

COUNTRY HYDROMET DIAGNOSTICS

Informing policy and investment decisions for high-quality weather forecasts, early warning systems, and climate information in developing countries.



October 2024

St. Kitts and Nevis Peer Review Report

Reviewing Agency: Finnish Meteorological Institute

Authors: Ms. Anni Karttunen, Mr. Matti Eerikäinen



WORLD
METEOROLOGICAL
ORGANIZATION



IDB
Inter-American
Development Bank



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

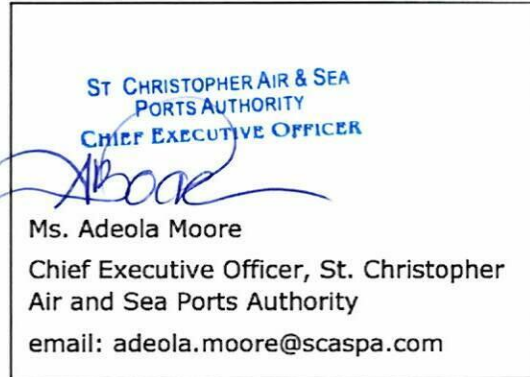


S  **FF**
Systematic Observations Financing Facility

Copyright

© FMI, 2024

The right of publication is reserved by FMI. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the FMI. Short extracts may be reproduced without authorization, provided that the complete source is clearly indicated. Editorial correspondence and requests to publish, reproduce or translate this publication in part or in whole should be addressed to:



The findings, interpretations and conclusions expressed are those of the named authors alone and do not necessarily reflect those of the agencies involved.

Authorisation for release of this report has been received from the Peer Reviewing Agency and the Country NMHS as of October 2024.

Disclaimer

This report has been prepared based on information and analysis provided by FMI. While reasonable care and skill has been taken in preparing this report, no representation or warranty, expressed or implied, is made as to the accuracy, completeness, or suitability of the information and assumptions relied upon, and we do not accept any liability whatsoever for any direct or consequential loss arising from any use of this report or its contents.

Acknowledgements

The SOFF programme is acknowledged for the financial support to carry out the work to prepare this national Country Hydromet Diagnostics report, and preceding workshops. Collaboration between peer adviser, beneficiary and implementing entity was very fruitful and open.

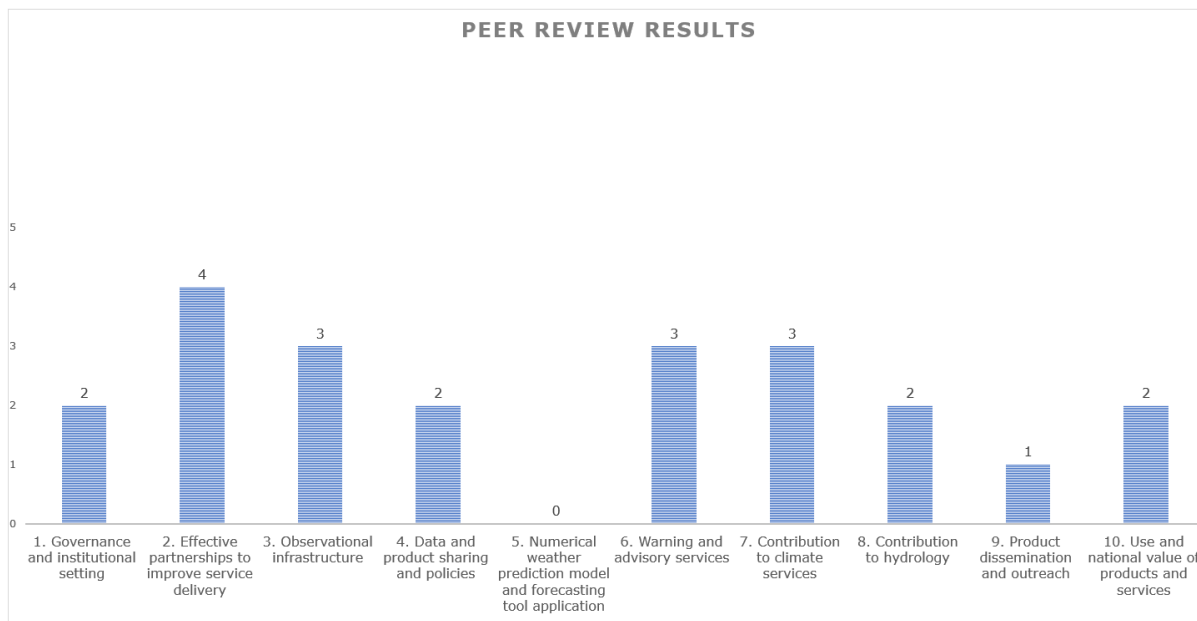
Table of Contents

COUNTRY HYDROMET DIAGNOSTICS.....	I
COPYRIGHT.....	II
DISCLAIMER.....	II
ACKNOWLEDGEMENTS.....	II
TABLE OF CONTENTS	III
ABBREVIATIONS.....	IV
EXECUTIVE SUMMARY.....	1
CHAPTER 1: GENERAL INFORMATION.....	2
<i>Introduction.....</i>	<i>2</i>
<i>CHD methodology.....</i>	<i>3</i>
CHAPTER 2: COUNTRY HYDROMET DIAGNOSTICS.....	4
<i>Element 1: Governance and institutional setting.....</i>	<i>4</i>
<i>Element 2: Effective partnerships to improve service delivery.....</i>	<i>9</i>
<i>Element 3: Observational infrastructure.....</i>	<i>11</i>
<i>Element 4: Data and product sharing and policies.....</i>	<i>15</i>
<i>Element 5: Numerical model and forecasting tool application.....</i>	<i>18</i>
<i>Element 6: Warning and advisory services.....</i>	<i>18</i>
<i>Element 7: Contribution to Climate Services.....</i>	<i>22</i>
<i>Element 8: Contribution to hydrology.....</i>	<i>24</i>
<i>Element 9: Product dissemination and outreach.....</i>	<i>26</i>
<i>Element 10: Use and national value of products and services.....</i>	<i>27</i>
ANNEX 1 CONSULTATIONS (INCLUDING EXPERTS AND STAKEHOLDER CONSULTATIONS)	29
ANNEX 2 URGENT NEEDS REPORTED.....	30
ANNEX 3 INFORMATION SUPPLIED THROUGH WMO	32
ANNEX 4 LIST OF MATERIALS USED	33

Abbreviations

ABMS	Antigua and Barbuda Meteorological Service
CariCOF	The Caribbean Climate Outlook Forum
CAP	Common Alerting Protocol
CCCCC	Caribbean Community Climate Change
CMO	Caribbean Meteorological Organization
CIMH	Caribbean Institute of Meteorology and Hydrology
FMI	Finnish Meteorological Institute
GBON	Global Basic Observation Network
GCF	Green Climate Fund
NASPA	Nevis Air and Seaport Authority
NEMA	National Emergency Management Agency
NSP	National Strategic Plan
QMS	Quality Management System
SCASPS	St. Christopher Air & Sea Ports Authority
SKMS	St. Kitts Meteorological Service
SKNMS	St. Kitts and Nevis Meteorological Service
SOFF	Systematic Observations Financing Facility
VAMS	Vance W. Amory Air Traffic Services/Nevis Meteorological Services
WMO	World Meteorological Organization
WSD	Water Services Department

Executive Summary



Element	Maturity level score
1. Governance and institutional setting	2
2. Effective partnerships to improve service delivery	4
3. Observational infrastructure	3
4. Data and product sharing and policies	2
5. Numerical weather prediction model and forecasting tool application	Not applicable
6. Warning and advisory services	1
7. Contribution to climate services	1
8. Contribution to hydrology	2
9. Product dissemination and outreach	1
10. Use and national value of products and services	2

Following critical gaps has been identified:

- There is currently no legal framework nor mandate for a National Meteorological Service in St. Kitts and Nevis. The draft bill exists, and it is recommended to proceed with the formalization.
- Currently two separately administrated observation service units, SKMS in St. Kitts and VAMS in Nevis, are operating to provide the national meteorological services. It has been recommended to combine the two offices into one National Meteorological Office St. Kitts and Nevis Meteorological Service (SKMNS). It is recommended to proceed with the plans, including restructuring of the staff and duties.

- In parallel with the unifying of the observation units and the legislative development, it is recommended to expand the duties to include national forecasting and warning of meteorological event. At this moment the Antigua and Barbuda meteorological service (ABMS) is responsible for all weather forecast and warning generation to St. Kitts and Nevis. The expansion of duties and transition from ABMS to SKNMS should be made in phases as this will require investments in systems and software tools (recommended to use open-source solutions with highly automatized tools for cost and work efficiency), staff and human capacity building. Annual budget will need to be updated to reflect the new duties.
- Formalizing key partnerships and improving stakeholder engagement will be critical to support effective forecasting services and potential expansion to impact-based forecasting.
- Main gaps related to the observation network is automating the currently manual GBON stations to ensure 24/7 operation and to improve data management system and database, including automatic quality control and assurance as well as annual preventive maintenance and the sensor calibration process. Based on WMO GBON regulation there is a gap in not having an upper-air sounding station in St. Kitts and Nevis, but as the regional network already covers it within the required spatial density, it is not seen as cost-effective or urgent to invest in a sounding system.
- Improving the climate services will require additional staff and human capacity building as well as access to the regional climate database and model provided by the CariCOF.
- Most urgent capacity building needs are to strengthen the maintenance unit capabilities. Significant investments in human resources and their capacity are needed to transfer into a National Meteorological Forecasting Office.
- To improve the dissemination to the public and to enable effective new service creation and dissemination it is recommended for SKMS to develop a website with tailored products.
- Finishing the ongoing work with Quality Management System standardization. It is recommended to expand the framework to include new services as forecasting and warning duties become SKMS's responsibility.
- Improving the regional collaboration especially related to the WMO regional calibration centre services and the availability of data from the regional climate database and models. Strengthening the collaboration between peers in terms of experiences with new observation technologies and solutions as well as regional network planning, data sharing and investments e.g. regional weather radar composite availability and possibility of regional lightning detection network.

Chapter 1: General information

Introduction

St. Kitts and Nevis is a two-island country in the Eastern Caribbean Sea. It lies in the Atlantic hurricane belt where tropical cyclones occur during the period of August to October. The country faces severe weather and climate conditions such as cyclones, flash floods, hurricanes, and droughts that cause large socioeconomic impacts throughout the country. Climate change will play its part in modifying the frequency and intensity of

hazardous weather events as well as significantly increase the country's vulnerability to sea level rise.

