









Saba Climate Plan & Action Agenda

EXECUTIVE SUMMARY

A Roadmap to Resilience:
Strengthening the "Unspoiled Queen" through Integrated Climate Investment





PUBLIC ENTITY SABA
REMIS VELISQUE

NEPP Saba
Nature & Environment Policy Plan

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Introduction

Climate change is already reshaping daily life, public services, and economic stability on Saba. Rising temperatures, longer dry periods, increasingly intense rainfall events, stronger tropical storms and hurricanes, and warming seas are placing growing pressure on water and food security, infrastructure reliability, ecosystem health, and the island's overall liveability. These impacts are not isolated.

As a small, mountainous, geographically isolated island, Saba is structurally exposed to cascading climate risks. This exposure is amplified by dependence on external supply chains, a single primary access road, and centralised critical infrastructure. As climate hazards intensify, disruptions caused by drought, erosion, road failure, storm surge, hurricanes, or regional supply-chain breakdowns increasingly affect multiple systems at once. Without structural investment in climate adaptation, Saba will face growing reliance on emergency interventions, post-disaster recovery funding, and ad hoc support mechanisms, which are more costly over time, less effective in safeguarding essential services and economic continuity, and hamper Saba's potential to become more self-sufficient.

Climate adaptation on Saba must therefore be understood as a matter of public responsibility within the Kingdom. It concerns the protection of essential services, the avoidance of escalating public expenditure on loss and recovery, and the long-term resilience and self-sufficiency of a public entity that is fully integrated into the constitutional, fiscal, and governance framework of the Netherlands.

This Executive Summary brings together the core findings and priorities of Saba's Climate Plan and Action Agenda. It outlines the most significant climate risks facing the island, the associated economic and non-economic costs, the policy areas where coordinated action is required, the integrated roadmap guiding implementation, and priority flagship projects.



Climate change projections

Climate projections for the Caribbean Netherlands indicate a future characterised by higher average temperatures, more frequent and intense heatwaves, longer dry periods punctuated by heavy rainfall events, stronger hurricanes, and continued sea-level rise. While uncertainties remain in downscaled modelling for small islands, the direction of change is unequivocal and consistent with decades of regional observation across the Caribbean.

For Saba, these hazards translate into a distinct risk profile shaped by geography, scale, and infrastructure configuration. The island's steep volcanic terrain accelerates surface runoff during heavy rainfall, increasing the risk of erosion, rockfalls, and flash flooding. Longer dry periods, in turn, lead to cistern depletion, increasing pressure on the reverse osmosis system. Rising temperatures increase electricity demand, leading to higher household energy costs and greater financial pressure on households. More frequent and intense heatwaves are expected to lead to increased rates of heat stress and decreased labour productivity.

Crucially, these risks do not operate in isolation. Saba's vulnerability is systemic. Fort Bay Road is the island's only access route to the harbour, the gas station, the reverse osmosis plant, the power station, and the waste facility. Damage or disruption to this road would simultaneously affect the movement of essential goods from the harbour, access to water and energy infrastructure, and emergency response capacity. Disruption to harbour operations, whether from a direct storm impact or from storm conditions elsewhere in the region, can prevent the offloading of essential goods even when supplies are available. This exposure is further compounded by reliance on a limited number of shipping routes and transhipment hubs, particularly St. Maarten and Miami, which are themselves increasingly affected by extreme weather events.

Moreover, Saba's small scale makes it particularly vulnerable to global disruptions. Being at the end of the supply chain, the island is among the first to experience the consequences of international shortages or sudden shifts in demand. Events like the surge in consumer hoarding at the start of the COVID-19 pandemic showed how global pressures can quickly translate into a complete stop on product import possibilities on Saba. This vulnerability is compounded by the island's reliance on a limited number of suppliers, shipping companies, and cargo vessels capable of accessing its small harbour.

Sea-level rise will also increase storm surge impacts on coastal infrastructure which includes the telecommunications landing point, reverse osmosis plant, and significant coastal cultural heritage sites such as The Ladder. In parallel, rising sea surface temperatures and more frequent marine heatwaves are expected to accelerate coral bleaching and reef degradation, with implications for fisheries, biodiversity, and tourism attractiveness.



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Future loss and damage

Across the Caribbean, climate-related disasters already generate some of the highest relative economic losses globally. Between 2000 and 2022, climate change accounted for an estimated 39 per cent—approximately US $41.3 billion—of total economic losses across small island developing states. Caribbean islands are affected with particular intensity, experiencing natural disasters roughly twice as often as other small island regions and up to seven times more frequently than large economies. [1]

AEF (2024) estimates in their "Klein Gebied Grote Opgave"[2] report that a single Category 5 hurricane occurring within a 250-kilometre radius of Saba could result in infrastructure damage exceeding US$91.1 million. Under current climate projections, cumulative expected costs are estimated at approximately US $84.3 million by 2050, with an average annualised cost of around US $3.37 million.

The report further notes that these costs are an underestimation, for they do not include the replacement value for cost-covering infrastructure that may be damaged during a hurricane. The proportion of assets expected to be damaged is outlined in the following table:

Assumption of proportion of Saban assets (weighted by replacement value) that will need to be replaced after a category 5 hurricane (AEF, 2024)

Infrastructure Category	Expected Damage *(% of Replacement Value)*
Airport / Harbour / Utilities / Buildings	25 % each
Roads & Parking Lots	12.5 %
Fuel Storage, Drinking Water	50 %
Cultural Heritage & Agriculture	25 %

Estimated costs further exclude losses associated with the increasing frequency of intense rainfall and droughts, terrestrial and marine heatwaves, ocean acidification, ecosystem degradation, and supply-chain disruption, all of which are expected to intensify over time. When cascading economic impacts (such as prolonged service disruption, loss of tourism revenue, and extended recovery periods) are taken into account, Saba's overall exposure to climate-related loss and damage extends well beyond direct damage estimates.

A single Category 5 hurricane occurring within a 250-kilometre radius of Saba could result in infrastructure damage exceeding **US$91.1 million**.

[1] Panwar, V., Noy, I., Wilkinson, E. and Corbett, J. (2023) The Costs of Inaction: Calculating climate change-related loss and damage from extreme weather in Small Island Developing States. ODI Working Paper. London: ODI.

[2] AEF (2024) Klein gebied, grote opgave: de financiële opgave van de fysieke infrastructuur in Caribisch Nederland. Rapport opgeleverd aan het Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 13 februari.

Policy Areas: Domains

The scale and nature of projected loss and damage demonstrate that climate risk on Saba cannot be addressed through isolated measures or sector-specific responses. The impacts described above arise from the interaction of multiple systems—water, food, infrastructure, ecosystems, public services, and economic activity—whose functioning is tightly interconnected. Reducing future exposure therefore requires coordinated action across policy areas, supported by a shared framework that aligns planning, investment, and implementation.

In response, Saba's Climate Plan is structured around **seven domains** that reflect where climate risks concentrate and where targeted intervention can most effectively reduce systemic exposure. Together, these domains provide a practical organising framework for government action, enabling departments and partners to identify critical vulnerabilities, define and refine adaptation objectives, and coordinate measures in a way that strengthens system-wide resilience rather than addressing symptoms in isolation.

To support implementation, the Plan translates these domains into a structured action framework. While the Climate Plan includes a longer-term roadmap, this Executive Summary focuses on the immediate (2026-2027) and short-term (2030) priorities needed to guide near-term action and decision-making.

The following pages summarise, for each domain, the key climate-related challenges, the immediate actions required in 2026-2027, and the short-term targets to be achieved by 2030. The actions presented reflect current priorities based on available knowledge, data, and stakeholder input, and are intended to provide a clear basis for prioritisation, coordination, and accountability in the near term. These actions will be reviewed and updated on an ongoing basis to maintain relevance, feasibility, and alignment with evolving climate risks and island priorities.



DOMAIN 1

Water & Food Security



Climate-related Challenges

Increasing drought and heat stress; dependence on rain-fed cisterns and a single reverse osmosis system; high reliance on imported food and limited storage capacity; exposure to supply-chain disruption during extreme events.

2026 - 2027 IMMEDIATE TERM ACTIONS

- Secure funding for food security
- Initiate design and permitting for the warehouse, cold facility, and container yard expansion (see flagship 1).
- Initiate steps to secure a property for food production expansion.
- Development of rainwater management solutions to reduce flash flooding, sediment runoff and erosion, with a special focus on the critically vulnerable area such as Fort Bay Road (see flagship 3).

2030 SHORT TERM TARGETS

- Warehouse and cold storage are operational, enabling bulk imports and emergency food storage.
- Improved availability of inputs for local food production.
- Increased local food production and community access to local fresh produce.
- Implementation of priority watershed rainwater management solutions to slow down rainwater runoff, mitigate erosion and sediment run-off.

DOMAIN 2

Biodiversity & Ecosystems



Climate-related Challenges

Accelerating erosion and sediment runoff due to intense rainfall; degradation of terrestrial ecosystems and coral reefs; and marine ecosystems; increasing pressure on fisheries and biodiversity from warming seas.

2026 - 2027 IMMEDIATE TERM ACTIONS

- Identify priority areas for vegetation recovery, clarify land ownership, and develop action plans to support greening efforts.
- Expand population recovery initiatives for key reef herbivores: sea urchins.

2030 SHORT TERM TARGETS

- A comprehensive species inventory and habitat map provides the scientific foundation for targeted regeneration projects and improved legislation and ordinances, supported by ongoing monitoring and enforcement.
- Establish a Saba Bank monitoring plan and strengthen enforcement capacity in consultation with the Coast Guard if needed.
- Explore new restoration approaches and determine best practices for ecosystem restoration on Saba based on monitoring results.
- Establish an environmental financing mechanism to support implementation efforts.

DOMAIN 3

Risk Management, Disaster & Crisis Preparedness & Response



Climate-related Challenges

Increasing frequency and complexity of climate hazards; limited redundancy in critical lifelines; growing demands on emergency response and recovery capacity.

2026 - 2027 IMMEDIATE TERM ACTIONS

- Secure funding for the road connecting Blackrock Harbour to Glies Quarter (see flagship 2).
- Development of joint intra-regional disaster preparedness, response and recovery initiatives.

2030 SHORT TERM TARGETS

- Completion of the new Black Rock Harbour, strengthening connectivity, and operational resilience.
- Ensure telecommunications redundancy by reducing the risk of connectivity loss at the sea-cable entry point through operator-identified measures.
- Expand and decentralise emergency reserves of food, water, and medical supplies across the island, ensuring availability during extended disruptions (target: 3-month supply).

DOMAIN 4

Liveable Environment



Climate-related Challenges

Rising temperatures and more intense storms/hurricanes affecting housing, public space, and infrastructure; ageing assets; increasing energy and cooling demand with affordability implications.

2026 – 2027 IMMEDIATE TERM ACTIONS

- Installation of shading structures for public recreational spaces.
- Pilot basic retrofits for cooling and energy efficiency in a small number of social homes.
- Begin construction of the new solar park and battery storage system.
- Conduct a public energy efficiency campaign to influence household behaviour.

2030 SHORT TERM TARGETS

- Construction of pilot climate-resilient new social housing units designed for high thermal comfort, energy efficiency, and storm resistance.
- Assess electric mobility options and associated fire-safety risks to inform decisions on public charging infrastructure and government fleet electrification.
- Develop a Saba Climate Resilient Building Design Guide and construction skills training for contractors.

DOMAIN 5

Economic Resilience



Climate-related Challenges

High exposure of tourism, fisheries, and connectivity to climate shocks; limited economic diversification; vulnerability to external disruptions and price volatility.

2026 - 2027 IMMEDIATE TERM ACTIONS

- Explore waste valorisation possibilities including household-level waste separation and business incentives.
- Support the development of business case pilots that serve as learning labs and drivers of economic innovation.

2030 SHORT TERM TARGETS

- Inter-island air, sea, and digital connectivity is improved to strengthen regional trade and sustainable tourism growth.

DOMAIN 6

Community & Culture



Climate-related Challenges

Risk to cultural heritage sites and practices; social impacts of repeated disruption; uneven capacity to cope with and recover from climate stress.

2026 - 2027 IMMEDIATE TERM ACTIONS

- Improve public knowledge on heat risks, especially for elderly and low-income residents.
- Expand community watchdog programs to check on isolated residents during heatwaves or crises.
- Raise funding for the restoration and ongoing maintenance of The Ladder.

2030 SHORT TERM TARGETS

- Healthcare, mental care and social infrastructure is strengthened to respond to climate-related stressors.
- Establish policy, legal protection and a monument fund to restore and maintain cultural heritage sites including traditional Saban homes.

DOMAIN 7

Education & Awareness



Climate-related Challenges

Limited access to climate information translated into practical action; need for sustained capacity-building across households and institutions.

2026 – 2027 IMMEDIATE TERM ACTIONS

- Launch a climate awareness campaign linking climate change to daily life on Saba in order to build public understanding and drive engagement.
- Explore community engagement possibilities, e.g. by recruiting and training community members as “climate stewards” to foster local participation and involvement.
- Strengthen school gardens and grow-box programs through hands-on education, integrating food forest planting and seasonal produce cycles.

2030 SHORT TERM TARGETS

- Expand climate communication efforts by for example hosting an annual “Climate Week” and integrating climate-focused activities into the island’s event calendar throughout the year.
- Integrate climate action into the school curriculum, train teachers, and develop practical, locally relevant materials.

Priority Flagship Projects

Within the Integrated Climate Roadmap, three investments are identified as Flagship Projects. These projects address structural vulnerabilities that repeatedly amplify climate impacts across multiple systems and enable the effectiveness of other adaptation measures set out in the Action Agendas. They are therefore prioritised as implementation-ready investments with cross-domain resilience benefits.



FLAGSHIP PROJECT 1:
Warehouse and
Cold Chain Infrastructure



FLAGSHIP PROJECT 2:
Secondary Access Road:
Black Rocks Harbour – Giles Quarter



FLAGSHIP PROJECT 3:
Island-Wide Rainwater and
Watershed Management Programme

Flagship Project 1

Warehouse and Cold Chain Infrastructure



Saba's food supply is almost entirely dependent on weekly imports shipped from Miami via St. Maarten and offloaded at Fort Bay Harbour. At present, the harbour lacks adequate dry and cold storage facilities, which means even short disruptions to shipping schedules, harbour access, or regional logistics immediately affect food availability, prices, and emergency preparedness on the island.

This project provides dedicated warehouse and cold storage and cold chain capacity at Fort Bay Harbour, enabling essential goods to be stored safely and distributed over time. By introducing buffering capacity at the point of entry, the facility reduces the immediate impacts of supply-chain disruption, supports disaster preparedness, and improves continuity of food supply as well as food quality during extreme weather events and regional crises.

The project builds on a draft Food Security Proposal developed by the Public Entity Saba and is aligned with ongoing harbour and logistics planning. The site has been identified and the scope defined. Subject to financing, the project is ready to proceed in the short term.

Investment scope and indicative costs

Component	Indicative Budget (€)[3]
Harbour extension & shore protection	1,900,000
Warehouse construction & site works	375,000
Cold storage & refrigeration systems	150,000
Fencing	120,000
Solar installation	160,000
Refrigerated transport	80,000
Total	**≈ €2,785,000**

[3] The project budget is based on the budget contained in the Saba Food Security Proposal.

Flagship Project 2

Secondary Access Road: Black Rocks Harbour – Giles Quarter



Saba currently relies on a single access route—Fort Bay Road—which connects the harbour and key infrastructure, including fuel storage, the reverse osmosis plant, power generation facilities, waste management, the stone quarry , with the rest of the island. Increasingly intense rainfall events, erosion, and rockfalls have heightened the risk of temporary or prolonged disruption along this route. When Fort Bay Road is compromised, access to essential services and supplies is simultaneously affected.

The secondary access road linking Black Rocks Harbour to Giles Quarter introduces redundancy into this critical lifeline. It ensures that goods, fuel, and emergency services can continue to reach the island even when Fort Bay Road is disrupted and allows recovery and repair activities to proceed without relying on a single corridor. The road is therefore a necessary complement to the Black Rocks Harbour investment, ensuring that additional maritime capacity translates into operational resilience on land.

Investment scope and indicative costs

Component	Indicative Budget (€)
Earthwork	4,000,000
Retaining walls	2,500,000
Drainage	2,000,000
Road construction	4,000,000
Utilities	1,800,000
Project management, permits, fees	200,000
Unforeseen (15%)	2,250,000
Total	**€16,750,000**

Flagship Project 3

Island-Wide Rainwater and Watershed Management Programme



Saba's steep topography causes rainfall to move rapidly downslope, concentrating runoff along roads and infrastructure corridors. Increasingly intense rainfall events accelerate erosion, trigger rockfalls, damage road surfaces, and transport sediment into Fort Bay Harbour and surrounding marine ecosystems.

The island-wide rainwater and watershed management programme focuses on managing at the scale of the watershed through measures that slow, capture, and redirect rainfall. The project will help reduce erosion and flash-flood risks, limit impacts on critical infrastructure, and strengthen the island's capacity to manage heavier rainfall under changing climate conditions. It delivers cross-domain benefits for infrastructure reliability, disaster risk reduction, water management and ecosystem health, and strengthen the island's capacity to manage heavier rainfall under changing climate conditions.

Initial rainwater management assessments have already been conducted, identifying priority intervention zones such as Fort Bay Road. The programme can be implemented in phases, allowing early benefits while scaling up over time.

Investment scope and indicative costs

Component	Indicative Budget (€)
Watershed interventions & infiltration systems	800,000 – 1,000,000
Sediment control & erosion protection	400,000 – 600,000
Water storage & controlled diversion	800,000 – 1,000,000
Monitoring & adaptive management	100,000
Total	**≈ €2,100,000 – 2,700,000**

Taken together, the three Flagship Projects form a mutually reinforcing resilience package.

The warehouse and cold chain infrastructure strengthens supply buffering; the secondary access road introduces physical redundancy; and the watershed management programme reduces the frequency and severity of disruption events, while at the same time facilitating vegetation recovery, thereby reducing erosion and strengthening natural cooling effects on the island. By concentrating investment where climate risks converge and implementation readiness is high, these projects provide a practical bridge between strategy and delivery, reducing future loss and damage while improving fiscal predictability.



Conclusion

This Executive Summary sets out why climate change on Saba constitutes a present and compounding risk to essential services, infrastructure reliability, economic stability, and community wellbeing. As climate pressures intensify over time, the frequency and scale of disruption are expected to increase, with associated implications for public expenditure and service continuity.

The Climate Plan and Action Agenda provide a coherent and integrated response to these risks. Organised around seven policy domains and guided by an Integrated Climate Roadmap, the Plan establishes clear adaptation priorities and a phased pathway for implementation that addresses structural vulnerabilities rather than recurring damage.

Within this framework, three Flagship Projects have been identified as priority investments because of their cross-domain relevance and role in strengthening critical lifelines. Together, they form a focused set of interventions that anchor the transition from strategic intent to delivery.

Please refer to the accompanying Climate Plan and Action Agenda for the complete detailed analysis, domain overviews and action agendas, and implementation framework supporting the priorities outlined in this Executive Summary.

View accompanying Climate Plan and Action Agenda





Commissioned by the Public Entity Saba

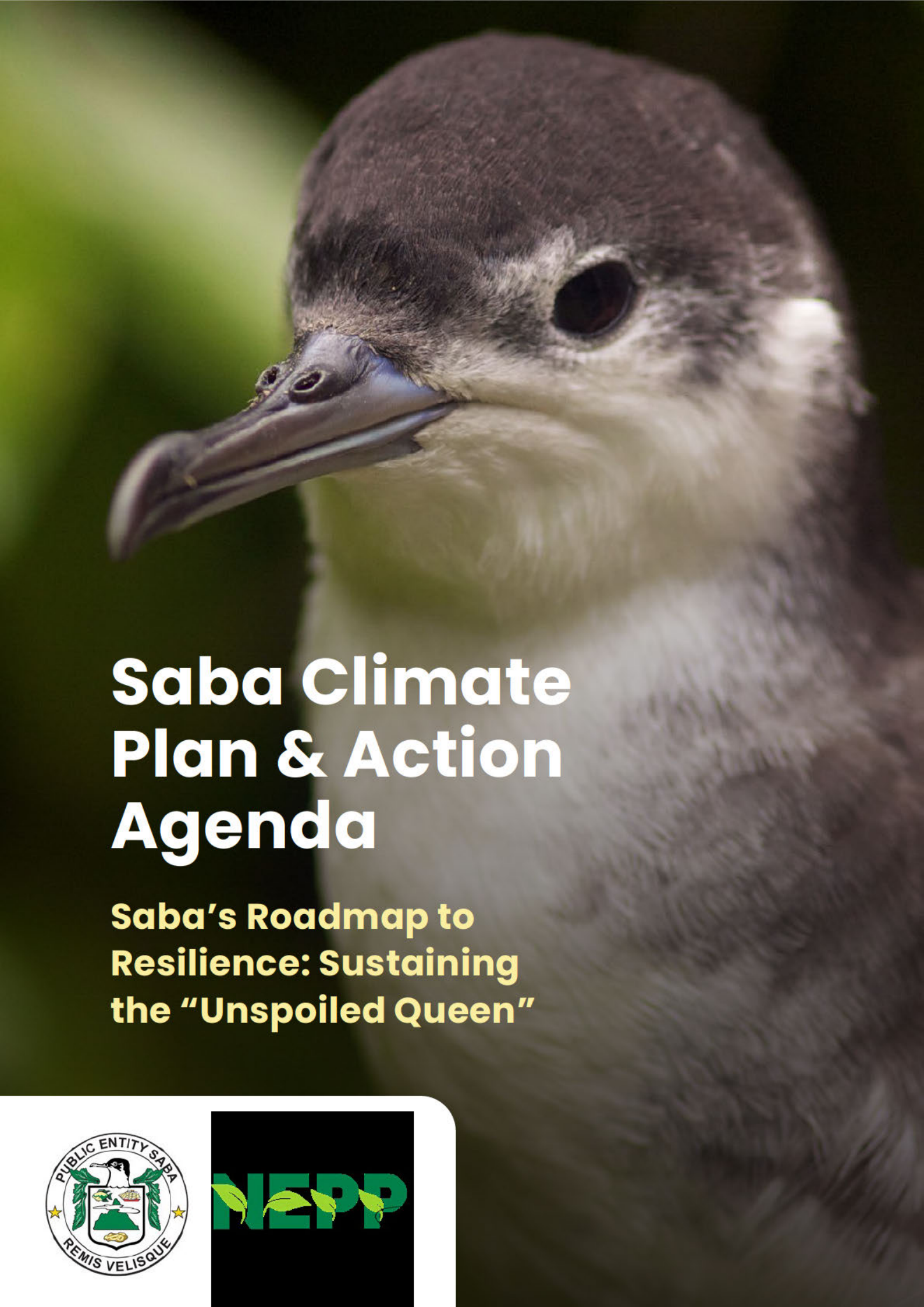
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Saba Climate Plan & Action Agenda

Saba's Roadmap to Resilience: Sustaining the "Unspoiled Queen"

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Introduction

Purpose of the Climate Plan

Saba is highly vulnerable to the impacts of climate change due to its small size, remoteness and geographic location in the hurricane-prone Lesser Antilles. Already, the increased occurrence of drought in the region is impacting rainwater supply, agriculture programs and food security. The rise in severe storms and hurricanes is compounding erosion problems, impacting supply chains, critical infrastructure and the built environment. Concurrently, erosion runoff, combined with rising sea temperatures, is damaging precious coral reefs and marine ecosystems, further affecting food security, livelihoods, and the island's tourism sector.

The Public Entity Saba (PES) has made significant progress over the years to improve the island's self-sufficiency through various initiatives, such as water management, renewable energy, sustainable agriculture and environmental conservation projects. These initiatives have also strengthened the island's capacity to cope with climate change. The Public Entity has also undertaken an initial stakeholder analysis and community engagement process to assess climate change knowledge, efforts, and aspirations for the future.

The development of this Climate Adaptation Plan builds on these efforts and establishes a strategic foundation for collaborative action to strengthen Saba's resilience and proactively address both current and future climate challenges. The goal of the Climate Plan is to:

- Outline an integrated roadmap to build the island's environmental, social and economic resilience to climate change in the short, medium and long-term;
- Improve the island's self-sufficiency and self-reliance;
- Outline what resources and collaboration will be required to support adaptation and mitigation actions; and
- Enable the island to adapt and thrive in the face of climate change.

How to use the Climate Plan

This Climate Plan provides a structured adaptive framework to guide policy development, planning, and investment in climate adaptation and mitigation on Saba.

The document is structured to move from context to action. It begins by outlining Saba's climate risks, vulnerabilities, and the expected future impacts of climate change on the island. It then sets out seven domains which structure the island's response across the key systems that underpin island life and governance. Within each domain, the Plan defines key challenges, establishes adaptation objectives, and identifies priority actions. These are brought together through the 'integrated climate roadmap,' which links short-, medium-, and long-term priorities, and is supported by a set of flagship projects that address critical system-level vulnerabilities.

The actions and flagship projects outlined in this Plan reflect those currently considered most suitable based on available knowledge, data, stakeholder input, and existing priorities. These will be reviewed, refined, and adjusted as needed to maintain their relevance and feasibility. This adaptive management process will ensure continued alignment with the island's long-term resilience objectives as climate risks, impacts, and response options evolve.

