

# ACTION DOCUMENT ON POLLINATORS, FOOD SECURITY AND CLIMATE RESILIENCE IN THE CARIBBEAN REGION

The Outcome of the BES-Net  
Caribbean Regional Trialogue  
on 4-6 September 2018  
in Santo Domingo,  
the Dominican Republic





The United Nations Development Programme works in nearly 170 countries and territories, helping to achieve the eradication of poverty and the reduction of inequalities and exclusion. We help countries to develop policies, leadership skills, partnering abilities, institutional capabilities and build resilience in order to sustain development results. The Nairobi-based Global Policy Centre on Resilient Ecosystems and Desertification (GC-RED) is one of the United Nations Development Programme (UNDP) Global Policy Centre. GC-RED is responsible for advancing global thinking and knowledge sharing on inclusive and sustainable development in drylands and other fragile ecosystems.



The Biodiversity and Ecosystem Services Network (BES-Net) is a capacity sharing “network of networks” that promotes dialogue among science, policy, and practice for more effective management of biodiversity and ecosystems, contributing to the long-term human well-being and sustainable development. The Network is supported by face-to-face capacity building activities (the BES-Net Trialogues), a matchmaking facility, and a cutting-edge web portal – with all components mutually reinforcing. BES-Net is hosted by UNDP GC-RED.

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**Acknowledgement:**

The Action Document was developed, building on the Background Document prepared for the Caribbean BES-Net Trialogue on Pollinators, Food Security and Climate Resilience, which was held in Santo Domingo, Dominican Republic, on 4-6 September 2018, and incorporating the result of the working group exercises undertaken by the participants. The actions included in the document faithfully reflect those which were identified and ratified by the participants both during and after the Trialogue. A full list of the Trialogue participants and contact details is available in Annex 1. The authors are grateful to all the experts and partners who provided comments and inputs to the document. Invaluable guidance and support were also received by the BES-Net team, including Yuko Kurauchi and Marta Panco.

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## STATEMENTS FROM THE ORGANIZERS



"At the global level, there is justified concern about pollinators, given the many types of threats they face which are putting at risk their populations and the services they provide, such as food production, especially high-demand vegetables for human consumption, as well as honey and pollen. As a result of the Trialogue, at the national level and with immediate effect, we have committed to incorporate the issue of pollinators as a crucial element in all environmental impact assessments, particularly in tourism projects with garden and landscaping areas to ensure they use native and endemic plants that are pollinator-friendly."

**Hon. Ángel Estévez**

*Minister,  
Ministry of Environment and Natural  
Resources of the Dominican Republic*



"The Trialogue has provided the country with an important opportunity to deepen the knowledge on the relevant role of pollinators in staple food production and other exportable goods that contribute to foreign trade in our country. This is an innovative experience bringing together policymakers, scientists and representatives from the local communities to deliberate and reflect on the contributions of wild pollinators to biodiversity, food security and human well-being and we expect it will lead to positive policy actions, ensuring that ecosystems and various pollinators species within the Caribbean receive suitable protection."

**Lic. Daneris Santana**

*Vice-Minister of Protected Areas and  
Biodiversity,  
Ministry of Environment and Natural  
Resources of the Dominican Republic*



"The issue of pollinators is urgent, although often overlooked in terms of human wellbeing. Pollinators provide a clear example of the link between biodiversity and sustainable development in the framework of the 2030 Agenda. We need sectoral and cross-sectoral dialogue like this Regional Trialogue to address the challenges to food security, and pollinators and ecosystem services provide us with an entry point, whilst also helping us to achieve our Multilateral Environmental Agreements. We face challenges because of the large gap in terms of scientific data for monitoring but with initiatives such as the Coalition of the Willing on Pollinators of which the Dominican Republic is now a signatory, we are taking the first steps."

**Luciana Mermet**

*Deputy Resident Representative,  
UNDP Dominican Republic*



"The terms like pollinators and pollination may still be uncommon in many parts of the Caribbean, yet the Caribbean island countries are in a precarious ecological position. They are blessed with the benefits of rich and unique insular biodiversity, but these benefits have been increasingly threatened as a result of land use change, recurrent extreme climate events, and invasive alien species, among others. We are honored to have all three complementary sector representatives together, policymakers, scientists and practitioners, to deliberate on region-specific challenges and opportunities on pollinators and pollination and build a common agenda for action both at policy and programme levels."

**Anne Juepner**

*Manager,  
Biodiversity and Ecosystem Services  
Network (BES-Net)  
Director,  
UNDP Global Policy Centre on Resilient  
Ecosystems and Desertification*



## FEEDBACK FROM THE PARTICIPANTS

The trialogue session was very informative. Having been raised in a family that maintained farming, it was very interesting to me to gain a better understanding of the role and range of pollinators. I have noticed the reducing numbers of bees and butterflies in my country, but had never considered what could have contributed to that change outside of possibly climate factors or how I could play a part to help create a safe and protected space for pollinators to flourish. In our farm space, we have been able to dedicated areas to planting plants that attract pollinators. We will take this action further through the eventual creation of a habitat space for bees. We will also continue to work on building awareness around the plight of pollinators and their importance to gaining our food and nutrition security.

**Anastasha Elliott**

*Co-founder/ Chief Executive Officer, Sugar Town Organics*

"The Trialogue improved the awareness of the stark realities on the situation with pollinators in the region and strengthened the connections among people operating at the local level. As we move forward, it is imperative that the messages be shared widely within the countries and all the local stakeholders including those from the government and community groups come together to discuss challenges and solutions. This is where partnership and commitments to action are made that are sustainable and lead to key outcomes."

**Ruth Spencer**

*National Coordinator,  
Global Environment Facility Small Grants Programme; Deputy Director, Marine Ecosystems  
Protected Areas Trust, Antigua and Barbuda*



"The process in the preparation for the Trialogue as well as the actual Trialogue sessions created some excitement and opened several opportunities for progressive, local action that would not have been possible without this event. Direct follow-up action by BES-Net and other partners will be helpful in facilitating further agreed actions among our stakeholders."

**Floyd M. Homer**

*Director, Trust for Sustainable Livelihoods, Trinidad and Tobago*



## I. INTRODUCTION

The following Action Document is the result of the [Biodiversity and Ecosystem Services Network's \(BES-Net\) Caribbean Regional Trialogue](#), which was held in Santo Domingo, Dominican Republic, on 4-6 September 2018. The event was attended by over 60 participants from six member states of the [Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services \(IPBES\)](#): Antigua and Barbuda, Cuba, Dominican Republic, Grenada, Saint Kitts and Nevis, Saint Lucia, and Trinidad and Tobago (Annex 1). The BES-Net Trialogues are multi-stakeholder dialogues among the three communities of policy, science and practice that focus on specific policy questions at the national and regional levels. In the Caribbean Regional Trialogue, the cutting-edge facilitation event brought together scientists, local farmers, beekeepers, non-governmental organizations (NGO) and policymakers from agriculture, health, climate change and environment sectors. Annexe 2 provides an overview of the Trialogue programme.

Over the three days in Santo Domingo, the Trialogue fully achieved its objectives of:

- Raising awareness about the relevance of the global findings of the IPBES [thematic assessment on Pollinators, Pollination and Food Production](#);
- Sharing knowledge across the policy, science and practice communities on the theme;
- Identifying regionally and nationally-relevant risks and opportunities for pollinators and pollination; and
- Generating commitment to collaboration and action to protect pollinators in order to ensure sustained food and nutritional security and climate resilience.

On Day One, the participants went into the field to understand the issue from farmers and beekeepers' points of view and to see some cutting-edge research on native bee pollinators that is focusing particularly on key food and export crops such as tomatoes and avocados. They also had the opportunity to hear a keynote speech from renowned global IPBES expert, responsible for coordinating the global pollinator assessment.

On Day Two, the participants jointly reviewed the status of pollinators in the region; analyzed their importance to national crop economy, sustainable local food production and climate resilience; and assessed ways to address the challenges of invasive pests and pathogens, land-use change and pesticide use.

On Day Three, the participants adapted the IPBES global recommendations, identifying their own priority action plans in each country in response to the challenges to pollinators. Short-term actions, or the "21-day challenge", to



be pursued by the participants were agreed upon, based on the recommendation by Mr. Floyd Homer, the IPBES Multidisciplinary Expert Panel Capacity-Building Task Force member for Trinidad and Tobago. They include:

- Raising awareness through TV and radio interviews, blogs and newspaper articles;
- Developing a Caribbean 'app' platform for citizen science to collate information and track the distribution and identity of pollinators and pests;
- Including pollinators as a new element in all environmental impact assessments;
- Exploring ways to maintain the pollinators' habitats; and
- Developing guidance on pesticide use for farmers.

On Day Three, the High-Level Breakfast was also held. It provided a rare opportunity for high-level government authorities from a wide range of sectors, such as agriculture, health, climate change, and environment, together with international donor partners in the region, to discuss the key messages emerging from the above dialogues and engender their support for the local policy proposals over delicious pollinator-themed breakfast.

This Action Document builds on the original [Caribbean Background Document on Pollinators, Food Security and Climate Resilience](#), which was prepared in a collaborative way in the run-up to the Trialogue. The Background Document is based on the findings of the global IPBES assessment report, an additional region-focused literature review and a set of semi-structured interviews with key stakeholders from the science, policy and practice community. The literature review and the interviews looked into the evidence available on the status of pollinators, key drivers of pollinators' trends and policy gaps and opportunities tailored to the seven countries in the region. Given that the global thematic assessment contained little data from the Caribbean region, it was important to provide regional context to highlight the relevance of the global findings.

The Action Document was also developed in a collaborative manner. All participants of the Trialogue were given the opportunity to review the descriptions of the status of pollinators in their countries and to jointly develop Action Plans, through which to raise awareness, generate information and improve policy and adopt the pollinator-friendly practices. The combined Strategic Regional and National Actions for Pollinators, Food Security and Climate Resilience (Table 1-8) thus aim to be a roadmap for regional collaboration. Indeed, many of the actions have already been implemented as the Action Document goes to print. There will be regular monitoring and follow-up on the actions, particularly when partners and stakeholders gather at IPBES and other regional and global meetings.





## II. KEY MESSAGES

### Why are pollinators important?

Globally, approximately 90 per cent of flowering plants rely on the transfer of pollen by animals (IPBES, 2016b). The vast majority of pollinators are wild, including more than 20,000 species of bees, some flies, butterflies, moths, wasps, beetles and thrips, as well as birds, bats and other vertebrates.

One-third of production (by volume) and three-quarters of different types of agricultural products are at least partially dependent on animal pollination (IPBES, 2016a). In 2015, the global economic value of pollination was estimated at between US\$235 billion and US\$577 billion (IPBES, 2016b). The productivity of several crops of great economic importance in the Caribbean region, such as coffee, cocoa, avocados and tomatoes depend or benefit significantly from access to pollinators, whether domesticated or wild.

Insect pollination has been shown to increase the quantity and quality of fruits and seeds in these crops. Both the abundance and the diversity of pollinators are critical in this increase in productivity and quality (IPBES, 2016a).