In St. Kitts and Nevis, the meteorological services are divided to two separate statutory governmental organizations: St. Kitts Meteorological Service (SKMS), which is a section of the St. Christopher Air and Seaport Authority (SCASPA) and Vance W. Amory Air Traffic Services/Nevis Meteorological Service (VAMS) operating as a part of the Nevis Air and Seaports Authority (NASPA). SKMS has been appointed the lead responsibility for meteorology in St. Kitts and Nevis and is the country's main focal point to the national emergency and climate preparedness, regional and other international collaboration, and meteorological investment projects. A long-term objective is to merge the operations of both SKMS and VAMS into one unit, the St. Kitts and Nevis Meteorological Service (SKNMS).

Currently SKMS and VAMS operate as meteorological watch offices and all forecasts and warnings for the country are provided by the Antigua and Barbuda Meteorological Service (ABMS). Both ABMS and SKMS are hoping to gradually start shifting some of the responsibilities to SKMS, but the effort will need considerable support in terms of capacity building and infrastructure investments.

Although, SKMS is not developing forecast and warning products themselves, they are actively collaborating with ABMS and offering local meteorological analysis and knowledge on the local conditions to improve forecasts and warnings. Additionally, SKMS is the national contact point for the dissemination of all weather and climate warnings.

SKMS is actively engaged with national stakeholders and provides insight to warning and forecasting information for national emergencies, water sector planning and related climate services. Services are mainly used for aviation weather services and tailoring of climate outlooks. Nationally there is a lot of potential for new stakeholders and service users to benefit of expanded meteorological services to sectors such as agriculture and food security, water, energy, tourism, transport, health and disaster risk reduction.

To achieve the target of forecasting office status that provides versatile weather and climate forecasts and services for the public and different stakeholders, SKMNS capacity in terms of tools and operating systems and the amount of human resources and skills need to be systematically improved and the official status and mandate granted to support the development.

CHD methodology

The Country Hydromet Diagnostics (CHD) work was done as an additional output for the Systematic Observations Financing Facility (SOFF) project in St. Kitts and Nevis and was preceded by preparation of the SOFF outputs National Gap Analysis and Contribution Plan.

During the SOFF project's readiness phase the following activities were organized:

- Remote workshop for the kick-off for the SOFF work
- A fact-finding mission focusing on the Gap Analysis work: observation network status, plans, site survey on the surface weather station and head office. The mission focused on providing information to the Gap Analysis and National Contribution Plan documents.
- Discussions with the Antigua and Barbuda Meteorological Service (ABMS). ABMS is responsible for providing weather forecasts and warnings also to the area of St. Kitts and Nevis and a key partner for SKMS.

- A mission focusing on the CHD. Reviewing CHD template and discussing with key stakeholder:
 - National Emergency Management Agency (NEMA)
 - Water Department
- Two visits to the Caribbean Meteorological and Hydrological Institute (CIMH) to discuss regional network support and plans and the capacity of the regional calibration centre.
- Remote meetings to prepare and comment on missions and findings on the documents.

Chapter 2: Country Hydromet Diagnostics

Element 1: Governance and institutional setting

1.1 Existence of Act or Policy describing the NMHS legal mandate and its scope

In St. Kitts and Nevis, the meteorological services are divided to two separate statutory governmental organizations: St. Kitts Meteorological Service (SKMS), which is a section of the St. Christopher Air and Seaport Authority (SCASPA) and Vance W. Amory Air Traffic Services/Nevis Meteorological Service (VAMS) operating as a part of the Nevis Air and Seaports Authority (NASPA). SKMS has been appointed the lead responsibility for meteorology in St. Kitts and Nevis.

A long-term objective is to merge the operations of both SKMS and VAMS into one unit, the St. Kitts and Nevis Meteorological Service (SKNMS). This has been supported by the project "Capacity Building to support Accreditation, Planning, Programming and Implementation of GCF-funded activities in St. Kitts and Nevis" by Green Climate Fund (GCF).

St. Christopher Air and Sea Ports Authority Act and Subsidiary Legislation (Ch 8.07. Revised 2002) is the governing legislation over all air and seaports in St. Kitts and Nevis. This legislation also guides the meteorological department with a focus on ensuring the civil aviation safety and security. NASPA was established by the Nevis Air and Sea Ports Authority Act in 1995.

No separate meteorological legislation exists nor legislation that mandates any department responsible for the meteorological and climatological forecasts, warnings and the national observation network in St. Kitts and Nevis or sets the functions, powers and administration for these. SKMS received technical assistance from the CMO to develop national legislation by adopting and adapting the endorsed Model Meteorological Bill in 2021, an effort that was supported by WMO Climate Risk and Early Warning Systems (CREWS) project. The policy includes defining the mandate of the national meteorological service and restructuring of the current services. The bill has not been established and is still under review. The National Strategic Plan for 2021-2025 was developed to support the legislative transformation.

The main functions for the meteorological services in St. Kitts and Nevis are:

- Provision of accurate and timely meteorological and aviation information to the aircraft personnel and the general public.
- Observation of weather for St. Kitts and Nevis.

- Daily weather reports, aviation and rainfall observations.
- Reporting and alerting on hazardous weather events such as hurricanes.
 - Alerting national emergency units, public, media, aviation operators, businesses.
- Collecting climatological data.

The National Climate Change Policy that was developed in 2017 provides the legal mandate and policy framework for climate action in St. Kitts and Nevis as well as the mandate for the development of the National Climate Change Adaptation Strategy. Besides this, there are a number of legislative and regulatory instruments that have direct and indirect linkages to sustainable development in St. Kitts and Nevis. These frameworks recognize the country's high vulnerability to climate variability as a key constraint for achieving desired outcomes for sustainable development.

The National Disaster Management Act, St. Christopher and Nevis, No. of 1998 sets the legal framework for the National Emergency Management Agency (NEMA) operations and provides guidance for the effective disaster management. The Natural Hazard Mitigation Policy and Plan was published by NEMA in 2001.

Antigua and Barbuda Meteorological Services (ABMS) is the Regional Meteorological Watch Office and currently responsible for the meteorological forecasts and warnings also for St. Kitts and Nevis as agreed in the CMO resolution 1¹ that stipulates the regional agreements for meteorological forecast and warning services among CMO members.

St. Kitts and Nevis is not an individual member in the World Meteorological Organization (WMO). It is part of the British Caribbean Territories group that is represented in the WMO by the Coordinating Director of the CMO.

Overall, despite the existence of sector specific legislation, there is a clear gap of having a consistent legal framework for weather, water and climate services in St. Kitts and Nevis. The lack of a clear legal mandate and basis applies for both meteorological and hydrological services and responsibilities.

1.2 Existence of Strategic, Operational and Risk Management plans and their reporting as part of oversight and management.

St. Kitts and Nevis Meteorological Service has a National Strategic Plan for 2021 to 2025. The plan was generated with the assistance of CMO and funded by WMO CREWS project. The plan has been approved by the Airport Manager. The plan includes a national governance structure, providing a platform for effectively address the needs and requirements in development and application of weather, water, and climate services in St. Kitts and Nevis and an Action Plan to support it.

Four strategic goals in the National Strategic Plan are:

1. Ensure that the St. Kitts and Nevis Meteorological Service has an enabling policy and institutional environment.
2. Strengthen the St. Kitts and Nevis Meteorological Service's human and infrastructure capacity to deliver effective weather and climate services.

¹ [CMO Resolution 1](#)

3. Strengthen partnerships with stakeholders to improve service delivery, increase the use of meteorology, hydrology, marine and climate products, and ensure successful risk communication.
4. Strengthen the St. Kitts and Nevis Meteorological Service's human capacity, perform management and operational efficiency.

SKMS plans to update the plan to be in-lined with the new Government's vision.

There is ongoing development in SCASPA on the Quality Management System (QMS) to reach ISO9001:2015 standard. The implementation also applies for SKMS work. This work includes drafting of risk plans for all aviation critical observations.

Besides the National Strategic Plan, "Develop Standard Operating Procedures for National Meteorological Services" report was produced by Tonkin & Taylor International Ltd funded by Caribbean Community Climate Change (CCCCC) that proposes the new organization structure for the meteorological service in St. Kitts and Nevis. The report includes two development scenarios on the transformation of SKMS and VAMS to a modern and sound NMS. Included in the analysis is an assessment on the required additional staffing, skills and training needed for to take over the forecasting duties.

1.3 Government budget allocation consistently covers the needs of the NMHS in terms of its national, regional, and global responsibilities and based, among others, on cost-benefit analysis of the service. Evidence of sufficient staffing to cover core functions

SCASPA and NASPA are statutory bodies/corporates formed by the Government with responsibility for the ownership and operation of the islands' air and seaports. SCASPA provides the budget to SKMS and NASPA to VAMS. SCASPA and NASPA generate revenue from cost recovery services from the aviation.

The annual budget for SKMS is approximately 708 400 East Caribbean Dollars, which is a bit more than 262 000 US\$. The budget covers the salaries (74% of the budget), funds for training activities (23%) and key operational costs (3%) but has no annual investment allocations. Most investments and new development are made using project-based funding which needs to be approved by the Ministry of Finance and allocated to SKMS.

As a member of CIMH St. Kitts and Nevis is annually contributing to CIMH budget. In return SKMS should receive the regional calibration services and maintenance and operation training that directly support the GBON initiative.

A significant gap in the current budget is the lack of annual budget allocation for maintenance, calibration, spares and sensor replacements needed for all crucial observation and IT systems. Lifecycle plans, measuring of service effectivity and socio-economic benefit studies provide important justification for the budget. An analysis on the stakeholders and sectors benefiting of improved weather and climate services in St. Kitts and Nevis has recently been conducted as part of the National Strategic Plan development to offer input to the ongoing discussion on the policy and structure regarding meteorological services now and in the future in St. Kitts and Nevis. The findings support the development of a strong policy with potential to establish cost-recovery mechanisms for SKMS to expand with new capabilities and services thus providing improved financial flexibility and independence.

1.4 Proportion of staff (availability of in-house, seconded, contracted- out) with adequate training in relevant disciplines, including scientific, technical, and information and communication technologies (ICT). Institutional and policy arrangements in-country to support training needs of NMHS.

The number of permanent staff in SKMS is currently 10 people, of which 7 are meteorological officers and 3 junior trainees. Additionally, the Quality Management Officer in SCASPA is sharing her time with the SKMS QMS duties. The number of staff working in VAMS is 8 working as meteorological observers with no forecasting training.

In SKMS three meteorological officers are trained in forecasting and applied meteorology, and four in basic observations and technical operations. The Senior Meteorological Officer is taking care of the management of the section in addition to meteorologist duties.

All SKMS officers have trained in the CIMH meteorological training courses and two of these officers have also been studied at the University of West Indies. Junior staff have only been trained in-house and are waiting for opportunities to train in CIMH and University courses. The Officers with forecasting level degree have attended regional refreshment training courses and overall SKMS is actively utilizing CIMH’s available courses when their resources allow. The ongoing Quality Management System work will update the staff competency frameworks related to the aviation observer duties.

