



Towards resilient and nature-positive islands

A Scoping Analysis for WUR Research in the Caribbean



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1 Introduction and context

Wageningen University and Research (WUR) has a long history of involvement in scientific research targeted at various aspects, social, economic and environmental, of the islands in the Caribbean, and beyond. Its interest has focused on and around the Dutch Caribbean islands of St Martin, St Eustatius, Saba, Aruba, Bonaire and Curaçao. However, WUR scientists and researchers¹ have worked in a number of other Caribbean islands including Dominica, Cuba, Haiti, Trinidad and Tobago, Nevis and the Dominican Republic. Our more recent project involvement is showcased in a publication that is now available online². This strategy has been developed in active consultation and participation with local communities and key stakeholders on the Caribbean islands. It sets out the critical challenges and potential research areas for the islands.

This WUR strategy focusses on Small Island Development States (SIDS) in the Caribbean. SIDS are defined by the United Nations as follows: "*Small Island Developing States (SIDS) include low-lying coastal countries that share similar sustainable development challenges, including small population, limited resources, remoteness, susceptibility to natural disasters, vulnerability to external shocks, and excessive dependence on international trade*". The Caribbean counts 16 SIDS including the mainland state of Surinam³. Whilst many islands may fall within this broad definition, there is a high level of cultural, economic and environmental diversity within and between them. They may vary between dry and arid, with little opportunity for agriculture and high levels of water scarcity, to lush, with tropical climates and rich soils that can support a diversity of food production. Many of them have land that is topographically low-lying and susceptible to the impacts of a changing climate, others have relatively diverse topography with hills and mountains. And each island has its own specific history many of them with ancestry and influences in their culture from Africa, Asia and European. Our experience indicates that whilst each island is unique, making it difficult to define common

1 Full reference: Jones-Walters, L.M., Hulsman, R., Maas, J., Vogel, T. and van der Ploeg, M. (2023) Towards resilient and nature-positive islands: a Scoping Analysis for WUR Research in the Caribbean. Wageningen University and Research, Wageningen, The Netherlands

2 <https://www.wur.nl/en/research-results/research-programmes/international-programmes/latin-america-and-caribbean/caribbean.htm>

3 <https://www.un.org/ohrrls/content/list-sids>



characteristics in relation to their social, economic and environmental situations. The most relevant scale for targeting efforts is almost always local.

The context for this strategy is provided by the urgent need for sound science to support decision making in relation to the pressing issues and challenges of the modern world many of which are particularly testing for islands. These include climate change and its associated problems of sea level rise, extreme weather in all its forms, water scarcity and soil and ecosystem degradation. Islands can suffer from high competition for available space, between different land uses and management and food production. The inherent vulnerability of islands to a range of external economic, social and environmental factors remains an underlying issue that has been highlighted by the recent pandemic. Nature and natural resources on islands are also a limited resource that has to be managed in the context of other demands; in many cases such resources underpin agricultural production, energy production, tourism and a range of other ecosystem services.

This document aims to link the critical issues at island level to the aims and aspirations of the people we have met both in situ and online, and to connect these with WUR own research interests and capacities. The document is pitched at a level that is broader than agriculture and broader than farming, which is why it reference 'Food Systems as its main focus with attention to the relation with nature, water and energy. Furthermore, we hope to take a step beyond consultation and knowledge development, to deliver genuine structural, long-term solutions in collaboration with key actors at island level.

2 Research agenda and strategic partners

2.1 Conceptual framework: how do we approach SIDS?

Figure 1 below shows how 'WUR wishes to address the achievement of its basic objective of the strategy which is to achieve "shock resilient small islands". Around this basic objective four main research areas/themes are defined: Governance, Economic systems, food systems and environment. Subsequently, environmental and socio-economic drivers and then key challenges have been added (see chapter 2 above) to complete the picture.

