typology of 25 general sectors encompassing economic activity in the region. These were derived from three relevant resources, including the Regional Framework, the Implementation Plan, and ‘Cluster Best Practices for the Caribbean’ (IDB 2010).

The tools presented vary in terms of user-capacity required for their successful application. To help users rapidly choose between tools each tool is marked with relevant icons to guide on critical capacity criteria. These icons will provide extra information to users about important characteristics of tools, permitting rapid, informed selection (see Table 3 for descriptions).

**Table 3. Capacity icons with description**

Capacity icon	Title	Meaning
	Accessible to non-experts	This tool is written in clear, non-technical language and can be used with minimal or no adaptations when working with non-experts and wider community.
	User friendly	This tool is clear and easy to understand and follow the process. It provides clear guidance through the process and gives examples.
	Multi-modular / end-to-end	This tool covers more than one climate risk management analyses modules. The tool won't require users to look elsewhere for further information or data. If you're familiar with your planned activity/decision, then you have everything you need to use the tool now.
	Subject to payment	This tool is available at additional charge only.

	Available in other languages	Tools available in French, Spanish or Caribbean languages.
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The analyses and results from chosen tools can then be included in the decision making process for the activity/decision. This will inform the process and ensure that climate variability and change have been taken into account.

## 10. Final outputs of CCORAL

CCORAL allows Caribbean stakeholders to integrate climate change into national development planning towards creating resilient economies. Caribbean decision makers can see how their daily duties and activities can be influenced by increasing climate variability and change and access relevant climate risk management tools and resources. CCORAL does this by providing different guidance for users depending on their needs and experience.

To help record findings and recommended resources, CCORAL provides users with a downloadable workbook. The workbook contains an expanded version of the table explaining the connections between stages in a user’s decision making process with relevant climate risk management resources. Users can see how each recommended resource is part of a larger, multi-step climate risk management process, explore detailed instructions for each step and take notes to capture their progress.

Additionally, CCORAL provides a list of handpicked external resources to further aid users looking for extra information. These lists are tailored for each CARICOM country.

Completing CCORAL is not the end of the process. Users are encouraged to share their findings with colleagues, using their results to start or inform conversations and deliberations. By using CCORAL, decision makers will also be able to demonstrate to funders, investors and development partners that climate resilience has been considered and integrated into relevant activities.

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