Currently the total number of staff is enough for the operation of the required services. In case SKMS will expand its duties to forecasting and warning services, new staff need to be recruited and existing retrained for the new duties. Merging SKMS and VAMS into SKNMS would increase the headcount of the services and alleviate the staff shortage.

As part of the ongoing QMS work, a staff competency framework is developed for the aeronautical services. The framework is based on the CIMH competency framework for meteorological aeronautical officers. The previous competency assessment was done several years ago, and a new one is scheduled for 2024/2025. The training policy for SCASPA also applies to SKMS, but there is no dedicated plan for the meteorological section. Staff training needs are assessed by the management and training courses are scheduled when opportunities for such arise.

Key shortcomings in operating the current services are:

- Need to establish a maintenance team. Refresh training on system and sensor maintenance and effective maintenance practices and fieldwork including calibration is needed.
- Little skills in overall IT management. Human capacity building is needed to support the DMS and database upgrades and the plans to expand into new services.
- Junior staff to be able to attend certified training courses.

Table 1 Number of staff in SKMS

Position	Number of male staff	Number of female staff
Meteorologist	2	-
Meteorological Technician	3	1
Meteorological Technician in training	2	1
Climate services	-	1
QMS officer*	-	1
Total	7	4

* QMS officer working closely with SKMS is a part of SCASPA authority, not SKMS section.

SKMS is following a formal competency assessment framework for the aeronautical officers and has scheduled a competency assessment for 2025. SCASPA also has a training policy for the authority level, but nothing specific has been created for the meteorological section.

1.5 Experience and track record in implementing internationally funded hydromet projects as well as research and development projects in general.

Latest projects have included the following:

- Green Climate Fund and Caribbean Community Climate Change Centre – Capacity Building to Support Accreditation, Planning, Programming and Implementation of GCF-Funded Activities in St. Kitts and Nevis.
 - Development of Standard Operating Procedures for National Meteorological Services. Finalized in 2022.
- Caribbean Community Climate Change Centre – Enhancing Climate Resilience in CariForum Countries funded by the European Union.
 - St. Kitts and Nevis received one automatic surface weather station.
- Green Climate Fund and Caribbean Community Climate Change Centre. To be initiated.
 - Develop website for SKMS.
 - Develop data repository.
 - Create storm surge model for St. Kitts and Nevis
- WMO - Climate Risk and Early Warning Systems (CREWS)
 - Main output were the development of draft legislation and national strategy plan.

Summary score and recommendations for Element 1

The summary score for the element is 2 “Effort ongoing to formalize mandate, introduce improved governance, management processes and address resource challenges”.

Key recommendations are **to proceed with the formalization of the draft bill thus significantly strengthening the status and mandate of the meteorological office.** Parallel to this it is recommend **formalizing the relationship between St. Kitts and Nevis separate meteorological offices and to draft a plan and schedule on combining the two offices and restructuring and training of the staff.**

SKMS is planning to gradually start to take over some responsibilities related with the forecasting products for St. Kitts and Nevis. This requires close support and collaboration with Antigua and Barbuda Meteorological Service. **It is recommended to draft a transition plan with schedule that includes mapping of new capabilities and tools needed for SKMS, co-creation possibilities for services, backups and final handover plan and to plan needed budget for the investments of needed new systems and tools and human capacity building.**

The transition towards becoming a centralized national forecasting office will include several parallel actions streams; **promoting the meteorological bill, combining the two offices and restructuring staff and tasks, building the capacity to take over forecasting and warning services including both human capacity building and investments in new systems and tools and updating the development strategy to match the new structure. It is recommended to support the transition on all staff**

and management levels. It is recommended for St. Kitts and Nevis to become a full WMO member once the new office is established.

The transition will require investments in the needed systems, hardware and training and potentially increasing the staff number. **Besides the initial investment the annual budget will need to be increased to reflect the new expanded responsibilities that are bestowed on the meteorological office. It is recommended for the bill to grant SKMS the rights for cost-recovery on services to strengthen the budget sustainability in the long-run.**

Element 2: Effective partnerships to improve service delivery

2.1. Effective partnerships for service delivery in place with other government institutions.

In St. Kitts and Nevis, the meteorological services are divided to two key governmental organizations:

- St. Kitts Meteorological Service (SKMS), which is a section of the St. Christopher Air and Seaport Authority (SCASPA), and bears the responsibility of observation networks in St. Kitts.
- Vance W. Amory Air Traffic Services/Nevis Meteorological Service (VAMS) operating as a part of the Nevis Air and Seaports Authority (NASPA) and responsible for the weather observations in Nevis.

SKMS has been appointed the lead responsibility for meteorology in St. Kitts and Nevis and is the country's main focal point to the national emergency and climate preparedness, regional and other international collaboration, meteorological investment projects and such. VAMS main collaboration is with NASPA and SKMS whereas SKMS collaborates with the other stakeholders. A long-term objective has been to merge the operations of both SKMS and VAMS into one unit, the St. Kitts and Nevis Meteorological Service (SKNMS).

SKMS has very effective partnerships with relevant government institutions, but none of the partnerships has been formalized. The working relationship is very effective and direct with direct contacts between the key persons (the contact point in SKMS is the Senior Meteorological Officer).

Key partnerships are with the National Emergency Management Agency (NEMA), Water Service Department (WSD), Ministry of Environment and Fire department. SKMS has a seat in the national emergency mitigation council hosted by NEMA to provide support and advisories on hazardous hydrometeorological events. Additionally, SKMS is supporting the tourism, health and agriculture sector. Most assistance and services are provided ad-hoc, based on requests from the stakeholders.

The National Strategy Plan for 2021-2025 included a stakeholder analysis that highlights several key sectors that would benefit from improved weather and climate services for example tourism, agriculture, health, energy, water and transportation, and analysis on key stakeholder interests, expectations and potential of further cooperation. The analysis provides valuable insights for selecting key partnerships and ways of working with them and developing new services for the sectors.

2.2. Effective partnerships in place at the national and international level with the private sector, research centres and academia, including joint research and innovation projects.

Antigua and Barbuda Meteorological Service (ABMS) is currently producing all public weather forecast, watches and warning services to St. Kitts and Nevis. The collaboration is governed by the Caribbean Meteorological Organization (CMO) resolution². Working relations with the services are good and effective with virtual briefs and discussion on the meteorological events and ongoing correspondence via email or calls.

Sain Kitts and Nevis is a member state in the main regional meteorological organizations: the Caribbean Meteorological Organization (CMO) and Caribbean Institute for Meteorology and Hydrology (CIMH). CMO is a specialized agency of the Caribbean Community that coordinates the joint scientific and technical activities in weather, climate and water related sciences in sixteen English-speaking Caribbean countries. SKMS received assistance from CMO for the policy and strategy draft and action plan.

CIMH is a training and research organization that assists in improving and developing meteorological and hydrological services and awareness of the benefits of such services for the economic well-being of its member states. CIMH is the main provider for technical operation and maintenance training, hosts the regional calibration laboratory, runs a regional numerical model, and hosts the Caribbean Climate Outlook forum. These services are critical to the success of the regional GBON sustainability. SKMS officers have mostly been trained in the joint program of University of West Indies and CIMH and CIMH technical courses and CIMH has been key in supporting SKMS maintenance works for the surface weather stations.

SKMS provides data for research purposes based on requests from the academic sector but does not have resources to actively participate in any research work.

2.3. Effective partnerships in place with international climate and development finance partners.

SKMS does not have direct partnerships with international finance partners and is working through the regional organizations such as CMO or through the National Designated Authorities (NDA) e.g. the NDA for GCF is the Department of Economic Affairs and Ministry of Sustainable Development.

2.4. New or enhanced products, services or dissemination techniques or new uses or applications of existing products and services that culminated from these relationships.

Limitations in SKMS's resources and human capital severely limit the possibility of developing new products or services. SKMS is doing their best to answer to new service requests they receive mainly on ad-hoc basis from the different stakeholders. The same applies for ad-hoc based received feedback for the current services.

Summary score, recommendations, and comments for Element 2

The summary score for the element is 4 "Effective partnerships with equal status in most relationships and approaching relevant funding opportunities in a coordinated manner".

It is recommended to proceed with the plan of joining St. Kitts Meteorological Service and Nevis Meteorological Service into one national meteorological service.

All-in-all SKMS is very well connected to all key stakeholders and government organisations with direct two-way access between key decision makers and the SKMS Senior Meteorological Officer. Although the arrangement is working effectively, it is very

² [CMO Resolutions](#)

dependent on the individuals currently in key positions and thus vulnerable for changes. Although the partnerships have not been formalized, but SKMS is generally included in all relevant bodies and hearings and treated with equal status. **It is recommended for SKMS to formalize key partnerships and create or strengthen SOPS when needed to ensure efficient working relationships long-term.** Passing the meteorological bill that grants SKMS formal mandate will further support the equal status in partnerships. SKMS is also actively participating and benefiting from regional projects by development partners and different financing partners.

A key limitation in the current operational environment for SKMS is the lack of resources and human capital to devote to new service development, research or project activities. **When progressing with the plans to expand SKMS services to forecasting and warning duties, it is important to improve stakeholder engagement in defining new products and services and prioritizing development needs.** Regular stakeholder engagement and co-development of services is encouraged.

Element 3: Observational infrastructure

3.1. Average horizontal resolution in km of both synoptic surface and upper-air observations, including compliance with the Global Basic Observing Network (GBON) regulations.

St. Kitts and Nevis surface weather network consists of two synoptic weather stations; one at R. L. Bradshaw International Airport in St. Kitts and one in V. W. Amory International airport in Nevis, both nominated as GBON stations. Both stations are manual and only operated during the operating hours of the airport. The stations are located less than 20 km apart from each other. Both stations are strategically important as they are located at busy airports and operated by the two separate meteorological services. Despite the proximity it is recommended to support both GBON stations to increase network redundancy, honour the dual island and meteorological service status and to support the harmonization of the stations to provide synergy benefits for the maintenance and spare part stock. Based on WMO minimum GBON criteria one station would be sufficient for the country.

Besides GBON stations there are eight operational surface weather stations in St. Kitts and four in Nevis. Due to shortage in resources the station maintenance and sensor calibration activities have only been minimal, and the stations are not up to GBON standards. Currently the main areas not covered with the national surface weather observation are the high elevations on the western corridor of St. Kitts. SKMS is currently looking for a suitable site for one additional station in the area.

Some of the stations are transmitting observations real-time whereas other stations operate with manual periodic pickups.