This Climate Plan should therefore be understood as a "living document," that will be routinely updated as new data becomes available, implementation progresses, and the island's priorities and circumstances evolve.

Background

The Caribbean Netherlands as a whole has made notable progress in recent years on climate mitigation, particularly through the renewable energy transition. Investments of €33.6 million, supported by SDE++ funds and Region Deals,[1] have enabled the islands to reduce reliance on imported fossil fuels and increase renewable energy generation. These achievements demonstrate that targeted resources can deliver tangible results.

At the same time, it has become increasingly clear that the most pressing climate challenge facing the Dutch Caribbean is climate adaptation, due to significant and growing exposure to climate-related hazards, including increasingly intense tropical storms and hurricanes, storm surge, drought, erosion, and ecosystem degradation. Addressing these risks requires a dedicated framework, clear priorities, and structural financing—elements that, until recently, were not in place for the BES[2] islands.

This gap was highlighted in 2023 by *It Is Never Too Late*, the report of Ed Nijpels, Quartermaster of the Bonaire Climate Table. Commissioned by the Dutch Government and Public Entity Bonaire, and presented to Parliament, the report concluded that: "*There has been a lot of talk and far too little action from the European Netherlands*" in supporting climate resilience in the Caribbean Netherlands.[3] Unlike the European Netherlands—with its Delta Programme and National Climate Adaptation Strategy—the BES islands lack an equivalent plan underpinned by dedicated resources and long-term structural financing.

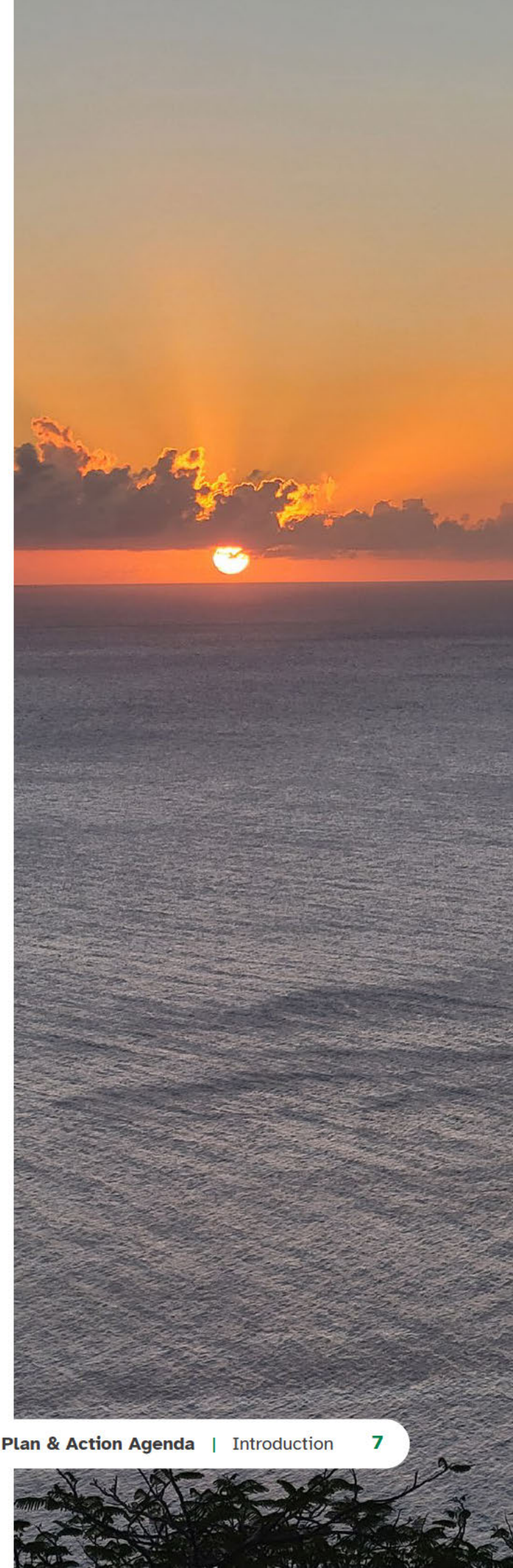
In response, the Public Entities and Dutch Government committed to developing climate plans for each island, with €1 million in initial funding provided by the Ministries of Infrastructure and Water Management, the Interior, Economic Affairs and Climate Policy (now Climate and Green Growth). This Climate Plan for Saba gives effect to that commitment and provides an important step toward building a more climate resilient island.

This plan has been developed in parallel with Statia's climate plan, with each reflecting the distinct vulnerabilities, priorities, and ambitions of its island. Their joint development has encouraged cross-island learning, improved alignment, and a stronger collective voice in national dialogue. Together, the two plans are timed to inform the 2026 revision of the Netherlands' National Adaptation Strategy (NAS), providing an opportunity for the Caribbean Netherlands to be more clearly represented within the wider adaptation framework of the Dutch Kingdom.

These island-level plans are also embedded within the Climate Agenda for the Caribbean Netherlands, jointly launched in 2024 by the Dutch Government and all six Caribbean islands of the Kingdom—Bonaire, Saba, Statia, Aruba, Curaçao, and St Maarten. The Agenda sets out eight shared priorities,

including accelerating the energy transition, strengthening climate-resilient infrastructure, securing water resources, protecting ecosystems, fostering sustainable economies, and expanding access to climate finance (EZK, 2024). It also emphasises monitoring, knowledge-sharing, and inclusive governance as foundations for implementation (Kingdom of the Netherlands, 2024).

Within this broader policy landscape, Saba's Climate Plan is both a locally grounded initiative and a contribution to regional and national priorities. It provides a structured framework for adaptation and mitigation that reflects local realities while building on earlier progress in renewable energy. Above all, it represents a commitment to ensure that Saba not only withstands the impacts of climate change, but thrives—through resilience, ecosystem restoration, and sustainable growth.



[1] Rijksoverheid. (2023). Rijksoverheid - Nieuws. Retrieved from Kabinet steunt eilanden met investeringsprogramma economie en energietransitie: https://www.rijksoverheid.nl/actueel/nieuws/2023/05/16/kabinet-steunt-eilanden-met-investeringsprogramma-economie-en-energietransitie

[2] The BES islands are the "bijzondere gemeenten" (special municipalities of the Netherlands) Bonaire, St Eustatius and Saba, otherwise known as the Caribbean Netherlands or Dutch Caribbean.

[3] Nijpels, E. (2023). Advisory Report on Bonaire Climate Table: It is never too late.

Defining Mitigation and Adaptation

Climate action is commonly understood through two complementary approaches: mitigation and adaptation. Both are essential, but they play different roles depending on scale, context, and exposure to climate risk.

Climate mitigation refers to strategies and actions taken to reduce greenhouse gas emissions. Key mitigation strategies include shifting from fossil fuels to renewable energy and sustainable transport systems. They also include actions that reduce overall energy consumption, for example through energy-efficient appliances and building envelopes. These measures play an important role in helping the island become more self-sufficient by decreasing Saba's dependence on imported fossil fuels, which are subject to price volatility and supply disruptions, and help reduce cost of living pressures.

However, due to its small population size and limited emissions profile, Saba's mitigation actions, while important, will have a negligible influence on global climate trajectories. Even under ambitious mitigation pathways, the island will continue to experience rising temperatures, changing rainfall patterns, stronger storms, and increasing climate-related disruptions driven by global emissions beyond its control.

For this reason, climate adaptation is the primary focus of Saba's Climate Plan. Adaptation refers to strategies and actions that reduce vulnerability to the actual and expected impacts of climate change, while strengthening the capacity of people, ecosystems, and infrastructure to cope with, recover from, and adjust to these impacts.[4] For Saba, adaptation is not a future-oriented choice but an immediate necessity, as climate impacts are already affecting water security, food supply, ecosystems, infrastructure, livelihoods, and access to essential services.

Adaptation actions come in many forms, including nature-based solutions, such as restoring coral reefs, planting trees, or improving soil health to increase water filtration. It can also include engineering measures, like upgrading water infrastructure, strengthening coastal defences, or retrofitting buildings to withstand stronger storms. Often, the most effective strategies are a hybrid of both grey (engineering) and blue/green (nature-based) approaches.

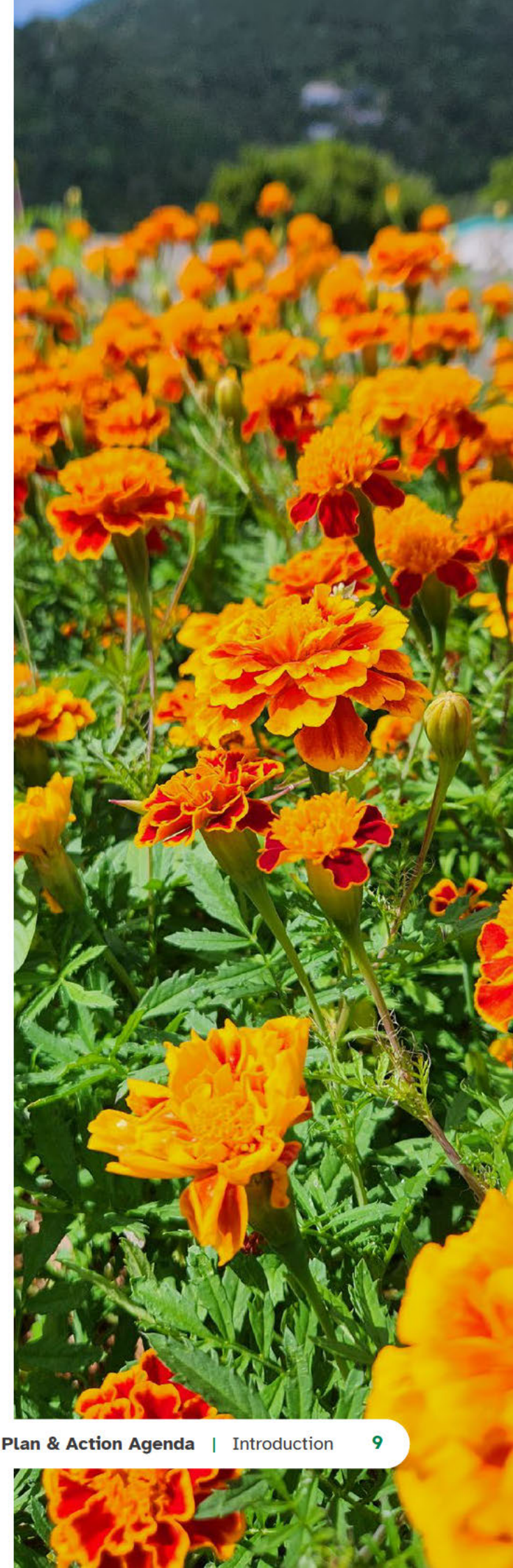
At its core, adaptation is about protecting what matters most. This includes safeguarding access to essential services such as water, food, energy, health care, and transport, as well as preserving the island's ecosystems, biodiversity, and cultural heritage. But adaptation is not only about minimizing risks—it also presents opportunities to reimagine and strengthen local systems. For example, it can support the shift to climate-resilient agriculture,

restore degraded landscapes through food forests, create green jobs in ecotourism, and reduce reliance on imports by reinforcing local supply chains. In this way, adaptation becomes a driver of both resilience and sustainable development.

Successful adaptation depends on building adaptive capacity, which is the ability of communities, ecosystems, and economies to anticipate, respond to, and recover from climate disruptions. Enhancing this capacity reduces vulnerability and supports more flexible, informed, and locally relevant responses to both gradual slow-onset climate change (e.g. increasing temperatures and decreasing rainfall) and sudden shocks from climate hazards (e.g. hurricanes and heatwave events). It also underpins resilience, the ability of people, institutions, and systems to absorb impacts, adjust to changing conditions, and continue functioning under pressure.

Bringing these elements together, the aim of adaptation is not simply to withstand the impacts of climate change. It is to build systems, both human and natural, that can adapt, improve, and grow stronger over time. Adaptation is ultimately about creating the foundations for a future where communities, ecosystems, and local economies can thrive, even in the face of ongoing climate change and increasing uncertainty.

[4] Intergovernmental Panel on Climate Change (IPCC, 2022) IPCC 2022. Climate Change 2022: How to adapt to a changing climate, summary for all. Working Group II team of the Sixth IPCC Assessment Cycle.

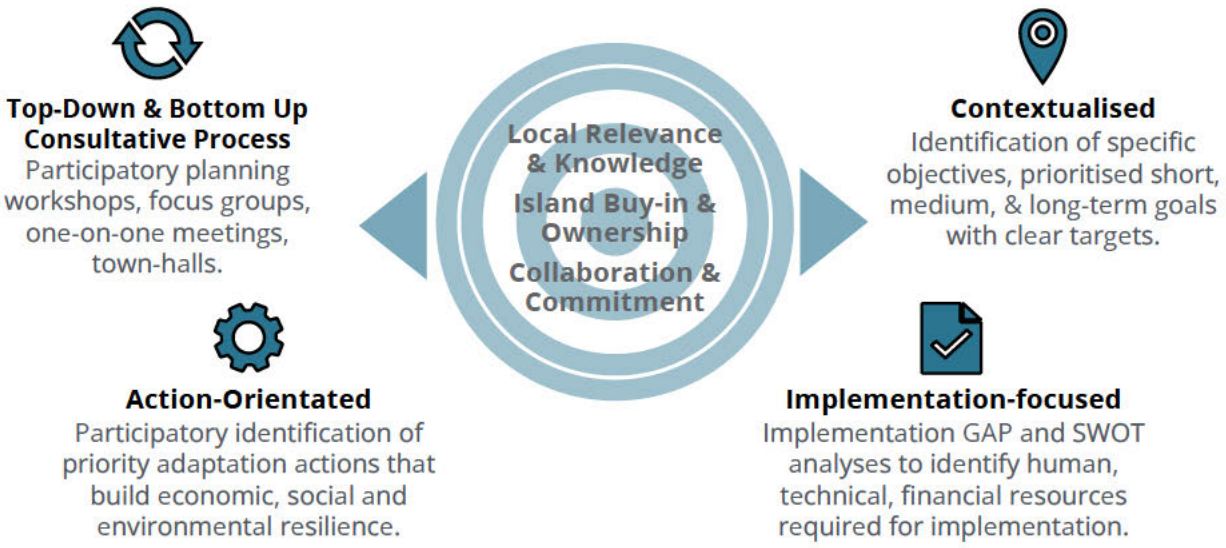


Plan Development Process

The Saba Climate Plan has been developed through a deeply participatory and consultative process, driven by the island, for the island. This approach brought together voices from across local government, civil society, the private sector, and the wider community, ensuring that the plan is grounded in local knowledge, builds on what is already happening, and responds to Saba's unique vulnerabilities, needs, and priorities.

While locally driven, the participatory planning process also includes extensive consultations with key ministries in The Hague to ensure that the plan i) aligns with national strategies and priorities, ii) feeds into the 2026 Netherlands' National Adaptation Strategy process, iii) catalyses the identification of available resources to support implementation, and iv) establishes a shared foundation for collective, inclusive, and coordinated action. This two-way process, underpinned by continuous feedback and iteration, bridges bottom-up insights with top-down coordination. This ensures the plan is both deeply rooted in local realities and strategically positioned for implementation and long-term support.

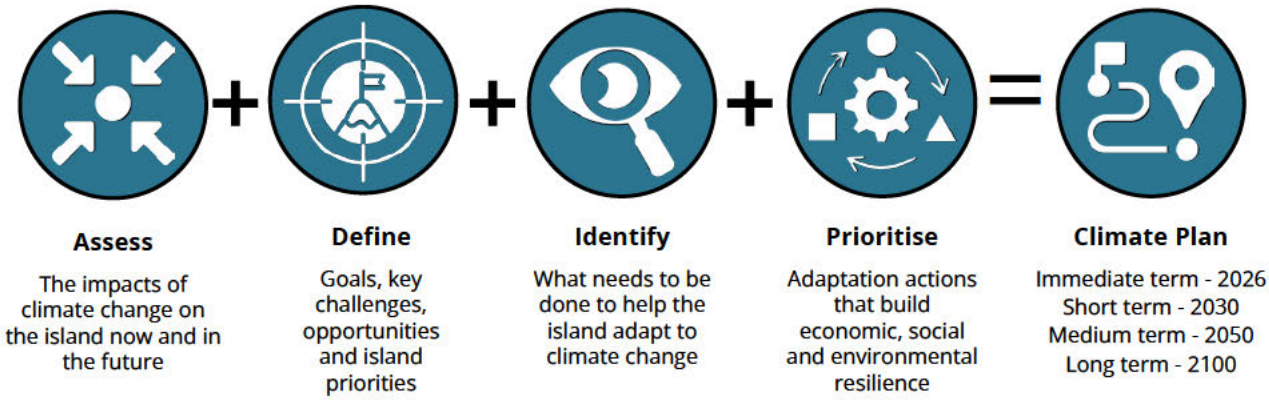
Diagram 1: The Climate Plan Approach



In February and April 2025, on-island workshops, focus groups, town halls, and stakeholder meetings brought together a broad cross-section of the community, including local government, civil society, businesses, youth, elders, and community leaders to contribute to the climate plan. Guided by a series of questions, participants shaped the plan through the participatory process outlined in the diagram below.

In order to set the plan up for success, there needs to be a united vision for what the objective of the plan is, and what it should seek to achieve for the island. This structure supported inclusive and meaningful conversations to ensure that everyone could contribute, regardless of background or technical knowledge. It created space for knowledge sharing and co-creation, helping build buy-in and local ownership of the planning process. It also facilitated the emergence of a shared vision for the island, along with concrete objectives, priorities, principles, actions, and clear targets that reflect what matters most to Saba.

Diagram 2: The Climate Plan Development Process

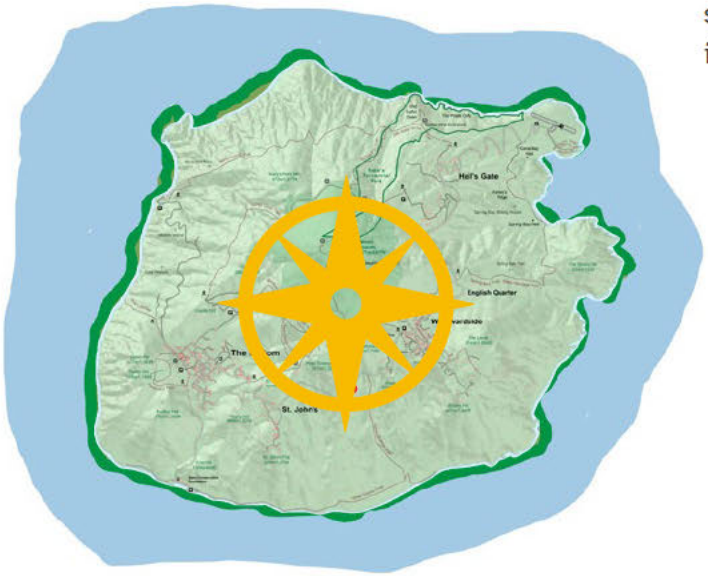


During the course of the participatory planning and validation process stakeholders defined the overarching goal and ambition of the plan as follows:

To develop a practical, inclusive, and community-led roadmap that strengthens **Saba's resilience**, **self-sufficiency**, and **liveability** in the face of climate change—protecting what makes the island unique as **The Unspoiled Queen.**

The plan aims to secure sustainable systems for water, food, energy, ecosystems, infrastructure, and cultural identity, ensuring that **Sabans today and in the future can thrive on their own terms.**

Rooted in Saba's values, traditions, and environment, this plan envisions a resilient island that leads by example, where climate adaptation is not just about survival, but about **strengthening pride, wellbeing, and opportunity for all.**



To achieve this objective, the six core priorities underlying the Climate Plan are the following:

1. **Enhance self-sufficiency** in water, food, energy systems and critical skills.

2. **Safeguard livelihoods** from climate impacts while tapping into the economic opportunities that climate adaptation presents.

3. **Strengthen disaster preparedness** and emergency response capabilities at both local community-wide and regional level, including coordination with nearby islands.

4. **Reduce vulnerabilities** to environmental degradation (e.g. erosion, coral bleaching), extreme weather events, and resource shortages.

5. **Secure long-term financing** for priority resilience building climate adaptation projects.

6. **Foster inter-island cooperation:** Strengthening trade, connectivity, resource-sharing and knowledge exchange with nearby islands and the Caribbean region.

To ensure that this plan delivers on the desired outcomes for Saba, the five guiding principles underlying the plan and its actions are:

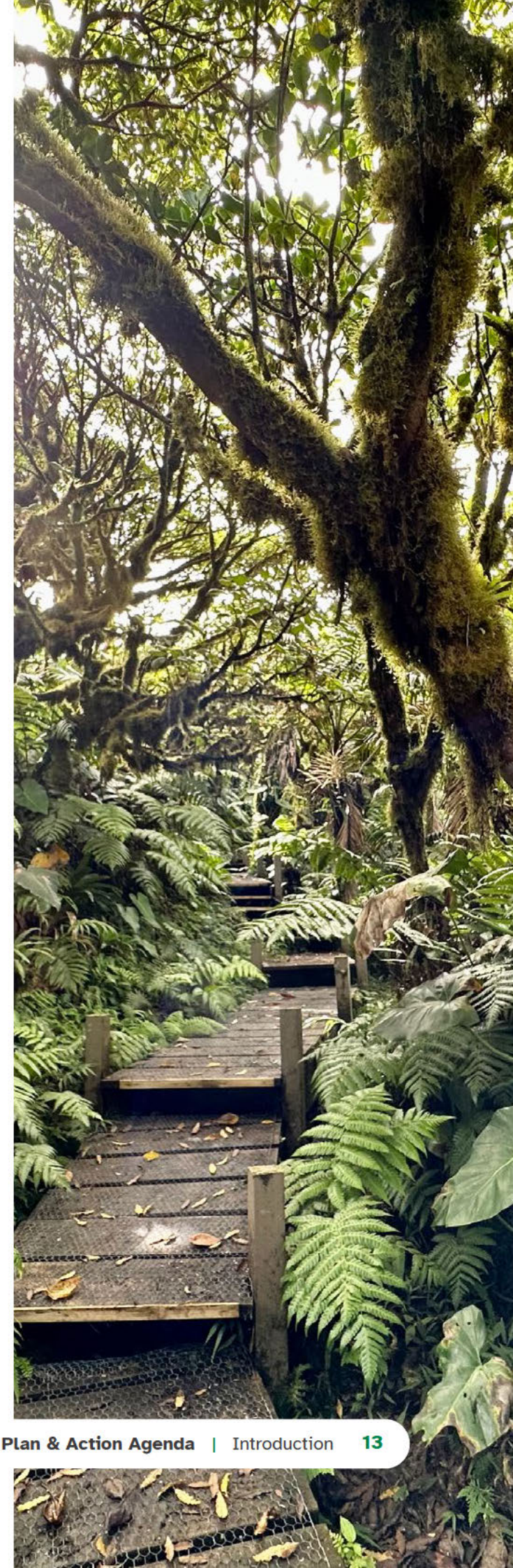
1. Resilient:
Actions should be prioritised based on their ability to strengthen economic, social, and environmental resilience.

2. Proactive:
Building a resilient and thriving island requires a proactive approach to climate adaptation, rather than a reactive one.

3. Inclusive:
Keep Sabans at the heart of the climate plan, and promote accessible, inclusive adaptation strategies that serve all residents, including vulnerable groups (low-income families, elderly, and youth).

4. Integrated:
Climate adaptation needs to be mainstreamed to futureproof all projects, plans and policies being implemented on island.

5. Engagement:
Awareness, engagement, and participation in climate adaptation actions will be fostered in both the planning and implementation of actions.



Climate Change Impacts

Trends and Predictions

In 2023, the KNMI released the first climate scenario predictions for the BES islands, warning of a future defined by rising temperatures (up to 3.2°C by 2100 under high-emissions scenarios), sea level rise (up to 126 cm), and increased intensity of hurricanes, droughts, and extreme rainfall events. The climate modelling for the BES islands was notably less detailed and less certain than for the European Netherlands, as KNMI's modelling relied on low-resolution models extrapolated with regional measurements, due to the absence of good data available for the BES islands themselves. [5]

The current data limitations highlight the need for comprehensive monitoring systems across the islands to improve forecast models and climate assessments that capture local conditions. Addressing this need will require national investment in climate research and data collection for the BES islands, as emphasised in the Witteveen+Bos report (2024), to provide the scientific foundation for informed decision-making and planning at both local and national levels. [6]

While KNMI only published its first analysis of climate scenarios for the Dutch Caribbean in 2023, climate change has been a sustained focus in the wider Caribbean region for almost three decades. Since the early 1990s, governments and institutions in the Caribbean region have been closely tracking the impacts of climate change on small island states, culminating in the establishment of the Caribbean Community Climate Change Centre (CCCCC) in 2005 to coordinate regional adaptation and mitigation efforts.[7]

The unique vulnerabilities of Caribbean SIDS to rising temperatures, shifting rainfall patterns, sea-level rise, and intensifying hurricanes have long been recognised, not just as environmental concerns, but as threats to economic stability, public health, and national sovereignty. These concerns gained political urgency with the adoption of the Liliendaal Declaration on Climate Change in 2009, in which CARICOM heads of government declared that "*...climate change poses the most serious threat to the sustainable development, livelihoods, and wellbeing of our peoples and the security and territorial integrity of our states.*"[8]

The KNMI 2023 report outlines four climate scenarios in their projections for the BES islands. These scientific data points can be difficult to interpret in practical terms. To make these projections more tangible, the following table incorporates the above mentioned 30 years of regional climate data, linking historical trends with projected future conditions to paint a more comprehensive picture. This combined view highlights how climate change is already affecting the region and what these shifts are likely to mean going forward.