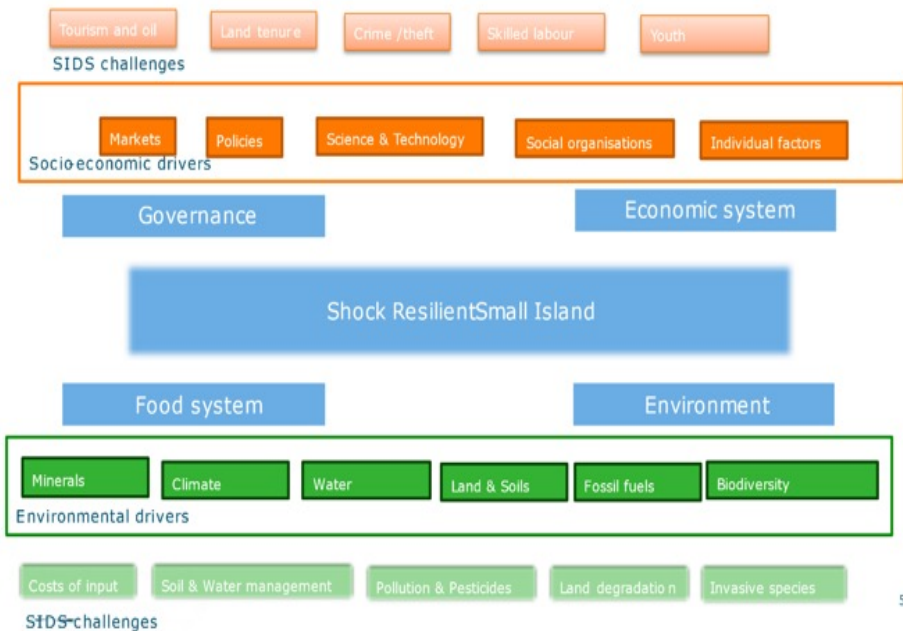


Figure 1 – Conceptual framework for the WUR approach to SIDS

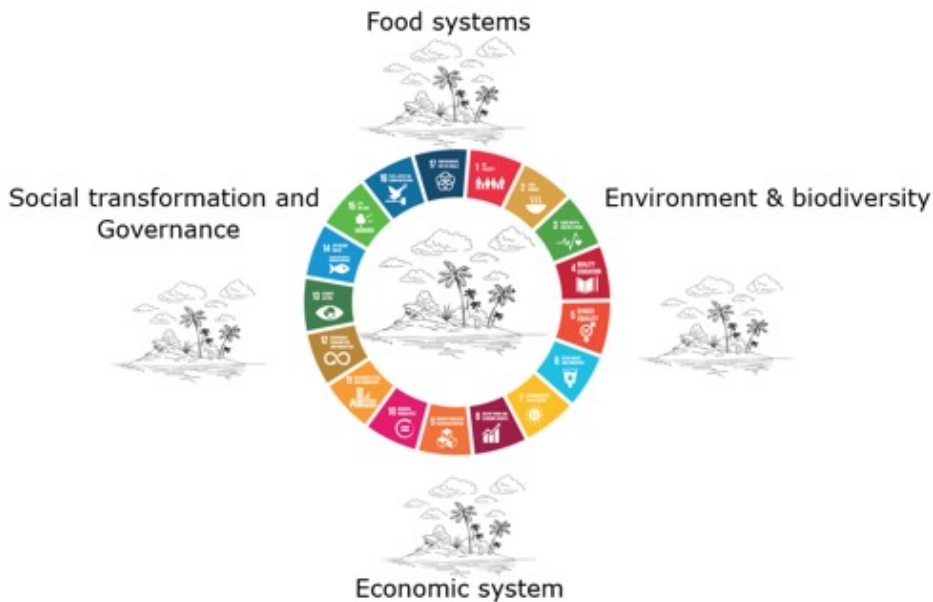


Figure 2 – The four topic-clusters, under which key research projects can be generated

2.2 Research agenda topics from WUR

The graphic (figure 2) below shows the four main research areas-themes of Governance (and Social transformation), Food Systems, Economic systems and Environment (& biodiversity). These four topic-clusters, under which key research projects can be generated, were identified by WUR staff involved in the Caribbean, based on their knowledge and experience and the recent visits to various islands and through discussions and workshops with local and national stakeholders. Below the graphic is a summary of critical issues that provide the basis for research ideas and projects, grouped under each of the topic-clusters.