Pollinator-dependent crops are extremely important for food security and human nutrition. Some crops such as fruits, vegetables, seeds, nuts and oils are important for maintaining healthy diets because they provide most of the necessary vitamins, minerals and micronutrients.

Pollination by animals also contributes to the integrity and resilience of natural areas, producing food for many animal and bird species. Animal-mediated pollination promotes the genetic variability of plants, which could increase the ability of the natural vegetation to recover and to cope with climate change.

Finally, pollinators provide multiple benefits beyond food production for rural communities. In addition to honey, the hives of honeybees produce other products of commercial value such as wax and propolis. The products of the hives of stingless bees have medicinal uses and can be utilized in the manufacture of cosmetics and other products.

### What is the problem for pollinators in the region?

Despite their great importance, pollinator populations have declined drastically at the global level during the last decades (IPBES 2016b). Although information is scarce in the Caribbean region, there is a trend towards a reduction in populations. Globally, 16.5 per cent of the vertebrate pollinators is in the list of the world's threatened species, increasing to 30 per cent for island species. Concerning managed species, honey bee numbers are generally increasing with local declines and important seasonal colony loss registered in several countries. As a result, there are losses of genetic diversity and local adaptations in honey bee populations.

There is little documentation available in the Caribbean on the status and trends of pollinators or the link between specific threats and pollinator decline. However, all seven countries in the Caribbean Trialogue identify similar drivers of change in pollinator populations such as:

- The change in land use and loss of habitat, such as the natural forests, mainly caused by the advance of the agricultural frontier. This not only decreases the availability of food and nesting sites for wild pollinators but also hinders access to these resources by honeybees and other managed pollinators.
- Intensive farming practices involve the use of chemical inputs, such as pesticides, with potentially harmful effects on pollinating insects and other beneficial insects.
- Pollinators and pollination services is not an issue that is considered by the Regional Pesticide Board, which is responsible for harmonizing regulation and managing the importation of pesticides.
- The negative effects of introduced or invasive pollinators on local populations, against whom they can compete for limited resources. Bees, especially the managed species, are susceptible to diseases caused by different parasites, viruses and other pathogens. Many bees are infected during transportation and then, on arrival, spread the diseases to the natural populations. Disease burden reduces the resilience of the bees to the other multiple threats.

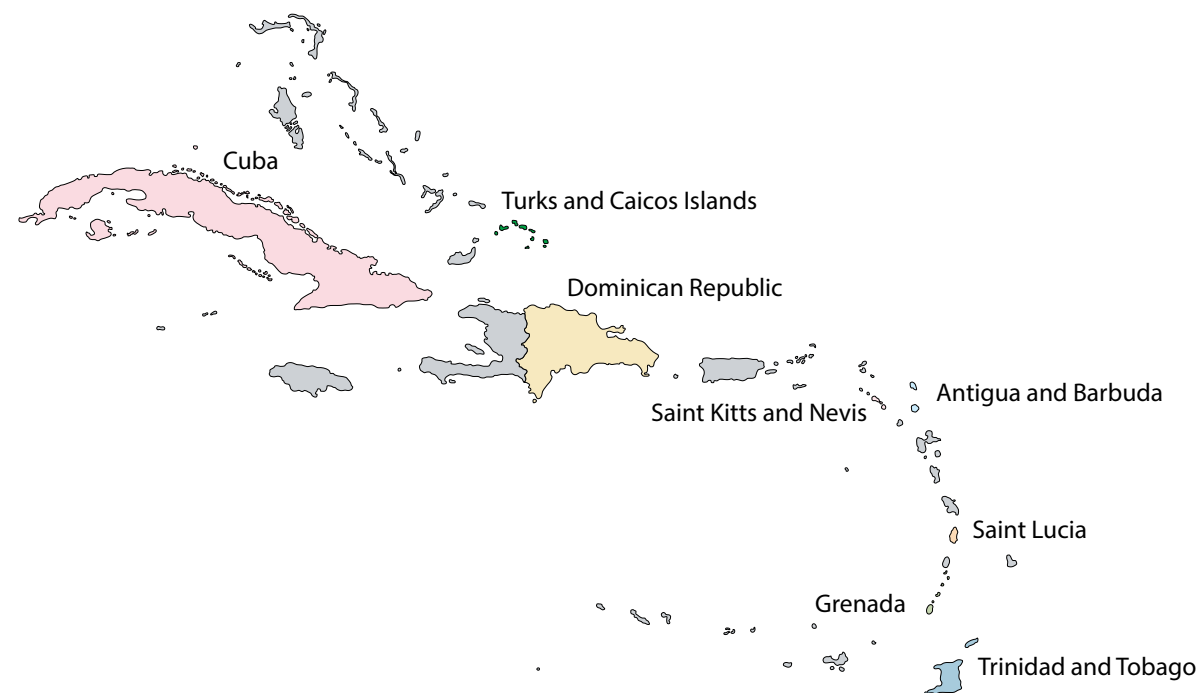
- Pollinator decline and its link to the productivity of key crops and food security are not seen as a priority topic in agricultural or environmental policies and plans.
- Although little is known about the effects of climate change and meteorological phenomena on pollinator populations, changes have been documented in recent decades. Hurricanes that swept through the Caribbean in 2013 led to the destruction of large numbers of managed nests of social bees and native solitary bees.

### Strategic Regional and National Actions to Address the Problem

There is a wide range of globally recognised response options to address the threats linked to pollinators decline. During the Caribbean Regional Trialogue on Pollination, Food Security and Climate Resilience, the participants undertook a series of working group exercises to identify and collectively agree upon the following strategic regional and national actions to address the problems that pollinators face. The participants have adapted the IPBES assessment table format (see Table SPM1 [IPBES, 2016b]) to organize their strategic policy and practice responses and provide an overview of the actions identified. The participants in the Trialogue acknowledged the critical role that pollinators play in food production, biodiversity conservation, and food security. They acknowledged deep concern about the status of wild and managed pollinators in the Caribbean region and the need to embrace citizen science for data collection to track the abundance of pollinators and pests in their islands. Some of the most important calls for action from the Caribbean Trialogue included: raising awareness through media; developing a Caribbean App for citizen science to collate information and track status of pollinators and pests in the region; including pollinators in all national biodiversity reports and environmental impact assessments; ways to maintain habitat, and guidance on pesticide use for farmers.







**TABLE 1. STRATEGIC REGIONAL ACTIONS FOR POLLINATORS, FOOD SECURITY AND RURAL DEVELOPMENT IN THE SEVEN IPBES MEMBER STATES**

STRATEGY	ACTION	COUNTRY LEAD	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
<b>GOAL 1. TRANSFORM SOCIETY'S RELATIONSHIP WITH NATURE</b>					
INTEGRATE PEOPLE'S DIVERSE KNOWLEDGE AND VALUES INTO MANAGEMENT	Adapt and develop an existing website/ application for citizen science to identify, track, monitor pest and pollinators	Trinidad & Tobago	Lena Dempewolf (Consultant); Floyd Homer (Ministry of Planning and Development);	Ministry of Planning and Development, Civil Society Organisations	30 Sep 2018
	Enhance data collection by using citizen science and uploading to pollinators App	Grenada	D Charles; M. Church	IICA; SGU	23-26 Sep2018
	Support the collection and recording of data on pollinators and pollination activities	Santa Lucia	IICA	Sustainable Development, Forestry, Farmers Association; Lena Dempewolf; SALCC	Nov 2018
	Research and catalogue indigenous knowledge on pollinators and their supporting ecosystems	Santa Lucia	MLF	Ministry of Agriculture, Folk Research Centre; SALCC	Dec 2018
	Promote the prioritization of pollinator-related themes in National Research Funds. Establish relationships with organizations through the Ministry of Environment and then propose a Donor Table on the issue.	Dominican Republic	Fondos Internacionales; PNUMA; PNUD; FAO; GIZ; CBC (Corredor Biológico del Caribe); JICA	Carlos Rodríguez (MESCyT-FONDOCyT); Jose Antonio Nova (CONIAF); Venecia Alvarez de Vanderhorst (Ministerio de Relaciones Exteriores); Jose Rafael Almonte (Ministerio de Medio Ambiente y Recursos Naturales)	
	Continue promoting the introduction in agriculture of more ecological ways such as conservation agriculture and sustainable land management (Regional efforts)	Cuba	CITMA (Directorate of the Environment, Environment Agency-International Projects); Ministry of Agriculture (DNF, SEF, Directorate of various crops, Directorate of Grains, Directorate of Science and Technology, and other)	Institute of Ecology and Systematics; Grain Institute	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA

STRATEGY	ACTION	COUNTRY LEAD	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
LINK PEOPLE AND POLLINATORS THROUGH COLLABORATIVE CROSS SECTORAL APPROACHES	Create and promote a Regional Project on Pollinators, Food Security and Climate Resilience	Dominican Republic	National Biodiversity Committee	UNDP; Caribbean members of IPBES	July 2019
EDUCATE AND RAISE AWARENESS	Creation of public service awareness materials, posters on pollinators, methods of pollination in relevant to local ecosystems	Santa Lucia	MLF	Ministries of Agriculture, Forestry and Sustainable Development; OECS; SALCC	March 2019
	Creation of media materials	Antigua & Barbuda	Valley Ventures		

**GOAL 2. IMPROVE CURRENT CONDITIONS FOR THE MAINTENANCE OF POLLINATOR POPULATIONS AND POLLINATION SERVICES**

MANAGE IMMEDIATE RISKS	Review list of pesticides on the Pesticide Control Board list	Santa Lucia	IICA; MLF	Ministry of Agriculture; Pesticide distributors (Renwick & Co); Environmental Health	Oct 2018
	Strengthen education and training of farmers and other users in the responsible use of approved pesticides	Santa Lucia	IICA	Ministry of Agriculture; CARDII; Pesticide distributors; SALCC	Jan 2019
ENHANCE RESILIENCE	Promote the breeding of pollinators with high resilience and adaptability to CC conditions	Santa Lucia	IICA	Mille Fleur ; Ministry of Agriculture; SALCCEC ; SALCC	March 2019
	Harmonize policies between the National Plan for Climate Change, agricultural policies and the National Biodiversity Strategy and Action Plan 2016-2020	Cuba	Forum of Ministers of Environment for LAC for CBC; CITMA (Environment Directorate); Ministry of Agriculture, Directorate of Science and Technology; Municipal Governments	Agroforestry Research Institute; MINAG; Environment Agency; Institute of Ecology and Systems	2019-2020
	Support the initiatives for the pollinators in the Caribbean Biological Corridor	Cuba	CITMA (Environment Directorate); Ministry of Agriculture, Directorate of Science and Technology; Municipal Governments	Institute of Ecology and Systematics; INAF; Agricultural universities in the country; Ministry of Higher Education	2019 -2020
UTILIZE IMMEDIATE OPPORTUNITIES	Improve hive and apiary management (e.g. husbandry, forage)	Santa Lucia	IICA	Mille Fleur, Ministry of Agriculture	March 2019