Photograph: © Kai Wulf

[5] Royal Netherlands Meteorological Institute (2023). KNMI'23 Climate Scenarios for the Netherlands.

[6] Witteveen+Bos, (2024). Climate change and adaptation efforts BES islands. Final report, 21 October 2024 for the Ministry of Infrastructure and Water Management.

[7] Pulwarty, R.S., Nurse, L.A. and Trotz, U.O. (2010) 'Caribbean Islands in a Changing Climate', Environment: Science and Policy for Sustainable Development, 52(6), pp. 16–27. doi:10.1080/00139157.2010.522460.

[8] CARICOM (2009) Liliendaal Declaration on Climate Change and Development. Caribbean Community Secretariat. Available at: https://caricom.org.

Table 1: Summary of climate trends and projections [9]

Climate Variable and KNMI Climate Scenarios	Regional Historical Trends	Projected Future Conditions
Air Temperature 2050 annual temperature increase = 28.6 °C (+0.8 °C) - 29.1 °C (+1.2 °C) in a low and high emissions scenario. 2100 annual temperature increase = 28.5 °C (+0.7 °C) - 31.0 °C (+3.2 °C) in a low and high emissions scenario.	There has been an increasing trend in hot days and hot nights for the Caribbean as a whole (an increase of approximately 15% or 34 more days between 1981 and 2010). The greatest increase for warm days and warm nights was observed in the Lesser Antilles. 7% decrease in the annual frequency of cool days and 10% decrease in cool nights. For cool days and cool nights, the greatest decrease over the period 1980 to 2011 was for the Lesser Antilles Coolest and hottest day and night temperatures have already increased by roughly 1°C (1980-2011). Extreme heat more common, with recorded events rising fivefold between 1981–2010.	Minimum, maximum and mean temperatures will continue to increase irrespective of scenario Further intensification of the hot season along with more frequent and more intense heatwaves. The frequency of hot days and nights is projected to increase sharply, becoming nearly year-round by the 2040s. Cool days and nights may become virtually absent as early as during the 2020s. The number of extreme heat events will likely rise by 15–40% during the 2020s. Increased heat stress as a local expression of global warning (virtually certain)
Rainfall In a dry scenario rainfall in 2050 will decrease by 6% (910mm) to 12% (1065mm) in a low and high emissions scenario. In a dry 2100 scenario rainfall will decrease by 5% (579mm) to 44% (1065mm) in a low and high emissions scenario. In a wet scenario rainfall is still expected to decrease by 3% and 8% in a low and high emissions scenario by 2100.	The number of consecutive dry days is increasing, as well as the amount of rainfall during rainfall events. El Niño episodes are associated with pronounced heat and drought, while La Niña brings extreme rainfall.	Changes in precipitation are more difficult to project, but a slight decrease in total annual rainfall is anticipated despite the climate scenario, while single rain events will become more intense. Overall PRECIS RCM Rainfall Projections for the region are: • -5.76% in the 2020s • -11.88% by 2050s • -29.40% (2081-2098) Droughts are expected to become more frequent and intense, especially from the 2050s onward (high confidence). Dry spells are all expected to become more frequent (medium confidence). Regional Climate Model (RCM) predict that the Lesser Antilles will be the most severely impacted by dry periods and droughts.

Table 1 continued

Climate Variable and KNMI Climate Scenarios	Regional Historical Trends	Projected Future Conditions
Tropical Storms and Hurricanes Hurricanes of the most severe category are expected to occur more frequently. Once every 20 to 34 years from 2015 to 2050, compared to once every 39 years from 1980 to 2017.	The peak of the North Atlantic season is traditionally from mid-August to late October, with a primary peak around September 10th. Over the past 5-10 years, hurricanes have also formed as early as July. A secondary peak occurs around the middle of October, which is mainly for the Caribbean Sea and the Gulf of Mexico region, after which the number of storms drops off quickly through the end of the season. Significant increase in frequency and duration of Atlantic hurricanes since 1995. Increase in Category 4 and 5 hurricanes; rainfall intensity, and associated peak wind intensities since 1995. Hurricanes are developing more rapidly. Historically it would take 36 hours, today hurricanes develop similar wind speeds within 24 hours which is impacting disaster readiness preparation.	No change or slight decrease in frequency of hurricanes during hurricane season. However, there will be an increase in the frequency of Category 4 and 5 hurricanes by 25%–30% by the end of the 21st century (medium confidence) due to rising sea surface temperatures. The A1B scenario predicts up to an 80% increase in Category 4 and 5 hurricanes over the next 80 years. Rainfall rates inside hurricanes are also predicted to increase by between 20% and 30%, increasing flash flood potential (medium confidence). There will be a shift toward stronger tropical storms by the end of the century as measured by maximum wind speed increases of +2 to +11% (medium confidence). Storm surges when added to higher sea level rise will increase storm tide impacts and damage.
Sea Level Sea levels are expected to rise in 2050 between 13 cm - 34 cm in a low and high emissions scenario. Sea levels are expected to rise in 2100 by 29 cm - 126 cm in a low and high emissions scenario.	Sea level in the Caribbean has been rising at rates of 1.8 mm per year between 1950 and 2009. The figure for the OECS[10] region is 2.5 to 3.5 mm per year, with rates between 2 mm per year around Guadeloupe in the Leeward Islands, and up to more than 2.5 mm per year around the British Virgin Islands. In the Windward Islands, rates have been around 1 mm per year near Grenada and the Grenadines, gradually increasing northwards to near 2 mm per year near Dominica.	Even if global warming is halted in the foreseeable future, sea levels will continue to rise (virtually certain). Predictions are of a sea level rise of 10 to 40 cm by 2050 and up to 1 m by 2090 compared to a 1986–2005 baseline. Rising seas combined with stronger winds in the strongest storms substantially increase the impact potential of storm surge and coastal inundation.

Table 1 continued

Climate Variable and KNMI Climate Scenarios	Regional Historical Trends	Projected Future Conditions
Sea Surface Temperature (SST) No data was included in the KNMI Climate Scenarios for Sea Surface Temperature increases which impact coral reefs, the marine ecosystem, fisheries sectors, sargassum inundations and hurricanes.	Average sea surface temperature range is between 25°C to 30°C, with the lower temperatures in December/ January and the highest temperatures in July. Increase in the occurrence and intensity of "marine heatwaves" e.g. 2005 and 2010 which led to widespread and severe coral bleaching events.	Even if global warming is halted in the foreseeable future surface sea temperatures (SST) will continue to warm (virtually certain). The mean rate of SST warming will increase from 0.13°C for the 30-year period 2000-2029 to 0.31°C for 2030-2059, and eventually reach 0.41°C for 2070-2099 i.e., SST warming will intensify. Sea temperatures are expected to rise in 2050 to between 28.5°C - 29.5°C in a low and high emissions scenario. By 2100 sea temperatures are expected to reach between 29.0°C - 31.5°C in a low and high emissions scenario. By mid-century, the expanding and contracting of the Atlantic Warm Pool (AWP) will be replaced by a "blanket" of uniformly warm ocean temperatures across the Caribbean Sea throughout the entire year feeding both increasing sargassum blooms and more intense hurricanes. By the end of the century, the projected SST will exceed 28°C across the entire Caribbean Sea year-round. With the coolest projected SSTs falling within the range of the warmest years presently recorded. It is also expected that the frequency and length of heatwave events will increase.

[9] Table 1 sources include: OECS Commission (2019) Climate Trends and Projections for the OECS Region: AdaptAction Technical Report. Organisation of Eastern Caribbean States. Available at: https://www.oecs.org/climate-and-disaster-resilience/resources/scientific-documents.html. World Meteorological Organisation, (2024). State of the Climate in Latin America and the Caribbean 2023. WMO-No. 1351. WMO, Geneva, Switzerland. Climate Studies Group Mona (Eds.). 2020. "The State of the Caribbean Climate". Produced for the Caribbean Development Bank. Zermoglio, F., Bonnin Roncerel, A., Clarke, J., Solana, C., Le Dissez, A., Thomas S., McCue, J., Van Meerbeeck, C., Nurse, L., (2021). OECS Climate Change Adaptation Strategy and Action Plan 2021-2026. French Development Agency Adapt'Action Facility. Royal Netherlands Meteorological Institute (2023). KNMI'23 Climate Scenarios for the Netherlands. Witteveen+Bos, (2024). Climate change and adaptation efforts BES islands. Final report, 21 October 2024 for the Ministry of Infrastructure and Water Management.

[10] OECS = Organisation of Eastern Caribbean States (full member states include neighbouring St Kitts and Nevis, Anguilla, and Montserrat.

Current and Future Impacts

Although climate change is often discussed in terms of future risks and long-term planning, stakeholders throughout the participatory process made it clear that for Saba climate change is an immediate and tangible reality that is already impacting daily life, livelihoods, self-sufficiency, infrastructure, and the island's natural and cultural resources. These on-the-ground observations highlight the critical importance and urgency of implementing integrated adaptation actions that both address current challenges and help the island build resilience to prepare for what lies ahead.

The table on the next page highlights the climate change impacts currently being experienced on the island based on stakeholder observations, and correlates these observations with 2024 climate data. It also outlines the expected primary, secondary, and tertiary impacts that stakeholders anticipate may occur if investments are not made to address the island's vulnerabilities and strengthen its climate resilience.

Diagram 3: Summary of island climate change observations



Table 2: Current climate change observations and expected impacts and knock-on effects

Climate Variable	Current Climate Change Observations & Experiences	Local/ Regional Weather Data *(2024)*	Primary Impacts *(Immediate and Direct Effects)*
Air Temperature	**It's Getting Hotter** *Increase in average and extreme temperatures, especially experienced during summer periods.* Temperatures feel much hotter than before. Increase need for fans and air conditioning throughout the year. It's uncomfortable to be outside for long periods, especially when you are walking on the streets. Sleeping is harder due to nighttime heat.	2024 witnessed the highest average and extreme (heatwave) temperatures[11] recorded since 1850.[12]	Increased need for cooling (AC demand rises); outdoor work and activities become difficult; increased heatstroke and health risks; heat stress impacting people, plants, birds, and animals.
Rainfall	**It's Getting Drier** *Decrease in rainfall, longer dry seasons.* Longer dry spells, with cisterns running dry more frequently. The land looks more barren, and there is visible stress on plants and trees. Fire risk feels higher with more dried vegetation.	Although 2024 was an exceptionally wet year, the Caribbean has been facing increasing droughts[13] over the past decade.[14]	Reduced water availability; crop failures; soil degradation; higher wildfire risk; increased household and business water costs; loss of greenery (impacting tourism).
Storms	**It's Getting Stormier** *Increase in storm intensity and heavy rainfall events* Rainfall feels more unpredictable, with sudden intense downpours causing flash floods and rockfalls. Water runs off quickly instead of soaking into the soil. The streets are flooding more often, making travel difficult. Increasing slope instability in certain areas.	2024 Hurricane Season included 18 tropical storms 11 of which developed into hurricanes. 5 of which reached Category 3 or stronger. On average, there are 14 storms per year, including 7 hurricanes and 3 major hurricanes. On July 2, Hurricane Beryl became the earliest hurricane ever in the season to reach Category 5. [15]	Flash flooding, rockfalls, localised slope failure; blocked roads limiting island connectivity (e.g. cutting off the harbour and disrupting supply chains) infrastructure damage (roads, buildings); increased sediment runoff impacting reefs; immediate health risks (vector and waterborne diseases, mould growth).

[11] Higher average temperatures combined with higher relative humidity compared to the average, and reduced wind, lead to a higher perceived temperature (KNMI, 2025. The State of our Climate in 2024: Weather in the Dutch Caribbean in a Changing Climate).

[12] Copernicus Climate Changes: https://climate.copernicus.eu/global-climate-highlights-2024.

Secondary Impacts *(Knock-On Effects and Adjustments)*	**Tertiary Impacts** *(Long-Term and Systemic Effects)*
Rising energy costs; increased strain on power grid; economic burden on low-income households (contributing to stress and anxiety); reduced physical outdoor activity (impacting physical and mental health); prolonged heat exposure (worsening sleep, anxiety, and psychological fatigue); loss of pollinator insects, increase in flies; increase in vector-borne diseases (mosquito-borne illnesses) and global pandemic outbreaks; increased blight on agricultural crops and plants; impact on biodiversity (disrupting breeding and habitat health); higher risk of wildfires.	Increased need for subsidies from national government to help reduce the cost of electricity; single salaries falling short of basic household needs; rising public health costs due to chronic heat-related illnesses; built environment failure under intensifying heat stress; loss of rainforests, plants, and biodiversity; supply chain disruptions due to the impacts of heat on global food production; increased migration from the island due to worsening living conditions.
Forest shrinkage which will further impact rainfall; Rising food prices and increasing disruptions to food imports due to impacts of changing rainfall on global food production; higher cost of water infrastructure maintenance; increased mental health stress due to water insecurity; loss of tourism due to loss of biodiversity.	Economic instability due to imported food price hikes and water scarcity; intensifying household financial stress; increased need for national government subsidies to maintain water accessibility and affordability; forest loss and reforestation failure.
Erosion of key land areas; further deterioration of roads and critical infrastructure; greater need for emergency services; tourism decline due to hazardous conditions; reduced agricultural productivity due to soil degradation.	Permanent damage to natural landscapes; ecosystem shifts leading to long-term biodiversity loss; increasing financial burden due to continuous road and infrastructure repairs; increased public safety risks due to slope instability and falling rocks; population decline due to declining liveability.

[13] According to KNMI, the dry season at the beginning of 2024 was drier than average for all the Dutch Caribbean islands (KNMI, 2025. The State of our Climate in 2024: Weather in the Dutch Caribbean in a Changing Climate).

[14] Climate Studies Group Mona (Eds.). 2020. "The State of the Caribbean Climate". Produced for the Caribbean Development Bank

[15] Royal Netherlands Meteorological Institute (2024). The State of our Climate in 2024: Weather in the Dutch Caribbean in a Changing Climate.

Table 2 continued

Climate Variable	Current Climate Change Observations & Experiences	Local/ Regional Weather Data *(2024)*	Primary Impacts *(Immediate and Direct Effects)*
Hurricanes	**Hurricanes are Getting Stronger** *and are less predictable, and the season is starting earlier.* Hurricanes are intensifying, forming more rapidly, and unleashing heavier rainfall than in the past. Winds often feel more destructive than what is officially forecasted due to the impacts of the island's topography on wind speed. As hurricanes become harder to predict, disaster preparedness becomes more complex. Some community members feel like hurricane season is becoming more stressful each year due to the greater uncertainty surrounding hurricane development.	2024 Hurricane Season included 18 tropical storms 11 of which developed into hurricanes. 5 of which reached Category 3 or stronger. On average, there are 14 storms per year, including 7 hurricanes and 3 major hurricanes. On July 2, Hurricane Beryl became the earliest hurricane ever in the season to reach Category 5. [15]	Severe infrastructure damage (homes, businesses,[16] harbours, airport); power outages; telecom disruptions; water system failures; transport and accessibility issues; supply chain disruptions; direct threat to lives and livelihoods; destruction of forests, marine and coastal environments.
Sea Surface Temperature (SST)	**Sea is Getting Hotter** *Increase in ocean temperature and marine heatwaves.* The ocean feels noticeably warmer, especially in summer. More coral reef disease and bleaching events. More jellyfish and sargassum in the harbour.	2024 witnessed the highest average ocean temperatures and extreme ocean heatwaves recorded since 1979[17]	Increased coral mortality[18] and bleaching; fish population decline; loss of marine biodiversity; reduced attractiveness of marine tourism and diving industry; increased frequency of sargassum influxes.
Sea Level	**Sea Level is Changing** *Rising sea levels and increased storm surges.* Higher storm surges are impacting the harbour. The bottom of the Ladder is being eroded (cultural heritage site at risk). Recreational swimming areas are changing.	Sea level change between 1993-2023 = 15 - 20cm. In 2024 the average sea level rise in the region was 7 cm. [19]	Cultural heritage erosion higher costs of maintaining and reinforcing coastal infrastructure i.e.: the harbour and RO facility.

[16] This includes damage to small fishing and diving vessels, which represent significant capital investments for small businesses on island. The increasing strength and rapid intensification of storms makes it more challenging to pull boats out of the water and place them into the dry dock in time, or alternatively to take them to St. Maarten for protection.

[17] Copernicus Climate Changes: https://climate.copernicus.eu/global-climate-highlights-2024

Secondary Impacts *(Knock-On Effects and Adjustments)*	**Tertiary Impacts** *(Long-Term and Systemic Effects)*
Longer-term economic strain due to reconstruction costs; loss of local businesses, and workforce migration; increasing cost of homeownership due to repeated repairs and damage; greater local and national government expenditure on disaster relief and recovery; reduced tourism flows (e.g. St. Maarten's airport shutdown disrupting access); increased supply chain vulnerability due to hurricane impacts on points of entry and key hubs like St. Maarten and Miami; emotional and mental health impacts from the stress of experiencing hurricanes and dealing with their aftermath; damage to forests and reforestation efforts, limiting climate mitigation potential.	Reduced long-term investment in the island due to recurrent hurricane damages; decline in local industries dependent on infrastructure resilience; potentially higher levels of emigration; possible need to relocate vulnerable critical services; loss of forest and its associated microclimate that brings rain to the island.
Decline in fisheries; economic losses in seafood industry; impacting community access to local seafood; increase in toxic algae blooms affecting marine life and human health; loss of dive tourism.	Collapse of key marine industries (fisheries, tourism); irreversible biodiversity losses in coral reef systems; decline in regional fish supply affecting interconnected economies; food chain disruptions.
Loss of cultural heritage (the Ladder) and natural landmarks (current coastal recreation areas); loss of habitats for terrestrial and marine species; reef and dive sites impacted.	Water and supply chain disruptions including disruptions caused by sea level impacting harbours and infrastructure in St. Maarten and the US.

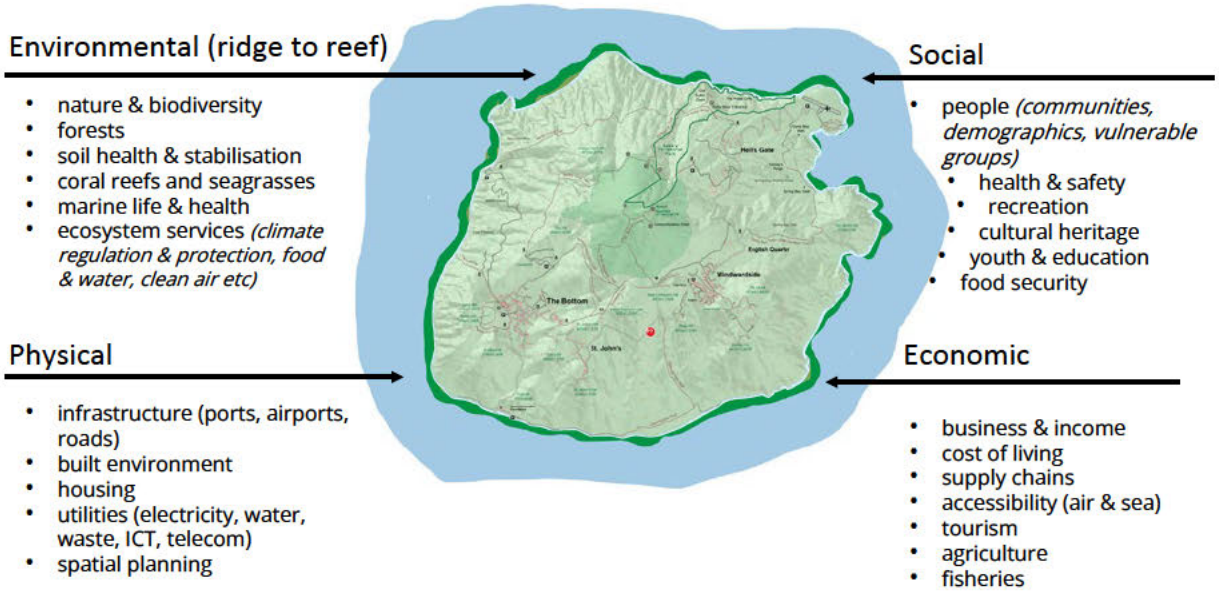
[18] Increasing sea temperatures also deplete coral energy reserves which renders the coral more vulnerable to disease and other threats, leading to higher mortality rates.

[19] Lindsey, R. (2023). NOAA Climate Change: Global Sea Level. https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level

The impacts outlined in the table above demonstrate how climate change is already affecting multiple aspects of life on the island, with direct and knock-on effects that extend beyond individual sectors. These impacts interact and reinforce one another, creating cascading pressures across Saba's natural environment, physical infrastructure, social systems, and economic wellbeing. This interconnected nature of climate impacts is illustrated in Diagram 4 below.

Building on these observed and anticipated impacts, stakeholders identified three critical areas of vulnerability where risks are most concentrated and likely to intensify over time. This analysis draws on inputs from participatory planning workshops and subsequent validation with stakeholders. These areas reflect stakeholder perspectives on the island's most pressing vulnerabilities and are outlined on the next page, with further detail provided in the domain and action agenda sections of the document.

Diagram 4: The environmental, social, physical and economic impacts of climate change



1. Intensifying Economic and Social Pressures

- **Rising Costs:** Households are already spending more on energy (air conditioning), water, and food, which is making life on the island less affordable.
- **Threat to Livelihoods:** Fisheries and tourism are both economic pillars of Saba which are vulnerable to climate change as extreme weather events and rising sea surface temperatures contribute to ecosystem degradation, coral bleaching and disease, declining fish populations, disruption of tourism, and destruction of critical equipment and facilities.
- **Pressure on Services:** Stakeholders noted that the expected impacts of climate change on health (e.g. heat-related illnesses, vector-borne diseases) may increase pressure on the healthcare system. It might also increase the dependency on governmental social services, such as welfare (e.g. increasing need for water and energy subsidies).
- **Migration Risks:** Stakeholders noted that if living costs continue to rise and economic opportunities continue to shrink, the observed outmigration of young people, contributing to brain drain and associated demographic shifts on the island, may worsen.

2. Challenges in Infrastructure Resilience

- **Increased energy demand:** Rising temperatures, heat waves and droughts place additional strain on desalination and energy systems by increasing electricity demand for cooling and water production, which could lead to more frequent power grid failures and water shortages.
- **Disrupted Accessibility and Connectivity:** Erosion, rockfalls and flash flooding during heavy rain disrupts accessibility and connectivity, especially from to and from the harbour, and from The Bottom to Windwardside.
- **Centralised Utility Risk:** Centralised utilities pose a high risk, as any fault, storm damage or blocked roads could disrupt access to energy, water, and ICT[20] across the entire island.
- **Built Environment Vulnerability:** Buildings need to be futureproofed for stronger hurricanes, rising temperatures, and erosion risks, while still respecting Saba's architectural heritage

[20] This includes the point where the telecommunication sea cable enters the island. If this single entry point is damaged, it will disconnect the entire island from all telecommunications (including internet), leaving the emergency services satellite system as the only external communication line.

3. Supply Chain Vulnerability

- **Import Dependence and Quality Risks:** Reliance on a weekly limited supply of expensive, imported produce, of which the quality of fresh products often has deteriorated significantly because of long transport and a disrupted cold chain.
- **Single Shipping Line Dependency:** Dependence on one main shipping line for food, fuel, household, and building supplies makes the island highly vulnerable to supply chain disruptions, global shortages, price-hikes and climate shocks. Especially since this shipping route is located in the hurricane belt (Miami, St Maarten).
- **Limited Storage Capacity:** Lack of cold and large volume storage to maintain the cold chain if the road to the harbour is blocked, or to store supplies pre/post-crisis.
- **Contingency Planning Gaps:** Stronger contingency planning to mitigate disruptions to food, medical, and building supply chains, power, water, healthcare and accessibility caused by crises.

Together, these vulnerabilities highlight where climate change is already placing pressure on the island's systems and where impacts are likely to intensify over time. The following section considers the expected economic costs of these impacts.