St. Kitts and Nevis does not have a sounding station, nor any history of operating one. St. Kitts and Nevis is already well covered within the GBON required density by the regional upper-air network that includes the stations located in the neighbouring countries of Julian Airport in St. Maarten and Le Raizet Aero in Point-a-Pitre International Airport in Guadeloupe. Additionally, the close neighbour Antigua and Barbuda, is considering investing in an upper-air sounding station. Thus, the stations in St. Maarten and Antigua and Barbuda would both be located less than 100 km from St. Kitts and Nevis and the station in Guadeloupe approximately 160 km away.

Currently SKMS's only involvement in marine meteorology is through some basic monitoring and there are large gaps in the marine area observations.

Equipment is calibrated upon installation and maintenance is carried out regularly. Later, during the lifetime of the systems calibrations are often lacking due to lack of resources for annual calibration and lately due to lack of a reliable calibrating facility in the region. SKMS has previously been utilizing CIMH’s calibration facilities, but the service capability of CIMH has deteriorated and cannot fulfil the required GBON sensor calibrations. The ongoing work to update the QMS will also improve the quality assurance of the sensors.

Metadata management is handled manually and stored locally, and records are not complete for all of the stations.

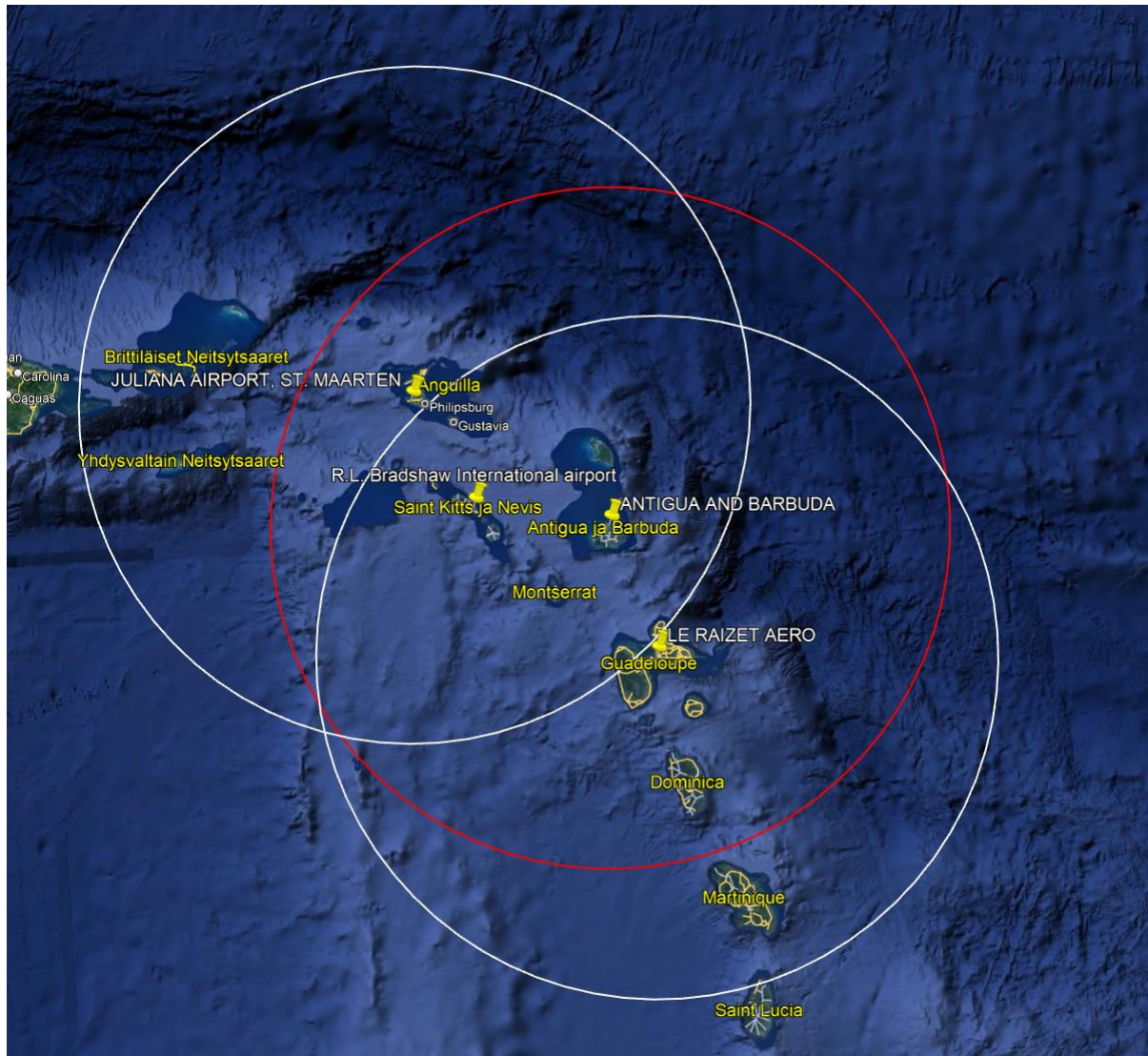


Figure 1 Map of the regional upper-air GBON station network. Existing stations in St. Maarten and Guadeloupe are indicated with white circles 250 km radius (recommended density for upper-air stations in SIDS would be covered with 500 km radius). New proposed upper-air station in Antigua and Barbuda is indicated with the red circle 250 km.

3.2. Additional observations used for nowcasting and specialized purposes.

Currently SKMS only operates the surface weather station network. SKMS has been following the regional development and experiences of peer services in deploying new innovative solutions e.g. the 3D printed automatic weather stations.

St. Kitts and Nevis is covered by the weather radars in St. Maarten and partially Guadeloupe. SKMS receives this information (visual images, no raw data).

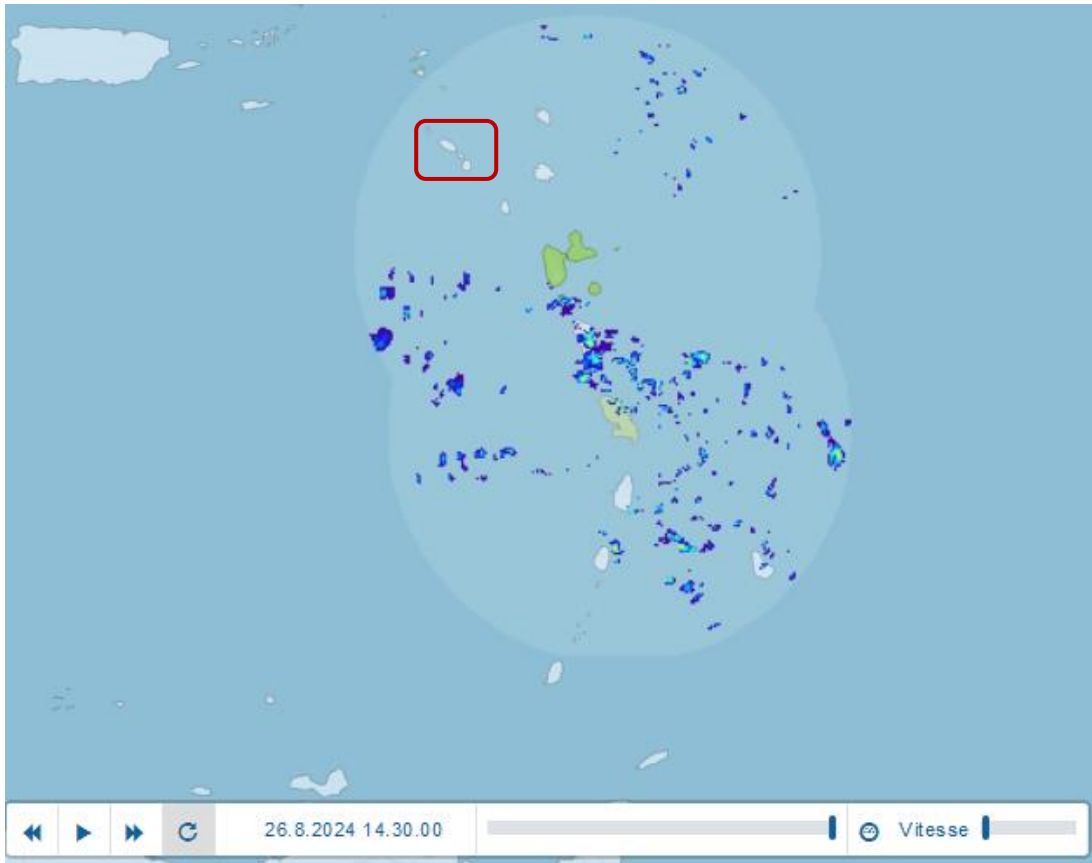


Figure 2 Weather radar coverage from the Guadeloupe weather radar. St Kitts and Nevis marked with a red box. (available from the website <https://meteofrance.gp/fr/images-radar/mosaique-antilles>)

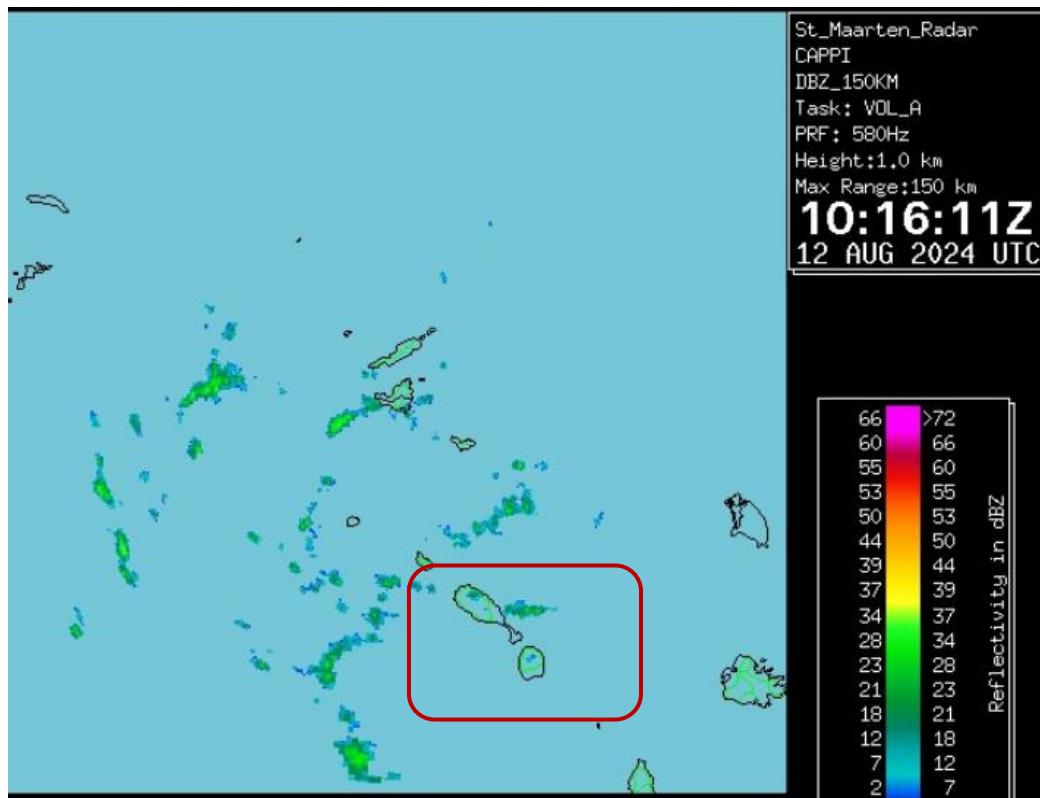


Figure 3 Weather radar image from St. Maarten weather radar. St. Kitts and Nevis marked with a red box (available from the website of the meteorological department for St. Maarten <http://www.meteosxm.com/>)

3.3. Standard Operating Practices in place for the deployment, maintenance, calibrations and quality assurance of the observational network.