**GOAL 3. TRANSFORM AGRICULTURAL LANDSCAPES**

STRENGTHEN EXISTING DIVERSIFIED FARMING SYSTEMS	Maintain and continue the efforts for the integral farms in the country and the demonstration polygons throughout the country	Cuba	CITMA (Dirección de Medio ambiente, Agencia de Medio Ambiente); Ministerio de la agricultura (Dirección de Suelos y Fertilizantes; Dirección Nacional Forestal y Servicio Estatal) Forestal a todos los niveles; DCT; Gobiernos Municipales	Centro de investigación y universidades de todo el país; IES; INAF; Instituto de Suelos	Analizar con MINAG para 2019 y 2020, comienza a desarrollarse, también dentro CITMA
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TABLE 2. NATIONAL ACTIONS TO ADDRESS THE THREATS TO POLLINATORS IN ANTIGUA AND BARBUDA



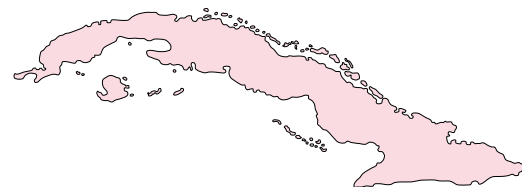
STRATEGY	ACTION	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
GOAL 1. IMPROVE CURRENT CONDITIONS FOR THE MAINTENANCE OF POLLINATOR POPULATIONS AND POLLINATION SERVICES				
MANAGE IMMEDIATE RISKS	Adapt and develop an existing website/Stop indiscriminate land clearing as the native species of plants and numbers of mason bees seem to be declining and increase water storage facilities on agricultural production sites.	Valley Venture partnering with SGP	GEF/SGP assisting with project funding collaborating with EAG, Jason Williams of Department of environmental	Oct 2018
	Conduct a radio program for the sharing of information on local pollinators on crusader radio	Beekeeping coop member		20 Sep 2018
	Propagate four varieties of disease-resistant coconut trees that produce pollen for the bees.	Valley Ventures	GEF/SGP and EAG	Oct 2018
	Feed information and produce a case study with info for a local Biodiversity Digest, the 6th National Report for biodiversity mainstreaming, education and awareness.			
	Organize continued educational classes on Heliconia-a member of the Musa family which provides economic value through the sale of flowers and environmental benefits providing nectar for the purple throated carib.			
	Enhance protection of 3 humming birds (Green Antiguan Crested, Emerald Carib and Purple Throated) which have rare occurrence in Antigua but has been seen feeding and nesting in Valley Ventures-a sanctuary for Birds			
	Collaborates with IPBES to obtain pictures of the local mason bees, their nest and dry pupa sac.			
	Prohibit highly hazardous pesticide use both domestically and commercially through public education and awareness	Pesticide board	GEF/SGP through sharing on the GEF/ technical Assistance Committee –an interagency committee of 67 heads of departments and through the review of project documents and sharing of information to the public	Oct 2018
ENHANCE RESILIENCE	Identify/research alternative native bee's (mason bee; solitary) with a view to determining forage and reproductive patterns Identify indigenous flora drought resistance/ tolerant species with a view to increasing propagation Increase water storage, propane /for seed stock for coconut Education and awareness/ site visits	Valley ventures	SGP funding opportunity	Nov 2018
UTILIZE IMMEDIATE OPPORTUNITIES	Make conditions more favourable for practitioners and stakeholders to engage ministries		Media, telecom companies (flow, Digicel)	Dec 2018
	Enhance the engagement of the public Tie in sustainable tourism support	Valley ventures	Media houses	Dec 2018
GOAL 2. TRANSFORM AGRICULTURAL LANDSCAPES				
ECOLOGICALLY INTENSIFY <sup>1</sup> AGRICULTURE THROUGH ACTIVE MANAGEMENT OF ECOSYSTEM SERVICES	Link pollinator with farms, demonstrating terracing and other integrated systems to reduce Promote citrus greening	Valley ventures	Through education and outreach through Farming Groups	Jan 2019

STRATEGY	ACTION	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
STRENGTHEN EXISTING DIVERSIFIED FARMING SYSTEMS	Reinvigorate farming practices (e.g. Location on the boundary of the Mount Obama park provides multiple benefits with the mountains and forest landscape through the 12 acres developed by Valley ventures. Ponds on-site function as a bird sanctuary for the provision of water)	Valley ventures	Farming groups	Mar 2019
INVEST IN ECOLOGICAL INFRASTRUCTURE	Enhance the usage of the waste coconut fibre for soil amendments and procure clipper/shredder for coconut waste to be used for potting mixes	Valley Ventures	Local community and farming groups	May 2019
GOAL 3. TRANSFORM THE RELATIONSHIP BETWEEN SOCIETY AND NATURE				
INTEGRATE PEOPLE'S DIVERSE KNOWLEDGE AND VALUES INTO MANAGEMENT	Enhance the usage of valley ventures as a living lab for educational tours and site visits	Valley ventures	SGP support Farmers, Farmers Coop.	July 2019
LINK PEOPLE AND POLLINATORS THROUGH COLLABORATIVE CROSS-SECTORAL APPROACHES		Valley Ventures	SGP and local community groups	Aug 2019



<sup>1</sup> Ecological intensification may be formally defined as a knowledge-intensive process that requires optimal management of nature's ecological functions and biodiversity to improve agricultural system performance, efficiency and farmers' livelihoods, [www.fao.org/agriculture/crops/thematic-sitemap/theme/biodiversity/ecological-intensification/en](http://www.fao.org/agriculture/crops/thematic-sitemap/theme/biodiversity/ecological-intensification/en)).





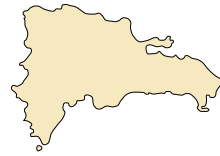
**TABLE 3. NATIONAL ACTIONS TO ADDRESS THE THREATS TO POLLINATORS IN CUBA**

STRATEGY	ACTION	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
GOAL 1. IMPROVE CURRENT CONDITIONS FOR THE MAINTENANCE OF POLLINATOR POPULATIONS AND POLLINATION SERVICES				
MANAGE IMMEDIATE RISKS	Continue to increase the control of pesticides (acquisition and use)	CITMA (ORASEN) - Chemical products and hazardous waste; Ministry of Agriculture (MINAG) (Pesticide Registration Commission - Directorate of Plant Health, Directorate of Science and Technology - DCT); Municipal Governments	Research centers and universities (Institute of Plant Health), Jorge Dimitrov Institute GR) Agrarian Universities of the country (MAY, VC, MTZ, Oriente) Continue integrating efforts and proposals. Investigations for 2019 and 2020	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA
ENHANCE RESILIENCE	Develop VI Report of Cuba on biological diversity to the UN Convention on Biological Diversity in 2018	CITMA (Directorate of the Environment); Ministry of Agriculture (Directorate of Science and Technology); Municipal Governments	Institute of Agroforestry Research (coffee, cocoa, forest products) – MINAG; Environment Agency (Institute of Ecology and Systems - IES) - Proposed support research for 2019 and 2020	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA
	Promote honey production and polycultures, while protecting insects' pollinators different from bees	CITMA (Directorate of the Environment, AMA, CNAP); Ministry of Agriculture (Forest Directorate, Directorate Crops, DCT); Municipal Governments	Institute Ecology and Systematics INIFAT in-situ and ex-situ protection; INIVIT (National Institute for Tropical Viandas Research; Agroforestry Research Institute (INAF)	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA
	Enhance Reforestation and forest management	CITMA (Directorate of the Environment, AMA, National Center for Protected Areas with the SNAP (National System of Protected Areas); Ministry of Agriculture (National Forest Directorate - DNF, National Forest State Service - SEF and in provinces, DCT); Municipal Governments	IES; INAF; Agricultural universities in the country - Ministry of Higher Education	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA
GOAL 2. TRANSFORM AGRICULTURAL LANDSCAPES				
ECOLOGICALLY INTENSIFY AGRICULTURE THROUGH ACTIVE MANAGEMENT OF ECOSYSTEM SERVICES	Promote: 1) management and reforestation of mangroves; 2) forest management and ordering, and 3) symbiotic management between crops in need of pollination and pollinators	CITMA (Directorate of the Environment, AMA - International Projects); Ministry of Agriculture (Forest Directorate, Forest State Service. at all levels, Directorate Crops, DCT); Municipal Governments	IES; INAF; INIVIT; INIFAT	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA
STRENGTHEN EXISTING DIVERSIFIED FARMING SYSTEMS	Maintain and continue the efforts for the integral farms in the country and the demonstration polygons throughout the country	CITMA (Directorate of the Environment, Environment Agency); Ministry of Agriculture (Soil and Fertilizer Directorate, National Forest Directorate and State Service) Forestry at all levels, DCT; Municipal Governments	Research center and universities around the country IES INAF Soil Institute	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA
INVEST IN ECOLOGICAL INFRASTRUCTURE	Use the spaces created by the national system of protected areas, promote connection corridors in the national biological corridors, together with the projects Connecting landscapes	CITMA (Directorate of Environment and Environment Agency / National Center for Protected Areas Ministry of Agriculture (DNF, SEF, DCT); Ministry of Economy and Planning (MEP); Ministry of Finance and Prices (MFP)	(Institute of Tropical Geography) Faculty Geography UH; Institute of ecology and systematics	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA. Second phase with the MEP and MFP

STRATEGY	ACTION	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
GOAL 3. TRANSFORM SOCIETY'S RELATIONSHIP WITH NATURE				
INTEGRATE PEOPLE'S DIVERSE KNOWLEDGE AND VALUES INTO MANAGEMENT	Continue promoting the introduction in agriculture of more ecological ways such as conservation agriculture and sustainable land management	CITMA (Directorate of the Environment, Environment Agency - International Projects); Ministry of Agriculture (DNF, SEF, Directorate Various Crops, Directorate Grains, Directorate Science and Technology, and others)	Instituto de Ecología y sistemática; Instituto de Granos; Instituto de Suelos	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA
LINK PEOPLE AND POLLINATORS THROUGH COLLABORATIVE CROSS SECTORAL APPROACHES	Promote the integration of policies between the State plan for confronting Climate Change, agricultural policies, the National Action Plan for the management of biological diversity 2016/2020 and its relationship with scientific research. Connection with the peasants and society in general	CITMA (Directorate of the Environment, AMA - Projects); Ministry of Agriculture (Directorate Science and Technology, and others); Municipal Governments	IES - AMA, INAF, INIFAT, INIVIT; MINAG; INCA - MES	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA. Second phase with the MEP
EDUCATE AND RAISE AWARENESS	Promote the integration of policies to reinforce environmental education, conferring a crucial role on pollinators	CITMA (Directorate of the Environment, AMA - International Projects); Ministry of Agriculture; Ministry of Education (MINED), Higher Education; Ministry of Information Technology and Communications (MIC)	Agricultural Universities in the country; Institute of Ecology and Systematics; Mass media Social Organizations for Pollinators	Analyze with MINAG for 2019 and 2020, begins to develop, also within CITMA. Second phase with the MIC







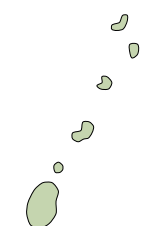
**TABLE 4. NATIONAL ACTIONS TO ADDRESS THE THREATS TO POLLINATORS IN THE DOMINICAN REPUBLIC**