Economic Cost of Climate Change

Nowhere is the financial case for investment in climate resilience more compelling than in the Caribbean. The region faces some of the world's most severe macro-fiscal shocks from extreme weather events. For small islands like Saba, limited resources, narrow economic bases, high import dependency, and constrained human capital leave them particularly vulnerable. Every storm, drought, hurricane or disruption on a global scale carries outsized economic consequences. Yet, the full scale of these costs remains largely unquantified for Saba. This chapter therefore draws on regional data to provide an overview of both the current and projected costs of climate change—the so-called "costs of inaction."[21]

Current Loss and Damage

For decades, Caribbean small island states have borne the brunt of climate-induced loss and damage. As global average temperatures rise—now over 1.3°C above pre-industrial levels—the economic toll continues to grow. An IMF study of 12 Caribbean countries found that repeated exposure to disasters significantly hampers long-term growth, deters investment, and weakens overall macroeconomic performance.[22]

Between 2000 and 2022, climate change accounted for 39%—or US $41.3 billion—of total economic losses recorded across small island developing states. When measured against national output, the disparity is stark: disasters cost small island states 4.5 times more, as a share of GDP, than they do large economies—and this rises to sixfold for the Caribbean. To compound this, the Caribbean is struck by natural disasters twice as often as other small island regions and seven times as frequently as large economies.[23]

In many countries, insurance helps offset the cost of private property damage. But in the Caribbean, as climate events grow in frequency and intensity, insurance premiums have become unaffordable for many. This shifts the financial burden onto governments, who are then forced not only to repair public infrastructure but also to fund or subsidise rebuilding efforts for affected communities. This is especially true for Saba, where after Hurricanes Irma and Maria, EUR 3.661 million of the EUR 3.861 million reconstruction and recovery funding was spent on repairing people's houses, followed by government buildings and public space.[24]

[21] Panwar, V., Noy, I., Wilkinson, E. and Corbett, J. (2023) The Costs of Inaction: Calculating climate change-related loss and damage from extreme weather in Small Island Developing States. ODI Working Paper. London: ODI.

[22] Otker, I., Srinivasan, K. (2018). Bracing for the Storm. IMF Finance and Development Magazine, March 2018.

[23] Panwar et al., 2023

[24] Tweede Kamer der Staten-Generaal (2018) Kamerstuk 35 000-IV, nr. 12 – Stand van Zaken Wederopbouw Sint Eustatius. Den Haag: Tweede Kamer.

Understanding 'Loss and Damage'

The UNFCCC (2018) defines "loss and damage" as the adverse effects resulting from both sudden-onset climate hazards (such as hurricanes, floods, heatwaves, and storm surges) and slow-onset events (including sea-level rise, desertification, salinisation, ocean acidification, biodiversity loss, and land degradation).[25] Although the terms are often used interchangeably, this dual framing helps illustrate the wide-ranging—and often compounding—impacts of climate change on vulnerable economies.

The concept of loss and damage includes both direct and indirect losses. Direct losses refer to physical destruction or disruption caused by sudden-onset events, while indirect losses capture the ripple effects that may persist long after damaged assets and services have been restored. [26] It also encompasses both economic losses (those with a market value) and non-economic losses, which relate to lives, cultural heritage, ecosystems, and other values that cannot be easily priced.[27]

Non-economic losses, in particular, are difficult to fully quantify. For instance, assigning a monetary "replacement" value to a destroyed heritage site fails to capture its social and cultural significance, its emotional meaning to the community, and its role in shaping collective identity.

Table 3: The difference between economic and non-economic losses

ECONOMIC LOSSES		NON-ECONOMIC LOSSES		
Physical Assets	Income	Individuals	Society	Environment
• Infrastructure • Property	• Business Operations • Tourism • Agriculture	• Life • Health • Human Mobility	• Territory • Cultural Heritage • Indigenous Knowledge • Societal/ Cultural Identity	• Biodiversity • Ecosystem Services

[25] UNFCC, (2018). Loss and Damage: Online guide. Retrieved from: https://unfccc.int/sites/default/files/resource/Online_guide_on_loss_and_damage-May_2018.pdf

[26] Newman J. & Noy I. (2023) 'The cascading nature of indirect disaster losses', Economic Modelling, 120, 106171.

[27] Thomas A. et al. (2018) 'Exploring loss and damage in the Caribbean', Regional Environmental Change, 18(8), 2367-2381.

Table 4: Definition of Damage and Loss

Dimension	Direct	Indirect
Economic	Immediate damage to market-valued assets, goods and services (e.g. houses, harbour, solar and reverse osmosis infrastructure).	Secondary financial effects that ripple through the local economy until those assets and services are fully restored (e.g. cancelled dive-tourism, hotel bookings, increased energy and water prices, higher import costs).
Non-economic	Immediate harm to non-market goods and services (e.g. heritage sites, hiking trails and coral reefs) that can be described but are hard to price.	Long-term or intangible impacts that emerge after the event—mental-health stress, loss of cultural identity if historic buildings or burial grounds are lost, and declines in biodiversity that undermine the islands' tourism attraction.

Clearly distinguishing between different aspects of loss and damage is essential, as initial repair costs reflect only a small portion of the total economic impact. Long-term fiscal strain and cascading economic losses often far exceed both the immediate repair bills and the upfront investment required to climate-proof infrastructure, services, housing, and other critical systems.[28] For example, when Hurricane Irma struck on September 6, 2017, it crippled St. Maarten's harbour and airport—severing the main supply route to Saba. The consequences extended beyond food and water shortages, it impacted fuel, medical supplies, access to healthcare, and essential building materials needed for recovery and reconstruction. In addition, on Saba, supplies could not reach the island because cargo boats were unable to dock at the harbour. Excessive runoff channelled down Fort Bay Road carried debris, rocks, and sediment into the harbour basin, blocking access. Docking was only possible after the debris was dredged out.

The threat to Saba extends beyond direct landfalls. Tropical storms or hurricanes passing through the (Eastern) Caribbean can also cause severe disruption. According to an IMF study, nearly half of the Caribbean's costliest hurricanes did not make landfall. Tropical-storm-force winds can extend up to 240 km from the storm's centre, and in some cases, nearly 900 km. Hurricane Lenny (1999) exemplifies this risk: though its centre passed 370 km north of Dominica and 660 km from Grenada, it still caused US $272 million in damage in Dominica (68% of GDP) and US $94 million in Grenada.[29]

Econometric analysis confirms the threat—each 1% increase in maximum wind speed raises the damage-to-GDP ratio by 2% for offshore storms, compared to 3% for direct hits.[30] Additional risks stem from the island's dependence on supply chains routed through St. Maarten and Miami. A hurricane striking either of these hubs would not only disrupt the flow of essential goods—such as food, fuel, and medical supplies—but also drive up their cost, exacerbating economic vulnerability.

[28] Acevedo S. (2016) Gone with the Wind: Estimating Hurricane and Climate Change Costs in the Caribbean. IMF Working Paper WP/16/199.

[29] Otker, Srinivasan, 2018

[30] Acevedo, 2016

Future Loss and Damage

Climate projections indicate a steady rise in the intensity and unpredictability of hurricanes and tropical storms in the coming decades. Under a warming scenario of 2°C by 2046–2065 and 3.7°C by 2081–2100, average annual hurricane-related damages in the region are expected to increase by 22–77%. Even under a 2.5°C warming scenario, damages are projected to rise by 18–31%. The lower end of these ranges reflects damages from storms that do not make landfall, while the higher end reflects direct hits. [31]

AEF (2024) estimates in their "Klein Gebied Grote Opgave"[32] report that a category 5 hurricane within a radius of 250km from Saba would result in the following infrastructure damage:

Table 5: Estimated cost of category 5 hurricanes expected until 2050 (AEF, 2024)

Estimated	Saba
Cost per Hurricane	US $91,077,275
Number of Category 5 hurricanes until 2050	0.93
Costs up until 2050	US $84,330,810
Average costs per year	US $3,373,232

The report further notes that these costs are an underestimation, for they do not include the replacement value for cost-covering infrastructure that may be damaged during a hurricane. The proportion of assets expected to be damaged is outlined in the following table:

Table 6: Assumption of proportion of Saban assets (weighted by replacement value) that will need to be replaced after a category 5 hurricane (AEF, 2024)

Infrastructure category	Percentage damage
Airport	25%
Harbour	25%
Roads and parking lots	12.5%
Public transport	25%
Water management	25%
Drinking water	50%
Waste water	25%
Waste processing	25%
Telecom sea cable	25%
Fuel storage	50%
Energy generation (solar park)	25%
Energy grid	0%
Buildings	25%
Recreation	25%
Agriculture	25%
Cultural Heritage	25%

[31] Panwar et al., 2023

[32] AEF (2024) Klein gebied, grote opgave: de financiële opgave van de fysieke infrastructuur in Caribisch Nederland. Rapport opgeleverd aan het Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 13 februari.

While these tables provide an indication of the expected cost of a category 5 hurricane on the island, the expected cost of future losses and damages caused by the increasing frequency of intense rainfall, droughts, heatwaves, groundwater salinisation, ocean acidification, and land and forest degradation—remains unquantified for Saba. In the absence of island-specific estimates, regional projections from the Caribbean provide a useful indication of the scale of these impacts.

Damages from increasingly intense rainfall and storms in the Caribbean region are projected to reach US $40.4 billion under a 2°C scenario and US $38.5 billion under a 1.5°C scenario by 2050. Flash floods and flooding could cause an additional US $13.4 billion in damages under 2°C, or US $12 billion under 1.5°C. On average, annual losses from storms, flooding, and landslides between 2023 and 2045 are expected to be 11% higher than in the previous 23 years (2000–2022). Cumulatively, under a 2°C warming scenario, total losses and damages in island states could reach US $56 billion by 2045.[33]

In addition to storm-related damages, the limited data available on fisheries and agriculture point to significant economic risks. Annual losses in landed fish values across Latin America and the Caribbean are projected to reach between US $1.21 billion under a mild climate scenario and US $2.72 billion under a more severe one. Economic losses from climate-induced declines in agricultural production are expected to total between US $14.7 and $31.4 billion from 2015 to 2050.[34] In the Caribbean alone, projected losses exceed US $1.8 billion between 2011 and 2050 under various climate scenarios.[35]



[33] Panwar et al., 2023
[34] Panwar et al., 2023
[35] Sircar A. et al. (2024) A Review of Loss and Damage in the Caribbean (1994–2024). Climate Analytics.

Required Investment

Despite the limitations in available data, the data does indicate that Saba will be unable to absorb these climate-related losses through the island budget without severely undermining development progress and compromising the Public Entity's ability to deliver basic services and social welfare programmes. Current financing mechanisms—such as the free allowance, local levy and 'special purpose grants'[36] are also inadequate for funding the long-term, integrated, structural, cross-sectoral adaptation measures required to strengthen the island's resilience and mitigate the forecasted economic costs of climate change.

According to the Vereniging van Nederlandse Gemeenten (VNG), municipalities across the Netherlands are struggling to implement critical climate adaptation interventions. The challenge arises from a structural mismatch between the long-term nature of adaptation and the short-term, sector-specific funding mechanisms currently available. In order to combat this bottleneck, the VNG has highlighted the need for stable, multi-annual (structural) climate adaptation funding.[37]

They also advocate for breaking down siloed budgets at national and regional levels so these can be pooled and aligned for adaptation purposes. In addition, they call for more investment in building regional (human and technical resource) implementation capacity, with particular support for smaller municipalities. For Saba as a "bijzondere gemeente," this capacity needs to be matched by an enabling legislative environment for implementation. Combined, these actions are critical not only for enabling adaptation but for mitigating the severe and escalating economic impacts of climate change—impacts that will otherwise place an unsustainable burden on local and national government.

[36] Incidental funds allocated by Ministries for specific projects and objectives.

[37] Vereniging van Nederlandse Gemeenten (VNG) 2021, Klimaatadaptieve gemeenten – Position paper, VNG, Den Haag. Van Dorresteijn, D., Mommers, V., 2021, Klimaatadaptatie van project naar proces – samenwerken aan een integrale aanpak (resultaten van één jaar ondersteuningsprogramma), Vereniging van Nederlandse Gemeenten (VNG), Den Haag.

Domains and Action Agendas

As the previous section clearly shows, climate change affects every system that sustains life on Saba—from water and food to health, infrastructure, and livelihoods. Addressing these impacts requires more than isolated or sector-specific responses; it demands a coordinated, whole-of-government approach that recognises the interdependencies between systems and ensures that actions in one area reinforce, rather than undermine, resilience in another.

This integrated approach is operationalised through the **Domains and their associated Action Agendas** which serves as both a strategic reference and a practical planning tool. It supports government departments and partners in making sure that the impacts of climate change are integrated onto decision-making processes—shaping how policies are developed, projects are planned, and investments are prioritised. This approach enables every domain to both contribute to and benefit from coordinated climate action, ensuring that resources are used efficiently, risks are managed proactively, and development decisions strengthen long-term resilience and sustainability.

The framework is structured around seven key domains, which refer to the key sectors or focus areas where climate change is expected to have the most significant impact—and where targeted adaptation and mitigation efforts are required. Each domain represents a thematic area of concern and includes specific challenges and opportunities for building resilience. Together, the seven domains outlined below help organise the plan's actions into a coherent, cross-cutting framework that reflects the interconnected nature of climate risks and adaptation needs on Saba.

Domain 1	**Water and Food Security** (water, agriculture, livestock, fisheries)
Domain 2	**Biodiversity and Ecosystems** (mitigating land degradation and soil health, restoring land and marine-based ecosystems, and protecting land and marine biodiversity)
Domain 3	**Risk Management, Disaster and Crisis Preparedness and Response** (risk awareness and management; disaster and crisis preparedness, response)
Domain 4	**Liveable Environment** (built environment, infrastructure, utilities)
Domain 5	**Economic Resilience** (resilient livelihoods, entrepreneurship, trade, industries)
Domain 6	**Community and Culture** (community, cultural heritage protection)
Domain 7	**Education and Awareness** (climate education and awareness)

For each domain, this document identifies the most pressing climate-related challenges and underlying vulnerabilities, and highlights relevant policies and projects already underway. The content has been co-created with domain holders through participatory workshops and subsequently validated, ensuring that it reflects both sector-specific realities and shared priorities.

Each domain section sets out a **Domain Action Agenda**, which translates the analytical framework and workshop outcomes into a practical guide for action. These agendas define overarching goals and priority actions that stakeholders consider essential to strengthening climate resilience within their respective sectors. Each Action Agenda is organised around the core adaptation challenges facing the domain, reflecting the most critical climate-related vulnerabilities that need to be addressed to support long-term resilience.

For each core challenge,
the Action Agenda identifies:

- **Adaptation objectives:** the outcomes stakeholders aim to achieve to manage and, where possible, reduce climate risk and improve system resilience; and

- **Key actions:** the priority measures required to deliver these objectives, including both new interventions and actions already underway through existing policies, projects, or initiatives. Where relevant, ongoing efforts are referenced to support alignment, coordination, and continuity.

Taken together, the Domain Action Agendas are intended to support government departments, agencies, and partners to:

- Understand how climate change affects their specific areas of responsibility;

- Identify remaining gaps or vulnerabilities; and

- Align planning, policy development, and investment decisions with the island's broader resilience objectives.

Used collectively, the Domain Action Agendas provide a shared foundation for coordinated, cross-sectoral implementation, supporting a practical and integrated pathway toward climate resilience.

As outlined in the "How to Use This Document" section, this framework is intended to function as a living document. The Domain Action Agendas therefore will be regularly reviewed and updated as conditions evolve, new information becomes available, and priorities shift, ensuring that actions remain relevant, coordinated, and responsive to changing climate risks and resilience development needs.



DOMAIN 1:

Water and Food Security

Water, agriculture, livestock, fisheries & supply chains

Overview of Challenges and Vulnerabilities

Water and food security are among the most critical and climate-sensitive challenges facing Saba. The island relies on imported food, rainwater harvesting, and desalinated water to meet local needs. Climate change is increasing pressure on both systems through prolonged dry periods, more intense rainfall events, and growing risks of disruption along regional and international supply routes. This section examines the key challenges and vulnerabilities affecting water and food security on the island.

Water Security

Saba's population has traditionally relied on household cisterns for water supply due to the island's lack of natural freshwater resources. Climate change has intensified pressure on this system. Extended dry periods and droughts are causing household and farm cisterns to run dry more frequently, increasing reliance on the island's central reverse osmosis (RO) plant for refilling. This growing dependence shifts greater demand onto the island's centralised water infrastructure, and places additional pressure on household budgets and the cost of local agricultural production.

While the RO plant at the harbour has sufficient technical capacity to meet the island's overall water demand, its centralised nature makes the system vulnerable to climate-related operational disruptions. Storm surge, rough seas, and heavy sedimentation following severe weather events can interrupt pumping operations, resulting in temporary supply outages.

The supporting RO infrastructure is also at risk from severe weather events. Water is pumped from the main plant via a pipeline under Fort Bay Road to the first water reservoir –a roadside cistern near the SEC power plant. It is then pumped to the filling station for truck distribution, and on to Saba Splash and other reservoirs —all via a road that is susceptible to erosion, rockfalls, and torrential runoff during storms, hurricanes, and heavy rainfall events (*See Domain 3 for detailed discussion of Fort Bay Road*).

While several cisterns on the island ensure decentralized storage of RO-water, current capacity may not be sufficient to buffer water supply during plant shutdowns, hurricanes, droughts, or other emergency situations, especially in case of compounded impacts. As island reliance on the RO plant increases, these vulnerabilities become more consequential for overall water security.

Saba's water infrastructure does include a number of rainwater and greywater

cisterns that could play a greater role in strengthening system resilience. However, there is no comprehensive overview of their location, condition, or storage capacity, nor a coordinated approach to their maintenance and use. Several older cisterns could potentially increase overall water storage if restored, properly maintained, and equipped with basic infrastructure such as pumps, valves, and appropriate filtration. Filtration is particularly important where cisterns collect road runoff, due to contamination risks Although restoring existing water storage capacity could help, additional capacity needs to be built at strategic locations to ensure sufficient water supply during crises.

Food Security

Food security on Saba is closely linked to water security and is shaped by the island's limited land area, geographic isolation, small market size, and near-total reliance on imported food. Most food supplies—particularly fresh produce—are shipped via St. Maarten on a weekly basis, leaving the island exposed to disruptions caused by adverse weather, shipping delays, or wider regional and global shocks.

Against this backdrop, boosting local agriculture is often cited as a pathway to greater food security. However, on Saba such initiatives face well-documented structural constraints. These include limited water availability and infrastructure for irrigation, combined with steep, rocky terrain and a shortage of suitable fertile agricultural land. High land purchase and leasing costs further constrain feasibility. In addition, the island's small market size limits economies of scale, while high input costs—driven by the need to import seeds, fertilisers, animal feed, and livestock—further undermine the feasibility and viability of farming activities.

Comparable constraints are evident in the marine sector. Despite the island's marine environment, fisheries currently make only a limited contribution to local food security. Most locally caught fish and shellfish is sold off-island, where market size and pricing are more favourable, rather than contributing to local consumption.

While commercial scale food production may not be viable on Saba, initiatives such as backyard farming, food forests, and other forms of small-scale food production can play a complementary role in improving dietary diversity and household-level resilience. It is important to note, however, that the contribution of these initiatives will be inherently limited as they will not be able to fully replace imported food supplies or meet the island's overall food demand. However, they can help ensure more consistent access to fresh produce throughout the week, given that imported fresh produce only arrives once a week, on Wednesdays.

This reliance on imported food makes Saba's food security highly sensitive to the structure and performance of the island's external supply chains. These supply chains depend on a small number of shipping connections linking international and regional markets—primarily the United States (via Miami) and Europe—to St. Maarten, through which almost all imported food is transshipped. The routes are served by only a limited number of container lines, reducing flexibility when delays or disruptions occur. As a result, any disruption along these international shipping routes quickly affects the reliability and timing of food supplies reaching the island.

Compounding this risk moving forwards, is the expected rerouting of one of the major shipping lines that currently transports goods from Europe, from St. Maarten to Guadeloupe, which may further constrain routing options for goods destined for Saba.[38]

This concentration of supply-chain risk is further heightened by Saba's reliance on St. Maarten as its primary transshipment hub. Port operations and logistics in St. Maarten are vulnerable to hurricanes, storm surge, and other severe weather events, as experienced in the aftermath of Hurricanes Irma and Maria. When port activity or shipping schedules are disrupted, Saba has limited alternative routes available, increasing the risk of short-term shortages. Climate change is expected to increase the frequency and intensity of extreme weather events in the region, potentially heightening these risks over time.[39]

From St. Maarten, most food imports destined for Saba pass through a small number of St. Maarten–based wholesalers, where goods are stored, repacked, and allocated before onward shipment.
At the wholesale level, market power is concentrated in a few firms, with Prime Distributors linked business-wise and family-wise to both Divico and Carrefour. This monopoly weakens price competition and contributes to higher wholesale prices that cascade into Saba's retail prices.[40]
During periods of constrained supply or logistical delay, these wholesalers generally prioritise the domestic market and their larger clients.[41] In practice, this has resulted, according to stakeholder observation, in Saba's orders being reduced or postponed, increasing the island's exposure during periods of stress in the wider supply chain.

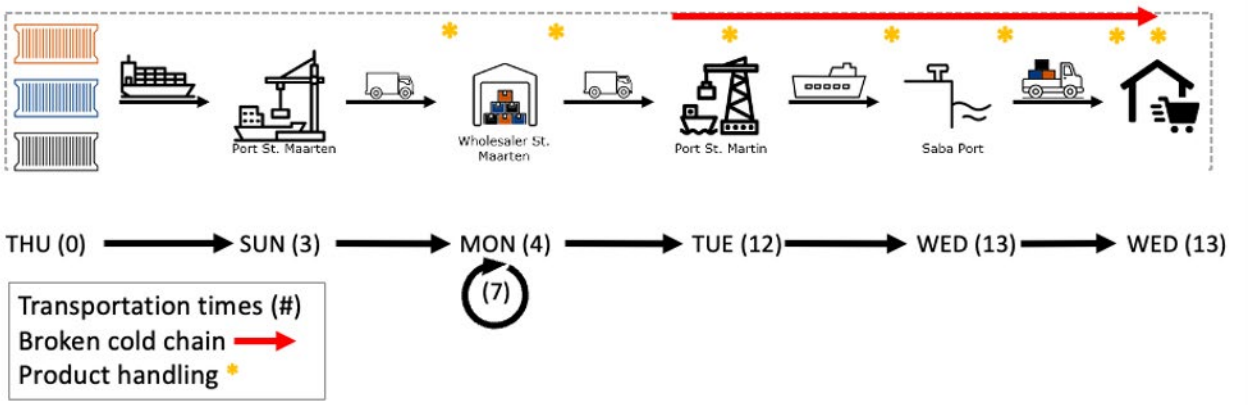
Even when food is available for onward shipment, the physical movement of goods to Saba introduces additional vulnerabilities. The supply chain is long and fragmented, with fresh produce loaded, unloaded, and handled multiple times—by exporters, wholesalers, ports, and feeder vessels—before reaching supermarket shelves on the island. Each handling stage contributes to a breakdown of the cold-chain and exposes products to heat and weather, reducing product quality and shelf life, which increases food losses.

These challenges are compounded by the lack of cold storage and covered handling space at Fort Bay Harbour, where perishable goods are exposed during unloading. In addition, stakeholders have observed that fresh products supplied via St. Maarten may at times arrive close to, or beyond, their recommended expiration dates, leading to additional losses for supermarkets and contributing to reduced availability, higher costs and reduced nutritional value.[42]

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[38] Mak et. al., 2024.
[39] Witteveen+Bos, (2024); KNMI, 2023.
[40] Ecorys (2017a) Onderzoek naar prijzen in Caribisch Nederland. Deel I: Hoofdrapport. Rotterdam: Ecorys.; Ecorys (2017b) Onderzoek naar prijzen in Caribisch Nederland. Deel II: Bijlagen. Rotterdam: Ecorys.
[41] Simmons, 2021; .Van Geelen, 2020.
[42] Mak et. al., 2024; Simmons, 2021; .Van Geelen, 2020.

Figure 1: Current supply line (Image Source: Van Geelen, 2020)



The island's limited on-island food storage capacity further amplifies these vulnerabilities. Constraints at multiple points in the supply chain—including limited space at the harbour and insufficient dry and cold storage capacity in supermarkets and restaurants—reduce Saba's ability to prepare for supply disruptions, make bulk purchases, or maintain the cold chain. As a result, the island has limited capacity to buffer short-term supply interruptions, hold contingency stocks, or stabilise availability during emergencies. Even relatively minor delays in shipping can therefore translate into reduced availability of essential food items and upward pressure on prices.

At the local level, the structure of the retail market limits the ability to absorb or offset these upstream pressures. With only a handful of supermarkets on the island, price negotiation and competition are structurally limited, and the small market size restricts opportunities to achieve economies of scale. As a result, higher costs incurred earlier in the supply chain—through transport constraints, supply disruptions, handling losses, and wholesale pricing—are passed directly through to consumers.[43]

Consumer prices on Saba are the highest in the Caribbean Netherlands: the general price level is around 18 percent higher than on Bonaire and 6 percent higher than on Sint Eustatius, while supermarket prices are approximately 30 percent higher than on St. Maarten. Between 2010 and 2023, food prices increased by more than 50 percent. These impacts are felt most strongly by lower-income households, for whom high prices and limited supply increase the risk of food insecurity.[44]

The cumulative "tax-on-tax" effects along the supply chain—often described by stakeholders as the "triple ABB"—further increase the landed cost of goods on Saba. In practice, when export exemptions are not consistently applied, St. Maarten's 5% BBO may be passed through in wholesaler prices for goods sourced via St. Maarten. Once the

[43] Mak et. al., 2024
[44] Simmons, 2021

goods arrive on Saba, ABB (6%) is levied on the CIF value, meaning the tax base includes freight and insurance as well as the product value. In addition, broker clearance fees are often calculated as a percentage of the ABB paid, adding a further cost layer and reinforcing the compounding effect.[45]

Taken together, these dynamics indicate that food security on Saba is primarily shaped by supply-chain exposure, logistical constraints, and limited storage capacity. Strengthening resilience under a changing climate therefore depends on improving supply-chain preparedness, reducing losses along the supply chain, and increasing on-island food storage to better manage disruptions and protect access to essential food supplies.