SOP's are only in place for the aviation related observations that are in the core of the current mandate for SKMS. Expanding the SOP for weather and climate services are included in the National Strategy Planning (NSP).

3.4 Implementation of sustainable newer approaches to observations.

For the future investments, SKMS is following the regional development and experiences of peer services in deploying new innovative solutions e.g. the 3D printed automatic weather stations.

3.5. Percentage of the surface observations that depend on automatic techniques.

None of the current GBON weather stations are automatic.

Summary score, recommendations, and comments for Element 3

The summary score for the element is 3 "Moderate network with some gaps with respect to WMO regulations and guidance and with some data quality issues".

The density of surface weather stations for GBON is fulfilling and exceeding the criteria set by WMO, the temporal resolution of the observations is currently limited to the operating hours of the stations but will be resolved once the automatization of the stations go ahead. **SKMS is recommended to automatize both GBON nominated stations within the SOFF project.** Besides the GBON stations there is a network of surface weather stations for mainly climatological and agricultural needs that cover most of the land area.

A clear gap in regard to WMO GBON criteria is the lack of an upper-air sounding station. But since the regional upper-air network of sounding stations in St Maarten, Guadeloupe and possibly Antigua and Barbuda already cover the area of St. Kitts and Nevis with the a much higher density than WMO requires for the SIDS area, **it is recommended not to have an upper-air sounding station in St. Kitts and Nevis.**

The close proximity of the neighbouring countries enable synergy benefits for the observation networks. For example, St. Kitts and Nevis is well covered by weather radars from St. Maarten and Guadeloupe. A lack in the region is the absence of lightning detection network, it is recommended to foster regional collaboration in the topic and invest in the regional solution.

SKMS is recommended to follow up on the experiences of peers in testing new innovative observation systems such as the 3D printed surface weather stations before investing in such technologies. When implementing new solutions, SKMS should consider the ease of maintenance and the need of man power, before investing.

It is recommended to expand the support to marine observation stations regionally and in St. Kitts and Nevis if SOFF expands to this.

SKMS is recommended to strengthen the maintenance unit with human capacity building. SKMS is recommended to improve the quality control and quality assurance processes, metadata management and to commit to an annual calibration cycle and process. Overall, the regional calibration capabilities hosted

by CIMH need to be improved. It is also recommended to establish a national process to deal with potential quality problems for the GBON stations.

Element 4: Data and product sharing and policies

4.1. Percentage of GBON compliance – for how many prescribed surface and upper-air stations are observations exchanged internationally. Usage of regional WIGOS centres.

Both registered GBON surface stations are reporting to the GBON WDQMS platform during the operating hours of the stations hence both stations are partially compliant.

Data transfer from the GBON stations is done using WIS2.0 protocol. The transfer is currently manual.

4.2. A formal policy and practice for the free and open sharing of observational data.

There is no formal policy. Current practice is for SKMS to share all data and services for free and there is no set restrictions on the data. There are neither no data sharing agreements or interagency protocols and data is shared ad-hoc based on requests. It is recommended to establish a data sharing policy ...

Data sharing is currently manual as well as quality controlling and archiving. Due to these reasons data sharing and retrieval is human resource intensive and can only be done when the resources allow.

4.3. Main data and products received from external sources in a national, regional and global context, such as model and satellite data.

The Antigua and Barbuda Meteorological Service (ABMS) is responsible for creating weather forecasts and warnings to St. Kitts and Nevis. These products are made daily and posted on ABMS's website from where SKMS can collect the information. Before dissemination one of SKMS meteorologists will review the products and when needed discuss them with ABMS. SKMS officers with meteorologist training can add value with local insights on the conditions and typical scenarios and to localize the information. To support the meteorological work SKMS uses GOES satellite data (used from the GEONetCast system) and weather radar information from the weather radar in Guadeloupe. Officers with meteorological training are capable to interpret remote sensed data from different satellite products.

The Local Weather Forecast for St Kitts and Nevis

Valid up to 8 am tomorrow Friday 26th July 2024.

Today's Temps

High 33°C
91°F
Low 23°C
73°F



Mod chc of shwrs

Synopsis: A weak tropical wave is moving through the region; however, dry atmospheric conditions will restrict significant shower activity.

Weather today: Partly cloudy with a 50 percent or a moderate chance of showers.

Weather tonight: Partly cloudy with a 20 percent or a slight chance of showers.

Winds: East at 15 to 30 km/h or 9 to 18 mph with possible gust up to 48 km/h or 30 mph.

Seas: 1.5 to 2.1 metres or 4 to 7 feet, a small craft advisory is in effect.

Sunset today: 6:46 pm.

Sunrise tomorrow: 5:49 am.

*Antigua and Barbuda Meteorological Services
Patrice Edwards-Forecaster*

Forecast issued at 6:28 AM, BOT on 25/07/2024

[Click for St Kitts and Nevis Four Day Forecast](#)

St Kitts and Nevis Four Day Forecast

Thursday	Friday	Saturday	Sunday
Partly Cloudy with a 40 percent or moderate chance of showers	Partly Cloudy with a 20 percent or slight chance of showers	Partly Cloudy with a 40 percent or moderate chance of showers	Partly Cloudy with a 40 percent or moderate chance of showers
High: 33°C/91°F Low : 24°C/75°F	High: 33°C/91°F Low : 24°C/75°F	High: 34°C/93°F Low : 25°C/77°F	High: 34°C/93°F Low : 25°C/77°F
Sunrise:5:48 am Sunset :6:46 pm	Sunrise:5:49 am Sunset :6:46 pm	Sunrise:5:49 am Sunset :6:46 pm	Sunrise:5:49 am Sunset :6:45 pm
Wind: E 10 -20 mph	Wind: E 10 -18 mph	Wind: E 6 - 14 mph	Wind: E 6 - 12 mph
Seas:, 4 - 6 feet	Seas:, 4 - 6 feet	Seas:, 4 - 5 feet	Seas:, 3 - 4 feet

Figure 4 Example of the forecast information for St. Kitts and Nevis provided by the Antigua and Barbuda Meteorological Services. Daily forecast (on top) and four-day forecast (on bottom).

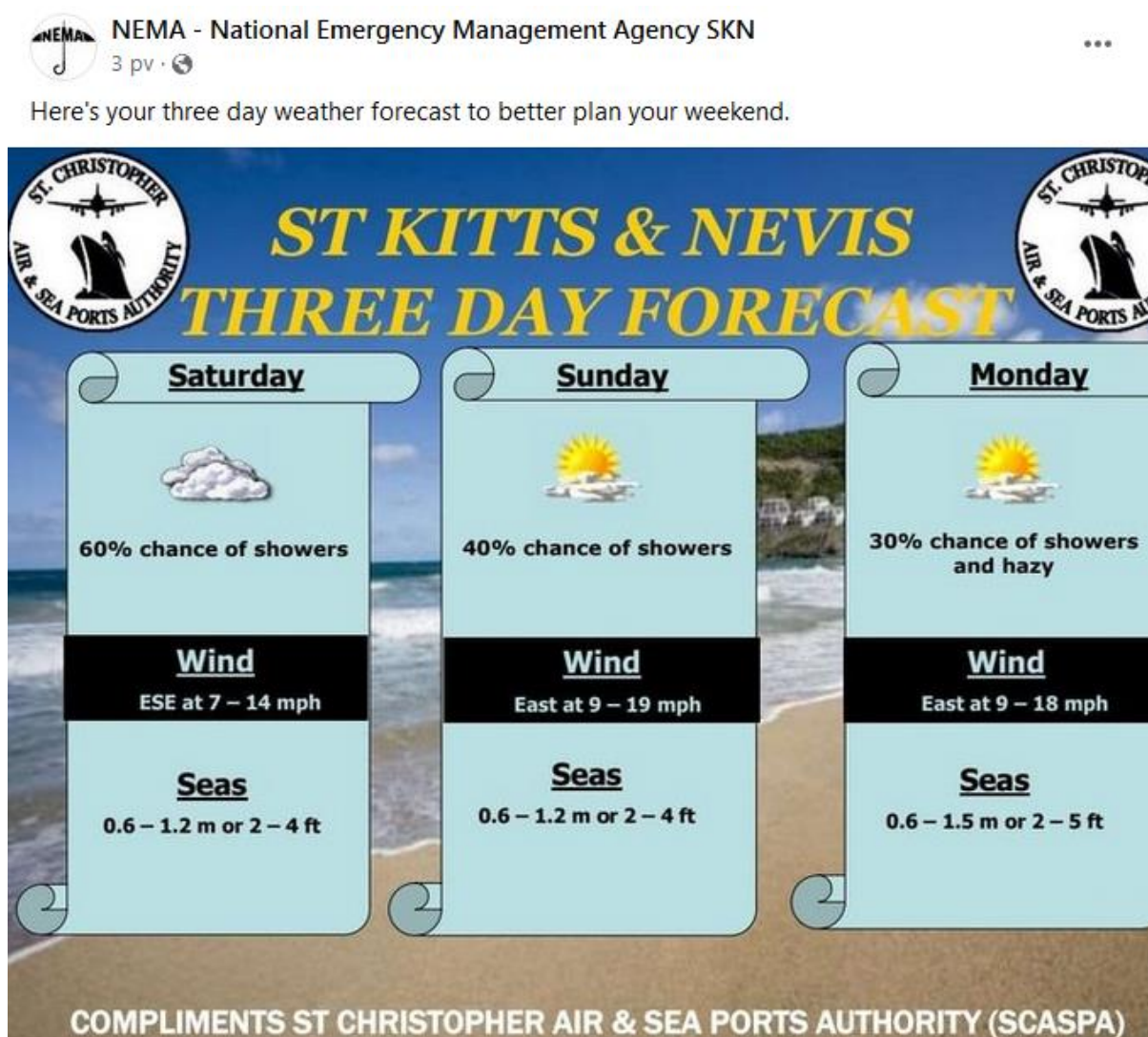


Figure 5 Three-day weather forecast by SKMS shared via NEMA Facebook page.