STRATEGY	ACTION	RESPONSIBLE/ CHAMPION FROM THE GROUP WHO WILL PUSH THIS FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
<b>GOAL 1. REVIEW THE WORK PLAN AND DEFINE THE RESPONSIBLE ENTITIES THAT WERE ABSENT FROM THE TRIALOGUE</b>				
	Establishment of the Pollinators Subcommittee within the Biodiversity Committee	Biodiversity Committee	Ministry of the Environment and Natural Resources, Centre for Agriculture and Forestry Development (CEDAF), among others	
	Convene the Biodiversity Committee and the Pollinators Subcommittee with all of the institutions involved that can enrich and support the Action Plan	Janina Segura, Coordinator of the Biodiversity Committee, Dominican Republic, CEDAF	Biodiversity, Ministry of the Environment and Natural Resources, other entities	This meeting was held on 26 September 2018
<b>GOAL 2. IMPROVE THE CURRENT CONDITIONS FOR THE MAINTENANCE OF POLLINATOR POPULATIONS AND POLLINATION SERVICES</b>				
MANAGE IMMEDIATE RISKS	Incorporate species of plants that are beneficial to pollinators in the plans of already existing projects on reforestation, restoration and agroforestry	José Manuel Mateo (Director of Biodiversity, Ministry of the Environment and Natural Resources)	(Dominican Institute of Agricultural and Forestry Research, IDIAF) and Ecotopia (Colmar Serra) Beekeepers' Associations San Pedro de Macorís (Cesar Domingo Carrasco Reynoso) CEDAF (Victoria Matias) (UTEPDA) Technical Unit of Agroforestry Development Projects (Lemuel Familia)	10 September 2018 - A meeting was held with the technicians of the Directorate of Biodiversity to promote the theme of pollinator conservation in restoration projects
	Include in all the requirements for environmental permits of tourist hotels that the plants in their garden areas are beneficial for pollinators	José Manuel Mateo (Director of Biodiversity, Ministry of the Environment and Natural Resources)		10 September 2018 - Action in process. The Ministry of the Environment was asked that environmental permits of tourist hotels stipulate that the plants in their garden areas are beneficial for pollinators
ENHANCE RESILIENCE	Promote the planting of live fences on farms, with honey plants	Niyra Castillo Apiculture Division (General Directorate of Livestock-Ministry of Agriculture (MA))	Program for the Improvement of Dairy Livestock of the Dominican Republic (MEGALECHE) National Council for the Regulation and Promotion of the Dairy Industry (CONALECHE) Livestock Farmers' Association CEDAF	1 October 2018- It was coordinating with the technical team of MEGALECHE, livestock farmers and beekeepers to coordinate actions. Ongoing action
	Promote pollinator-friendly practices among beekeepers, and crop and livestock farmers: • training of farmers in organic/ ecologically sustainable practices; • training in alternatives to pesticides and/or their responsible use, and integrated pest management; • training in the prevention and integrated management of pests and diseases affecting domesticated pollinators	José Antonio Nova (National Agricultural, Livestock, and Forestry Research Council, CONIAF) Colmar Serra (IDIAF) CEDAF Niyra Castillo Apiculture Division (General Directorate of Livestock-MA)		Apiculture Division (Directorate General of Livestock-MA) continuously trains beekeepers in the prevention and integrated management of pests and diseases affecting domesticated pollinators

STRATEGY	ACTION	RESPONSIBLE/ CHAMPION FROM THE GROUP WHO WILL PUSH THIS FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
CAPITALIZE ON IMMEDIATE OPPORTUNITIES	Improve the methods of raising native and managed bees	AAPICULTURE NETWORK – Dirección General de Ganadería, DIGEGA, CAD, IDIAF CEDAF	Kelvin Guerrero (Universidad Agroforestal Fernando Arturo de Meriño (UNEF)- National Foundation for Scientific and Technological Innovation and Development (FONDOCyT))	Apiculture Division (Directorate General of Livestock-MA) continuously trains and provides technical assistance to improve the breeding methods of managed bees
	Create an urban area to serve as a transit and connectivity area for pollinator pathways. Reduce the fragmentation of the habitats. • Increase natural areas. • Incorporate gardens and for pollinators, bee hives, etc.	Apiculture Committee and CLUSAPIDOM, Francisco Rogado APICULTURE NETWORK (DIGEGA, CAD, Botanical Garden, IDIAF, CEDAF)	TOWN HALLS Botanical Gardens (City Afforestation Project)	*Research is needed
	Promote and advocate for national funds for research and innovation that prioritize issues related to pollinators	Carlos Rodriguez Ministry of Higher Education, Science and Technology of the Dominican Republic (MESCyT)-National Foundation for Scientific and Technological Innovation and Development (FONDOCyT)	International Funds, United Nations Environment Programme (UNEP), UNDP, Food and Agriculture Organization of the United Nations (FAO), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	
	Establish an alliance with support institutions through the Ministry of the Environment. Then ask the Ministry to set up a donor roundtable	José Antonio Nova CONIAF  Venecia Álvarez de Vanderhorst Ministry of Foreign Affairs  José Rafael Almonte Ministry of the Environment and Natural Resources  Janina Segura (CEDAF)	Corredor Biológico del Caribe (CBC, Caribbean Biological Corridor) Japan International Cooperation Agency (JICA)	
	Carry out baseline research on the status of pollinators in the Dominican Republic and design a scientific research proposal to request funding for research.	Victoria Matias (CEDAF)	Consultancy: Colmar Serra (IDIAF) Santiago Rivas (CEDAF)	Develop a research profile and set up a team with 1 or more people to carry out the research
	Carry out research on the effects of some pests on pollinators	Niyra Castillo Apiculture Division (General Directorate of Livestock-MA), Colmar Serra (IDIAF)		Set up a team to develop a research proposal for financing







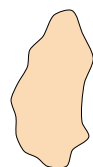
STRATEGY	ACTION	RESPONSIBLE/ CHAMPION FROM THE GROUP WHO WILL PUSH THIS FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
GOAL 3. TRANSFORM AGRICULTURAL LANDSCAPES				
ECOLOGICALLY INTENSIFY AGRICULTURE THROUGH ACTIVE MANAGEMENT OF ECOSYSTEM SERVICES	Incorporate the focus on pollinators in the National Project on the Creation of Productive Landscapes	José Manuel Mateo (Director of Biodiversity, Ministry of the Environment and Natural Resources)	CONIAF IDIAF CEDAF Universities	Review the work plan of the Productive Landscapes Project (UNDP/The GEF/ Ministry of the Environment) to identify and incorporate the approach of pollinators
STRENGTHEN DIVERSIFIED AGRICULTURAL SYSTEMS	Allow the growth of wild plants or cultivate plants that are beneficial for pollinators on uncultivated edges and areas of agricultural cropland	Ministry of Agriculture	Farmers' groups Ministry of the Environment and Natural Resources	Identify the responsible agencies
INVEST IN ECOLOGICAL INFRASTRUCTURE	SEE ACTION 1			
GOAL 4. TRANSFORM THE RELATIONSHIP BETWEEN SOCIETY AND NATURE				
INTEGRATE DIVERSE KNOWLEDGE AND VALUES INTO MANAGEMENT	Incorporate the theme of pollinators in the Field Schools	Victoria Matias (CEDAF)  Santiago Rivas (CEDAF)		
LINK PEOPLE AND POLLINATORS THROUGH CROSS-SECTORAL COLLABORATION	Create and promote a Regional Project for the Conservation of Pollinators, Food Security and Climate Change Resilience	Biodiversity Committee, Dominican Republic	UNDP Caribbean Member Country of IPBES	Start of baseline research / situation of pollinators in the Dominican Republic
EDUCATE AND RAISE AWARENESS	Hold discussions on pollinators	Start of baseline research/situation of pollinators in the Dominican Republic	Beekeepers' Association	
	Promote the incorporation of the theme of biodiversity and pollinators in the elementary, secondary and university curriculum	Venecia Álvarez de Vanderhorst	Ministries of Education) (Basic and Upper)  Apiculture Commission, CLUSAPIDOM and the APICULTURE NETWORK (Livestock raising, Environmental Consortium of the Dominican Republic, Botanic Gardens, IDIAF CEDAF)	
	Promote the incorporation of the theme of biodiversity and pollinators among educators.	Marina Hernandez and Nelson García	Ministry of Education	

ONGOING ACTIONS COMPLETED ACTIONS

TABLE 5. NATIONAL ACTIONS TO ADDRESS THE THREATS TO POLLINATORS IN GRENADA

STRATEGY	ACTION	RESPONSIBLE/ CHAMPION FROM THE GROUP WHO WILL PUSH THIS FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
GOAL 1. IMPROVE CURRENT CONDITIONS FOR THE MAINTENANCE OF POLLINATOR POPULATIONS AND POLLINATION SERVICES				
MANAGE IMMEDIATE RISKS	Encourage the use of environmentally friendly pesticides through organic farming, etc.	M Church	IICA, GEF, UNDP, NGOs, CBOs	Feb 2019
	Strengthen organic farming practices thus encouraging pesticide-free farming zone	D Charles	IICA, NGOs, CBOs	Feb 2019
	Encourage the continued use of a fair-trade practise that encourages pesticide-free zones	D Charles	IICA	Mar 2019
ENHANCE RESILIENCE	Promote the planting of indigenous flora species that support pollinators population	M Church	IICA, SGU, Ministry of Environment, Fisheries, Forestry	May 2019
UTILIZE IMMEDIATE OPPORTUNITIES	Encourage the forestry department to continue its rehabilitation program in term of restoring and maintaining biodiversity	M Church	IICA, FAO, UNDP,	Jan 2019
	Promote the planting of floral plants on tourist attraction sites	M Church	IICA, M.O.T, GTA	Feb 2019
GOAL 2. TRANSFORM AGRICULTURAL LANDSCAPES				
ECOLOGICALLY INTENSIFY AGRICULTURE THROUGH ACTIVE MANAGEMENT OF ECOSYSTEM SERVICES	Encourage collaboration between crop farmers and apiculturist, and Encourage production of cover crops that provide food sources for pollinators throughout the year (based on the micro-climate)	D Charles	IICA, FAO, UNDP,	Apr 2019
STRENGTHEN EXISTING DIVERSIFIED FARMING SYSTEMS	Implement the recently approved national climate change adaptation plan (agricultural and forestry sector)	M Church	GIZ, MOE,	
	Enhance demonstration plots or farmers field school	M Church	FAO, CARDI	Jun 2019
GOAL 3. TRANSFORM SOCIETY'S RELATIONSHIP WITH NATURE				
INTEGRATE PEOPLE'S DIVERSE KNOWLEDGE AND VALUES INTO MANAGEMENT	Building awareness and capacity building among stakeholders, and empower stakeholder groups with necessary tools	D Charles	Media houses	May 2019
LINK PEOPLE AND POLLINATORS THROUGH COLLABORATIVE CROSS SECTORAL APPROACHES	Develop systems or platform to share best practices Build awareness along the agri-food chain	M Church		Sep 2019
EDUCATE AND RAISE AWARENESS	Train extension officers in biodiversity, biodiversity services and the impact of the use of agro-chemicals and another domestic chemical	D Charles		Jun 2019
	Promote the sharing of knowledge with policymakers, politicians, the general public	M Church		Jul 2019
	Make communication materials available on the impact of human activities and climate change on pollinators and its effect on food and nutrition security (sustainable economic development)	D Charles		Jul 2019