Building a Resilient Foundation: Ongoing Programs and Policy Anchors

In recent years, the Public Entity of Saba has implemented a range of initiatives aimed at addressing key aspects of water and food security. These initiatives include the following:

- The establishment of Hell's Gate Farm to support affordable access to locally grown food, healthy diets, traditional farming practices, and local employment, with produce sold at the weekly Windwardside market at prices below imported alternatives.
- The development of a hydroponics farm in 2022, to help increase the availability of fresh produce throughout the week, and lower the costs of fresh produce for the community.
- The distribution of fruit trees as part of an agroforestry programme under the NEPP programme, to help increase fruit availability, restore degraded land and improve soil health.
- The provision of subsidies to make it easier for households to become active in backyard farming. Approximately 30 households made use of this program to start their backyard farms.
- The provision of subsidies for feed, livestock imports, and fencing under NEPP and the goat control project.
- The delivery of various workshops and training courses for the local community to build skills related to agriculture and nature conservation.
- The development of a **Draft Food Security Proposal for Saba (2025)**[46], which focuses on the following key projects:
  - » Improve storage capacity for essential goods to enable stockpiling of essential goods. Which will increase resilience against supply chain disruptions, allowing bulk purchasing to benefit economies of scale to reduce prices.
  - » Safeguard land for long-term agricultural use in order to expand and diversify

[45] Ecorys, 2017; Mak et. al., 2024
[46] Public Entity Saba, (2025). Draft Food Security Proposal.

local food production. Increasing the amount of land dedicated to agriculture and animal husbandry creates opportunities to develop a range of initiatives that strengthen local supply and resilience. These may include establishing poultry production for eggs and meat, developing food forests or syntropic farming systems, expanding water storage capacity to support farming during periods of drought, and introducing innovative projects such as mushroom cultivation in containers.

» On Saba, most private farming takes place at a small scale, primarily through backyard farming. Residents who are otherwise employed maintain plots for crop production or animal husbandry. Given the limited economic viability of commercial-scale agriculture, this form of production remains the most prevalent. Strengthening this approach requires improved access to key inputs, including quality seeds, seedlings, trees, fertiliser, manure, and mulch.

» Preserve and strengthen local knowledge and skills related to food production within the community, supported by practical training and knowledge-sharing initiatives. While this will remain small-scale under normal conditions, it ensures that in the event of disruptions to food supply, Saba retains the knowledge and capacity to produce food locally.

Action Agenda

Core Adaptation Challenge 1.1: Water scarcity

Saba lacks natural freshwater sources and depends entirely on rain-fed household cisterns and coastal reverse osmosis (RO) plants. As climate change is expected to bring longer droughts and more erratic rainfall, cisterns run dry more frequently, increasing reliance on the RO system. Yet the RO plant and infrastructure is itself highly vulnerable to the impacts of storm surges, storm events, and hurricanes.

Adaptation Objective 1.1:
Ensure reliable and sustainable water access → Expand water storage capacity

Identified Key Actions:

- Safeguard the continuity of water access by expanding reverse osmosis (RO) water storage capacity.
- Integrate rainwater harvesting and storage into the new solar park to capture runoff from solar panels for non-potable uses.
- Evaluate whether and where rainwater and greywater storage could meaningfully contribute to water system resilience, including through a review of existing cisterns.
- Install public drinking water points in high-traffic areas to reduce heat stress and increase access to hydration.

(IPDC Supply Chain Climate Stress Test).

Core Adaptation Challenge 1.2: Supply Chain Vulnerability

Saba lacks the cold storage and logistics infrastructure needed to safely handle temperature-sensitive goods or maintain food supply during disruptions. Without covered unloading areas, bulk cold storage capacity, or emergency reserves, the island is highly exposed to food spoilage, supply chain delays, and hurricane-related interruptions. The absence of resilient infrastructure weakens both everyday food security, food safety and disaster preparedness and response.

Adaptation Objective 1.2: Investment in food and cold storage infrastructure
→ Improve the cold chain, expand storage capacity and improve disaster preparedness.

Identified Key Actions:

- Build a hurricane resilient storage facility with sufficient capacity to stockpile essential goods ensuring adequate reserves are available to mitigate the impacts of supply chain disruptions *(Saba Food Security Proposal).*
- Purchase of refrigerated trucks to maintain proper temperature conditions while transporting frozen and refrigerated products from warehouses to retail outlets *(Saba Food Security Proposal).*
- Investigate the impacts of climate change on the islands supply chain, and alternative import routes that could create a more robust import system

Core Adaptation Challenge 1.3: Access to Fresh Produce

While commercial farming may not be viable on Saba, targeted local food production initiatives can play a valuable complementary role in mitigating supply chain vulnerability by providing limited but reliable access to fresh food during periods of disruption.

Adaptation Objective 1.3: Build buffers to mitigate supply chain disruptions and increase food security and enhance self-sufficiency where viable.



Identified Key Actions:

- Secure and acquire a property, if possible, to use as a permanent local food production site and enable future expansion *(Saba Food Security Proposal)*.
- Expand agricultural production to increase the range and volume of locally grown food supplied to the community, and facilitate access to locally produced food.
- Introduce and facilitate other food production initiatives, for example circular mushroom production and animal husbandry, while promoting the use of local resources and waste streams to diversify inputs and reduce organic waste.
- Facilitate access to key inputs, including seeds, locally produced animal feed, fertiliser, and compost, so that Saba has the materials needed on island to rapidly increase local food production in times of crisis.
- Promote planting fruit trees and backyard gardens to support low-input food production.
- Expand water storage capacity through the construction of additional cisterns to support agricultural production and farm operations.
- Develop an island-wide food strategy focused on nutrition, local capacity, and climate resilience.
- Position the local farm as a hands-on learning and demonstration site for sustainable agriculture, showcasing diverse farming techniques and local food production systems *(Saba Draft Food Security Proposal)*.
- Organise targeted workshops and training sessions to build practical skills for residents interested in starting or sustaining small-scale agricultural activities *(Saba Draft Food Security Proposal)*.



DOMAIN 2:

Biodiversity and Ecosystems

Mitigating land degradation and soil health, restoring land and marine-based ecosystems, and protecting land and marine biodiversity.

Overview of Challenges and Vulnerabilities

Saba's biodiversity is both a defining feature of the island and a critical foundation for its long-term resilience. Despite its small size, the island encompasses five distinct ecosystems: the elfin cloud forest at the summit of Mount Scenery; the surrounding montane thicket and rainforest; lower-elevation dry forests and woodlands; rugged coastal and cliffside habitats; and the extensive marine ecosystems that include coral reefs, and the globally significant Saba Bank. These interconnected systems support a rich variety of species and provide essential services such as slope stabilization, water retention, carbon sequestration, food and income from fisheries and tourism.

However, these ecosystems are increasingly under pressure. Prolonged dry periods, heavier and more intense rainfall events, storms and hurricanes, are increasing the risk of erosion, flash floods and sediment runoff, impacting both terrestrial and marine habitats. While pollution from construction runoff and limited waste storage and processing capacity further compound these pressures, contributing to degradation across both land and marine systems.

Efforts to reforest degraded areas or restore habitats are constrained by the limited availability of public land, the absence of long-term land agreements, and a lack of institutional mechanisms to plan, authorize, and sustain large-scale ecological restoration over time.[47]

At the same time, habitat fragmentation is weakening ecological connectivity between Saba's distinct zones, making it harder for species to migrate or adapt.[48] For example, road infrastructure can disrupt movement corridors, affecting species such as soldier crabs that migrate between the sea and mountain, and iguanas that move between habitats for breeding. Any infrastructure designed to support climate adaptation will need to account for habitat fragmentation and incorporate measures to maintain or restore ecological connectivity.

[47] Dutch Caribbean Nature Alliance (DCNA) (2020). BioNews Issue 24: Saba and the Saba Bank. In: State of Nature in the Caribbean Netherlands (BioNews Special).
[48] de Freitas, J.A., et al. (2016) A landscape ecological vegetation map of Saba (Lesser Antilles). Den Helder: IMARES Report C195/15. Wageningen Marine Research.

The Saba Bank—one of the Kingdom of the Netherland's most important marine biodiversity hotspots and a key fishery for red snapper, lobster, and pelagic species—is also being affected by warming waters, coral bleaching, and acidification. These climate related stressors are impacting the marine ecosystem, spawning patterns and the reproductive success of key species.[49] These challenges are compounded by pressures in certain areas from overfishing, tanker anchorage and inadequate environmental monitoring and controls.[50]

Nature-based Adaptation Opportunities

Restoring and protecting ecosystems is not only essential for climate adaptation—it is the foundation of resilience and sustainable development on Saba. Healthy ecosystems act as the island's first line of defence against climate hazards. Forested and vegetated slopes help absorb rainfall and stabilize the terrain, reducing erosion, landslides, and flood risk. Coral reefs support fisheries, and sustain marine biodiversity. In a small island context like Saba's, these natural systems serve as critical, cost-effective infrastructure.

Nature-based adaptation harnesses the protective services of these ecosystems in ways that are regenerative and locally grounded. Reforestation of degraded hillsides and dry forest areas, for instance, can reduce erosion, improve water retention, and create cooler, more stable microclimates. Meanwhile, marine conservation and improved management of the Saba Bank can strengthen fish stocks, support reef health, and reduce the island's exposure to climate-driven coastal impacts. These interventions do more than reduce risk—they help address root causes of vulnerability while restoring the ecological balance that supports life on the island.

At the same time, ecosystem restoration unlocks new economic potential. Saba's emerging blue and green economy—from diving and ecotourism and sustainable fisheries to nature-based education and community agriculture—depends on a healthy natural environment. Restoration efforts can also generate local employment and skills development in areas such as native plant nurseries, marine monitoring, reforestation, trail maintenance, and environmental education. This is why ecosystem restoration is a central pillar of Saba's climate adaptation agenda—supporting not only ecological resilience, but also livelihoods, identity, and long-term wellbeing.

[49] DCNA, 2020; Dutch Caribbean Nature Alliance (DCNA) (2018). BioNews Issue 8: Status of Saba Bank's Reefs. Ministry of Agriculture, Nature and Food Quality (LNV). (2020) Sustainable Fisheries Plan: Fisheries Management Plan for the Caribbean Netherlands (BES) 2020–2030.
[50] DCNA, 2018.

Building a Resilient Foundation: Ongoing Programs and Policy Anchors

In response to these challenges, Saba is laying the groundwork for large-scale ecosystem restoration through a combination of national policy commitments, locally tailored implementation agendas, and active NGO engagement. Together, these efforts form a strong foundation upon which to scale up integrated, climate-resilient restoration—linking biodiversity protection with long-term sustainability, community well-being, and adaptive capacity. These include the following:

1. Nature and Environment Policy Plan for the Caribbean Netherlands (2020–2030)

The Nature and Environment Policy Plan for the Caribbean Netherlands (NEPP-CN) provides the overarching BES-wide framework for nature and environmental policy across Bonaire, Saba, and St. Eustatius. The objective of NEPP is to align local conservation needs with international biodiversity targets, sustainable development goals, and to lay the strategic foundation for the island's Nature & Environment Policy Implementation Agenda. Action areas identified in the first phase of the NEPP programme include the following:

- Preserve and sustainably manage the Saba Bank, a marine biodiversity hotspot and key fisheries area, through improved monitoring, enforcement, and research capacity.
- Preserve and restore coral reefs around the island, with the aim to strengthen fisheries, restore biodiversity and facilitate sustainable tourism on the long term.
- Protect and restore the island's unique terrestrial ecosystems, including cloud forests, dry forests, and coastal cliff zones, which are under increasing pressure from erosion, invasive species, and development.
- Strengthen management of the Marine Protected Area (MPA), including measures to address anchoring damage, coastal water pollution, and unsustainable fishing practices.
- Restore degraded areas through reforestation and the stabilization of slopes to reduce erosion, particularly in areas affected by past land clearing and road construction.
- Improve land-use planning and development regulation to reduce fragmentation of natural habitats and integrate ecological considerations into spatial planning and infrastructure development.
- Control invasive species, including free-roaming livestock and aggressive non-native plants, through biosecurity measures and management strategies.
- Enhance environmental education and public awareness, ensuring broad community support for nature conservation and sustainable land and sea use.

2. Rainwater Management and Erosion Control (2025)

The development of a rainwater management plan has been initiated to identify scalable interventions to reduce the intensity and impact of rainwater runoff. Initial report recommendations include:

- Focusing pilot projects in erosion hotspots eg: Fort Bay Road and Spring Bay.
- Installation of sediment traps and infiltration systems in upper catchment areas to prevent debris from reaching lower communities and infrastructure, particularly around The Bottom and Fort Bay.
- Installation of monitoring systems to enable data-driven adaptation, including: soil moisture and runoff sensors, rain gauges, drone and satellite-based remote sensing.
- Assess the feasibility of using natural depressions (e.g. Juggler's Pool, Crispeen Gully) for water retention and controlled diversion, with potential for passive irrigation or low-impact hydropower in the long term.

3. DCNA Climate Action Plan (2023)

The regional DCNA Plan promotes ecosystem-based adaptation and cooperation across the Dutch Caribbean to strengthen climate resilience. For Saba, priorities include:

- Safeguarding the Saba Bank and its fisheries: Increase investment in monitoring, enforcement, and sustainable fisheries management to safeguard this vital marine ecosystem.
- Restoration of dry forests and cliffside vegetation: Reforest dry forests and stabilize slopes to curb erosion and sediment runoff.
- Sustainable financing for conservation and adaptation: Develop long-term funding models (e.g., conservation levies, visitor fees, blue carbon) to support conservation and adaptation.



4. WWF Spatial Planning and Nature Policy Goals in the Caribbean Netherlands (2023)

WWF's 2023 guidance emphasizes the importance of integrating biodiversity protection into land-use planning, development decisions, and spatial policy across the Caribbean Netherlands. For Saba priorities include:

- Protecting the Elfin Forest, high-altitude cloud zones, dry forest, and cliffside habitats: Enforce zoning restrictions and buffering ecologically sensitive zones to prevent habitat loss and fragmentation.
- Preserving the ecological integrity of the Saba Bank: Stricter enforcement of marine zoning regulations and sustainable fisheries management.
- Establishing green public spaces within towns: Inclusion of urban greening and micro-parks in local development frameworks.

Action Agenda

Core Adaptation Challenge 2.1: Erosion and Run-off

Saba's steep topography and volcanic soils make the island particularly vulnerable to erosion. Although recent landscape management has restored vegetation and stabilised some slopes, the absence of effective rainwater management still leads to torrential runoff and flash flooding—intensifying erosion and carrying sediment, pollution and waste into the sea. As climate change brings longer droughts, heavier downpours, and stronger hurricanes, these challenges increasingly threaten roads, infrastructure, and the health of both terrestrial and reef ecosystems.

Adaptation Objective 2.1:
Improve rainwater management →
Reduce runoff-related risks and impacts.

Identified Key Actions:

- Implement watershed-based rainwater management measures to slow runoff and reduce the intensity and impacts of rainwater flows across the island, particularly in critical areas such as Fort Bay Road *(Rainwater Management and Erosion Control Recommendations, 2025)*.
- Installation of sediment traps and infiltration systems in upper catchment areas to prevent debris from reaching lower communities and infrastructure, particularly around The Bottom and Fort Bay *(Rainwater Management and Erosion Control Recommendations, 2025)*.
- Installation of monitoring systems to enable data-driven adaptation, including: soil moisture and runoff sensors, rain gauges, drone and satellite-based remote sensing *(Rainwater Management and Erosion Control Recommendations, 2025)*.
- Assess the feasibility of using natural depressions (e.g. Juggler's Pool, Crispeen Gully) for water retention and controlled diversion, with potential for passive irrigation or low-impact hydropower in the long term *(Rainwater Management and Erosion Control Recommendations, 2025)*.

- Explore possibilities for facilitating vegetation growth in critical areas prone to erosion.

- Investigate building more protective walls and fences to try reduce the risk of rockfalls on Fort Bay Road.

Core Adaptation Challenge 2.2: Deforestation and Recovery

Saba's vegetation degradation and limited forest recovery are rooted in historical land degradation driven largely by past goat overgrazing. Climate change pressures are now exacerbating impacts and limiting natural recovery, while lack of public land and predominantly private land ownership[51] constrain large scale restoration.

Adaptation Objective 2.2: Expand reforestation and replanting efforts
→ Combat land degradation and support ecological resilience

Identified Key Actions:

- Scale up vegetation recovery efforts with climate-resilient and erosion-reducing species (building on SCF's 1500+ trees and PES' 5000 goal).

- Identify suitable areas for vegetation recovery and develop action plans to support greening efforts considering less labour intensive methods e.g. seed bombing, land ownership, accessibility for tree care, climatic and environmental conditions.

- Involve the community in watering and maintenance via volunteer days or a "Tree Guardian" program.

- Where appropriate, incorporate agroforestry, fruit-bearing trees, and species used in traditional medicine practices.

- Establish a nature compensation mechanism for all development projects to ensure tree loss is offset with replanting.

- Create shaded, green public spaces using multifunctional trees to deliver both climate and social benefits.

Core Adaptation Challenge 2.3: Declining Ecosystem Health

Saba's ecosystems face growing threats from climate change, ocean warming, and unsustainable resource use, including overfishing and habitat disturbance. Limited and fragmented data on local biodiversity and species populations hinder targeted conservation action, while ongoing habitat loss—both marine and terrestrial—puts the island's unique ecological resilience increasingly at risk.

[51] Land ownership is further complicated by weak documentation, and in the scenario of undivided estates having multiple heirs with different interests.

Adaptation Objective 2.3:
Protect and restore ecosystems →
Marine and terrestrial.

The actions below are drawn from the participatory planning process and reflect input from local stakeholders, conservation organisations, research initiatives, and community programmes active on Saba. Implementation is intended to build on the work of existing conservation, research, and education partners, with support through policy alignment and coordination by the Public Entity.

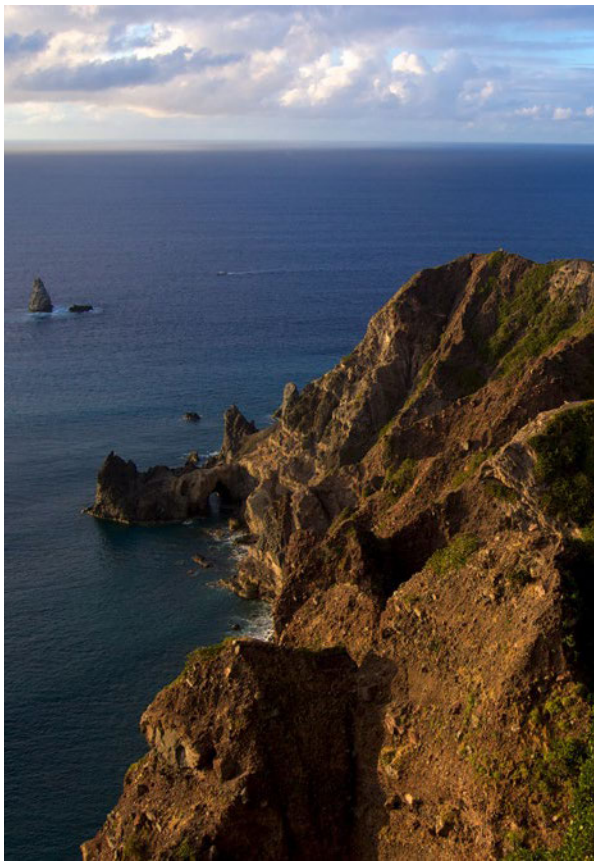
Identified Key Actions:

- Expand population recovery initiatives for key reef herbivores: sea urchins.
- Complete a species and biodiversity inventory and habitat mapping for both terrestrial and marine ecosystems (including Saba Bank).
- Map marine and terrestrial biodiversity hotspots, and estimate species population baselines to inform protection strategies.
- Build on invasive species control programs and the implementation of proper biosecurity measures.
- Conduct regular vegetation surveys as a way to monitor not only vegetation health, but also shifts in vegetation due to impacts of climate change.
- Scale up marine research and protection at the Saba Bank, including the development of a Saba Bank monitoring plan supported by research partnerships, increased patrols, improved legislation and stricter enforcement.
- Develop a digital platform to monitor and share data on the impacts of climate change over time and to track progress on environmental goals, marine and terrestrial ecosystem health, vegetation zone shifts, research findings, etc.
- Expand coral reef restoration efforts, for example by focusing on heat-resistant species and reintroducing additional primary grazers to combat algae.
- Establish a sustainably fishing policy, which could include scientific based seasonal fishing closures and size limits to allow for population recovery of key reef species.
- Enforce habitat protections for fragile ecosystems (e.g. tide pools, seagrass beds) at risk from climate and human impacts.
- Expand and promote the Timelapse app to crowdsource ecological change data, supported by a local scientist or analyst.
- Use cultural and environmental education and stewardship programs (e.g. Junior Rangers, Snorkel Club, intergenerational learning) to build community guardianship over nature.

Core Adaptation Challenge 2.4: Resource Constraints

The long-term protection and restoration of Saba's marine and terrestrial ecosystems depend on effective governance, sustainable financing, and adequate capacity for monitoring and compliance, supported by national government. Stakeholders identified opportunities to strengthen coordination, resourcing, regulatory frameworks, and community engagement to support ecosystem protection over time.

Adaptation Objective 2.4: Strengthen governance and financing mechanisms for coordinated ecosystem protection.



Photograph: © Kai Wulf

Identified Key Actions:

- Develop sustainable long-term financing mechanisms to fund ongoing marine and terrestrial conservation (e.g. single-entry nature fees, revolving funds, nature compensation).
- Ongoing baseline tourism analysis to determine annual visitor volumes and revenue potential from a single-entry nature fee for all visitors coming to Saba.
- Collection of species data to inform scientifically-backed fishing closures in legislation, including size limits and seasonal restrictions.
- Update and enforce environmental ordinances, including those related to Saba Bank, marine traffic (e.g., oil leaks, anchoring) and illegal dumping.
- National government to explore the possibilities for strengthened enforcement at the Saba Bank in consultation with the Coast Guard.
- Pursue biosphere or UNESCO site recognition to elevate Saba's ecological significance and attract conservation funding.
- Ensure community participation and transparency in all environmental legislation, planning, and land-use decisions.



DOMAIN 3:

Risk Management, Disaster and Crisis Preparedness and Response

Risk awareness and management, Disaster and crisis preparedness, response.

Overview of Challenges and Vulnerabilities

Saba's compact size, steep topography, and location in the Eastern Caribbean place it on the frontlines of intensifying climate risks. These risks are identified across the domain chapters of this Climate Plan, with each section outlining the specific vulnerabilities within its area of responsibility and the measures required to address them. These include, for example, water insecurity linked to drought and system disruption, food insecurity driven by import dependence and supply chain exposure, as well as heat-related health risks and ecosystem degradation.

Building on this cross-sector analysis, this domain examines how these risks interact and escalate into system-wide disruption, with a particular focus on critical infrastructure, access, and the continuity of essential services, and the implications for disaster and crisis preparedness, response, and recovery.

While the island is well-versed in hurricane preparedness, climate change is introducing new patterns that strain even the most seasoned systems—more unpredictable storms, back-to-back events, compound events and an increasing risk of cascading effects—where impacts in one system trigger failures in others. In this context, managing disaster risk and strengthening response is no longer only about emergency readiness, but about planning for systemic resilience.

The experience of Hurricanes Irma and Maria in 2017 exposed the fragility of critical systems. Although the island was not in the storm's direct path, the destruction of St. Maarten's port and airport—its primary logistical hub—severely disrupted Saba's supply chains (*See Domain 1 for more information on supply chain vulnerability*).

Power and communications were interrupted, emergency rationing became necessary, and medical evacuations, which routinely rely on helicopter transport due to the island's geography, became more constrained during the period of regional disruption. Recovery and repair of damaged infrastructure

required sustained effort over time, and temporary supply chain failures left lasting impacts on household costs and government budgets.[52]

Since then, Saba has further strengthened its preparedness and coordination mechanisms, building on an already effective emergency response system. Early warnings are well communicated, roads are cleared rapidly, and community response is efficient and trusted. Yet climate change is accelerating the pace and complexity of risk. Hurricanes have now been recorded shifting intensity and direction in under 24 hours, making forecasting difficult. For example: Hurricane Erin underwent rapid intensification in mid-August 2025, strengthening from hurricane status on 15 August to a Category 5 hurricane by 16 August — a development described by NOAA as one of the fastest intensification events on record in the Atlantic basin.[53]

A further consideration is the topography of Saba. The island's steep volcanic terrain and highly localised microclimates mean that wind conditions can vary markedly over short distances. During Tropical Storm Ernesto, while the system was officially classified as a tropical storm, some residents reported that wind conditions in their immediate surroundings felt significantly stronger than in other parts of the island. These accounts point to how mountainous terrain can channel and redirect wind locally, contributing to uneven impacts across the island during a single storm event.