SKMS also receives model outputs in the forms of figures and outlooks for the climate modelling from CariCOF.

Summary score, recommendations, and comments for Element 4

The summary score for the element is 2 “A limited amount of GBON compliant data is shared internationally. The existing data sharing policies or practices or the existing infrastructure severely hamper two-way data sharing”.

SKMS is recommended to fully migrate into WIS2.0 and utilizing an automatic data dissemination in WIS2.0 protocol for hourly data sharing for automatic GBON surface weather stations.

SKMS is recommended to create a data policy and plan on the data access or user platform to access the data repository from database. The ongoing GCF project will cover some of these needs and all further improvements should be designed to complement the ongoing works. When selecting the database solution SKMS is recommended to highlight the need for a public and stakeholder interface for data access.

A key component related to the data sharing and storage is securing good data quality. SKMS is **recommended to start utilizing automatic data quality control and quality assurance**. Full implementation of this will require human capacity building.

Element 5: Numerical model and forecasting tool application

5.1. Model and remote sensed products form the primary source for products across the different forecasting timescales.

Antigua and Barbuda Meteorological Service (ABMS) is responsible of creating forecast and warning products for the area of St. Kitts and Nevis as agreed in the CMO Resolution 1. Information on ABMS capacity can be read in the Country Hydromet Diagnostics report³ for Antigua and Barbuda.

SKMS does not use any direct model products or independently create any products based on these. In the work of monitoring weather conditions, localizing ABMS created forecasts and participating in the national emergency management efforts, SKMS utilizes remote sensed (satellite and weather radar images) and forecast products (maps and trajectories) from regional specialized WMO centres such as Hurricane centre products that are freely available and in figure, chart or text format.

5.2. a) Models run internally (and sustainably), b) Data assimilation and verification performed, c) appropriateness of horizontal and vertical resolution.

St. Kitts and Nevis is not utilizing models currently.

5.3. Probabilistic forecasts produced and, if so, based on ensemble predictions.

St. Kitts and Nevis is not producing or utilizing and probabilistic forecasts currently.

Summary score, recommendations, and comments for Element 5

The element does not apply for St. Kitts and Nevis as SKMS and VAMS are observation offices and there is no forecasting or model data use in place. ABMS is responsible of forecast products for the area. ABMS summary score for element 5 was assessed as 3.

Element 6: Warning and advisory services

6.1. Warning and alert service cover 24/7.

Antigua and Barbuda Meteorological Service (ABMS) is currently producing all public weather forecast, watches and warning services to St. Kitts and Nevis. ABMS produces products on a daily basis and SKMS receives them from the ABMS website⁴ (email as backup). The following daily products that are in text format are provided:

- Severe weather warnings
- World weather watch data and information

ABMS operates on a 24/7 basis, whereas SKMS is operating 06:00 to 21:00 or during the operating hours of the airport. In case of an approaching or ongoing hazardous weather event such as a hurricane, the Senior Meteorological Officer of SKMS will be on duty throughout the event based at the National Emergency Operation Center (NEOC) located at NEMA. During hazardous weather events and in the anticipation of them SKMS will

³ [CHD - Alliance for Hydromet Development](#)

⁴ [AntiguaMet website](#)

follow closely the evolution of the systems (especially the tropical cyclones) collaborating actively with ABMS, utilizing available observations e.g. weather radar and satellite images and following other key sources such as the regional Hurricane centre advisories and forecasts. During this period SKMS collaborates daily with ABMS and the national emergency authorities.

There is no formal policy in place for minimum and maximum lead times for warnings. The informal policy of SKMS has been issue alerts on drought weeks a month in advance based on the seasonal forecast and in tropical cyclone cases start issuing alerts 3 days before predicted impact.

TROPICAL CYCLONE WARNING STATEMENT

WHCA31 TAPA
HURRICANE TAMMY WARNING STATEMENT
ANTIGUA AND BARBUDA METEOROLOGICAL SERVICES
12:11 AM ECT SUN, OCT 22, 2023

THIS IS FOR ST. KITTS AND NEVIS

...HURRICANE WARNING DISCONTINUED FOR THE ISLANDS...

THE HURRICANE WARNING HAS BEEN DISCONTINUED FOR ST. KITTS AND NEVIS.

AT 11 PM ECT OR 0300Z THE CENTRE OF HURRICANE TAMMY WAS LOCATED NEAR LATITUDE 17.8 NORTH, LONGITUDE 61.9 WEST OR ABOUT 15 MILES NORTH-NORTHWEST OF BARBUDA.

TAMMY IS MOVING TOWARD THE NORTH-NORTHWEST NEAR 10 MPH (17 KM/H), AND THIS GENERAL MOTION IS EXPECTED TO CONTINUE THROUGH SUNDAY, FOLLOWED BY A TURN TOWARD THE NORTH MONDAY.

ON THE FORECAST TRACK, THE CENTER OF TAMMY WILL MOVE NORTH OF THE NORTHERN LEEWARD ISLANDS BY SUNDAY AFTERNOON.

MAXIMUM SUSTAINED WINDS 85 MPH (140 KM/H) WITH HIGHER GUSTS. SOME STRENGTHENING IS POSSIBLE DURING THE NEXT FEW DAYS.

HURRICANE-FORCE WINDS EXTEND OUTWARD UP TO 25 MILES (35 KM) FROM THE CENTER AND TROPICAL-STORM-FORCE WINDS EXTEND OUTWARD UP TO 125 MILES.

THE MINIMUM CENTRAL PRESSURE 992 MB (29.30 INCHES).

Figure 6 Example of a tropical cyclone warning statement produced by ABMS for St. Kitts and Nevis.

SKMS is working closely with the Disaster Mitigation Council and the National Emergency Management Agency⁵ (NEMA). Working relations are very good and direct although formally NEMA needs to request assistance and human resources from SKMS through SCASPA which is experienced as a layer of unnecessary bureaucracy. NEMA and SCASPA have an established protocol for the interaction.

St. Kitts and Nevis have National Disaster Strategy and National Disaster Plan produced under the provision of the National Disaster Management Act 1998.

NEMA operates the national multi-hazard early warning system that is responsible of preparing and acting on all disasters in St. Kitts and Nevis, they coordinate and facilitate pre and post disaster management activities at the community and national levels. NEMA has the mandate to operate at both the national and community levels in coordinating and facilitating the pre- and post-disaster management activities and to provide accessible and accurate information on risks of multiple hazards to all residents and visitors.

The national disaster risk reduction effort involves communities, Government and non-government entities in its efforts. Main contributors are the National Disaster Committee, The National Disaster Executive and its Disaster Sub Committees, National Emergency Management Agency (NEMA), Nevis Disaster Management Committee, Districts Managers, Government Agencies, Non-Governmental Organizations and Agencies, Private Voluntary Organizations, volunteers and regional and international agencies. The Committees and Sub Committees consists of all key government organizations, non-government organizations e.g. Red Cross Society, Raio Society, Hotel & Tourism Association, private

⁵ <https://www.nema.kn/>

organizations e.g. media houses and regional or international agencies e.g. USAID, UNDP, IADB.

Meteorological services represented by the SKMS Chief Meteorological Officer attends selected Sub Committees and provides weather forecasts for the use of the Disaster Committee when needed. The National Disaster Committee meets at least once per year or when necessary, Sub Committees meet more often. The performance of subcommittees is evaluated annually after the hazard season and an after-action review is completed for every high impact event by NEMA.

Weather alerts, warnings and preparedness statements are widely shared nationally using radio, TV, WhatsApp and social media. Both SKMS and NEMA are pushing the information through the available channels. The wide dissemination portfolio is estimated by both SKMS and NEMA to effectively reach most of the population.

SKMS also pushes warning statements through email chains to the subscribed stakeholders. As most of the population have access to internet, SKMS is planning to establish a dedicated website for national weather and climate service and product dissemination and NEMA is planning to develop a dedicated mobile app for the national dissemination of warnings.

Besides the dissemination of warning products, SKMS participates together with NEMA to create information to increase public awareness and preparedness for hazards through social media campaigns and radio or TV interviews.

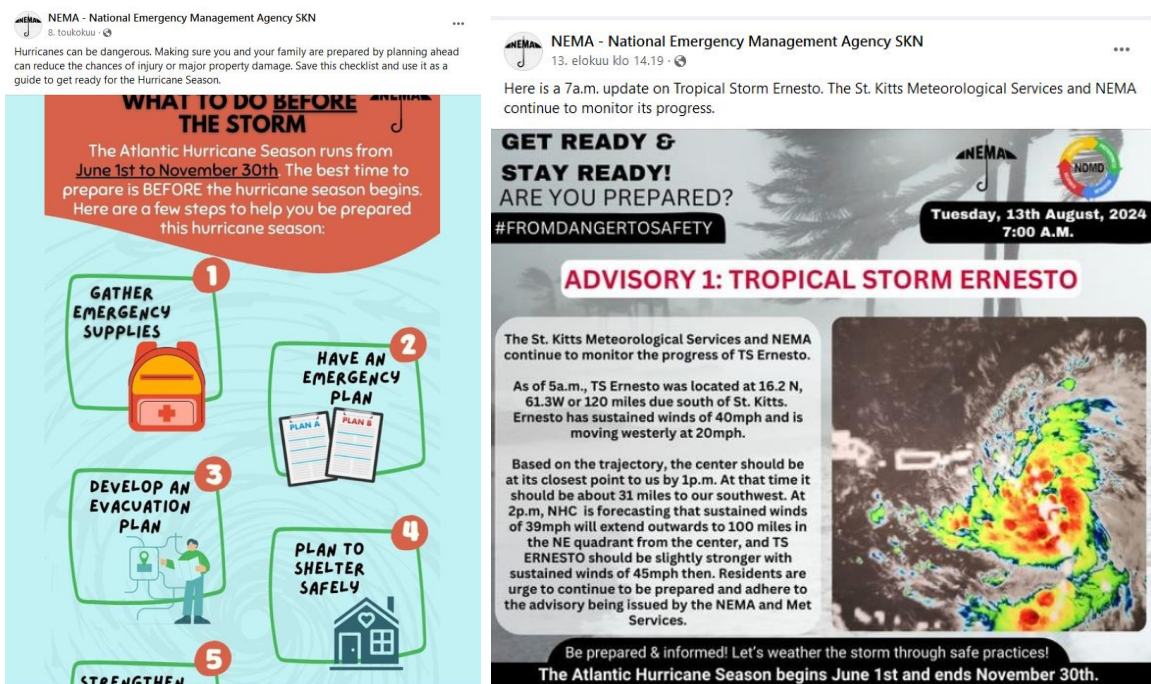


Figure 7 Example of Hurricane preparedness list shared by NEMA (left) and Advisory for Tropical Storm shared by NEMA (right). From NEMA Facebook page.