2.2.1 Food systems

Caribbean food systems are diverse and influenced by the region’s history, geography, and culture. Each country has its own unique food culture. The crops grown on Caribbean islands vary depending on factors such as soil type, climate, and topography. Some crops that are commonly grown throughout the region



include: sugar cane; bananas ; coffee; cocoa; mangoes; avocados; citrus fruits; and root crops (such as yams, sweet potatoes, and cassava). Seafood is also an essential part of the Caribbean diet. Overall, the crops grown on Caribbean islands reflect the region’s history, geography, and culture, and play an important role in the local economy and cuisine. The Caribbean islands face several challenges relating to sustainable food systems. Addressing these challenges requires a comprehensive approach that includes promoting sustainable agricultural practices, investing in local food systems, improving food distribution and access, and reducing food waste. Efforts to promote climate resilience, conserve natural resources, and protect traditional farming practices can also play a critical role in promoting sustainable food systems in the Caribbean – providing strong links to the other areas shown within the graphic. Topical issues of relevance to the research agenda therefore include:

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- **Lack of circularity:** Circular agriculture is an approach to farming that aims to minimize waste and maximize the use of natural resources. In the Caribbean islands, circular agriculture can play an important role in promoting sustainable agriculture practices, reducing environmental impact, and improving food security⁴.
 - **Limited access to nutritious and affordable food:** In some Caribbean countries, access to nutritious and affordable food is limited, which can result in high rates of malnutrition, obesity, and other diet-related health issues.
 - **Dependence on food imports:** Many Caribbean countries depend heavily on (processed) food imports, which can be expensive and can lead to food and nutrition insecurity in the event of supply chain disruptions.
 - **Land degradation and soil erosion:** Land degradation and soil erosion are significant challenges in some Caribbean countries, which can reduce agricultural productivity and make it more challenging to sustainably produce food.
 - **Climate change:** Climate change is a significant threat to agriculture and food systems in the Caribbean, as rising temperatures, changing rainfall patterns, and more frequent and severe natural disasters can all have significant impacts on crops and livestock.
 - **Loss of traditional farming knowledge and practices:** Traditional farming knowledge and practices are at risk of being lost in some Caribbean countries, which can make it more challenging to sustainably produce food and maintain local food systems.

4 Circular agriculture can involve a range of practices, such as using organic waste as fertilizer, promoting crop rotation, using cover crops to prevent soil erosion, and implementing agroforestry systems that integrate trees and crops. These practices can help to reduce the use of synthetic fertilizers and pesticides, which can have negative impacts on soil health and water quality. Circular agriculture can also contribute to the development of local food systems, by promoting the production and consumption of locally-grown foods. This can help to reduce the region's dependence on food imports, improve food security, and support local farmers and businesses. The adoption of circular agriculture practices in the Caribbean islands can face several challenges, including limited access to resources, a lack of awareness about sustainable agriculture practices, and limited access to markets for sustainably-produced goods. However, efforts are underway to promote circular agriculture in the region, including through the development of policies and programs that support sustainable agriculture practices, the promotion of agroecology, and the development of regional networks to share knowledge and resources.

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- Pests and alien invasive species: The impact of pests and alien species in the Caribbean islands is significant and multifaceted. Invasive species can have negative impacts on the environment, biodiversity, economy, and public health of affected countries. They can disrupt ecosystems, cause crop losses and damage infrastructure, and introduce new diseases, among other impacts.
 - Storage and collection of fresh water: Water storage and collection issues in the Caribbean islands are significant, particularly in areas with limited rainfall and unreliable water sources. The region faces challenges related to water scarcity, quality, and accessibility.

We do not propose to explore the following issue in the context of food systems, but it should be presented here as a significant contextual issue in relation to overall social transformation and governance and it is an area for consideration in relation to 'environment and biodiversity' (see below):

- Unsustainable fishing practices: Unsustainable fishing practices, including overfishing and the use of destructive fishing methods, are a significant threat to the sustainability of marine resources in the Caribbean and have already resulted in a decrease in the availability of seafood resources.
- Unsustainable and expensive fossil fuel energy; energy in the Caribbean depend in many countries on fossil fuel imports which is expensive and contaminating. Among other for the transport, storage, processing and preparation of food, energy is required. The coming years many Caribbean countries face the challenge of transitions towards renewable resources. Residue streams of food or other organic material can offer possibilities for biodigestion/biogas while at the same time solar panel in combination with food production may offer possibilities towards more sustainable energy and food production (Agrovioltaicos).