Beyond storm intensity, compound climate events—such as heatwaves followed by flash floods—are becoming more frequent, longer-lasting, more severe, and, in some cases, more intense. The IPCC (2023) defines these as multiple climate-related hazards occurring at once; Singh (2025) notes that compound risks result from "the combination of multiple drivers and/or hazards that contributes to societal or environmental risk."

For Saba, these interactions can have devastating knock-on effects. A heatwave could for example deplete cistern water reserves, followed by a storm that knocks out the desalination plant at Fort Bay—leaving the island without access to clean water when it is needed most. These dynamics also highlight that effective disaster preparedness, response, and recovery are shaped not only by local capacity, but also by coordination beyond the island, including with the SSS islands (Saba, St Eustatius, St Maarten), the wider Caribbean region, and Kingdom partners.

Road Network Vulnerability

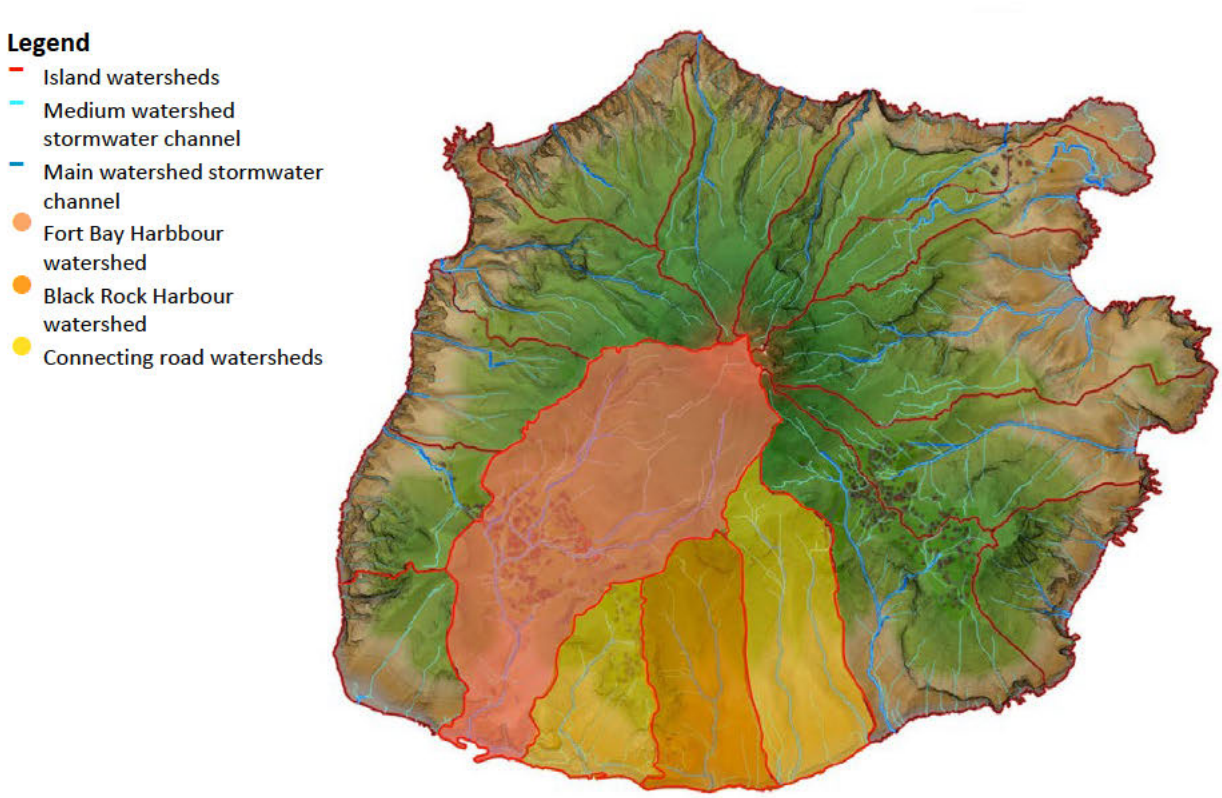
What makes Saba particularly vulnerable to the impact of climate hazards is the island's structural dependency on a single road system. This continuous route connects communities with all critical infrastructure, including the hospital, desalination plant, power station, solar park, gas station, harbour, airport, and telecommunications facilities. As a result, disruption at any point along this network can affect the functioning of multiple systems simultaneously, with impacts extending beyond the immediate location of damage.

[52] Ministry of the Interior and Kingdom Relations (2023) Policy review: Reconstruction of the Windward Islands following Hurricanes Irma and Maria. The Hague: Government of the Netherlands.
[53] National Environmental Satellite, Data, and Information Service (2025) Category 5 Erin is the first Atlantic hurricane of 2025. NOAA.

Within this island-wide system, Fort Bay Road is a particularly critical segment because it connects the island to Fort Bay Harbour, the primary entry point for fuel, food, construction materials, and other essential supplies. Fort Bay Road also provides access to key infrastructure located along its route and in the harbour area, including the power station, reverse osmosis (RO) plant and cistern, waste facility, gas station, stone quarry and telecommunications connections. In addition, water, electricity, and telecoms lines run beneath the road surface. While this reduces exposure to surface hazards, it also means that damage to the road during extreme rainfall or slope instability events can disrupt multiple services simultaneously and complicate access for repair.

The physical setting of Fort Bay Road contributes directly to its vulnerability. Fort Bay Harbour lies at the base of the island's main watershed, which channels runoff from the upper slopes of Mt Scenery and surrounding areas toward the coast. During periods of heavy rainfall on Mt Scenery or in The Bottom, this drainage pattern can generate flash flooding that temporarily renders Fort Bay Road impassable. Storms and hurricanes further increase the risk of erosion and rockfalls along this steep corridor, compounding access challenges between the harbour and the rest of the island.

Diagram 1: Watershed Management Areas



When Fort Bay Road is disrupted, the effects extend beyond transport delays. Supplies arriving at the harbour may not be able to move inland, access to essential facilities such as the gas station can be restricted, and emergency and repair services may be delayed. At the same time, increased runoff can carry sediment into the harbour, with potential implications for harbour operations and maintenance.

For these reasons, the management of the watershed, stormwater flows, and slope stability associated with Fort Bay Road is a central consideration for the island's resilience (*See Domain 2 for more information*). Climate change is expected to intensify these challenges over time, as rainfall events and storm impacts become more severe. Addressing these risks in an integrated manner is therefore essential to reducing disruption, supporting the timely restoration of services, and maintaining reliable access between the harbour and the rest of the island.

Harbour Vulnerability

While the vulnerability of Fort Bay Road directly affects access to the harbour, the harbour system itself is also increasingly exposed to climate-related risks. Extreme weather events, including storms, hurricanes, and storm surge, pose direct threats to harbour infrastructure, with the potential to disrupt supply offloading, restrict access to fuel, and affect the functioning of critical facilities located in the harbour area. These risks highlight that resilience at the harbour cannot be addressed through access alone, but must also consider the robustness and continuity of key services concentrated at this location.

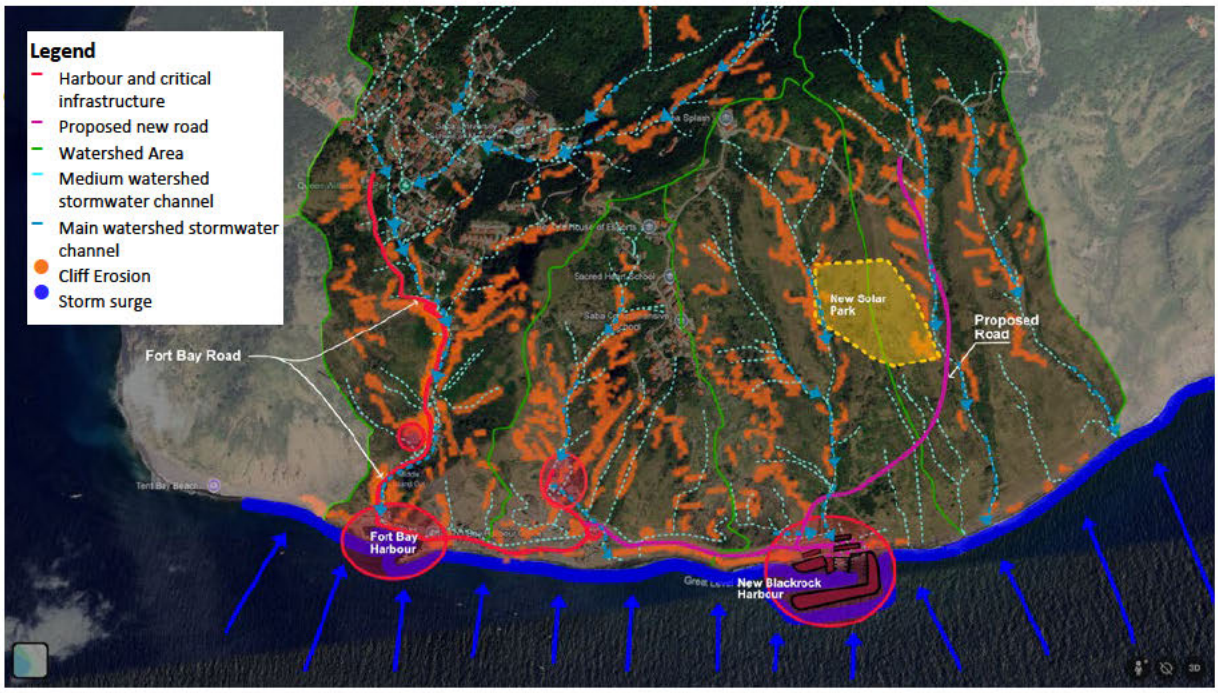
A particular concern is the presence of critical utilities at Fort Bay Harbour, including the reverse osmosis (RO) plant and the island's primary telecommunications connection, where the undersea cable transitions to the land-based network. Damage to this landing point could disrupt island-wide communications at a time when reliable connectivity is essential for emergency coordination, response, and recovery. This concentration of infrastructure creates a single point of failure that warrants specific consideration within contingency planning.

In this context, the Black Rocks Harbour project represents a strategic infrastructure investment intended to reduce reliance on a single port by providing an additional location for receiving and offloading supplies. Physical model testing was carried out in UK laboratories to simulate extreme storm impacts, confirming the design's capacity to withstand major events. Once operational, Black Rocks Harbour will provide an alternative location for receiving and offloading supplies in the event Fort Bay is rendered unusable.[54]

However, the effectiveness of this port-level redundancy depends on reliable land-based connectivity. A new access road is planned to link Black Rocks Harbour to Giles Quarter, reducing dependence on the coastal route serving Fort Bay. At present, funding for the harbour does not include construction of this connecting road, representing a gap in the island's climate resilience strategy. Without a durable, all-weather access route, Black Rocks Harbour itself risks becoming isolated during periods of heavy rainfall, erosion, landslides, or flash flooding.

[54] BES Reporter. (2024). Saba New Harbour Project Makes Progress, Various Studies Completed. Available at: https://www.bes-reporter.com/nieuws/nieuws-van-bonaire-infrastructuur/62027/saba-new-harbour-project-makes-progress-various-studies-completed

Diagram 2: Mapping of the critical vulnerabilities that are being exacerbated by climate change



Beyond physical access, harbour resilience also depends on contingency planning for essential services. This includes considering measures to reduce reliance on single assets for telecommunications and fuel supply. At present, fuel storage and distribution are concentrated at Fort Bay, creating potential constraints if harbour operations are disrupted. Similarly, the reliance on a single undersea cable landing underscores the importance of planning for telecommunications continuity during extreme events. This highlights the importance of contingency planning to strengthen redundancy and operational flexibility across critical harbour-based services.

Without coordinated planning across Fort Bay Harbour, Black Rocks Harbour, Fort Bay Road, and associated contingency measures, Saba will remain vulnerable to disruption and cascading service impacts during major events. Future-proofing the island's lifelines therefore requires a networked infrastructure approach, supported by structural financing, cross-sector coordination, contingency and continuity planning, and long-term maintenance and asset management.

The Energy Transition

The transition toward electric mobility underscores the importance of coordinated planning between the energy and transport sectors. Beyond infrastructure readiness, this includes ensuring appropriate safety protocols, emergency response capacity, and training—particularly for fire and rescue services—to address the specific risks associated with electric vehicles. Integrating these considerations into mobility and energy planning will be essential to enabling a safe, affordable, and resilient shift toward cleaner transport. *(See Adaptation/Mitigation Objective 4.1 for the related action)*

Action Agenda

Core Adaptation Challenge 3.1: Disaster Risks

Saba's risk management is shaped by its small size, steep terrain, and exposure to increasingly unpredictable and severe climate hazards. While the island has strong experience with hurricane preparedness, response and recovery, evolving climate patterns—including more frequent, overlapping events and prolonged disruptions—are placing greater pressure on systems that support emergency response, continuity of essential services, and recovery. These dynamics highlight the need to strengthen not only crisis response, but also contingency planning and continuity arrangements that enable the island to function safely during and after disruptions.

Adaptation Objective 3.1:
Strengthen disaster preparedness, contingency planning, and response capacity to ensure continuity of essential services and community safety during climate-related disruptions.

Identified Key Actions:

- Continue to integrate compound and cascading climate risks (e.g. heat–drought–storm sequences, rapid hurricane intensification etc) into Saba's disaster risk management and contingency planning frameworks.
- Improve localised weather and wind monitoring to better capture microclimatic variations caused by Saba's steep topography.
- Strengthen access to sustainable financing and compensation mechanisms to support reconstruction and recovery capacity, in alignment with relevant regional and Kingdom-level arrangements.
- Ensure essential services and critical infrastructure have backup power via diesel generators or solar and battery storage in case of prolonged outages.
- Strengthen locally adapted emergency communication and alert systems, using radio, WhatsApp groups, and trusted community leaders to ensure timely, accessible information during emergencies.
- Provide training for storm clean-up and emergency response, expanding local capacity for rapid mobilisation.

Core Adaptation Challenge 3.2: Infrastructure Vulnerability

Saba's critical infrastructure is highly vulnerable to climate hazards because multiple essential services—including healthcare, energy, water, telecommunications, and port access—are delivered through a tightly interconnected system with limited redundancy. Disruption to the island's primary access routes or harbour infrastructure due to severe weather, flash flooding, landslides, or rockfall can rapidly cut off emergency care, interrupt utilities, and block the delivery of vital supplies. As a result, a single infrastructure failure can cascade into widespread and prolonged service disruption across the island.

Adaptation Objective 3.2: Ensure the continuity of essential services by reducing single points of failure and embedding redundancy, contingency capacity, and adaptive planning across Saba's critical infrastructure systems.

Identified Key Actions:

- Expand and decentralise emergency reserves of food, water, fuel, and medical supplies across the island, ensuring availability during extended disruptions (target for example: 3-month supply).
- Build the new access road to link Black Rocks Harbour to Giles Quarter, reducing dependency on the single harbour access point and improving redundancy in roads.
- Implement telecommunications redundancy solutions for the undersea cable landing point at Fort Bay, in coordination with Satel and National Government.
- Establish a dedicated, multi-year financing mechanism to support lifecycle asset management of critical harbour and access-road infrastructure, including monitoring, maintenance, and post-event repairs.
- Ongoing review of Fort Bay Harbour's exposure to future climate risks and identify priority adaptation measures for phased implementation over time.
- Integrate deployable backup systems (e.g. generators, solar units, mobile water purification) to provide temporary emergency coverage when primary infrastructure is disrupted.





DOMAIN 4:

Liveable Environment

Built environment, infrastructure, utilities.

Overview of Challenges and Vulnerabilities

Saba's built environment, including its homes, roads, utilities and public spaces, is already being shaped by climate change. Rising temperatures, more intense rainfall and increasingly frequent extreme weather events are increasingly part of everyday life on the island. Together, these changes influence how people live, move and spend time outdoors. Responding to these conditions means ensuring that buildings, streets and public facilities support everyday comfort and economic activity, while remaining robust enough to withstand stronger storms and hurricanes, as well as rising temperatures and heatwaves.

As temperatures rise, thermal comfort is becoming an increasingly important consideration in housing and building design. During stakeholder engagement, some participants noted that some homes retain heat well into the evening when compared to others, which increases household reliance on air conditioning to maintain comfortable indoor conditions. Air conditioning, once largely a seasonal expense, was described as increasingly becoming a year-round necessity, even during the Caribbean winter. For many Sabans, particularly those with limited financial means, the increased need for cooling and its associated costs have become an added strain on household budgets.

Increasing temperatures and heatwaves are also affecting outdoor life on the island. Stakeholders noted increasing discomfort along unshaded roads, reduced usability of unshaded playgrounds during hotter periods, and the need for more shaded areas at schools where students can gather during breaks. While positive steps were acknowledged, such as the addition of a shade structure at Queen Wilhelmina Park, participants generally observed the need for more shaded areas distributed evenly across the island where people can rest or gather.

Taken together, these observations suggest that relatively modest measures, including tree planting, maintenance of existing trees, roadside shelters and shaded pavilions, may play an increasingly important role in supporting outdoor comfort, public health and social interaction as temperatures continue to rise.

Utilities

Saba's electricity system provides a strong example of infrastructure resilience and strategic self-sufficiency in a small-island context. Guided by the **2016 BES-wide Energy Policy Framework**, the island has made substantial progress in reducing

dependence on diesel generation while strengthening the robustness of its power supply. The framework recognised Saba's steep terrain, isolated grid, and limited technical capacity as constraints, yet set out a realistic pathway for transition through solar generation, storage, and integrated planning. Since then, implementation on Saba has advanced significantly.

The current electricity system combines a conventional power plant with large-scale solar generation, with further expansion planned. Two adjoining solar parks near the airport are already operational and together supply close to 40 per cent of the island's total electricity demand, significantly reducing reliance on diesel. A third solar park, planned for Giles Quarter, is expected to increase the renewable share to almost 80 per cent, with further improvements anticipated in the near future. This progress represents a notable achievement for a small and geographically constrained island system.

From a resilience perspective, Saba's electricity network has been deliberately designed to reduce exposure to storm-related damage. Electricity distribution lines have been placed underground, substantially lowering the risk of outages during extreme weather events and minimising the likelihood of cable disconnection. As a result, the system already incorporates a high degree of built-in redundancy, and resilience is not considered a limiting factor in current operations. In this regard, Saba's electricity infrastructure stands out as comparatively robust within the region.
This relatively robust and increasingly renewable electricity system provides an important enabling condition for the gradual electrification of transport. However, the uptake of electric vehicles must be carefully managed to avoid unintended pressure on the grid, particularly during peak demand periods, and to ensure that charging infrastructure is deployed in a safe, coordinated, and spatially appropriate manner.

Looking ahead, the primary challenge is not system reliability, but managing higher shares of renewable energy within a small, isolated grid. As highlighted in the *2016 BES-wide Energy Policy Framework*, increasing renewable penetration requires sufficient battery storage and careful grid management to balance supply and demand, particularly during nighttime hours or periods of low solar generation. While geothermal energy has been identified as a potentially promising option to diversify the renewable energy mix, its development remains exploratory due to feasibility, cost, and uncertainty, and is therefore not currently a core component of the island's plans for further development of the energy mix.

Reaching renewable energy levels beyond the planned 90 per cent would require further advances in grid management, storage technologies, and system flexibility—challenges faced by island grids globally. Given the significant progress already achieved, the current focus remains on consolidating system performance while monitoring global developments in renewable technologies and storage. Continued research into longer-term options, including geothermal potential, remains relevant in this context.

Affordability has also been a central consideration throughout the transition. Due to the high costs associated with small-scale island grids, Dutch government subsidies continue to play an important role in keeping electricity tariffs manageable

for households and businesses. The impact of increased need for air-conditioning on household budgets and energy subsidies reinforces the recommendation for improved building design, passive cooling strategies, and updated codes that support both thermal comfort and energy efficiency, alongside continued climate-proofing of critical infrastructure. Similar affordability considerations apply to electric mobility, reinforcing the importance of phased implementation, public transport solutions, and shared systems over rapid private vehicle uptake.

Infrastructure Backlog

The 2024 *Klein Gebied, Grote Opgave*[55] report highlights that a significant share of Saba's physical infrastructure is approaching the end of its design life or was not originally built to accommodate the combined pressures of steep topography, heavy rainfall, and intensifying climate impacts. The report notes that many roads, retaining walls, drainage systems, public buildings, and harbour infrastructure all require ongoing reinforcement, adaptation, or replacement.

In particular, the report notes that limited stormwater infrastructure means that intense rainfall is largely conveyed via roads, increasing wear, sediment transport, and the risk of service disruption *(see Domain 2 and Domain 3 for more information)*. At the same time, many public buildings require both structural and thermal upgrades to remain fit for purpose under changing climate conditions.

This infrastructure backlog does not only increase vulnerability during storms, but also constrains Saba's ability to accommodate new housing, expand essential services, and support economic development. The report underscores that addressing these challenges will require sustained investment over multiple years, alongside sufficient implementation capacity for planning, construction, and maintenance. Without a coordinated and long-term approach, existing infrastructure pressures are likely to continue shaping both resilience outcomes and development options on the island.

Land Ownership

An additional persistent structural challenge affecting Saba's liveable environment is moreover the unresolved issue of land ownership. The lack of clarity and availability of publicly owned land creates a significant bottleneck for government-led projects, particularly those requiring physical space for implementation. This constraint compounds other development challenges—limiting the ability to expand infrastructure, create public amenities, or implement adaptation measures such as erosion control, water storage, and green space development. While resolving land tenure issues falls outside the direct scope of this Climate Plan, it remains a critical underlying factor that will influence the feasibility and pace of many adaptation actions that depend on access to land.

[55] Andersson Elffers Felix (AEF), 2024. Klein gebied, grote opgave: Investerings- en onderhoudsopgave fysieke infrastructuur Caribisch Nederland. Bijlage 1. Report commissioned by the Ministry of the Interior and Kingdom Relations (BZK).

Building a Resilient Foundation: Ongoing Programs and Policy Anchors

Saba is working to strengthen liveability and climate resilience through integrated spatial planning, infrastructure investment, and energy transition policies. National and local policies—such as the BES Energy Transition Policy Framework, the BES Spatial Development Program, and the Saba Spatial Development Plan (which is under development) —provide the foundation.

1. Spatial Development Program Caribbean Netherlands (2020–2025)

The BES-wide Spatial Development Program sets out the national framework for physical development in Bonaire, St. Eustatius, and Saba. It underpins the spatial development plan being developed for the island, and serves as a key guiding document for embedding climate resilience, environmental protection, and liveability in future development decisions on the island. Key contributions to the Liveable Environment domain include:

- **Prioritising climate-resilient land use** by requiring critical infrastructure (e.g. energy, water, emergency services) to be located in safe and accessible areas, and by ensuring that emergency services retain reliable access to key parts of the island under both normal and extreme weather conditions. This includes climate-proofing essential and sensitive functions such as homes and schools.
- **Supporting future-proof housing** development by aligning construction with actual population needs and affordability goals. Housing construction targets include at least 66% affordable rental and middle-income units.
- **Encouraging integration of green infrastructure**—such as parks and tree canopy—in urban and village areas to combat heat stress, increase liveability, and support nature-inclusive design.
- **Reinforcing water management and erosion control** through spatial strategies that buffer rainwater, reduce runoff damage, and designate zones for greywater, drainage, and retention—especially important for Saba's steep terrain.
- **Facilitating renewable energy transition** by ensuring spatial plans accommodate solar energy generation and storage infrastructure, aligned with the national target of 80% renewable energy by 2030.
- **Calling for integrated policy development** across sectors (e.g. energy, housing, agriculture) and structured consultation between the Public Entity and national government to shape coherent, climate-adaptive spatial policies.

2. Spatial Development Plan Saba (under development)

Saba's first island-wide Spatial Development Plan is underway and marks a pivotal opportunity to embed long-term climate resilience into how the island grows, adapts, and protects its people and places. Carried out by the Public Entity Saba (PES), the plan will introduce a strategic framework for land use, zoning, and development regulation—areas that have long lacked enforceable guidelines tailored to the island's unique context.

The island's spatial plan, which is being developed in partnership with the community, represents a chance to embed resilience into land-use decisions— for example by setting minimum cistern standards, protecting natural cooling systems like green areas and tree canopies, zoning for climate-smart infrastructure, and guiding where and how to build for both heat and hurricanes.

However, the planning process currently lacks critical climate and spatial data to fully assess vulnerability or guide climate-proofing efforts. While planners have a general understanding of where infrastructure is concentrated and what areas may be at risk, the absence of integrated, spatially referenced climate data remains a major constraint. A coordinated data strategy is needed to enable long-term, climate-informed decision-making across sectors.

Key missing datasets include:

- Updated erosion and landslide risk mapping based on slope, soil, vegetation, and drainage
- Projected shifts in climate and vegetation zones, including risks to the cloud forest
- Spatial weather and temperature patterns across the island, including projections for heat and rainfall
- Coastal and marine climate impacts, including storm surge exposure and coral reef vulnerability
- Rainwater catchment mapping and flood-prone zones (currently under development)
- Vulnerability overlays showing exposure of key infrastructure and social services

In addition, there is also a need for legal and regulatory alignment. Existing building codes—adapted from the European Netherlands—are not fit for local conditions. A revised code is under development, with calls for practical, hurricane-proof, and low-tech solutions that are both affordable and enforceable. Other regulatory reforms—such as legislation on livestock, land use restrictions, and environmental protection will also need to be aligned with the spatial plan and the island's climate goals.