**TABLE 6. NATIONAL ACTIONS TO ADDRESS THE THREATS TO POLLINATORS IN SAINT LUCIA**

STRATEGY	ACTION	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT	STATUS / COMMENTS
<b>GOAL 1. IMPROVE CURRENT CONDITIONS FOR THE MAINTENANCE OF POLLINATOR POPULATIONS AND POLLINATION SERVICES</b>					
MANAGE IMMEDIATE RISKS	Review list of pesticides on the Pesticide Control Board list	IICA & MLF	Ministry of Agriculture (MOA); Pesticide Distributors (Renwick & Co); Environmental Health	Oct 2018	Completed. Document attached
	Promote public awareness targeting farmers, Ministry responsible for agriculture, public and environmental health authorities, and the general public, Customs	MLF via SALCCEC seeks to develop posters via financing from GEF SGP		Feb 2019	Currently seeking feedback from GEF SGP on funding support to SALCCEC (college environmental club)
	Improve the capacity of Pesticide Control Board and Customs Dept. to monitor and enforce regulations pertaining to the importation of pesticides	MLF		Nov 2018	Meeting arranged with retired Customs officer to determine the capacity building needs of customs and Pesticide control board
USE APPROVED PESTICIDES	Strengthen education and training of farmers and other users in the responsible use of pesticides	IICA	MOA; CARDII; Distributors; SALCC	Jan 2019	Through field visits as part of the Env Science SBA programme
	Develop technical packages (electronic and paper) and make available to all users	MLF	MOA; Ministry of Education; TVET Unit	Jan 2018	
REDUCE HABITAT LOSS	Recommend (forestry, agriculture & physical planning) the creation of buffer zones in agriculture (land sparing), industry and construction to safeguard habitats for pollinators	Forestry Dept.	Physical Planning; MOA; Floral Co-op; Farmers Co-op	Oct 2018	Forestry already doing this
	Create a list of plants (important for pollination) to be used for landscaping, land rehabilitation, erosion control	Forestry Dept.	MOA; Farmers Association, Land Surveying	Oct 2018	Completed
	Recommend provision of incentives to landowners for the rehabilitation of degraded and altered landscapes. (Such as tax breaks: Classification of lands based on the level of forestation / vegetation present)	Forestry Dept. & IICA	Inland Revenue; Physical Planning; SALCC	Mar 2019	See SBA programme of SALCC Environmental Science Class
ENHANCE RESILIENCE	Encourage farmers and landowners to construct insect/pollinator habitats, and or safeguard or protect natural pollinator habitats such as caves, thick forests	Forestry	Jarabacoa; MOA	Mar 2019	See SALCC Environmental Science SBA programme
	Promote the breeding of pollinators with high resilience and adaptability to CC conditions	IICA	Mille Fleur; MOA; SALCCEC; SALCC	Mar 2019	See SALCC Environmental Science SBA programme
UTILIZE IMMEDIATE OPPORTUNITIES	Improve hive and apiary management (husbandry, forage)	IICA	Mille Fleur; MOA	Mar 2019	

STRATEGY	ACTION	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT	STATUS / COMMENTS
<b>GOAL 2. TRANSFORM AGRICULTURAL LANDSCAPE</b>					
ECOLOGICALLY INTENSIFY AGRICULTURE THROUGH ACTIVE MANAGEMENT OF ECOSYSTEM SERVICES	Continued thrust towards eco, agro-tourism projects specifically within rural communities. (Promote enrichment planting)	Forestry	IICA; GIZ CATS2 project; Heritage Tourism	Dec 2018	IICA currently working on a project proposal in the Saltibus with a community group (community responsible for ecological component)
STRENGTHEN EXISTING DIVERSIFIED FARMING SYSTEMS	Develop agro-silvopastoral systems sites islandwide. Forestry – agriculture – CARDI – IICA works together	Forestry	MOA; Farmers' Association	Apr 2019	
	Creation or incorporation of pollinator sanctuaries	Forestry	MOA	Aug 2019	
INVEST IN ECOLOGICAL INFRASTRUCTURE	Continued promotion of the planting of native plant life to support land rehabilitation, restoration and enrichment	Forestry	MOA; Sustainable Dev	Mar 2019	
	Promote and establish peri-urban ecosystem corridors	Forestry	Physical Planning; MOA; Infrastructure	Sept 2018	This is already taking place by Forestry and MOA
<b>GOAL 3. TRANSFORM SOCIETY'S RELATIONSHIP WITH NATURE</b>					
INTEGRATE PEOPLE'S DIVERSE KNOWLEDGE AND VALUES INTO MANAGEMENT	Create a list of local pollinators. Create colourful posters to raise awareness and use as information	Forestry	Sustainable Development; IICA; SALCCEC	Feb 2019	See SALCC Environmental Science SBA programme
LINK PEOPLE AND POLLINATORS THROUGH COLLABORATIVE CROSS SECTORAL APPROACHES	Support the collection and recording of data on pollinators and pollination activities	IICA	Sustainable Development; Forestry; Farmers Association; Lena Dempenolf; SALCC	Nov 2018	See SALCC Environmental Science SBA programme
	Research and catalogue indigenous knowledge on pollinators and their supporting ecosystems	MLF	MOA; Folk research centre; SALCC	Dec 2018	Planning to commence this during field visits with students (see attached)
EDUCATE AND RAISE AWARENESS	Creation of public service awareness materials, posters on pollinators, methods of pollination in relevant to local ecosystems	MLF	MOA; Forestry; Sustainable Development; OECS; SALCC	March 2019	Seeking funds to enable the environmental club of the SALCC to produce posters and a Facebook page



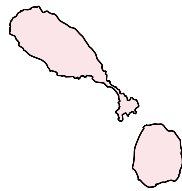


TABLE 7. NATIONAL ACTIONS TO ADDRESS THE THREATS TO POLLINATORS IN SAINT KITTS AND NEVIS

STRATEGY	ACTION	NATIONAL/ LOCAL	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
GOAL 1. MPROVE THE CURRENT LEVEL OF AWARENESS ON THE IMPORTANCE OF POLLINATORS AND POLLINATION SERVICES AND RISKS POSED TO POLLINATORS					
EDUCATE AND RAISE AWARENESS	<ul style="list-style-type: none"><li>Convene meeting with stakeholders to share information on pollinators</li><li>Make a short presentation during World Food Day activities</li><li>Make presentations on local radio and TV Programmes in both St. Kitts and Nevis</li></ul>	Begin the sensitisation programme with stakeholders on the importance and status of pollinators	Min. of Agriculture Reps.  St. Kitts Farmers' Co-operative Society	Ministry of Education Dept; Bee Keepers Cooperatives; SKN Farmers Co-op; IICA; Agro-processors Unit; Schools; Youth groups; CARDI	Oct 2018
GOAL 2. IMPROVE CURRENT CONDITIONS FOR THE MAINTENANCE OF POLLINATORS POPULATIONS AND POLLINATIONS SERVICES					
MANAGE IMMEDIATE RISK	Promote: <ul style="list-style-type: none"><li>Rainwater harvesting as adaptation measure for the use in agriculture, water for crop and prevent soil loss priority focused on habitat for pollinator</li><li>Reforestation program on farms, buffer on the agricultural area, plant traces on plant</li><li>Planting of hedgerows, natural fencing (trees)</li></ul>	Involvement and mobilization of Farmers by Ministries of Agriculture, Water Dept, Public Works and Dept of Physical Planning	Min. Of Agriculture IICA  St. Kitts Farmers' Co-operative	Mins. Of Education Dept, Bee Keepers Co-op; SKN Farmers Co-op, IICA, Agro-processors Unit, Schools, Youth groups and CARDI	Jan-Mar 2019
UTILIZE IMMEDIATE OPPORTUNITIES	Improve the methods of breeding bees	Establishment of a Bee sanctuary	Min. of Agriculture, Sk Farmers Co-op and Bee-keepers Co-op	Mins. Of Education, Bee Keepers Cooperatives and SKN Farmers Co-op, IICA, Agro-processors Unit, Schools, Youth groups and CARDI	Mar 2019 and ongoing
GOAL 3. TRANSFORM AGRICULTURAL LANDSCAPE					
STRENGTHEN EXISTING DIVERSIFIED FARMING SYSTEMS	Promote Agroforestry	Replanting of various fruits tree and pollinator-attracting plants among crops	Mins. Of Agriculture, Farmers and Beekeepers	Mins. Of Education, Bee Keepers Cooperatives and SKN Farmers Co-op, IICA, Agro-processors Unit, Schools, Youth groups and CARDI	Oct 2018 and ongoing
GOAL 4. RE-DEFINE AGRICULTURE POLICY TO ADDRESS ISSUES RELATED TO POLLINATORS					
CONVENE MEETING WITH AUTHORITIES/ POLICY MAKERS	Update on the importance of pollination and the issues affecting pollinators	Update the policy to include provision for pollinators	Mins. Of Agriculture and Dept of Environment	Mins. Of Agriculture, IICA, CARDI, Dept. of Environment and GEF	To be decided