2.2.2 Governance and Social transformation

The Caribbean islands face a range of (local) governance and social transformation challenges. Addressing them requires a comprehensive approach that includes government policy, civil society engagement, and private sector investment. Efforts to promote inclusive economic growth, strengthen democratic institutions, and



address social and environmental challenges⁵ are essential for the long-term sustainability of the Caribbean region. Topical issues of relevance to the research agenda include:

- **Lack of organisation of farmers and power of advocacy:** There is some evidence to suggest that there may be a lack of organization and power of advocacy of farmers in the Caribbean. Many small-scale farmers in the region face significant challenges related to limited access to resources, markets, and financial support, which can make it difficult to compete with larger agribusinesses. Additionally, there may be limited opportunities for farmers to engage in policy and decision-making processes related to agriculture and rural development⁶.

5 Environmental sustainability is covered in the next section but note that many Caribbean countries are vulnerable to the effects of climate change, including rising sea levels, more frequent and severe natural disasters, and coral reef degradation. These environmental challenges can have significant social and economic impacts.

6 However, there are also many examples of successful farmer-led initiatives and organizations in the Caribbean, and efforts are underway to promote more inclusive and participatory approaches to agricultural development that prioritize the needs and perspectives of small-scale farmers.



- **Historical inequalities in agriculture:** It is important to recognize and address the historical and ongoing inequalities that have shaped agriculture in the Caribbean and to work towards more equitable and inclusive systems that promote social, economic, and environmental sustainability.
- **Maintaining and capturing the key elements of traditional culture:** The high influx of people from other countries, either via tourism or through settlement and in-migration can influence the loss of traditional culture, that can include cuisine, the growing and use of traditional crops and the loss of valuable knowledge about a range of aspects that can include techniques for land use and management and the management and use of fisheries.
- **Education:** Access to quality education is a challenge in some Caribbean countries, which can limit opportunities for social mobility and economic growth.
- **Health and healthy eating:** Many Caribbean countries face significant health challenges, including high rates of chronic diseases such as diabetes and obesity, as well as communicable diseases such as HIV/AIDS and tuberculosis. Greater awareness of what to eat, where the food comes from and how it is produced (food education) as well as healthy living will provide the catalyst for improving physical and mental wellbeing and can trigger cultural change in food consumption and physical activity.
- **Land tenure and land grabbing:** Historically, land ownership in the Caribbean has been concentrated in the hands of a few individuals or families, and there may be



limited legal protections for small-scale farmers or Indigenous communities who may have traditional or customary land rights. Additionally, there have been instances of land grabbing, where foreign investors or companies purchase or lease large tracts of land for agricultural or other commercial purposes, often without adequately consulting or compensating affected communities. These issues can have significant social, economic, and environmental impacts and highlight the need for more equitable and sustainable land governance, land administration and land registration in the Caribbean.

- Mismatch of regulations: There can be a mismatch of regulations between international laws and local laws in the Caribbean islands, which can affect their capacity to deliver compliance. Some international regulations, such as those set by the EU or UN, may not take into account the specific cultural, social, and economic contexts of Caribbean countries, or may impose standards or requirements that are difficult or impossible for local governments or businesses to meet. This can create challenges for compliance and can lead to a lack of enforcement or implementation of international regulations at the local level. Additionally, some Caribbean countries may lack the resources or capacity to effectively implement and enforce not only international but also their own national regulations, which can further exacerbate the mismatch between international and local laws.

We do not propose to explore the following issues but they should be presented here as significant contextual issues in relation to overall social transformation and governance:

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- Economic inequality: There are significant income and wealth disparities in many Caribbean countries, which can result in social exclusion and political instability.
 - Adversarial political culture: excessive prime ministerial power, clientelism and corruption are significant issues in some Caribbean countries, and these can undermine public trust in government institutions and hinder economic development.
 - Crime and violence: Crime rates are high in some Caribbean countries, and violent crime can have a significant impact on social and economic development.
 - Social inclusion: Discrimination based on race, ethnicity, gender, and sexuality remains a significant challenge in some Caribbean countries, which can limit opportunities for social and economic mobility.



Influence of power blocs (such as China, USA or EU): Despite the fact that most Caribbean countries are sovereign independent states, the influence of power blocs is significant, with each country or bloc pursuing its own interests in the region. The USA has historically played a dominant role in the Caribbean, particularly in the areas of security and trade, while China has recently increased its economic and political engagement in the region through investment and infrastructure projects. The EU provides development assistance to Caribbean countries and engages in trade agreements, but has a more limited presence in the region compared to China and the USA.