Action Agenda

Core Adaptation/ Mitigation Challenge 4.1: Decrease Emissions

While the primary focus of this Climate Plan is on adaptation, reducing greenhouse gas emissions remains an important co-benefit, particularly in sectors such as electricity generation, cooking, and transport, where dependence on imported fossil fuels drives both emissions and vulnerability. Progress in these areas can support improved energy security, cost stability, and overall system resilience.



Adaptation/Mitigation Objective 4.1:
Expand renewable energy infrastructure and improve clean mobility options.

Identified Key Actions:

- Complete the new solar park by 2027, with battery storage targeting 60–70% renewable energy coverage.
- Design a roadmap to reduce cooking gas use by 2035, starting with subsidies and education on electric alternatives.
- Facilitate the transition to energy efficient appliances (e.g. induction stoves, energy efficient air conditioning units etc) including investigating affordability and subsidies.
- Expansion of the public (green) transport system, and investigation into additional mobility system options to reduce car dependency, alleviate the parking problem, and enable the development of more “walkable” and permeable streets.
- Explore and implement possibilities to equip the fire department with necessary equipment and skills to enable a safe shift to EVs.
- Installation of at least 2 public EV charging stations and gradual transition of government fleet to EV and/or biofuels.

Core Adaptation Challenge 4.2: Designing for a Changing Climate

Saba's built environment is increasingly exposed to the stresses of climate change. This exposure affects how buildings perform under conditions of increasing heat, hurricane intensity, and changing rainfall patterns. Strengthening climate resilience through integration of climatic design, targeted retrofitting, and guidance for future development can support safety, comfort, and long-term sustainability under changing climatic conditions.

Adaptation Objective 4.2: Climate resilient building → future-proofing the built environment through affordable climatic design.

Identified Key Actions:

- Build on existing renovation grants for vulnerable residents that are focused on improving housing safety and liveability (e.g. roofs, shutters, electrical systems), to incorporate climate resilience measures (e.g. passive cooling, energy efficient cooling, thermal insulation etc). Where feasible, consideration could be given to supporting other households based on vulnerability, housing condition, and adaptation needs.

- Embed climate adaptation in the spatial development plan, ensuring future-proof zoning and land use, including a structured review of the plan through a climate risk and resilience lens.

- Improve collection and accessibility of climate data for informed development decision-making.

  » Set up a basic local weather and erosion monitoring system, using rain gauges, temperature sensors, and manual data collection where needed.

  » Gather data on heat, water speed, and runoff in priority zones, if possible with assistance from local interns or community members.

- Pilot basic retrofits for cooling and energy efficiency in a small number of social homes.

- Retrofit existing public buildings to improve energy efficiency, shading, and structural resilience.

- Examine how traditional building practices (materials, construction techniques and building siting) responded to the climate, and develop a series of best practices (Building Design Guide) for future-proofing the built environment focused on hurricane proofing, passive cooling, climate resilience, sustainable building materials, and energy efficiency that is aligned to the island's architectural heritage.

- Construct new social housing as a demonstration of the climate-proof Building Design Guide. Investigate pairing housing delivery with appliance subsidies for energy-efficient cooling and induction cooking to reduce dependence on gas.

- Launch construction skills training for contractors to meet climate resilient building codes and standards in housing and public infrastructure.

- Support the development of building codes that promote hurricane resistance, passive cooling, insulation, and the use of green building materials (e.g. wood-composite shingles, ventilated roofs).

Core Adaptation Challenge 4.3: Increasing Temperatures

As rising temperatures and more frequent heatwaves make outdoor spaces increasingly uncomfortable, much of Saba's public realm lacks the basic shade and climate-smart design needed for hot days. Playgrounds, gathering areas, and walking routes often offer little protection from the sun. Expanding access to shaded, climate-responsive spaces is essential for a healthy, inclusive, and liveable island in a warming world.

Adaptation Objective 4.3: Climate Responsive Urban Spaces → expand access to shaded and climate-friendly public spaces.

Identified Key Actions:

- Construct additional shade structures and benches at high-use sites (e.g. government buildings, hospital, schools, playgrounds, public recreational spaces, etc).

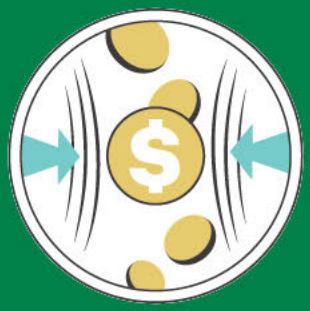
- Add trees or shade structures to existing playground that lack shade. And build shaded playgrounds in villages lacking these facilities (e.g. Hell's Gate), with attention paid to child safety and usability during hot hours.

- Explore the possibility of developing a mechanism to reclaim/transform vacant and abandoned plots into pocket parks, involving interested community members in co-designing these places of respite from the heat.

- Explore context-appropriate ways to improve walkability in The Bottom by introducing shade where feasible, including through collaboration with adjacent landowners.

- Investigate needs for shade/cooling/climate measures in Windwardside and





DOMAIN 5:

Economic Resilience

Resilient livelihoods, entrepreneurship, trade, industries.

Overview of Challenges and Vulnerabilities

Saba's economy is marked by extreme small scale, geographic isolation, and a narrow economic base, making it especially vulnerable to climate impacts and external economic shocks. Its primary pillars—public sector employment, the medical university, tourism, and fisheries—offer some stability, but little structural resilience. The island's gross domestic product grew by just 1.5% in 2022, underscoring the limited expansion of the private sector and continued reliance on public investment to drive growth.[56]

These structural limitations reflect the classic challenges faced by small islands: high per-unit costs due to diseconomies of scale, dependency on imported goods, and vulnerability to global disruptions.[57] Entrepreneurs face an environment where both living and operating costs are prohibitive, with business expenses ranking among the highest in the Kingdom. Without structural investment in enabling systems, private-sector development remains constrained.[58]

Freight costs are inflated by the requirement to route imports through St. Maarten, and taxation on the full landed value (including shipping and insurance) adds further burden. On Saba, the 6% ABB (general expenditure tax) are calculated on the CIF value—including cost, insurance, and freight—and not on the product value, which makes imports even more expensive, even when they are for productive business use.[59]

A central and persistent barrier to economic resilience—especially for tourism and trade—is the lack of affordable and reliable connectivity. Saba is dependant on Winair for commercial flights, and can only be accessed by air via St. Maarten. There are no regular direct air connections to St. Eustatius or St. Kitts, despite historic links. Air connectivity is further constrained by dependency on favourable weather conditions and the limited operating hours of the airport.

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[56] Centraal Bureau voor de Statistiek (CBS) (2024a) Caribbean Netherlands GDP 2022: Saba up by 1.5%. The Hague: CBS.

[57] Ministry of Economic Affairs and Climate Policy (EZK) and Ministry of the Interior and Kingdom Relations (BZK) (2025a) Situatieschets en Prioriteiten per Eiland. The Hague

[58] Mak, M., van Buiren, K., Bronkhorst, K., and Nanne, J., (2024). Steep island, high prices. Study into the causes of and solutions to the high cost of living on Saba. Amsterdam Bureau for Economics (Economisch Bureau Amsterdam); Saba Package Agreement (2023) Agreement between the Government of the Netherlands and the Public Entity Saba.The Hague: BZK / PES.

[59] EZK, BZK., 2025a.; Rijksdienst Caribisch Nederland (RCN) (2024) Public Service Obligation (PSO) Impact Study – Windward Islands.Kralendijk.

Flights between Saba and St. Maarten are brief (15 minutes) but prohibitively expensive, with costs comparable to longer international flights to major destinations. This pricing creates significant barriers to regional travel and inbound tourism.[60]

Although the Makana ferry provides a more affordable alternative, its schedule limits same-day inter-island travel. It is also impacted by weather conditions and limited contingency capacity in the event of breakdowns. While the ferry is currently subsidised, it is far more costly than ferry transport in the European Netherlands. The temporary nature of this subsidy threatens the viability of this already fragile service.[61]

In this context, tourism —which accounts for roughly 7% of Saba's GDP—cannot flourish as a reliable economic pillar.[62] Although the island has a unique eco-tourism offering that includes diving, hiking, and biodiversity, it lacks both the infrastructure and accessibility to capitalise on these assets. Climate change adds a further layer of complexity, as coral reef degradation, storm damage, and rising operational costs may impact the competitiveness of Saba's tourism offering.

Building a Resilient Foundation: Ongoing Programs and Policy Anchors

The mechanisms and recommendations below, drawn from island-level strategies and national frameworks, highlight current and proposed responses to strengthen Saba's economic resilience.

1. Public Entity Saba (2023) Saba Tourism Master Plan 2023–2028.[63]

- Position Saba as a low-impact, high-value eco-tourism destination by diversifying product offerings (e.g. heritage, science, and hiking tourism), improving visitor experience, and aligning branding with authenticity.
- Strengthen regional and international marketing by collaborating with St. Maarten and Statia tourism boards and integrating Saba into broader travel circuits.
- Develop or connect with an existing quality assurance system for accommodations, guides, and tour services—including licensing, sustainability standards, and community training.
- Improve tourism infrastructure and signage, particularly on trails and public spaces, while protecting environmental integrity.
- Collect and analyse tourism data consistently to support evidence-based planning and targeted promotion.

[60] Mak, et. al.,2024
[61] EZK & BZK, 2025a; Saba Package Agreement, 2023
[62] CBS, 2024
[63] Openbaar Lichaam Saba (OLS) (2023) Saba Tourism Master Plan 2023–2028. The Bottom: Public Entity Saba.

2. SEO Economic Research (2021) Public Service Obligation (PSO) Impact Study – Windward Islands.[64]

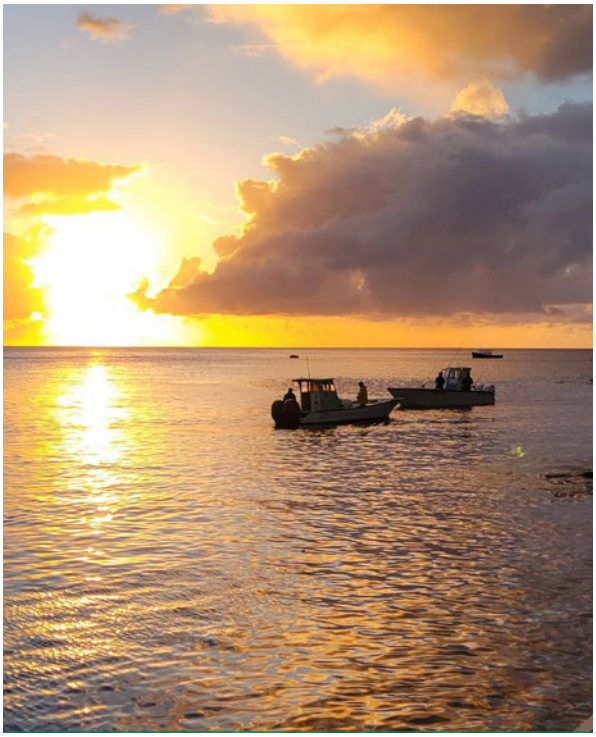
- Ensure affordable and reliable essential inter-island air and ferry links by embedding Saba's air and sea routes in a multi-year PSO regime with clearly defined service levels and cost coverage.
- Establish PSO criteria that reflect economic development and public service access, not just commercial viability—e.g. allowing same-day return ferry service for business, education, and tourism (Saba is working on this currently).
- Ensure predictable and affordable ticket pricing, especially for residents and small businesses reliant on regional supply chains and networks.

3. National Office for the Caribbean Netherlands (RCN) (2023) Situation Overview and Priorities per Island.[65]

- Continue the implementation of the Tourism Master Plan 2022–2028, which prioritizes professionalizing tourism services, expanding training in hospitality and guiding, enhancing digital visibility, and building strategic partnerships with tour operators and regional travel platforms.
- Expand vocational education programs aligned with infrastructure development to retain wealth and employment on-island.
- Anchor knowledge retention by attracting higher education institutions in climate, biodiversity, and sustainable development to support youth retention and community-based conservation.

4. Ministry of the Interior and Kingdom Relations (BZK) (2023), Parliamentary Letter on Economic Self-Reliance & Senate Report.[66]

- Reform customs and ABB taxation to better serve microenterprises, by shifting away from CIF-based levies and ensuring imports for productive use are not disproportionately penalized.
- Develop an integrated infrastructure agenda, including investments in warehousing, cold storage, and commercial units, in coordination with national ministries (in progress).



[64] SEO Economisch Onderzoek (2021) Public Service Obligation impact study for the Windward Islands. Amsterdam: SEO, commissioned by the Ministry of Infrastructure and Water Management.
[65] Rijksdienst Caribisch Nederland (RCN) (2023) Situatieschets en prioriteiten per eiland: Caribisch Nederland. The Hague: Government of the Netherlands.
[66] Ministerie van Binnenlandse Zaken en Koninkrijksrelaties (BZK) (2023) Kamerbrief inzake economische zelfredzaamheid Caribisch Nederland. The Hague: Government of the Netherlands.

5. Ministry of the Interior and Kingdom Relations (BZK) (2023), Letter of Intent on Economic Development in the Caribbean Netherlands.[67]

- Define a shared governance framework that clearly allocates economic development mandates between The Hague, PES, and public-private stakeholders.
- Modernize regulatory frameworks, including streamlining establishment laws and reviewing export and import procedures.
- Expand climate-aligned entrepreneurial training, targeting Sabans with limited access to opportunity—especially youth and women.
- Foster sustainable enterprise hubs, focused on circular economy, eco-tourism, and fisheries value chains.
- Increase participation in value-added sectors, such as renewable energy services and scientific tourism, through targeted investment and business facilitation.

Action Agenda

Core Adaptation Challenge 5.1: Tourism Sector Vulnerability

Saba's tourism industry is highly exposed to climate risks because it relies so heavily on diving and hiking—sectors threatened by coral bleaching, erosion, storm damage, and extreme weather. This narrow focus limits year-round tourism and increases economic vulnerability. Diversifying Saba's tourism portfolio and investing in sustainable, high-value experiences is essential for building sector resilience and sustainable growth.

Adaptation Objective 5.1:
Investment and development of a high value, year-round ecotourism sector.

Identified Key Actions:

- Promote a complementary 'Unspoiled Queen' tourism product portfolio beyond diving and hiking, such as nature-based wellness and education tourism.
- Encourage sustainable hospitality investment (e.g. small-scale, heritage-based lodging that align with cultural and environmental goals).
- Improve connectivity and affordability (e.g. more competitive flights, better ferry schedules) to make Saba accessible to longer-staying tourists (for example via the implementation of the Public Service Obligation[68]).
- Investigate the implementation of a tourism nature fee for all arrivals on island to help fund conservation and tourism infrastructure.

[67] Ministerie van Binnenlandse Zaken en Koninkrijksrelaties (BZK) (2022) Intentiebrief economische ontwikkeling Caribisch Nederland. The Hague: Government of the Netherlands.
[68] SEO Economisch Onderzoek (2021) Public Service Obligation impact study for the Windward Islands. Amsterdam: SEO, commissioned by the Ministry of Infrastructure and Water Management.

Core Adaptation Challenge 5.2: Limited Economic Opportunities

Saba's economy is shaped by its small scale, geographic isolation, and reliance on a limited number of sectors, which together increase exposure to climate-related risks and external shocks. These structural conditions, alongside high living and business costs, influence the range and viability of local economic opportunities.

Adaptation Objective 5.2:
Support the development of pathways that connect climate adaptation and mitigation with sustainable economic development.



Identified Key Actions:

- Explore local waste valorisation possibilities including household-level waste separation and business incentives.
- Support pilot projects (e.g. syntropic food forests, sustainable housing prototypes, recycled material innovations) that can serve as learning labs and innovation testbeds for sustainable development.
- Explore the viability of creating incentive schemes (e.g. tax relief, startup packages, land leases) that encourage skills, investment, and participation in local green sectors, including by residents who are interested in returning to the island.
- Strengthen skills pathways for climate-adaptive sectors by embedding practical training across secondary, vocational, and applied learning programmes with aim to increase needed skills on island.
- Promote structured work-based learning opportunities—such as job-shadowing, apprenticeships, and internships—linked to climate adaptation priorities and the circular economy.
- Empower community-led action by supporting small-scale local initiatives (e.g. micro-grants and leadership training) that advance adaptation outcomes and contribute to community wellbeing and local economic activity.



DOMAIN 6:

Community & Culture

Community, cultural heritage protection.

Overview of Challenges and Vulnerabilities

Community life and cultural heritage are integral to Saba's identity and long-term resilience. In small island contexts, cultural assets, social networks, and place-based knowledge are widely recognised as important enabling conditions for climate adaptation, disaster preparedness, and recovery [69] (IPCC, 2022; UNESCO, 2019). Alongside physical infrastructure and ecosystems, these factors influence how communities prepare for, respond to, and recover from environmental change.

This section draws primarily on stakeholder engagement undertaken as part of the climate adaptation planning process. Observations relating to social and cultural dynamics reflect perspectives shared during interviews and workshops and are intended to inform adaptation planning rather than to present definitive or statistically representative assessments of social change.

Community Participation

Saba is widely recognised as a close-knit community with strong traditions of mutual support and civic participation. Stakeholders highlighted that sustaining these strengths requires careful consideration of community capacity, particularly in the context of increasing economic pressures and the growing complexity of policy and planning processes.

Some stakeholders noted that participation in consultations and community initiatives can be affected by limited time, resources, and clarity regarding follow-up and implementation. These observations point to the importance of designing climate adaptation measures that are realistic, inclusive, and aligned with existing community capacities, while providing clear feedback on how community input informs decision-making.

Maintaining trust, transparency, and shared responsibility between institutions and residents was identified as an important enabling condition for successful implementation of climate adaptation actions, consistent with findings from small island adaptation literature emphasising the role of social capital and institutional trust.[70]

[69] IPCC, (2022). Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.
[70] IPCC, 2022

"When we was we"

Stakeholders emphasised the value of Saba's tangible and intangible cultural heritage, including oral histories, traditional practices, craftsmanship, place-based knowledge, and the Saban English dialect, whose words and expressions reflect the island's culture and way of life. They also highlighted the importance of strong social ties between families, neighbours, and the diaspora as part of this broader cultural fabric. Together, these cultural and social assets contribute not only to identity, but also to practical understanding of local landscapes, weather patterns, and historical risk-management practices.

Ensuring that cultural knowledge continues to be documented, shared, and accessible was identified as an important consideration for long-term resilience. Stakeholders noted opportunities to strengthen the role of education, community programmes, and local institutions in supporting cultural continuity, without prescribing specific approaches or interventions.

International policy frameworks increasingly recognise cultural continuity as a component of sustainable development and resilience, particularly in small and vulnerable communities.[71] Within this context, stakeholders broadly agreed that safeguarding cultural heritage supports social cohesion and adaptive capacity in the face of long-term environmental change.

[71] UNESCO, 2019. Culture in the Implementation of the 2030 Agenda. Paris: United Nations Educational, Scientific and Cultural Organization.

Fragile Architectural Heritage

Saba's built heritage, including traditional (wooden) cottages, historic pathways and rockwalls, and coastal landing sites such as Ladder Bay, forms a key part of the island's cultural identity and heritage landscape. These structures are more than historical artifacts, they represent generations of climate-responsive design and resourceful craftsmanship.

The Ladder, in particular, was for centuries the island's primary point of access, where all people, goods, and supplies were brought ashore and carried by hand up the steep steps from Ladder Bay to the settlements above. As such, it represents a defining element of Saba's history and identity, and its preservation is important to maintaining this connection to the island's past.

Stakeholders and technical experts noted that several heritage sites are increasingly exposed to environmental stressors such as coastal erosion, intense rainfall, storm surge, and slope instability. Ladder Bay, once the island's primary point of arrival, has been identified as particularly vulnerable to ongoing erosion and extreme weather impacts.

Preservation efforts face practical challenges. Most heritage buildings are privately owned, and there is currently limited dedicated funding or regulatory support for their maintenance. High restoration costs and a lack of incentives were cited as barriers to preservation, particularly where investments do not generate immediate financial returns.

The Monument Policy under development, which identifies priority sites for protection, was highlighted as an important step toward strengthening heritage governance. Stakeholders emphasised that its effectiveness will depend on complementary funding mechanisms, technical assistance, and clear legal frameworks.

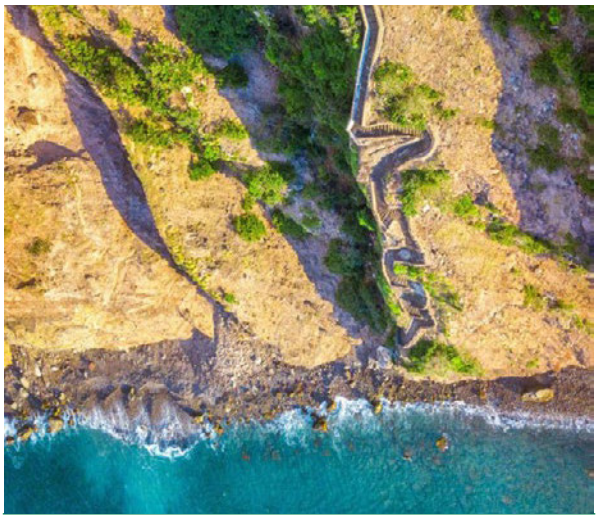
International research has increasingly highlighted the role of traditional and vernacular architecture in supporting climate-responsive design, particularly in warm, hazard-prone, and resource-constrained environments.[72] Integrating relevant design principles into future construction and renovation—where appropriate and feasible—may therefore support both heritage preservation and climate adaptation objectives.

Strengthening Cultural Governance and Institutional Alignment

To date, efforts to preserve and promote Saba's cultural heritage have taken varied forms, often reliant on short-term projects or external expertise, which can make sustained follow-through challenging. Stakeholders have highlighted opportunities to strengthen continuity, build local capacity, and enhance coordination among island institutions, the Netherlands, and regional partners. The cultural policy that is being developed aims to improve cross-sector integration and collaboration.

The recent visit by UNESCO underscores the growing recognition of Saba's unique cultural and natural landscape. Discussions focused on the potential for future heritage designations and the importance of linking conservation efforts—such as the protection of Ladder Bay and associated sites—to broader strategies for climate resilience. These conversations have highlighted the importance of planning tools, legal protections, and engineering expertise to safeguard vulnerable heritage assets, including those located in marine or privately owned areas.

Complementary efforts are also underway to digitise local archives and strengthen the island's historical record. With the cultural policy as a central anchor, these initiatives offer a timely opportunity to create a more coherent and future-facing cultural agenda—one that supports both the preservation of Saba's identity and its adaptation to a changing climate.



Photograph: © Kai Wulf

[72] ICOMOS, 2019. The Future of Our Pasts: Engaging Cultural Heritage in Climate Action. Paris: International Council on Monuments and Sites.

Action Agenda

Core Adaptation Challenge 6.1: Vulnerable Groups

Climate change will place increasing pressure on Saba's healthcare and social support systems. Vulnerable groups—including seniors, low-income households, and isolated residents—are especially at risk from heat stress, vector-borne diseases, emerging health threats, and disrupted access to (off-island) healthcare caused by climate hazards. Gaps in public awareness, preparedness, and mental health support further undermine community resilience. Addressing these challenges will require targeted investments in climate-ready healthcare, social outreach, and infrastructure improvements to protect the wellbeing of all Sabans in a changing climate.

Adaptation Objective 6.1: Strengthen healthcare and social infrastructure → to respond to climate-related stressors.

Identified Key Actions:

- Strengthen targeted community outreach and awareness programmes for vulnerable groups, including home visits, local radio, and preparedness campaigns focused on heat risks, hydration, and household readiness.
- Expand community-based support and monitoring initiatives (e.g. Meals on Wheels, neighbourhood check-ins), building on existing support provided by the Social Services Unit, to ensure isolated and at-risk residents are supported during heatwaves, extreme weather events, and other crises.
- Strengthen prevention and response capacity for climate-related health risks, including vector-borne diseases, emerging health threats, and future pandemics.
- Integrate mental health and psychosocial support into climate preparedness and recovery planning, including trauma-informed services, youth-focused programmes addressing environmental anxiety, and community-based recovery initiatives.
- Develop and implement community-based contingency and preparedness plans for compound climate events, including clear household guidance and coordinated response protocols.

Core Adaptation Challenge 6.2: Cultural Heritage at Risk

Saba's cultural heritage—both its historic sites and living traditions—is increasingly exposed to climate-related pressures, including erosion, more intense storms, and rising maintenance demands. These pressures affect iconic landmarks, such as Ladder Bay, as well as traditional Saban cottages and community spaces that contribute to the island's cultural identity. As climate risks intensify, there is a growing need to strengthen the frameworks, resources, and coordination that support the protection, maintenance, and celebration of both tangible and intangible heritage. Ensuring that cultural heritage is safeguarded as part of Saba's climate response will help sustain community identity, continuity, and resilience over time.

