

SESSION 2: DIAGNOSE CLIMATE SERVICES

Process Agenda

Day 2	Session 2	Objectives/Facilitation Notes
SESSION 2	DIAGNOSE CLIMATE SERVICES DELIVERY	<p>Objectives:</p> <ul style="list-style-type: none"> Recap of events and impacts as a result of sharing stories and developing historical timeline. Participants are broken out into sector groups. Describe existing climate services Diagnose strengths, weaknesses, and opportunities of existing climate services to support climate early warning by sector. Explore existing products and services that support situation awareness. Identify actions to improve the situation and develop a climate early warning strawman.
30 minutes	What is the current situation?	<p>Review of the ready-set-go framework presented in Session 1. Give the presentation developed during Pre-Dialog Technical Exchange and Planning that describes the existing ready-set-go situation for the climate-related event(s)/condition. The guidance for developing this presentation is provided in the Pre-Dialog Activity.</p> <p>The facilitator can note that we will focus one event/condition that was identified in Session 1. We may do more if we have time. Revisit key messages to make sure strawman incorporates key messages – rewrite the key messages as questions.</p>
60 minutes	Activity #2: What actions are needed to improve the situation?	<p>Break-out groups will diagnose the current capacity to delivery end-to-end climate services for each sector using a specific climate event. Focus questions include:</p> <ul style="list-style-type: none"> What worked? What didn't? (Information, communication, effectiveness of actions) What other parameters/information did you wish you had to take action/make decisions? <p>Activity #2</p>
30 minutes	Exploring available products and tools and climate services from other countries	<p>Presentations of examples of early warning systems, and types of information and tools that can be used to enhance situational awareness and support decision-making. Participants will examine what works and what needs to be changed, and through this process begin to map out the elements of a climate early warning system</p> <p>Climate Services Products and Tools</p>

Day 2	Session 2	Objectives/Facilitation Notes
60 minutes	Activity #3: What should constitute a climate early warning system?	<p>Break-out groups will develop a climate early warning system “strawman” highlighting actions needed to strengthen the delivery of climate services for each sector.</p> <ul style="list-style-type: none"> • What discoveries did you make? • What would you do differently? <p>This is a good time to revisit key messages and best practices and incorporate them into the climate early warning strawman.</p> <p>Activity #3</p>
30 minutes	Report Out and Synthesis	Break-out groups report out on “strawman” and synthesize results from break out to layout key actions need to move forward.

Activity #2 –Diagnose Existing Early Warning System for a Climate-Related Event

Activity #2 – Diagnose the Existing Early Warning System for a Climate-Related Event or Condition using the Ready-Set-Go Framework	
<p>Objective: The information flow, decisions and actions made relative to a selected climate-related event/condition will be diagnosed based on the presentation of the existing system. Participants will describe what worked, what did not work, and what needs to be changed for future water quality/quantity/coral reef issues related climate events.</p> <p>Output: Strengths, weaknesses, opportunities of existing system</p>	<p><i>Participants: broken out by sector if feasible</i></p> <p><i>Materials: Flipcharts, marking pens, sticky dots (various sizes and colors)</i></p> <p><i>Facilitator: guides participants through focus questions</i></p> <p><i>Recorder: prepares summary of the diagnosis for the Climate Story outline</i></p>
<p>Focus Questions:</p> <ul style="list-style-type: none"> • What worked? What didn't? (Information, communication, effectiveness of actions) • What other parameters/information did you wish you had to take action/make decisions? 	<p>Participants discuss the existing ready-set-go situation,</p> 

	Ready	Set	Go
Climate Early Warning System Strawman for: [e.g. drought, coastal inundation, coral bleaching]	<ul style="list-style-type: none"> • Begin planning and monitoring of forecasts • Update contingency plans • Sensitize communities • Enable early-warning systems 	<ul style="list-style-type: none"> • Continue monitoring • Adjust plans • Warn communities • Conduct local preparation activities 	<ul style="list-style-type: none"> • Activate response • Instruct communities to evacuate, if needed
What worked? What didn't? (Information, communication, effectiveness of actions)			
What other parameters/information did you wish you had to take action/make decisions?			
What was missing?			