2.2.3 Environment and biodiversity

The Caribbean islands are home to a diverse range of ecosystems and wildlife, including coral reefs, rainforests, wetlands, and endemic species of plants and animals. However, the region also faces several environmental and biodiversity challenges, including climate change, habitat loss and fragmentation, invasive species, pollution, overfishing, and unsustainable tourism development. These challenges can have significant impacts on ecosystems and biodiversity, as well as on the region's economic and social well-being. Addressing these challenges requires a comprehensive approach that includes conservation efforts, sustainable land use practices, reducing pollution, promoting sustainable tourism development, and addressing the root causes of climate change. Protecting and conserving biodiversity in the Caribbean is essential for maintaining ecosystem services, supporting sustainable economic development, and ensuring the long-term well-being of the region's people and wildlife. The Caribbean islands face several environmental and biodiversity issues, including:

- **Climate change:** The Caribbean is particularly vulnerable to the impacts of climate change, especially the impact of rising sea levels, more frequent and severe natural disasters, ocean acidification and coral reef degradation. These environmental challenges can have significant social and economic impacts as well as severe impacts on ecosystems and biodiversity.
- **Habitat loss and fragmentation:** Habitat loss and fragmentation due to urbanization, deforestation, loss of fresh water sources and land-use changes are significant threats to biodiversity in the Caribbean.

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- **Loss of ecosystem services:** The loss of ecosystem services in the Caribbean islands, such as coral reefs, mangroves, forests and fresh water sources, can have significant social, economic, and environmental impacts. These ecosystems provide a range of benefits, including coastal protection, fisheries and tourism revenues, and carbon sequestration, among others. Loss or degradation of these services can lead to increased vulnerability to natural disasters, declines in fish populations, reduced tourism revenues, reduce food production and increased greenhouse gas emissions, among other effects.
 - **Invasive species:** Invasive species, both plants and animals, are a major threat to biodiversity in the Caribbean, as they can outcompete native species and disrupt ecological systems.
 - **Pollution:** Pollution from agricultural runoff, urban development, and industrial activities can have significant impacts on water quality, soil health, and biodiversity in the Caribbean.
 - **Overfishing and destructive fishing practices:** Overfishing and destructive fishing practices are significant threats to marine biodiversity in the Caribbean, particularly for coral reefs and other sensitive marine ecosystems.
 - **Unsustainable tourism development:** Tourism is a significant industry in the Caribbean, but unsustainable tourism development can have significant impacts on the environment and biodiversity, including habitat destruction, pollution, and overuse of natural resources.
 - **Limited resources for conservation:** Many Caribbean countries have limited resources for conservation efforts, which can make it challenging to protect and conserve biodiversity in the region.
 - **Increasing population pressure:** Rising population numbers (as well as the seasonal increases associated with tourism) can have significant environmental and biodiversity-related effects. As the population grows, there is greater demand for food, water, and other resources, which can lead to land-use change, deforestation, pollution (from wastewater and landfills) and habitat destruction. This can result in the degrade of ecosystems and negatively impact biodiversity.
 - **Poor soil and water management:** Poor soil and water management practices,

such as overuse and depletion of groundwater resources, can have significant impacts on agriculture, the environment, and biodiversity in the Caribbean. These practices can lead to reduced crop yields, soil erosion, and the loss of biodiversity, particularly in sensitive coastal ecosystems. Additionally, the lack of fresh water can further exacerbate these impacts and lead to greater vulnerability to natural disasters and climate change.

2.2.4 Economic system

The economic systems of Caribbean islands vary depending on factors such as size, population, and natural resources. In general, many Caribbean islands have small, open economies that rely heavily on tourism, agriculture, and international trade. Tourism is a significant industry in the Caribbean, with many islands relying on it as a major source of income and employment. Agriculture is a relatively important industry in many Caribbean countries, particularly for the production of crops such as sugar cane, bananas, coffee, and cocoa. However, the region faces significant challenges related to agricultural productivity, including land degradation, limited access to markets, and climate change. International trade is also a significant part of the economic system in the Caribbean, with many islands exporting goods such as raw materials, manufactured goods, and services. However, the region faces challenges related to trade, including limited access to markets, and high transportation costs. Many Caribbean countries face economic challenges related to debt, low levels of investment, and limited access to financing. Efforts to address economic challenges in the Caribbean include promoting economic diversification, improving infrastructure, investing in education and skills training, and improving access to financing and trade. The development of regional economic partnerships and the promotion of sustainable economic practices can also play a significant role in promoting long-term economic growth and stability in the Caribbean. The economic systems of Caribbean islands face several challenges of relevance to the research agenda, including:

- Dependence on (unsustainable) tourism: Many Caribbean countries rely heavily on tourism as a major source of income and employment. This dependence can leave these countries vulnerable to economic shocks, such as natural disasters, health crises, or changes in global tourism trends. In many cases the tourism activities can also have highly damaging impacts on local communities, the environment, biodiversity and ecosystem services.