Adaptation Objective 6.2:
Cultural Heritage Protection → Strengthen cultural resilience by safeguarding heritage, traditions, language and community identity in the face of climate change

Identified Key Actions:

- Ensure restoration and maintenance of The Ladder„ taking into account climate-related risks such as erosion, and the impacts of storm surge.
- Advance policy to link climate resilience and cultural identity, ensuring heritage remains at the core of long-term planning and investment.
  - » Establish legal protections and a monument fund to conserve traditional Saban homes under threat, including support for maintenance using resilient materials.
  - » Integrate heritage into spatial development planning, including preservation of traditional architecture, culturally important townscapes, archaeology and cultural landscapes.
- Support cultivation of traditional medicinal plants, map their uses as part of reforestation and biodiversity efforts and ensure knowledge sharing on this topic.
- Create a digital archive of cultural records and document oral histories and traditions, including the Saban dialect, to support the safeguarding of tangible and intangible cultural heritage over time.
- Support intergenerational tangible and intangible knowledge transfer by engaging youth and elders in documenting and sharing traditional knowledge through school projects, oral histories, and intergenerational workshops.
- Celebrate cultural heritage at community events, linking identity and climate action through storytelling, food, music, and visual arts.





DOMAIN 7:

Education and Awareness

Climate education and awareness.

Overview of Challenges and Vulnerabilities

Education and awareness are widely recognised as key enabling conditions for effective climate adaptation, particularly in small island contexts where household-level decisions and community preparedness play an important role in building resilience.[73]

The challenges and vulnerabilities identified in this domain draw primarily on the findings of the *Climate Change Public Survey*[74] and *Implementation Recommendations*[75] commissioned by the Public Entity Saba in 2024. Complemented by stakeholder interviews and workshops undertaken as part of the climate plan engagement process. Together, these inputs help clarify how climate information is currently understood, accessed, and acted upon, and where strengthening education and awareness can most effectively support adaptation outcomes.

Climate Change Awareness

The Climate Change Public Survey results show that awareness of climate change on Saba is high, but that this awareness does not consistently translate into practical preparedness. While 95% of respondents indicated that they believe climate change is occurring, only approximately one-third consider themselves well informed, and more than half reported feeling unprepared to protect their homes or families during a climate-related emergency.[76]

These findings suggest that the central challenge is not whether climate change is recognised, but whether information is sufficiently practical, accessible, and actionable to support household-level preparedness. Addressing this gap is a foundational step in strengthening overall adaptive capacity.

How climate knowledge is built over time matters for sustaining preparedness and resilience. Survey findings indicate differences in self-reported climate awareness across age groups, with respondents in the 18–25 age group reporting lower levels of awareness and preparedness compared to older respondents.[77]

Stakeholder engagement with educators and youth programme providers indicates that

[73] IPCC, 2022; UNESCO, 2019
[74] Every, J. (2024a). Climate Change Public Survey Results. Internal Document .Public Entity Saba.
[75] Every, J. (2024b). Implementation Recommendations Report. Climate Plan Phase 1 Community Information. Internal Document. Public Entity Saba.
[76] Every, 2024a; 2024b
[77] Every, 2024a; 2024b

climate change, resilience, environmental conservation and sustainability topics are not yet consistently embedded across formal education pathways. Existing initiatives such as school gardens, environmental projects, thematic activities and public events offer valuable entry points for the development of multi-pronged, long-term, structured programmes.

Strengthening continuity within formal education systems therefore represents an opportunity to build climate literacy incrementally and to ensure that awareness develops into long-term capacity rather than remaining ad-hoc.

Effective Communication

The effectiveness of education and awareness efforts is closely linked to how climate information is communicated. *Climate Change Public Survey* respondents highlighted the value of clear, regular updates and the use of accessible communication channels such as community meetings, public information sessions, and digital platforms. Stakeholder discussions further indicated that practical examples of climate adaptation—such as household-level measures, visible pilot projects, or locally relevant case studies—are not always sufficiently visible to support wider uptake.

Sustained Momentum

For education and awareness to support adaptation over time, initiatives need to be sustained and coordinated across institutions. Stakeholders highlighted that many current efforts rely on short-term projects, external funding, or visiting expertise. While these initiatives are valued, sustaining momentum over time remains a challenge. Embedding climate education and awareness within local institutions, including schools, community organisations, and the public administration, was identified as an important enabler for continuity and alignment.

Additional recommendations put forward to build and sustain momentum include the following:[78]

- Develop and share locally relevant, step-by-step guides for households on climate and disaster preparedness, energy use, water conservation, and food security.
- Integrate climate change education into school curricula and continue Earth Week or Sea & Learn programming that builds environmental literacy from a young age.
- Explore the added value of a central climate information platform accessible to all residents, using existing community communication channels.
- Offer hands-on workshops to teach skills like backyard farming, composting, greywater reuse, and climate-resilient building techniques.
- Preserve and document traditional knowledge through school projects, oral history recordings, and intergenerational workshops.
- Invest in local capacity by training educators, youth leaders, and civil servants to become climate education ambassadors.

[78] Every, 2024b

Action Agenda

Core Adaptation Challenge 7.1: Education and Skills for Climate Resilience

Education plays a central role in sustaining climate knowledge, skills, and capacity over time on Saba. Across formal education, vocational pathways, and community-based learning, education provides the foundation through which climate-related knowledge can be built progressively, reinforced through practice, and carried forward across generations. Strengthening educational pathways that support practical learning, skills development, and knowledge transfer helps ensure that climate awareness is translated into lasting capacity and remains embedded beyond short-term initiatives.

Adaptation Objective 7.1: Education → Building capacity from early childhood through adult learning to drive long-term resilience.

Identified Key Actions:

- Support teacher capacity-building and resource development, in collaboration with education authorities and external partners, to integrate climate mitigation and adaptation education into school curricula.
- Strengthen connections between education and local food systems through practical learning opportunities linked to existing food security initiatives. *(See Domain 1 for detail on local agriculture and food production initiatives).*
- Facilitate access to hands-on learning opportunities for students, in partnership with schools and community organisations like Saba Reach, linked to existing environmental and cultural stewardship initiatives. *(See Domains 2 and 6 for related ecosystem and cultural heritage actions).*
- Promote lifelong learning through community-based workshops and awareness programmes, focusing on practical topics such as composting, backyard farming, energy-saving practices, climate resilient building, etc.
- Support pathways for vocational training and skills development in green sectors, in collaboration with regional institutions and training providers (e.g. renewable energy, regenerative agriculture, energy-efficient building, and water systems).

Core Adaptation Challenge 7.2: Climate Awareness

Climate change is widely recognised as a concern on Saba; however, this awareness does not always translate into practical preparedness. Survey findings and stakeholder input indicate that clearer, more accessible information and locally relevant examples of climate adaptation could better support households and communities in preparing for climate-related risks. Sustained, inclusive awareness initiatives—grounded in local experience and delivered through trusted community channels—can help strengthen preparedness and support community-wide climate resilience over time.

Adaptation Objective 7.2: Public awareness and engagement campaigns → Increasing climate understanding, visibility, and participation across the community.

Identified Key Actions:

- Deliver sustained, year-round climate awareness initiatives that share clear, practical information on climate impacts and actions relevant to daily life on Saba (e.g. home energy savings, cooling measures, local food growing, greywater use), using place-based examples such as rainfall patterns, rising food costs, and shading needs.
- Integrate climate awareness activities into existing community events and public spaces, for example Saba Day, Carnival, King's Day, street fairs, and pop-up sessions, to reach a broad audience through low-barrier, informal engagement formats.
- Promote visible and practical climate actions through storytelling, signage, social media, and demonstrations (e.g. shaded public spaces, vented roofs, water-saving measures), helping to normalise climate conversations and encourage uptake.
- Encourage behaviour-change approaches that make benefits tangible, such as highlighting household savings, comfort improvements, or resource efficiency gains resulting from climate-smart practices.
- Support community participation and local leadership in climate awareness, including training and engaging community members and youth as climate stewards or ambassadors to share knowledge, motivate participation, and reinforce peer-to-peer learning.
- Use visual tools and locally relevant data—such as maps, photos, and simple indicators—to make climate risks and changes more understandable and visible, supporting shared understanding and informed action.







Integrated Climate Roadmap

Recognising that conditions, priorities, and opportunities will continue to evolve, the Domain Action Agendas should be considered as a living document—one that will be updated as projects advance, new partnerships emerge, or challenges or external shocks such as hurricanes occur. To maintain alignment over time, an Integrated Climate Roadmap (see table on next pages) has been developed with domain holders to provide long-term direction, continuity, and accountability.

This roadmap links immediate priorities to Saba's long-term vision for 2100 which emerged from the stakeholder workshops—to remain true to its identity as the *"Unspoiled Queen," as a vibrant island where people and nature coexist in balance, cultural heritage is cherished, and sustainability and climate resilience define everyday life.* It establishes what milestones need to be achieved by 2050 (medium term), the targets established for 2030 (short term), and the immediate priorities for 2026.

By defining clear milestones across these four timeframes, the roadmap ensures that every initiative contributes to a coherent, long-term pathway toward resilience and sustainability. Just as importantly, it provides an agile and iterative structure—enabling actions to evolve and adapt as circumstances change, while remaining anchored to Saba's shared vision and long-term goals.

Table 1: Integrated Climate Roadmap Across all Domains

Domain	2100 Long-term Vision	2050 Medium Term Milestones
 **DOMAIN 1:** Water & Food Security	All residents of Saba have reliable access to affordable, nutritious food, contributing to health, wellbeing, and social stability under long-term climate change and global uncertainty. Diversified local food production contributes to 10% of total fresh produce demand.	Food supply disruptions no longer result in immediate shortages or price spikes, as strategic storage, secured local food production (5% of total demand), and contingency arrangements reduce reliance on just-in-time imports during extreme weather and supply chain disruptions.
	Integrated rainwater management limits flooding and sediment runoff during extreme rainfall, while water storage ensures drought resilience and reliable water supplies for communities, agriculture, and ecosystems.	The island has sufficient water storage capacity to meet at least three months of minimum water demand.
 **DOMAIN 2:** Biodiversity & Ecosystems	The Unspoiled Queen is a global example of climate-resilient biodiversity and the responsible use of ecosystem services.	Saba's terrestrial and marine ecosystems are actively regenerating—serving as climate buffers and economic assets—through species restocking, continuous monitoring, and enforced, science-based regulations.
 **DOMAIN 3:** Risk management, disaster & crisis preparedness & response	The island is fully prepared to withstand and recover from severe droughts, extreme rainfall, heatwaves, hurricanes and the impacts of climate change on global supply chains.	Critical infrastructure is climate-secure, with joint intra-regional resilience initiatives and sustainable financing in place for effective risk management, preparedness, response, and recovery. Completion of the connecting road to Giles Quarter

2030 Short term Targets	2026 - 2027 Immediate Term Actions
Warehouse and cold storage are operational, enabling bulk imports and emergency food storage. Improved availability of inputs for local food production. Increased local food production and community access to local fresh produce.	• Secure funding for the Saba Draft Food Security Proposal • Initiate design and permitting for the warehouse, cold facility, and container yard expansion (see flagship 1). • Initiate steps to secure a property for food production expansion.
Implementation of priority watershed rainwater management solutions to slow down rainwater runoff, mitigate erosion and sediment run-off.	• Development of rainwater management solutions to reduce flash flooding, sediment runoff and erosion, with a special focus on the critically vulnerable area such as Fort Bay Road (see flagship 3).
• A comprehensive species inventory and habitat map provides the scientific foundation for targeted regeneration projects and improved legislation and ordinances, supported by ongoing monitoring and enforcement. • Establish a Saba Bank monitoring plan and strengthen enforcement capacity in consultation with the Coast Guard if needed. • Explore new restoration approaches and determine best practices for ecosystem restoration on Saba based on monitoring results. • Establish an environmental financing mechanism to support implementation efforts.	• Identify priority areas for vegetation recovery, clarify land ownership, and develop action plans to support greening efforts. • Expand population recovery initiatives for key reef herbivores: sea urchins.
• Completion of the new Black Rock Harbour , strengthening connectivity, and operational resilience. • Ensure telecommunications redundancy by reducing the risk of connectivity loss at the sea-cable entry point through operator-identified measures. • Expand and decentralise emergency reserves of food, water, and medical supplies across the island, ensuring availability during extended disruptions (target: 3-month supply).	• Secure funding for the road connecting Blackrock Harbour to Glies Quarter (see flagship 2). • Development of joint intra-regional disaster preparedness, response and recovery initiatives.

Table 1 continued

Domain	2100 Long-term Vision	2050 Medium Term Milestones
 **DOMAIN 4:** Liveable Environment	Saba sets the global standard for sustainable island living, where resilient climate-smart homes, 100% renewable energy, and clean, connected mobility create a thriving low-carbon community rooted in tradition and innovation.	Homes are storm-resilient, built with low-maintenance, climate-smart materials that reflect Saban architectural traditions. A predominantly renewable energy system powers homes, critical services, and the harbour, supported by smart grids and battery storage to ensure reliability and resilience.
 **DOMAIN 5:** Economic Resilience	Saba thrives with a diverse, regenerative economy rooted in its natural assets and guided by circular principles.	Saba has harnessed climate adaptation and mitigation opportunities to foster local entrepreneurship and drive sustainable economic development.

2030 Short term Targets	2026 - 2027 Immediate Term Actions
• Construction of pilot climate-resilient new social housing units designed for high thermal comfort, energy efficiency, and storm resistance. • Develop a Saba Climate Resilient Building Design Guide and construction skills training for contractors.	• Installation of shading structures for public recreational spaces. • Planting of trees in public spaces to facilitate a cooling effect in the villages. • Pilot basic retrofits for cooling and energy efficiency in a small number of social homes.
Assess electric mobility options and associated fire-safety risks to inform decisions on public charging infrastructure and government fleet electrification.	• Begin construction of the new solar park and battery storage system. • Conduct a public energy efficiency campaign to influence household behaviour.
Inter-island air, sea, and digital connectivity is improved to strengthen regional trade and sustainable tourism growth.	• Explore waste valorisation possibilities including household-level waste separation and business incentives. • Support the development of business case pilots that serve as learning labs and drivers of economic innovation.

Table 1 continued

Domain	2100 Long-term Vision	2050 Medium Term Milestones
 **DOMAIN 6:** Community & Culture	Saba has an intentionally small population to safeguard its distinctive character, culture, traditions, and residents' quality of life.	Families feel supported and safe raising children on Saba, reflecting a strong sense of place and community.
		Intergenerational knowledge transfer programs keep cultural practices alive amid environmental shifts.
 **DOMAIN 7:** Education & Awareness	Sabans live in deep connection with their land, sea, and community. Stewardship is not a policy—it's a way of life, passed down through generations: if you take, you give back. This ethic of reciprocity has restored the island's ecosystems and reinforced its identity.	Climate awareness has fostered an empowered community where Sabans are informed, engaged, and actively contribute to collective climate action.
		Local education equips Sabans with future-ready, globally relevant, climate-resilient skills and livelihood opportunities.

2030 Short term Targets	2026 - 2027 Immediate Term Actions
Healthcare, mental care and social infrastructure is strengthened to respond to climate-related stressors.	• Improve public knowledge on heat risks, especially for elderly and low-income residents. • Expand community watchdog programs to check on isolated residents during heatwaves or crises.
Establish policy, legal protection and a monument fund to restore and maintain cultural heritage sites including traditional Saban homes.	• Raise funding for the restoration and ongoing maintenance of The Ladder.
Expand climate communication efforts by for example hosting an annual “Climate Week” and integrating climate-focused activities into the island’s event calendar throughout the year.	• Launch a climate awareness campaign linking climate change to daily life on Saba in order to build public understanding and drive engagement. • Explore community engagement possibilities, e.g. by recruiting and training community members as “climate stewards” to foster local participation and involvement.
Integrate climate action into the school curriculum, train teachers, and develop practical, locally relevant materials.	• Strengthen school gardens and grow-box programs through hands-on education, integrating food forest planting and seasonal produce cycles.

Flagship Projects

The Integrated Climate Roadmap translates Saba's long-term resilience vision into a phased pathway for action, setting out what must be achieved by 2026, 2030, 2050, and beyond. Within this pathway, a small number of investments stand out as foundational. These are projects that, when implemented, would address multiple climate related challenges across a variety of policy areas, and without which progress across multiple domains would remain constrained and the island's exposure to climate risk would continue to compound.

The three Flagship Projects identified in this section represent the highest priority investments for the short and medium term. They operationalise the Climate Plan by focusing on critical systems where climate risks converge and where targeted investment can deliver disproportionate resilience gains. Each project addresses a structural vulnerability that has been consistently identified throughout the Climate Plan and stakeholder process, and each creates enabling conditions for a wide range of other adaptation actions to succeed.

Taken together, the three Flagship Projects form a coherent resilience investment package within the Climate Roadmap. As anchor investments, they are intended to reduce systemic risk, strengthen preparedness, and safeguard essential services under increasingly volatile climate conditions. They provide a clear and practical starting point for implementation, establish priorities for financing, and offer a structured framework through which national support and investment can be mobilised as the island moves from planning to delivery.

Flagship Project 1

Warehouse & Cold Chain Infrastructure (Fort Bay)

As outlined in Domain 1, strengthening Saba's food security requires reducing the island's exposure to supply-chain disruptions through effective contingency planning. The proposed food storage and cold-chain infrastructure at Fort Bay directly addresses this requirement and is therefore prioritised as a flagship investment for the short and medium term.

The project's strategic value lies in its ability to provide buffering capacity at the point of entry, enabling the island to stockpile essential goods, preserve food quality, and maintain continuity of supply during periods of disruption. By addressing the absence of adequate dry and cold storage at the harbour, the project closes a critical gap in Saba's disaster preparedness and crisis-response architecture.

Positioned as a preventive resilience measure, the facility reduces reliance on just-in-time logistics and strengthens Saba's ability to absorb and manage shocks—whether caused by extreme weather events, regional port disruptions, or wider supply-chain crises—without immediate impacts on food availability or affordability.

Investment scope and indicative costs

Component	Indicative Budget (€)[79]
Harbour extension & shore protection	1,900,000
Warehouse construction & site works	375,000
Cold storage & refrigeration systems	150,000
Fencing	120,000
Solar installation	160,000
Refrigerated transport	80,000
Total	**€2,785,000**



[79] The project budget is based on the budget contained in the Saba Food Security Proposal.

Flagship Project 2

Secondary Access Road: Black Rocks Harbour – Giles Quarter

As set out in Domain 3, Saba's transport and access systems are highly exposed to climate-related disruption due to steep terrain, slope instability, and increasingly intense rainfall events. Fort Bay Road, which provides the only connection to the harbour and associated critical infrastructure, is particularly vulnerable to erosion, rockfall, and storm damage. Disruption along this corridor can rapidly affect the movement of essential goods, emergency response, and access to utilities and services located at the harbour.

While the development of Black Rocks Harbour increases maritime capacity, the Climate Plan recognises that this investment does not in itself resolve the underlying access vulnerability. Without a reliable secondary route linking harbour infrastructure to the island's road network, the ability to utilise alternative offloading capacity during disruption remains constrained.
The secondary access road linking Black Rocks Harbour to Giles Quarter is therefore prioritised as a flagship investment for the short and medium term. By providing an additional inland access route, the project strengthens redundancy within the island's access network, ensures continuity of supply and emergency response during disruption of Fort Bay Road, and supports timely repair and recovery of critical infrastructure following extreme weather events.

While the secondary road is vital for access to the harbor area, it is important to note that the construction of this road would open up a large area for development in Giles Quarter. This would boost tourism and the island's economy, but could also impact biodiversity and nature due to erosion risks from construction and development, and the potential loss of critical habitats. To mitigate these risks, the road's construction and any further development in Giles Quarter must be guided by a Spatial Development Plan that incorporates natural and environmental safeguards.

Investment scope and indicative costs

Component	Indicative Budget (€)
Earthwork	4,000,000
Retaining walls	2,500,000
Drainage	2,000,000
Road construction	4,000,000
Utilities	1,800,000
Project management, permits, fees	200,000
Unforeseen (15%)	2,250,000
Total	**€16,750,000**



Flagship Project 3

Island-Wide Rainwater & Watershed Management

As set out across Domains 1, 2, and 3, Saba's steep terrain and soil conditions, combined with increasingly intense rainfall events, result in rapid surface runoff, erosion, rockfalls, and flash flooding. These processes affect roads, drainage systems, and other exposed infrastructure, and contribute to ongoing pressure on both inland and coastal systems.

Effective management of these risks requires coordinated rainwater management at the scale of the watershed, reflecting how rainfall moves across slopes, catchments, and infrastructure corridors during intense events.

The island-wide rainwater and watershed management programme is therefore prioritised as a flagship investment for the short and medium term. By managing runoff at the scale of the watershed through measures that slow, capture, and redirect rainfall. The project will help reduce erosion and flash-flood risks, limit impacts on critical infrastructure, and strengthen the island's capacity to manage heavier rainfall under changing climate conditions.

Investment scope and indicative costs

Component	Indicative Budget (€)*
Watershed interventions & infiltration systems	800,000 – 1,000,000
Sediment control & erosion protection	400,000 – 600,000
Water storage & controlled diversion	800,000 – 1,000,000
Monitoring & adaptive management	100,000
Total	**€2,100,000 – 2,700,000**



Conclusion: From Plan to Action

This Climate Plan sets out a clear and evidence-based response to the climate risks already shaping daily life on Saba and those projected to intensify over the coming decades. It demonstrates that climate change is not a distant or abstract challenge for the island, but a present and compounding reality—affecting water and food security, ecosystems, infrastructure, livelihoods, cultural heritage, and community wellbeing. Rising temperatures, more intense rainfall, prolonged droughts, stronger hurricanes, and increasing supply-chain disruptions interact across systems, amplifying vulnerabilities and increasing the long-term costs of inaction.

In response, the Climate Plan provides a coherent framework that moves beyond isolated interventions. Through its seven Domains and associated Action Agendas, the Plan establishes a whole-of-government approach to climate adaptation and mitigation—recognising interdependencies between sectors and ensuring that actions in one domain reinforce resilience in others. The Domain Action Agendas translate climate risks into concrete adaptation objectives and priority actions, offering a shared reference point for policy alignment, project development, and investment prioritisation across the Public Entity and its partners.

The Integrated Climate Roadmap builds on this foundation by linking short-term actions to medium- and long-term outcomes. By setting clear milestones for 2026, 2030, 2050, and beyond, the roadmap ensures that immediate investments contribute to Saba's long-term vision: remaining the "Unspoiled Queen," where people and nature coexist in balance, essential services are safeguarded, cultural identity is protected, and resilience is embedded in everyday decision-making. Importantly, the roadmap is designed as a living framework—able to evolve as conditions change, new information becomes available, and lessons are learned through implementation.

Within this phased pathway, three Flagship Projects stand out as foundational investments. Together, they form a coherent and mutually reinforcing resilience package that addresses structural vulnerabilities identified consistently across the Climate Plan. The warehouse and cold-chain infrastructure at Fort Bay strengthens food security and disaster preparedness by providing buffering capacity at the island's primary point of entry, reducing reliance on just-in-time logistics and safeguarding access to essential goods during disruption. The secondary access road connecting Black Rocks Harbour to Giles Quarter reduces dependence on a single access route, strengthening redundancy within the island's transport and supply systems, and ensuring continuity of services during extreme events. The island-wide rainwater and watershed management programme addresses erosion, flash flooding, and sediment runoff at their source—reducing risks to roads, infrastructure, ecosystems, and harbour operations while strengthening the island's capacity to manage heavier rainfall under a changing climate.

Taken together, these Flagship Projects provide a practical bridge between strategy and delivery. They concentrate resources where climate risks are highest, benefits are greatest, and implementation is most feasible. By prioritising these investments, Saba can reduce future loss and damage, safeguard critical services, and create clear entry points for national partnership, financing, and coordinated support.

The next phase centres on translating the Climate Plan and Action Agendas into an operational framework for adaptive programme management and reporting. While the Climate Plan remains the strategic policy document, its priorities and actions will be organised into an adaptive project management system that supports continuous project updating, project sequencing, financial management, implementation tracking, and reporting. This will enable the Public Entity to oversee delivery across domains, update actions in alignment with climate impacts, monitor the allocation and use of funds, assess progress against the Integrated Climate Roadmap, and meet accountability and reporting requirements. Embedding this function within existing governance and operational structures ensures that climate action is managed as a coherent, transparent, and results-oriented programme.

Institutionalising climate adaptation and mitigation within daily decision-making is essential to sustaining momentum. By mainstreaming climate considerations across policies, programmes, and investments, resilience becomes not a parallel agenda, but a guiding principle shaping all aspects of island development. This approach enables the Public Entity to link investments to measurable outcomes, strengthen accountability, and ensure that limited resources are deployed where they deliver the greatest long-term value.

Ultimately, this Climate Plan equips Saba with more than a diagnosis of vulnerability. It provides a structured pathway for action, one that strengthens self-sufficiency, safeguards what makes the island unique, and embeds resilience at the core of long-term development. With sustained commitment, coordinated implementation, and structural financing, the actions outlined in this Plan will help ensure that Saba not only withstands the impacts of climate change, but continues to thrive for generations to come.




“Unspoiled Queen,” a vibrant island where people and nature coexist in balance, cultural heritage is cherished, and sustainability and climate resilience define everyday life.



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