Currently the largest gaps in the national early warning capabilities is the lack of national capabilities and mandate to create and issue warnings and therefore the full dependence on ABMS services, as well as the lack of an impact-based multi-hazard early warning system.

6.2. Hydrometeorological hazards for which forecasting and warning capacity is available and whether feedback and lessons learned are included to improve warnings.

There is no feedback channels or processes in place. SKMS typically receives ad-hoc feedback or feedback after the hurricane season from NEMA. The National Disaster Committee's Sub Committee performance is evaluated annually.

NEMA hosts annually disaster preparedness trainings and drills for example on tsunami and hurricane preparedness, which SCASPA and SKMS is participating. During these exercises SKMS will receive input from NEMA and other stakeholders on the performance.

6.3. Common alerting procedures in place based on impact-based services and scenarios taking hazard, exposure and vulnerability information into account and with registered alerting authorities.

Common alerting protocol is not used when issuing warnings. Implementing CAP and protocols for warning dissemination are highlighted as key outputs and objectives in the National Strategic Plan (NSP).

SKMS does not produce any impact-based forecasting or services but may include simple statements to the public forecasts and warnings on how to mitigate negative effects. Such statements are be made in collaboration with other stakeholders such as NEMA, Ministry of Health, Water Department or Agriculture Department. The statements can include for example a call to secure property in the impacted areas, minimize exposure, conserve water or to stay hydrated. Typical events to have such advisories are tropical cyclones, flash floods, drought events, heat waves and dust episode. Besides the statements NEMA produces informative material for the public to improve the awareness of potential impacts and mitigation measures for different hazards e.g. how to stay safe during a heat wave.

Working towards impact based forecasting and warning informed through hazard assessment, vulnerability assessment, risk assessment, impact assessment and studies of risk perception has been identified as a part of the strategic goal in NSP.

Discussions on how to benefit from and expand to impact-based forecasting with a multi-hazard approach has started with the lead of NEMA. National vulnerability maps and records of previous impacts both exist, but funds and capabilities to utilize these with other forecasting tools are lacking.

Summary score, recommendations, and comments for Element 6

The summary score for element 6 is 1 "Warning service not operational for public preparedness and response" since there are no warnings officially produced in St. Kitts and Nevis although the practical work related to the efficiency of warning public and mitigating hazards is closer to level 3 "Weather-related warning service with modes public reach and informal engagement with relevant institutions, including disaster management agencies".

The main gap in the warning and advisory services in St. Kitts and Nevis is the lack of national authority responsible for creating and issuing them. Currently the forecasting and warning capabilities and responsibilities are covered by ABMS. SKMS has only the responsibility to disseminate these and alert the national authorities, although they are actively participating in providing local insights, looking at additional sources of information and discussing with national emergency management. SKMS has plans to develop the capabilities and status from an observation office to a national forecasting

office with independent responsibility of national forecasts and warnings and gradually taking over the services ABMS is currently providing. **The recommendations are to formalize the mandate and status of SKMS and to progress towards SKMS taking over the responsibilities of a forecasting office with capabilities for national warning provision.** As the warning responsibilities and capabilities are transferred to **SKMS it is recommended to invest in creating an impact-based multi-hazard system with community level development.**

Overall, the public reach of weather-related warnings is very good in St. Kitts and Nevis with a range of dissemination channels and an effective MHEWS system coordinated by NEMA. Also, the collaboration and national coordination in the emergency management is effective with annual hazard drills, performance evaluation and very close collaboration. The main gap with the meteorological collaboration is the lack of formality, as SKMS does not have any formal status and the requests for collaboration need to go through SCASPA.

Currently SKMS is very well connected with all relevant national stakeholders and government services. SKMS's expertise is valued, and they are consulted in relation to all weather and climate related issues. In order to secure such good working relations also in the future and decrease the dependency of personal relations, **SKMS is recommended to formalize engagement with the key stakeholders.**

In order to improve the dissemination of warnings to the public **SKMS is recommended to develop a dedicated website and to closely collaborate with NEMA as they proceed with the development of a national hazard mobile app.**

Element 7: Contribution to Climate Services

7.1. Where relevant, contribution to climate services according to the established capacity for the provision of climate services.

The Caribbean Climate Outlook Forum (CariCOF), a WMO regional climate forum hosted in CIMH, has a leading role in providing climate services in the Caribbean, including St. Kitts and Nevis. CariCOF operates the regional climate database where it collects observation information from member countries, including St. Kitts and Nevis, runs the regional climate model and based on these provide climate forecasts, outlooks and other services for the region. Information is share to member countries that can nationally share the products or use these for background information when creating nationally tailored climate products and services.

For the climate outlook CIMH is centrally collecting observations from a multitude of countries in the region. Most of the observations shared for the climate center are produced by non-GBON stations. Through the collaboration all members can receive observation information, and the climate outlooks created from these.

CariCOF hosts annual events to discuss the forecasts for the wet/hurricane season and dry season. Between the events, a monthly forecast update is delivered for the members. CariCOF forecast includes products for rainfall and temperature for up to 3 and 6 months as well as for drought, and an alerting system supported by response actions. Main products that SKMS are receiving from CariCOF are:

SKMS receives the following products from CIMH:

- Climate summary report which includes total rainfall, mean and extreme temperatures, dry and heat spells and the accumulated rainfall information

- Caribbean Climate Outlook Newsletter that includes an overall view of the climate history over the past three months and projection for the next three months for the Caribbean region.
- CariCOF Drought Outlook
- Dry Spells Outlook
- Rainfall frequency and extreme forecasts
- Wet days and Wet spells Outlooks

SKMS disseminates the CariCOF outlooks and a summary for the upcoming 3-month period for the national stakeholders. This service is based on a newsletter type of email chain. Besides this SKMS can support national stakeholders to interpret the information and discuss the local conditions and impacts, and to take part in the national climate considerations.

Climate services are currently used by the following sectors in St. Kitts and Nevis:

- Agriculture
- Water services
- Tourism
- Health
- Disaster Management

Currently the offered services are limited to basic and essential services and special needs, or new requests can only be serviced if the time from other duties allows. SKMS has one officer that support climate services (and the Senior Meteorological Officer as a backup). To be able to improve the services and to expand to new products or applications, more staff will need to be trained and dedicated to such work.

St. Kitts and Nevis National Disaster Plan acknowledges that climate change and disaster management are closely linked and highlights the importance of utilizing information of climate change in the hazard and vulnerability mapping, mitigation and disaster response. For SKMS to be able to support such services climate services will need to be strengthened.

SKMS has not yet established a National Framework for Climate Services but is planning to include this in the future project activities.

SKMS is not monitoring the effectiveness or benefits of provided climate services and only receives user feedback through informal conversations.

Currently there is no central database or archiving system, synoptic data is archived in a local excel file. Climate database is only hosted by CariCOF. SKMS shares the national observations to this database but does not have a direct access to it. In the upcoming project by Green Climate Fund (GCF) a national climate repository will be delivered. The new repository will solve many of the current issues related to data management and access to the data. It is recommended to include an interface to the repository from where stakeholders can access the climate data directly in a user-friendly manner. Direct access is recommended as this will lessen the workload for SKMS staff as stakeholders can independently do specific queries.

Summary score, recommendations, and comments for Element 7

The summary score for the climate services SKMS is independently producing is 1 or 2 "Less than basic or basic capacity for climate services provision", but the overall score for the climate services delivered in St. Kitts and Nevis is 3 "Essential capacity for climate

services provision". The discrepancy in the score is due to the very high level of dependency on outside services and products.

Currently SKMS has no internal capacity to create climate services and is fully relying on CariCOF for the climate database and climate forecasts. SKMS is handling the national dissemination of the forecasts and participating in the discussions on national level as the dedicated climate expert providing interpretation and localization of the information to the national stakeholders.

A key shortcoming now is the lack of a modern database. This gap is planned to be addressed in the upcoming project by GCF as a new climate repository is invested in. **SKMS is recommended to progress with the GCF project and to select a data repository solution that benefits the entire service creation with data quality control mechanisms and tools for data importing and exporting. SKMS is recommended to consider developing an interface for stakeholders to access climate data directly in a user-friendly manner from the repository.** Besides establishing a modern database for the national level, it is **recommended to grant access to the CariCOF climate database with possibility to independently query observations and timeseries.**

Provided services are mainly limited to climate records, climate outlooks and specific seasonal forecast for drought, dry spells, wet spells and rainfall. The number of staff with allocated time and skills to create climate services is very small and cannot facilitate any additional services or new service development in the field. Stakeholder requests on specific data series or analysis of the climate can only be services when time from main duties allow.

The demand for climate services in St. Kitts and Nevis seems to be growing and there is a need for new type of products to serve the different stakeholders. In order for SKMS to expand their climate services portfolio and collaborate with more stakeholders it is **recommended to invest in more staff that would dedicate their time to such work.** This is recommended to be implemented as a part of the overall human resource remodelling when combining the meteorological observation offices into one service. Besides new recruitments it is **recommended to invest in human capacity building for all staff working with climate services.**

As in the weather services, also in climate services **SKMS is recommended to formalize the engagement process with other relevant agencies nationally.**

Element 8: Contribution to hydrology

8.1. Where relevant, standard products such as quantitative precipitation estimation and forecasts are produced on a routine basis according to the requirements of the hydrological community.

The Water Services Department (WSD) is responsible for the national water resources. It is divided into two separate departments one in St. Kitts⁶ and one in Nevis. WSD's main objective is to assess national water resources including the assessment of the water available for capturing and to ensure sustainability of the water resources. WSD works with watershed management with other government departments in monitoring the quality of water for public consumption, protection of surface and groundwater resources

⁶ [St. Kitts Water Services Department](#)

and regulating of land use and building of roads. WSD observation networks are mainly related to water level measuring in the water supplies.

No entity is formally responsible for flood forecasting and issuing flood warnings in St. Kitts and Nevis. Public Works Department which is responsible for storm drainage and flood control has informally been covering flood management.

Fresh water availability on the islands is dominated by the annual fluctuation of dry and wet seasons and the impacts of hurricane season. According to WSD the annual rainfall has decreased 18% during the last 25 years due to climate change impacts.