- Vulnerability to external shocks: The small size and open nature of many Caribbean economies make them vulnerable to external shocks (Covid, hurricanes, etc) including changes in global trade patterns, fluctuations in commodity prices, and changes in international financial conditions.
- Limited access to finance, costs of borrowing and high levels of debt: Access to finance can be a significant challenge for businesses and individuals in the Caribbean, particularly in rural areas or for small and medium-sized enterprises⁷. Limited access to finance can limit economic growth and development. The costs of borrowing in the Caribbean can be relatively high compared to other regions. This is due in part to several factors, including the small size of many Caribbean economies, high levels of debt, and the perception of greater risk associated with investing in developing countries. Additionally, many Caribbean countries are highly dependent on external financing, such as loans from international financial institutions, which can come with high interest rates and strict conditions. High borrowing costs can therefore pose a significant challenge to economic

⁷ Including that banking regulations on islands can be too complex for people with limited education to understand

development and sustainability in the Caribbean. Many Caribbean countries have high levels of public debt, which can limit their ability to invest in economic growth and development. Debt can also create a burden on future generations, as interest payments consume a significant portion of government budgets.

- **Economic inequality:** Economic inequality is a significant challenge in the Caribbean, with many countries experiencing high levels of income and wealth inequality. This inequality can limit access to opportunities and contribute to social and political instability.
- **Engagement with diaspora:** Building strong and sustainable partnerships with the Caribbean diaspora can help to promote mutual understanding, facilitate knowledge sharing, and contribute to the development of the region. Engaging with the Caribbean diaspora can be done in several ways, such as creating networks and forums for communication and collaboration, providing resources and opportunities for professional development and cultural exchange, and supporting diaspora-led initiatives and organizations. It is important to recognize the diversity within the Caribbean diaspora and to foster inclusive and respectful interactions that value the contributions and perspectives of all members.
- **Access to markets:** Access to markets can be a significant constraint on economic activities in small island developing states with limited domestic markets, which can make it difficult for local businesses to achieve economies of scale or to access international markets. Additionally, high transportation costs, tariffs, and non-tariff barriers can further limit access to markets and hinder trade. As a result, many Caribbean countries are highly dependent on a few key export commodities, such as tourism, agriculture, or extractive industries, which can make them vulnerable to global market fluctuations and economic shocks⁸.
- **Labour shortage in agriculture:** There is a growing concern about a labour shortage in agriculture in the Caribbean islands. This is due to several factors, including the aging workforce, outmigration of young people, and competition with other sectors for skilled workers. Additionally, the seasonal nature of many agricultural activities, such as harvesting, can make it difficult to attract and

⁸ Improving access to markets through trade agreements, infrastructure development, and other initiatives is therefore an important priority for promoting economic growth and sustainability in the Caribbean.

retain workers. This labour shortage can have significant impacts on the agriculture sector, including reduced productivity, higher costs, and reliance on imported food⁹.

- Lack of (transparent) data: There is a general perception that there is a lack of economic data for many Caribbean islands. This is due in part to several factors, including limited resources for data collection and analysis, inadequate statistical infrastructure, and a lack of capacity in statistical agencies. Additionally, there are concerns about the transparency and accuracy of the economic data that is available, particularly in relation to issues such as debt, fiscal policy, and economic growth. This lack of reliable data can make it difficult to develop evidence-based policies and strategies for promoting economic development and sustainability in the Caribbean¹⁰.
- Lack of knowledge on scalability (to other islands): (also related to the former point on lack of (transparent) data; There is a growing recognition of the need for greater collaboration and knowledge sharing among Caribbean islands to promote sustainable development and address common challenges. While there are some examples of successful knowledge transfer between islands, such as in the areas of renewable energy and disaster risk reduction, there is still much work to be done to strengthen regional cooperation and exchange of best practices. One challenge is the fragmented nature of many initiatives and programs, which can limit their scalability and impact. Additionally, there is a need for data sharing, greater investment in capacity building and knowledge management to support effective learning and knowledge transfer among Caribbean islands.