Sources of Climate Services Products and Tools

Below is a list of websites and tools for climate information in the Pacific Islands with an emphasis on climate early warning, seasonal outlooks, and ENSO monitoring. The links target products and information from a mix of agencies, institutions, and organizations, which are geared toward the transfer of regionally-relevant climate information for the Pacific Islands.

CLIMATE INFORMATION PORTALS

1. [NOAA Climate Portal](#)

With the rapid rise in the development of Web technologies and climate services across NOAA, there has been an increasing need for greater collaboration regarding NOAA's online climate services. The drivers include the need to enhance NOAA's Web presence in response to customer requirements, emerging needs for improved decision-making capabilities across all sectors of society facing impacts from climate variability and change, and the importance of leveraging climate data and services to support research and public education. To address these needs, NOAA embarked upon an ambitious program to develop a NOAA Climate Services Portal. The goal is for the Portal to become the "go-to" website for NOAA's climate data, products, and services for all users.

2. [Climate and Oceans Support Program in the Pacific \(COSPPac\)](#)

The aim of COSPPac is to enhance the capacity of Pacific Islands to manage and mitigate the impacts of climate variability and tidal events. COSPPac works with stakeholders in the Pacific Islands to build tools that can forecast and report on climate, tides and the ocean. Provide a number of products and services, including the Ocean Portal, Seasonal Climate Outlooks in Pacific Island Countries, Online Climate Outlook Forum (OCOF), Water Storage Outlook Model, tidal information, sea level data, Malaria Early Warning System, Drought Monitoring and Response System, and our Climate Bulletin.

3. [Climate and Oceans Support Program in the Pacific \(COSPPac\) Bulletin](#)

The Bulletin delivers climate and ocean monitoring and prediction data relevant to the tropical southwest Pacific, including diagnostics of ENSO, the Madden-Julian Oscillation (MJO), ocean temperature, cloud and rainfall patterns, as well as tropical cyclone information and seasonal outlooks.

4. [NOAA NESDIS National Centers for Environmental Information](#)

NOAA's National Centers for Environmental Information (NCEI) are responsible for hosting and providing access to one of the most significant archives on earth, with comprehensive oceanic, atmospheric, and geophysical data. From the depths of the ocean to the surface of the sun and from million-year-old tree rings to near real-time satellite images, NCEI is the Nation's leading authority for environmental information.

5. [US Global Climate Observing System \(GCOS\) Program](#)

NOAA is an active participant and proponent of the sustained and robust operation of a diverse array of climate observing systems that are part of a global network of climate observing systems under the Global Climate Observing System (GCOS).

6. [Asia Pacific Data Research Center](#)

The APDRC is building towards a vision of one-stop shopping of climate data and products for our users. Its mission is to increase understanding of climate variability in the Asia-Pacific region by developing the computational, data management, and networking infrastructure necessary to make data resources readily accessible and usable to researchers and general users; and by undertaking data-intensive research activities that will both advance knowledge and lead to improvements in data preparation and data products.

EL NIÑO-SOUTHERN OSCILLATION INFORMATION PORTALS

1. [Pacific Islands Climate Impacts and Outlooks Dashboard](#)

This website serves as a digital version of the quarterly "Hawaii and U.S. Pacific Islands Regional Climate Impacts and Outlook." The quarterly outlook draws on the Pacific ENSO Applications Climate Center's "Pacific ENSO Update" quarterly newsletter and other sources to bring together seasonal predictions and projections alongside information on recent impacts of weather and climate events in a concise and accessible format.

1. [Pacific ENSO Applications Climate Center](#)

The Pacific ENSO Applications Climate (PEAC) Center was established in August 1994 as a multi-institutional partnership to conduct research and produce information products on climate variability related to the El Niño – Southern Oscillation (ENSO) climate cycle in the U.S. Affiliated Pacific Islands (USAPI). The mission of PEAC is to conduct research and develop information products specific to the USAPI on the ENSO climate cycle, its historical impacts, and latest long-term forecasts of ENSO conditions.

2. [NOAA NWS Climate Prediction Center ENSO Page](#)

A coordinated program to monitor, assess and predict important oceanic and atmospheric phenomena that affect our weather.

3. [IRI ENSO prediction plume](#)

The International Research Institute (IRI) for Climate and Society provides a monthly summary of the status of El Niño, La Niña, and the Southern Oscillation, or ENSO, based on the NINO3.4 index (120-170W, 5S-5N).