SKMS and VAMS shares the precipitation data from its observation stations with the WSD on a weekly basis. In minimum this data is limited to the airport observation stations and a need to increase the amount and density of precipitation observations has been noted by several stakeholders. Previously a manual rain gauge network operated by sugar farms was providing this information, but after the economic shift from farming to tourism the network has stopped operation. Besides surface observations there is available precipitation information from weather radars hosted by neighbouring countries, but this information has not been utilized by the water sector. In addition to rainfall data, SKMS shares monthly climate outlooks (SKMS does not produce these, they are provided by the WMO regional climate centre CariCOF) that include 3 months outlook for rainfall, its frequency and extremes and the wet days and spells.

WSD in St. Kitts does a projection of the rainfall trend based on previous years observations and compares this with the climate outlook. Beyond the trend assessment no forecasting is done.

The relationship between SKMS and WSD is informal but currently very direct and good. This is largely thanks to good relations between key individuals. In order to sustain the good level of collaboration and trust it is recommended to formalize the relationship.

8.2. SOPs in place to formalize the relation between Met Service and Hydrology Agency, showing evidence that the whole value chain is addressed.

All engagement between the entities is informal and no SOPs are in place.

8.3. Data sharing agreements (between local and national agencies, and across international borders as required) on hydrological data in place or under development.

All engagement between the entities is informal and no data sharing agreements are in place.

8.4 Joint projects/initiatives with hydrological community designed to build hydrometeorological cooperation.

When procuring and installing rain gauges to St. Kitts and Nevis the projects are coordinated with the meteorological, water and environmental sector.

Most regional initiatives that SKMS has been participating to are directed to support hydrometeorological services. In this cases SKMS acts as the focal point but collaborates with WSD in sharing of the data and e.g. installing of the equipment.

Summary score, recommendations, and comments for Element 8

The summary score for the element is 2 "Meteorological input in hydrology and water resource management happens on an ad hoc basis and or during times of disaster".

The relationship between SKMS and the Water Service Department is recommended to be formalized and parallel to this, it is **recommended to define the responsibilities of all the different national water and flood sector entities**. Based on the division of responsibilities **closer collaboration and planning of needed services and priorities between the entities is encouraged**.

Element 9: Product dissemination and outreach

9.1. Channels used for user-centred communication and ability to support those channels (for example, does the NMHS operate its own television, video or audio production facilities? Does it effectively use cutting-edge techniques?).

Forecast products are developed by the ABMS but disseminated to the local channels via SKMS. SKMS is doing some localization and writing of forecasts to fit the local users and to include local considerations. Main dissemination channels for forecast products are TV, radio and e-mail. SKMS is planning on developing a dedicated website for its services and products soon.

When issuing alerts, ABMS will alert SKMS and share the warning and forecast products. SKMS can add local insights to the warnings and discuss with ABMS who can add such to the warning ABMS is responsible of formally issuing. SKMS will inform and discuss with NEMA and both SKMS and NEMA will push the ABMS issued messages to the local dissemination channels. (ABMS is only responsible to disseminate the warnings on their own website or by email to SKMS). NEMA uses a multitude of dissemination channels to reach the entire public. Main channels are TV, radio, email, social media, SMS and using of 3rd party message mobile applications such as WhatsApp, Viber and Messenger. Mobile phones and internet connection is very common in the islands and mobile services are becoming increasingly popular as main communication channel especially among younger generation. There is a plan on developing a national disaster mobile application, which would include meteorological warnings as a key input.

9.2. Education and awareness initiatives in place.

SKMS is participating actively in educational outreach by participating in school career fairs and school visits. SKMS is also participating in NEMA's disaster preparedness campaigns to increase public awareness. Such campaigns include videos and figures on disaster preparedness e.g. disaster preparedness checklists and information about shelters and increasing public awareness on approaching events or seasons e.g. forecasts for hurricane season or current events e.g. heat waves and how to stay safe during the events.

9.3. Special measures in place to reach marginalized communities and indigenous people.

NEMA's dissemination channels, warning products and outreach activities include specialized actions to reach visually impaired and physically disabled population. NEMA also takes care of translating major warnings (mainly on tropical cyclone) to Spanish, which is the second largest language community in St. Kitts and Nevis.

In order to reach younger population, NEMA has started to use versatile social media channels and is planning to develop a mobile app for national warning dissemination

Summary score, recommendations, and comments for Element 9

The current summary score for the element is 1 "Dissemination using only limited traditional channels such as daily newspapers and the national broadcaster with little control over messaging and the format". Once a dedicated website will be in place the

element score will rise to 2 “Traditional communication channels and a basic dedicated website is used to disseminate forecasts and basic information.”

SKMS is recommended to focus on the website development. The new website offers a great opportunity to develop and co-develop new products and to collect user feedback on them. **SKMS is recommended to expand its product portfolio with products tailored for website use** (shift from text-based products into more graphic products) and to **start following up on the user statistics for the website.** A dedicated website will support the ambition of expanding into a forecasting office and gradually starting to produce local forecast and warning products.

To ensure maximal efficiency in the warning dissemination and collaboration between officials, **SKMS is recommended to collaborate very closely with NEMA if they move ahead with the plan of developing a mobile application** for national disaster warning and information dissemination.

Element 10: Use and national value of products and services

10.1. Formalized platform to engage with users in order to co-design improved services.

A formalized platform that facilitates multi-sectoral discussion and improving of services is in place and functioning effectively in the national disaster risk reduction activities. In addition to this, there is no other regular or formal platform for such interactions. Besides the lack of platform or mechanisms to engage users, development of services is severely limited by the lack of human resources for such activities.

SKMS and its stakeholders have expressed interest to establish such a platform, and the co-design of especially impact-based forecasting has been highlighted by all parties.

10.2. Independent user satisfaction surveys are conducted, and the results used to inform service improvement.

No independent user satisfaction surveys have been conducted.

10.3. Quality management processes that satisfy key user needs and support continuous improvement.

SCASPA is in the process of renewing the aeronautical Quality Management System (QMS) from ISO9001:2008 to ISO9001:2015 protocol. The work also includes SKMS aeronautical observation capabilities. The estimated schedule is to complete the process during the next one or two years, although the certification process may take some more time.

In case the ambition of expanding SKNS capabilities and mandate to forecasting and warning duties it is recommended to implement QMS from an early stage to the services.

Summary score, recommendations, and comments for Element 10

The summary score for the element is 2 “Service development draws on informal stakeholder input and feedback”.

Engagement is very effective and direct between all major stakeholders and SKMS. Most of the relationships rely on the good direct connection between the Senior Meteorological Officer and the stakeholders. In order to ensure continuous effective relationships even if key persons are replaced, **it is recommended to formalize the engagement with key stakeholders.**

The multi-sectoral engagement in national disaster risk reduction and management efforts is functioning well, but the collaboration in other services and topics has a lot of room to improve and the stakeholders are seemingly willing to participate more actively in co-creation activities, especially related to the possible impact-based forecasting activities. In case the ambition of SKMS to start developing forecasting and warning products and services nationally will progress it is **recommended to involve stakeholders and public users from an early stage in the co-designing of new services.**

SCASPA and SKMS is in the process of establishing and certifying ISO9001:2015 QMS protocol. **It is recommended to finalize the process and to start implementing of the protocol.** When expanding the duties of SKMS to forecasting and warnings **it is recommended to include the services to QMS.**

Annex 1 Consultations (including experts and stakeholder consultations)

The CHD was developed as part of the SOFF Readiness Phase. During this time FMI made two missions to St. Kitts and Nevis. The following stakeholders were consulted during the work:

- Staff and management of SKMS
- Staff and management of SCASPA
- Antigua and Barbuda Meteorological Services
- National Emergency Management Agency
- Water Services Department
- Consultation of CIMH on regional training and calibration capabilities

Annex 2 Urgent needs reported

Following critical gaps has been identified:

- There is currently no legal framework nor mandate for a National Meteorological Service in St. Kitts and Nevis. The draft bill exists, and it is recommended to proceed with the formalization.
- Currently two separately administrated observation service units, SKMS in St. Kitts and VAMS in Nevis, are operating to provide the national meteorological services. The plan is to combine the two offices into one National Meteorological Office St. Kitts and Nevis Meteorological Service (SKMNS). It is recommended to proceed with the plans, including restructuring of the staff and duties.
- In parallel with the unifying of the observation units and the legislative development, it is recommended to expand the duties to include national forecasting and warning of meteorological event. At this moment the Antigua and Barbuda meteorological service (ABMS) is responsible for all weather forecast and warning generation to St. Kitts and Nevis. The expansion of duties and transition from ABMS to SKMNS should be made in phases as this will require investments in systems and software tools (recommended to use open-source solutions with highly automatized tools for cost and work efficiency), staff and human capacity building. Annual budget will need to be updated to reflect the new duties.
- Formalizing key partnerships and improving stakeholder engagement will be critical to support effective forecasting services and potential expansion to impact-based forecasting.
- Main gaps related to the observation network is automating the currently manual GBON stations to ensure 24/7 operation and to improve data management system and database, including automatic quality control and assurance as well as annual preventive maintenance and the sensor calibration process. Based on WMO GBON regulation there is a gap in not having an upper-air sounding station in St. Kitts and Nevis, but as the regional network already covers it within the required spatial density, it is not seen as cost-effective or urgent to invest in a sounding system.
- Improving the climate services will require additional staff and human capacity building as well as access to the regional climate database and model provided by the CariCOF.
- Most urgent capacity building needs are to strengthen the maintenance unit capabilities. Significant investments in human resources and their capacity are needed to transfer into a National Meteorological Forecasting Office.
- To improve the dissemination to the public and to enable effective new service creation and dissemination it is recommended for SKMS to develop a website with tailored products.
- Finishing the ongoing work with Quality Management System standardization. It is recommended to expand the framework to include new services as forecasting and warning duties become SKMS's responsibility.
- Improving the regional collaboration especially related to the WMO regional calibration centre services and the availability of data from the regional climate database and models. Strengthening the collaboration between peers in terms of

experiences with new observation technologies and solutions as well as regional network planning, data sharing and investments e.g. regional weather radar composite availability and possibility of regional lightning detection network.

Annex 3 Information supplied through WMO

Peer adviser acknowledges the material and templates provided by SOFF throughout the Readiness phase.

Annex 4 List of materials used

Besides available WMO materials SKMS and its stakeholders have shared information and documentation that has been used as the basis for the analysis. Some key documents are:

- Draft on St. Kitts and Nevis Meteorological Services National Strategic Plan & Framework for Weather, Water and Climate Service 2021-2025 (April 2021)
- CMO Resolution 1 (Nov 2011)
- The St. Kitts and Nevis National Disaster Plan, prepared by the National Emergency Management Agency (2013)
- St. Kitts and Nevis Disaster Risk Reduction Initiatives
- Develop Standard Operating Procedures for National Meteorological Services Proposed Organisation Structure Prepared for Caribbean Community Climate Change Centre (CCCCC). Prepared by Tonkin & Taylor International Ltd (March 2022)