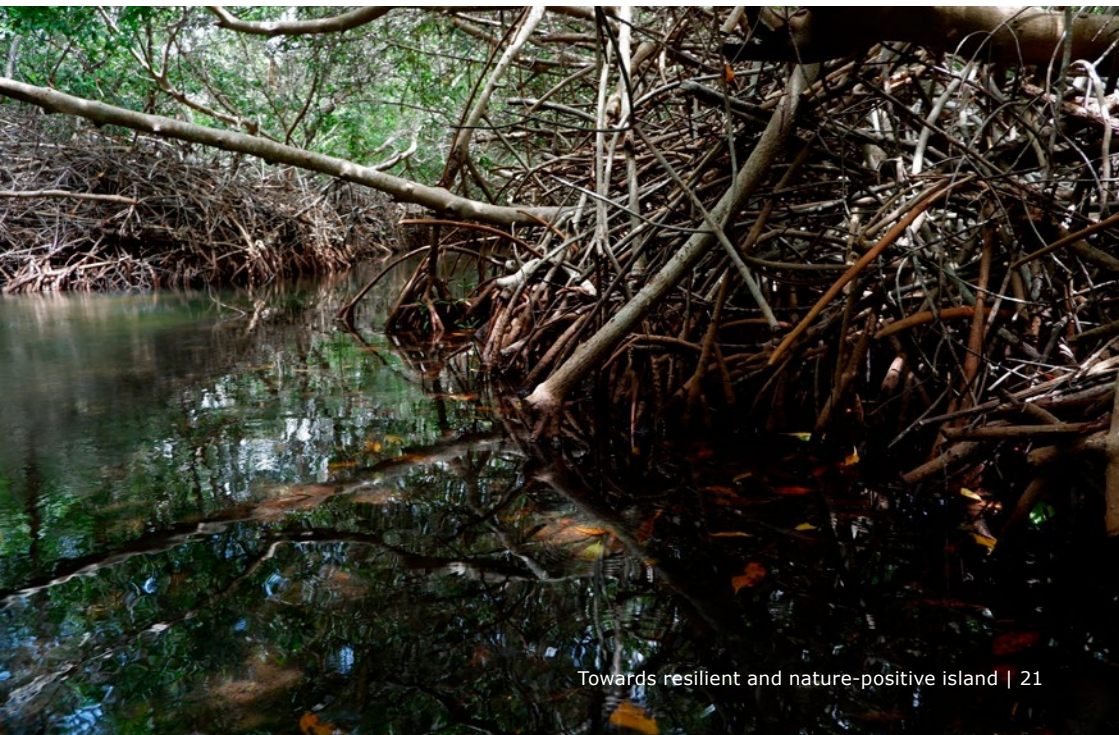
9 Addressing the labour shortage in agriculture in the Caribbean will require innovative approaches, such as improved labour policies, training and education programs, and the use of new technologies and practices to increase efficiency and productivity.

10 However, efforts are being made to improve the quality and availability of economic data in the region, such as through the establishment of national statistical offices and the development of regional statistical systems.

3 Conclusion

In conclusion, the challenges faced by Small Island Developing States (SIDS) and Caribbean Islands in particular are complex and interconnected, requiring a holistic and integrated approach to research and development. This report has highlighted some of the key research priorities for addressing these challenges, including sustainable food systems, climate change adaptation, biodiversity conservation, and economic development.

It is essential that research efforts are guided by the unique local context of each island, the needs and priorities of local communities and stakeholders, and that they are conducted in a collaborative and participatory manner. To achieve meaningful progress towards sustainable development of small islands in the Caribbean, there is a need for a better understanding of the complexity of the many challenges the islands face, sustained investment in research and innovation, as well as capacity building and knowledge management. By working together, and building on existing knowledge and best practices, a more resilient and sustainable future for the people and ecosystems of the islands in the Caribbean can be created.



Colophon

Author

Jones-Walters, L.M., Hulsman, R., Maas, J., Vogel, T. and van der Ploeg, M. (2023) Towards resilient and nature-positive islands: a Scoping Analysis for WUR Research in the Caribbean. Wageningen University and Research, Wageningen, The Netherlands

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