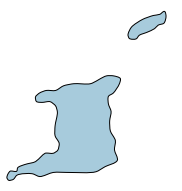


TABLE 8. NATIONAL ACTIONS TO ADDRESS THE THREATS TO POLLINATORS IN TRINIDAD AND TOBAGO

STRATEGY	ACTION	RESPONSIBLE PARTIES/ REPRESENTATIVE TO PUSH THE ACTION FORWARD	COLLABORATING ORGANISATION(S)	DATE FOR FIRST OUTPUT
GOAL 1. IMPROVE CURRENT CONDITIONS FOR THE MAINTENANCE OF POLLINATOR POPULATIONS AND POLLINATION SERVICES				
MANAGE IMMEDIATE RISKS	Convene a meeting to identify the phase-out process for pesticides containing neonicotinoids and malathion, which have a significant negative impact on pollinators	Dhano Sookoo	UWI – Department of Life Sciences and Chemistry, Research Division – Min. of Agri., Pesticides and Toxic Chemicals Control Board, THA, Insect Vector Control, EMA, Beekeepers Association, ASTT	7 Oct 2018
	Identify safer alternatives to the aforementioned harmful chemicals to promote its use	Lena Dempewolf	UWI – Department of Life Sciences and Chemistry, Research Division – Min. of Agri., Pesticides and Toxic Chemicals Control Board, THA, Insect Vector Control, EMA, Beekeepers Association, ASTT, Agricultural Extension Division	21 Oct 2018
ENHANCE RESILIENCE	Identify and promote local pollinator forage plants (all pollinators)	Lena Dempewolf, Marlon Cowie-Clarke	UWI – Herbarium, Life Sciences, TTBA, CARDI, IICA, FAO	30 Apr 2019
	Advocate for the protection of pollinator habitats through the new National Protected Areas Systems Plan	David Persaud	TTBA, Ministry of Agriculture – Forestry Division, THA, EMA, FAO/IFPAM	31 Oct 2018
UTILIZE IMMEDIATE OPPORTUNITIES	Adapt and develop an existing website/ application for citizen science to identify, track, monitor pest and pollinators	Lena Dempewolf, Floyd Homer	Environment, Policy and Planning Division, Trust for Sustainable Livelihoods, CSO	30 Sep 2018
GOAL 2. TRANSFORM AGRICULTURAL LANDSCAPES				
ECOLOGICALLY INTENSIFY AGRICULTURE THROUGH ACTIVE MANAGEMENT OF ECOSYSTEM SERVICES	Establish baseline biophysical accounts through pollinator surveys – through the pollinator task force	Lena Dempewolf, Marlon Cowie-Clarke	TTBA, ASTT, Ministry of Agriculture, Pesticide Board, UWI – Life Sciences, Ministry of Health, THA, TTMA, Caribbean Chemicals, Carlson Chemicals	30 Sep 2019
STRENGTHEN EXISTING DIVERSIFIED FARMING SYSTEMS	Coordinate pollinator task force to repeat pollinator surveys every 3-5 years	Lena Dempewolf, Marlon Cowie-Clarke	TTBA, ASTT, Ministry of Agriculture, Pesticide Board, UWI – Life Sciences, Ministry of Health, THA, TTMA, Caribbean Chemicals, Carlson Chemicals	30 Sep 2019
	Establish a pilot/learning model farm for demonstrating pollinator-friendly farming as well as managed pollinator use in greenhouses	Dhano Sookoo	Stingless Beekeeping Network, TTBA, ASTT, Ministry of Agriculture	31 Jan 2019
INVEST IN ECOLOGICAL INFRASTRUCTURE	Pilot bee hotel initiative at abandoned quarry rehabilitation sites	Floyd Homer	Trust for Sustainable Livelihoods, I Am Movement, National Quarries, Forestry Division, EMA/GEF Small Grants/IWEco, Stingless Beekeeping Network	30 Apr 2019
GOAL 3. TRANSFORM SOCIETY'S RELATIONSHIP WITH NATURE				
INTEGRATE PEOPLE'S DIVERSE KNOWLEDGE AND VALUES INTO MANAGEMENT	Establish a pollinator task force – the establishment of a local pollinator research and education propagation team	Marlon Cowie-Clarke, Lena Dempewolf	TTBA, ASTT, Ministry of Agriculture, Pesticide Board, UWI – Life Sciences, Ministry of Health, THA, TTMA, Caribbean Chemicals, Carlson Chemicals	31 Dec 2018
LINK PEOPLE AND POLLINATORS THROUGH COLLABORATIVE CROSS-SECTORAL APPROACHES	Facilitate private sector and housing development projects to encourage the establishment of urban green spaces that are pollinator friendly	Floyd Homer	THA, EMA, Town and Country Planning Division, HDC, Ministry of Housing and Urban Development, housing contractors	28 Feb 2019
EDUCATE AND RAISE AWARENESS	Promote school education programs about pollinator importance and conservation through the TTBA	Marlon Cowie-Clarke, Lena Dempewolf	TTBA, FAO, THA, NIHERST, Ministry of Education, Ministry of Agriculture, Forestry Division	30 Nov 2018



### III. DESCRIPTION OF THE ISSUE AT THE REGIONAL LEVEL

#### Values of pollinators and pollination

**Biodiversity.** Approximately 90 per cent of flowering plants require the transfer of pollen through animals (IPBES, 2016a). The vast majority of pollinators are wild, including more than 20,000 species of bees, other insects, bat, birds and other vertebrates. Some species of bees are managed, including the European honeybee (*Apis mellifera*), Asian honeybee (*Apis cerana*), some bumblebees (*Bombus sp.*) and other solitary bees. Although the vast majority of pollinating insects are bees, this group also includes several families of flies, wasps, butterflies, moths, beetles, thrips, ants, culicoids, bats, birds, primates, marsupials, rodents and reptiles (IPBES, 2016a).

Social and semi-social bees are the main group of pollinators that are under technified management for agricultural uses. The most frequently used are honeybees (*Apis mellifera*), bumblebees (*Bombus sp.*), and, to a lesser extent, stingless bees. The management of solitary bees, such as *Osmia sp.*, has also been successfully used as a source of pollinators in blueberry and alfalfa orchards, for example. It should be noted that agricultural practices are also diverse so that both their effect on biodiversity and their dependence on pollinators vary greatly among different forms of agriculture (IPBES 2016a).

In the Caribbean region, much more needs to be learned about the diversity and conservation status of local pollinators, mainly insects. Very little is also known about other important aspects such as their habitat and feeding requirements, their efficiency as pollinators, and their importance for specific crops. In the case of bees, although Caribbean species have been included in several systematic studies, there are still many more species to describe, mainly from the island of Hispaniola, shared by the Dominican Republic and Haiti. As expected in island ecosystems, the diversity of bees in the Caribbean shows a high degree of endemism.

**Ecosystem services.** Pollination is one of the services that ecosystems provide to humanity and mainly to agriculture and food security. Pollination by animals contributes to the integrity and resilience of natural areas. Animal-mediated pollination promotes the genetic variability of plants, which could increase the ability of natural vegetation to recover and cope with climate change. Pollination also maintains the diversity of wildlife in natural systems. It is necessary for the production of many fruits and seeds that serve as food for various animal species. Similarly, pollination is also necessary for the maintenance of other services that the environment provides to humanity, such as raw materials, recycling of materials and recreation.



**Economic valuation.** The products pollinated by animals have, on average, a higher economic value than those that do not depend on pollination. One-third of production (by volume) and three-quarters of different types of agricultural products depend at least partially on pollination by animals (IPBES, 2016a). The global economic value of pollination was estimated at between US\$235,000,000 and US\$577,000,000 in 2015 (IPBES, 2016b).

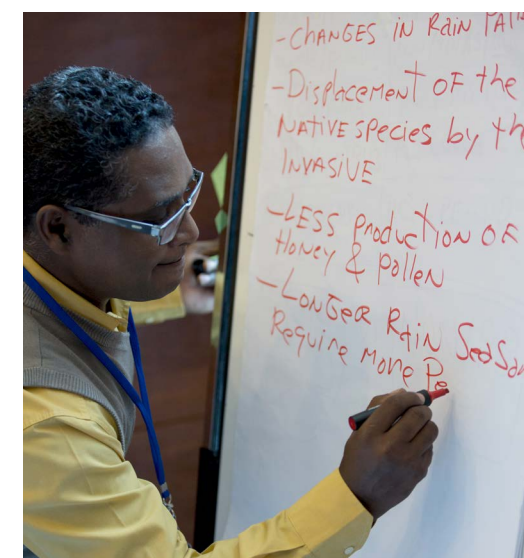
The loss of pollinators may increase the price of these products, which would cause large economic losses (IPBES, 2016a). Most studies on the economic value of pollination take into account only the direct value of pollinated agricultural products and their derivatives.

The productivity of several crops of great economic importance in the Caribbean region, such as coffee and cocoa, depend or benefit significantly from access to pollinators, whether domesticated or wild. Both the abundance and the diversity of pollinators are critical in the productivity and quality of some important crops (IPBES, 2016a).

Honeybees and the pollination services they provide are an important economic alternative for rural communities in developed countries and transition economies, and even in developing countries. Its cultivation contributes to the financial and food security of the people who depend on agricultural activities, to a greater or lesser extent. The bees use the plants to extract propolis, a resin with which they seal all the gaps in their hives and that is also an antiseptic and an antibiotic that they use to neutralize the contaminating effects of any insect or animal they kill inside the hive. This keeps the purity of the honey. In addition to honey, hives of honeybees produce other products of commercial value. The wax can be used to make candles, crafts and cosmetics, and for waterproofing, among others. Propolis is used in natural therapies as a topical healer and to treat gastritis. The products of stingless beehives have medicinal uses and can also be used in the manufacture of cosmetics and other products. Another example is butterflies, which are used to make handicrafts, serve as a tourist attraction and provide other aesthetic values.

**Non-economic valuation.** Economic valuation indices do not fully include the benefits that pollination by animals provides to human beings. In addition to the direct economic benefits, crops pollinated by animals provide food with different nutritional content, which is fundamental for nutrition and human health. The value of fruits and other wild products that complement nutrition and the family economy in rural areas has not been assessed.

Pollinators have cultural value and are therefore present in various cultural aspects, both current and ancestral. Numerous pollinating animals are represented in human spirituality, as well as in the values of their ethnic, national or regional identity. Currently, insects such as bees and butterflies are used as artistic inspiration and symbols of beauty. In the Dominican Republic, bees are a symbolic theme for social organizations, such as teamwork and work organization. They are also the inspiration for songs, poetry and other types of art. In Mesoamerica, the cultivation of stingless native bees has ancestral origins. Its products are traditionally used as medicine and as a raw material for the production of musical instruments and toys, among others.





## Threats and Drivers of Change

There are several agents of change that can affect pollinator populations, networks of plant-pollinator interactions and pollination services. Some agents (such as the use of pesticides, loss of habitat, climate change and the introduction of invasive species) exert direct pressure on the species, their interactions and their environment. Other agents are indirect (such as population growth and an increase in economic activities) because they increase the demand for the activities that give rise to the direct factors. The incremental or combined effect of two or more factors may explain more clearly the changes in pollinator populations and communities, and in pollination services. These include:

- Change in land use, both for agriculture and for urbanization, can cause the loss of natural areas and the connectivity between them, as well as the decrease in the resources needed for pollinators, which negatively affects their diversity and abundance.
- Intensive agricultural practices can cause a reduction of floral resources and nesting sites for pollinators. For example, some large-scale monocultures bloom massively and can be used by pollinators, but only for a short period of time.
- The use of agrochemicals, especially pesticides, may have direct lethal effects or residual (sub-lethal) effects on pollinators.
- The use of herbicides in herbicide-resistant genetically modified crops can decrease the availability of floral resources for pollinators that come from wild herbs.
- The use and transport of managed pollinators lead to the risk of spreading pathogens and vectors of diseases, even among different species.
- Exotic (non-native) species, both plants and pollinators, can become invasive and affect the structure of the interactions of local ecosystems by competing with native species. Other invasive species (not plants or pollinators) can also be predators or pathogens of pollinators or plants that provide them with resources.
- Predicted scenarios for climate change during the 21st century foresee changes in the composition of pollinator communities, as well as abundance and geographic distribution. These scenarios have also led to speculations about possible changes in the phenology (seasonality) of the species, affecting the structure of the interactions and pollination services.

The threats to which pollinators and pollination services are exposed at the global level are not foreign to the situation in the Caribbean. Indeed, the international economy increases pressure on the habitats on which pollinators depend, and much of the biodiversity in developing countries. Common threats and weaknesses at the regional level include the following:

- There is little information on the status and value of pollinators, and there is a lack of capacity to disseminate information and educate and train different sectors of society.
- The reduction in the abundance of pollinators is not a priority issue for the governments of the region.
- There is little legislation that covers the protection of pollinators. Local authorities do not have an influence on the implementation of policies related to the theme of conservation of natural resources in general, and specifically pollination services.
- Levels of poverty and access to health and education are associated with changes in land use and unsustainable uses of natural resources. This can be aggravated by the lack of legislation, as well as the weakness of institutions that lack the necessary means to enforce existing legislation; thus, there is little control over changes in land use.
- The weakness of the institutional framework also extends to other aspects that directly affect human health. An example is the lack of control over the use of pesticides, including some whose use is prohibited in North America and Europe.





## IV. DESCRIPTION OF THE ISSUE AT NATIONAL LEVEL

While the Caribbean countries share similar situations at the regional level, there are specific aspects that are distinct to each at the national level.

### ANTIGUA AND BARBUDA

Pollination is recognized as an important process in agricultural productivity. Manual pollination is a common practice in the cultivation of pumpkins.

There are community initiatives that include the protection of pollinators, as in the case of the Wallings Nature Reserve. Management entails using diverse plants that serve as a source for pollinators. Nectarivorous bats are recognized among the important pollinators, which are important pollinators of cacti and other local plants.

Antigua and Barbuda have managed to stay free of Africanized honey bees. In March 2005, the presence of *Varroa* sp. was reported for the first time, which entered the island through imported products and has spread significantly through the island of Antigua; thus far, Barbuda has been free of this parasite. The presence of the mite has caused drastic mortality of hives, drastically damaging the honey production industry and causing serious economic losses. Low productivity of Cucurbitaceae has also been reported, which may be due to the lack of pollinators.

The recovery of beekeeping has been slow but has increased as a result of the population's interest in the production of wax and honey. It has also encouraged the cultivation of honey flowers, such as sunflowers (orange and yellow), cempasuchil (marigold), as well as medicinal and culinary herbs such as thyme, rosemary, mint [balm] and other plants that help maintain the supply of food for wild pollinators.

#### Major pollinators:

- Honeybees, butterflies, birds, insects in general. There are 14 known species of bats, including the nectarivores that are pollinators of cacti.
- The tree bat (*Artdopsnichollsi annectens*) was discovered by *Kevel Lindsay* while carrying out an inventory of the Wallings Nature Reserve in 2008. This bat is endemic to Antigua and Guadeloupe and depends on forest areas of sufficient size to maintain its populations. In Guadeloupe, it is found only in the south of the island and infrequently.

#### Other uses of pollinators:

- Bat droppings are used as fertilizer in traditional agriculture. Practices and cultural values associated with pollinators
- Honey plants are highly valued within communities and are protected during droughts.
- Some people believe that manual pollination is more effective than natural pollination.

#### Use of Pesticides:

The administrative entities responsible for the use, prohibition, restriction and regulation of the import, export, management and sale of chemicals, including pesticides, are specified in the Pesticides and Toxic Chemicals Act. At present, the draft law, the Integrated Chemicals Administration Act, is currently under review. This new draft law is focused on protecting human health and the environment, and on promoting the responsible use of potentially toxic chemicals. Although pesticides for agricultural use are taken into account, there are no specific references to the protection of pollinators.

### CUBA

In Cuba, there are 89 known species of bees, of which 43.8 per cent are endemic to the country and another 33.1 per cent are endemic to the Antillas. Thirty-four of the Cuban species are found on Isla de la Juventud.

The population is aware of the importance of pollinators. Beekeeping is an economic activity for rural communities, where the importance of pollinators in crop productivity is also known. Meliponiculture (cultivation of native stingless bees) is also practised to obtain honey and other products from the hive. Moreover, the need to reduce dependence on agricultural inputs has encouraged the conversion of agriculture towards environmentally sustainable alternatives.

Pollinator populations are recovering with promising results after the terrible effects of Hurricane Irma and the subtropical storm Alberto. The severe winds and floods of these climate events caused great losses to the habitats, as well as the floral and crop resources. Approximately 8,000 tons of honey is currently being produced by 2,800 beekeepers who manage around 180,000 hives.

In addition to many wild flowering plants, several main crops in Cuba require pollinators.

Climate change also has impacts on water resources, agriculture and human health. By 2100, a 37 per cent reduction in the potential availability of water is expected, compared to the 1961–1990 baseline. In the case of agriculture, it is forecast that there will be a drop in the potential yields of some crops (e.g. potatoes, tobacco, etc.) due to changes in the duration of the rain cycles. The deficit of water for irrigation, as well as soil salinization and degradation, can cause a reduction in the agricultural areas.

#### Major pollinators:

- Honey bees, stingless bees (*Melipona beecheii*), earth bees, solitary bees, bumble bees, wasps, butterflies and moths, ants, beetles, bed bugs and flies, as well as birds.
- Cuba is a major ecological corridor for migrating birds, including migratory hummingbirds. Other uses of pollinators
- *M. beecheii* honey is used in traditional medicine to treat cataracts and other conditions. • Viprol® is a pharmaceutical product based on propolis of *Apis mellifera*. Practices and cultural values associated with pollinators
- The rural tradition emphasizes the importance of *M. beecheii* in the flourishing of crops.

#### Use of pesticides:

Prior to the 1990s, chemical pesticides were used intensively. Since the 1990s, traditional agricultural practices began to be implemented. At the same time, the use of 'national enemies' as agents of biological control, the creation of smaller and diverse plantations or crops, and the trend towards organic farming also began. Similarly, the protection of bees and the production of honey began to be encouraged. During the last 18 years, regulations have been implemented on the import and distribution of pesticides. Also, biological fertilizers combined with chemicals have been used. In general, since pesticides have been recognized as harmful to pollinators, people have attempted to minimize their use. Although monitoring has been conducted on the use of pesticides, their effects on pollinator communities and their consequences on crop productivity are little known. There is some concern, however, due to their environmental and economic implications.



## DOMINICAN REPUBLIC

Although there are no quantitative studies that provide figures to measure the importance of pollinators, there is some awareness related to environmental issues among government entities. The recent results of the IPBES assessment serve as a wake-up call to the authorities. Within the framework of current processes, and as a developing country, pollination has been considered among the important aspects of agricultural production and the economic sector. Other important functions of groups that include pollinators are also known, such as bats that are important seed dispersers. There is also some awareness among farmers, mainly those who practise greenhouse farming, and some may be implementing pollinator-friendly practices. In intensive agriculture, there is little knowledge on the importance of pollinators; however, pollination with honeybees is a common practice in the cultivation of melon, watermelon and other cucurbits in the south of the country.

With respect to the threats faced by pollinators, agricultural and cultural practices have been identified that are not very environmentally friendly (burning of weeds, indiscriminate use of glyphosate-based herbicides) and deforestation. These practices are sometimes encouraged or carried out by state institutions, and there is little response from the authorities to complaints from those affected.

The beekeepers reported bee mortality after the application of pesticides. Annual cases of mass deaths of honeybees have also been recorded, which coincide with the sugar cane harvest and extensive areas of productive crops such as tomatoes, corn, melon and other cucurbits.

The issue of the dangers associated with the introduction of exotic bumblebees for pollination has been addressed through tomato pollination testing in greenhouses with the Carpenter bee (*Xylocopa mordax*), a native species with potential to be managed commercially, as an alternative to importing pollinators. The results of these studies show the efficiency and viability of the native species, which produces significant differences in the weight and quantity of seeds per fruit and in productivity. Tomato production by manual pollination under controlled conditions is 16 to 18 pounds per square meter for a period of six to nine months. The results of pollination with the Carpenter bee produced between 30 and 34 pounds per square meter in a period of three months. In spite of this knowledge, there have been reports of cases where varieties of honey bees that did not previously exist in the Dominican Republic were illegally introduced, as well as cases of bumblebees of the genus *Bombus* (including *Bombus terrestris*).



Another important product is the avocado, one of the main fruits produced in the Dominican Republic and the fourth most important fruit crop of the country. The Dominican Republic is the second producer of this fruit worldwide. Avocado production has increased in recent years while production in competing countries had stagnated or reduced. This has created an opportunity for the Dominican Republic to position its products on pollinated by native bees on international markets, specifically focusing on the United States and Europe.

Factors that are causing threats to the quantity, health and diversity of managed and wild pollinators in the Dominican Republic include:

- Modification, fragmentation and loss of habitats (deforestation, change in land use);
- Overexploitation of species (in the case of bees whose hives are moved, without following the appropriate practices, in order to pollinate in structures such as greenhouses);
- Climate change/Uncertainty in temperature and humidity conditions due to climate change (irregular, absent or excessive rainfall) that affect the floral cycles and the phenology of floral resources, affecting the health of pollinators; and
- Pollution by agrochemicals.

In terms of legislation, both the general laws on the Environment and Natural Resources and the sectoral laws on Protected Areas include explicit articles for the protection of biological diversity. Although this includes all pollinators, there are no laws that specifically focus on their protection. Based on a series of workshops sponsored by the Ministry of Environment to review the list of endangered, threatened or protected species, it was identified that among the invertebrates included, there were no insects of the Hymenoptera order, to which bees and wasps belong, and it was proposed to include several species, including a species of a bee *Centris*.

To strengthen the institutional framework and ensure that the protection of biological diversity is taken into account in the economic model, it is necessary that the laws are drafted according to a model of sustainable development. This entails ensuring that structural changes in the economy, culture, policies and society revisit and own the theme of conservation. It is also necessary to promote civil society's commitment. Also, local governments must be involved, because they are the ones that can identify the needs and opportunities of citizens.

### Major pollinators:

Honeybees, carpenter bees (*Xylocopa mordax*), other native bees and pollinating insects.

### Other uses of pollinators:

- Honey and other products of the hive such as pollen and propolis are harvested for commercialization.
- The products of native beehives, which have medicinal uses and are commercialized on a small scale. Cultural practices and values associated with pollinators.
- Bees are important in popular imagination as a symbol of unity and teamwork.
- Honey is used in alternative medicine by communities, and it is used industrially in the pharmaceutical and cosmetic industries.
- Cultural expressions with themes related to pollinators and pollination.

### Use of pesticides:

Some pesticides have been banned due to their harmful effects on human health; however, it is known that they continue to be marketed and used because their residues have been detected (e.g. in bat populations). There are no current studies on the impacts of pesticides on pollinators, and farmers have not observed declines in their populations. However, farmers are aware of the impact of pesticides on bee populations and on the possible effects on pollination and the productivity of their crops. There is a trend towards the use of alternative forms of pest control to avoid harming pollinators. For example, farmers prefer to use pesticides at noon, possibly to avoid harming bees.

It has been observed that carpenter bees (*Xylocopa sp.*) are resilient to the use of pesticides and it has not been detected that their populations are decreasing. Although there are no documented effects, the bees do not seem to adjust well to greenhouse conditions. Farmers have not shown concern about pollinators in open field crops.



SANTA LUCIA

Among the main threats to pollinators in the country are: climate change and climate variability; the increase in the use of glyphosates; the use of chemicals to control pests; little assimilation of integrated pest management practices; low genetic variability in managed beehives; decreased diversity of herbs, shrubs and perennials (also related to the use of glyphosates); little diversity in cultivars and other types of managed landscapes; and loss of natural habitats due to housing and tourism development.

Major pollinators:

- Birds: Antilles crested hummingbird, green-throated caribs, Purple-throated caribs
- Mammals: long-tongued bat, Jamaican fruit bat, yellow-shouldered bat, Antillean fruit-eating bat.

Use of pesticides:

There is knowledge about the impact of pesticides. There is a list of regulated pesticides, and farmers comply with these regulations. There are laws for the protection of biodiversity and ‘non-target’ insects, but they do not explicitly mention pollinators.

SAINT KITTS AND NEVIS

Crops pollinated by animals include different fruit trees such as: cantaloupe, melon, cucumber, musk cucumber, pumpkin and watermelons.

The main threats to pollinators that have been identified in Saint Kitts and Nevis are:

- Human settlements, since they involve the loss, fragmentation and disturbance of natural habitats;
- Economic activities, especially the sugar industry, which have resulted in various types of soil degradation;
- Land degradation, which is prevalent in low altitude areas;
- Invasive species, which have been introduced intentionally or accidentally, and cause ecological stress;
- Subsistence practices, such as unregulated felling for coal production;
- Monkeys, which destroy wild hives, eat the eggs of birds and flower buds, reducing the floral resources that are available to pollinators;
- Natural disasters and extreme weather events, such as floods, droughts and hurricanes; and
- The loss of coconut palms, due to lethal yellow, which has had negative effects on the pollinators of the island.

Use of pesticides:

There is very little information on pesticides, and there are no control measures on their use. There are also difficulties in the control of the practices related to the correct use in terms of time and doses of application. There is also no connection between the use of pesticides and the reduction of pollinators. Although there are no data or documentation in this regard, there has been a decrease in pollinator populations, as well as the movements of these populations away from areas where pesticides are applied.

TRINIDAD AND TOBAGO

There are few recent studies on aspects related to pollinators and pollination. However, some recent studies show the importance of pollinators for several crops, such as cucumber, okra and chillies, and that the productivity of these crops decreases considerably in the absence of pollinators. In 2012, an estimate was performed on the national loss in cucumber production in the case of a lack of pollinators, which amounted to 1,326,370 kg, at an estimated cost of TT\$7,653,156 (US\$1,195,806). The estimated loss in the case of a lack of pollinators in cucumber production would be 96.5 per cent, for chillies, 88.1 per cent and for okra, 86.1 per cent. Bees, flies and wasps contribute even more to agricultural pollination in the country (Figure 1). However, the situation could get worse due to warm temperatures, which contribute to the pollen drying out and the flowers withering rapidly, especially in tomato crops.

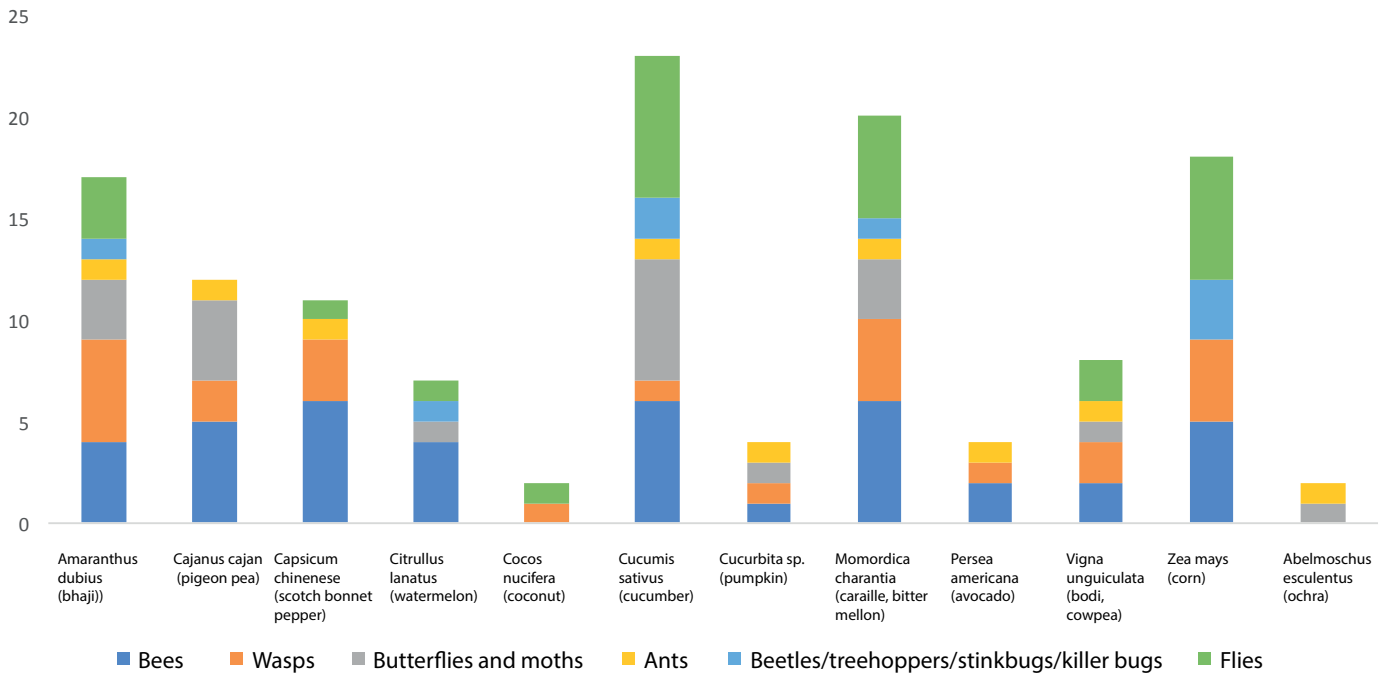


Figure 1. Insects that visit various crops in Trinidad and Tobago, by taxonomic group (identified by family, gender or species)<sup>3</sup>.

There is very little knowledge about the role of pollinating insects, which explains why the vast majority of farmers see them as potential pests and prefer to eliminate them using chemical pesticides. Nevertheless, some farmers practise alternative methods, such as planting cempasúchil, marigold (*Tagetes sp.*) and use garlic and onion as pest repellents. The use of extracts of *neem* (*Azadirachta indica*) is also mentioned. Tracts of land left uncultivated due to financial constraints benefit productivity by providing pollination services. Although this effect derives from economic problems and does not respond to a plan that includes the protection of pollinators, it is a practice that could be encouraged among farmers.

The main threats to pollinators identified in the country are:

- The use of pesticides and herbicides;
- The destruction of the habitat by quarry construction, wood extraction and housing development;
- The lack of laws, policies and plans for the protection of pollinators;
- The lack of knowledge, information and awareness among farmers and the general public;
- The *Apis mellifera* bee, which could be negatively affecting pollinators; and
- Climate change.

Major pollinators:

- Bees, other insects, bats, birds (hummingbirds). Although bees transport the largest amount of pollen from several important crops, so do some flies, wasps, butterflies (larvae and adults), beetles and treehoppers/stinkbugs/killer bugs on a smaller scale.
- At least 12 species of bees have been reported as crop flower visitors in Trinidad and Tobago, from at least 61 species of insects. These species include wasps, butterflies, flies, beetles, and even treehoppers, stink-bugs and killer bugs.

Other uses of pollinators:

- Honey of stingless bees in traditional medicine to treat eye cataracts. The honeybee venom is believed to have therapeutic properties.
- Marketing of *Apis mellifera* honey and stingless bees. A significant number of managed honeybees are hybrids of Africanized bees. Importing honey is prohibited, so prices are high.

<sup>3</sup> Source: Dempewolf, L. (2017). Identification, assessment and valuation of pollination services in neotropical agricultural landscapes, Doctoral thesis, University of the West Indies.



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ANNEX I. LIST OF THE PARTICIPANTS

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Alvin Langlais (Mr.)	Former President	Bee Keepers Cooperation	Antigua and Barbuda	alnov@apuainet.ag
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ANNEX II. AGENDA OF THE TRIALOGUE

Day 1: Tuesday 4th September	
Time	Activity
08:30 – 09:00	Registration
09:00 – 09:40	OPENING SESSION
09:40 – 10:50	INTRODUCTORY SESSION: Objectives of the Trialogue, Methodology and interactive ice-breaker.
10:50 – 12:00	THEMATIC SESSION I: Keynote Speech - “Is there a Problem and how can we tell? Status and Trends for Pollinators, Food Production and Food Security”. A keynote address by IPBES global expert and regional experts on the reasons for global concern, the results of IPBES assessment at the global and regional level, and implications for food production, food security and climate resilience. Followed by Q&A.
12:00 – 13:00	Lunch
13:00 – 19:00	THEMATIC SESSION II: Site Visit: Values of Pollination Services to Agriculture and Food Security. Participants visit a selection of sites near Santo Domingo and discuss with local practitioners the issues around managed and wild pollinators for key agricultural products.

Day 2: Wednesday 5th September	
Time	Activity
09:00 – 09:30	REVIEW OF DAY ONE: Values and Trends of Pollinators
09:30 – 11:15	THEMATIC SESSION III: TV Panel Show - “Regional and National Drivers of Change to Pollinators and Pollination Services”. In the format of a TV Panel Show with audience participation, a Panel made up of policymakers and scientists from the region presents and debates the drivers of change at the national level and find commonalities and differences in the threats facing pollinators between countries at the regional level.
11:15 – 11:45	Berry Break: A pollinator-themed coffee break
11:45 – 13:30	THEMATIC SESSION III: WORLD CAFÉ - Drivers of Change to Pollinators and Pollination Services. Participants have the chance to further explore the threats and drivers of change at the national and regional level.
13:30 – 15:00	Pollinator-Themed Lunch
15:00 – 18:00	THEMATIC SESSION IV: Working Groups - Policy and Management Options to address risks and opportunities. A preliminary working group session to identify locally-appropriate policy options within the format of a Regional Action Plan on Pollinators, in readiness, to share with high-level invitees.
19:00 –	Cultural Dinner

Day 3: Thursday 6th September	
Time	Activity
08:30 – 10:00	HIGH LEVEL BREAKFAST. Key messages from the IPBES global assessment and from the Trialogue sessions are discussed by high-level government authorities, donors and partners.
08:30 – 10:00	THEMATIC SESSION IV: Innovation Corner. In parallel to the High-Level Breakfast, participants will “sell” innovative ideas and actions to promote pollinator-friendly practice from each of their countries. Short videos will be taken of “Stories of Change” to capture local ideas that can be shared across the region.
10:00 – 10:15	Interviews with the media
10:15 – 10:30	Feedback from the High-Level Session
10:30 – 11:00	Coffee Break
11:00 – 13:00	THEMATIC SESSION IV: Drafting Groups: Refining the Regional Action Plan on Pollinators. A working group session to incorporate ideas from the morning sessions and refine the locally-appropriate policy and management options to be included in the Regional Action Plan on Pollinators.
13:00 – 14:30	Lunch
14:30 – 16:00	THEMATIC SESSION V: Panel Discussion - “How to Move Forward and Keep the Momentum Going”. A Panel discussion to identify ways in which the ideas and actions emerging from the Trialogue can be supported by new and ongoing initiatives at the national and regional level.
16:00 – 16:30	Moment of Reflection and Evaluation, agreement on ways to follow up on actions.
16:30 – 17:00	CLOSING SESSION





# BESNet

Biodiversity and Ecosystem Services Network

**Global Policy Centre on Resilient Ecosystems  
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