4. [NOAA National center for Environmental Prediction Coupled Forecast System ENSO Forecast](#)

The Coupled Forecast System (CFS) v2 provides a prediction of monthly and seasonal mean sea surface temperature anomalies (degrees C) for the Niño 3.4 region. The observation is shown by the solid black line. Thin lines display forecasts from individual CFSv2 ensemble members, and the dashed line shows the ensemble mean. Seasonal averages of +0.5 degrees C or higher favor El Niño, while seasonal averages of -0.5 degrees C or lower favor La Niña. This product is updated weekly.

5. [Island Climate Update](#)

The Island Climate Update is a monthly summary of the climate in the tropical South Pacific islands, with an outlook for the coming months. This bulletin is a multi-national project with collaboration from a number of Pacific nations and support from various organizations.

SEA SURFACE HEIGHT INFORMATION PORTALS

1. [The University of Hawaii Sea Level Center.](#)

The UHSLC serves multiple roles in supporting real-time oceanographic operations as well as climate and oceanographic research. It collaborates with agencies within host countries in the installation and maintenance of a global network of tide gauge stations. The data are routinely processed, analyzed, and distributed at varying levels of temporal resolution and quality control depending upon the timeliness of release and application.

2. [Predictive Ocean-Atmosphere Model for Australia \(POAMA\)](#)

The Pacific-Asia Climate Change Science Adaptation Planning Program (PACCSAP) project seasonal prediction of sea-level anomalies in the Western Pacific is focused on the development and verification of seasonal forecasts for sea level for Pacific Partner Countries. These forecasts are generated

using the Australian Bureau of Meteorology's Predictive Ocean-Atmosphere Model for Australia (POAMA). This is a global ocean-atmosphere coupled ensemble seasonal forecast system developed jointly by the Australian Bureau of Meteorology (BoM) and the CSIRO Division of Marine and Atmospheric Research (CMAR). **NOTE:** These products are experimental and for research use only.

3. [WaveWatch III wave height and direction](#)

Forecast wave height (in meters) and vector (speed and direction) of the waves out to 96 hours. Red colors indicate regions of high waves; blue colors smaller waves. Red arrow indicates the direction of wave movement.

4. [Climate Forecast System Sea Surface Height Forecast](#)

Climate Forecast System modeled projection of the height of the sea for the next 8 month period in units of meters. Blue areas denote lower sea-heights; red higher. Forecasts are from initial conditions of the last 30 days, with 4 runs from each day. Forecast ensembles consist of 40 members from an initial period of 10 days.

5. [Pacific Region Sea-Surface Heights](#)

Sea Surface Height, in centimeters, for the period of three weeks prior to the current date, and one week forecast beyond the current date. Darker colors are higher wave heights; bluer colors lower. This product is updated daily.

STORM INFORMATION PORTALS

1. [South Pacific Hurricane Tracks](#)

This page provides access to a wealth of hurricane information including charts on the track of the storm plus a text based table of tracking information. The table includes position in latitude and longitude, maximum sustained winds in knots, and central pressure in millibars.

2. [Western Pacific Typhoon Tracks](#)

This page provides access to a wealth of hurricane information including charts on the track of the storm plus a text based table of tracking information. The table includes position in latitude and longitude, maximum sustained winds in knots, and central pressure in millibars.

[3. Eastern Pacific Hurricane Tracks](#)

This page provides access to a wealth of hurricane information including charts on the track of the storm plus a text based table of tracking information. The table includes position in latitude and longitude, maximum sustained winds in knots, and central pressure in millibars.

[4. Global Tropics Hazards and Benefits Outlook](#)

The Global Tropics Hazards and Benefits Outlook is a forecast for areas with elevated odds for above- or below-median rainfall and regions where tropical cyclogenesis is favorable or unfavorable for the upcoming Week-1 and Week-2 time periods. The rainfall outlook is for precipitation integrated over a week and targets broad-scale patterns, not local conditions as they will be highly variable.

SEA SURFACE TEMPERATURE AND CORAL BLEACHING INFORMATION PORTALS

[1. NOAA OceanWatch - Central Pacific](#)

Oceanwatch acquires and processes satellite information and creates a variety of satellite data products for the Pacific Ocean region. In this manner they serve as an updated source of daily regional satellite oceanographic observations. Satellite-based activities include observation, monitoring, analysis, and data distribution. As part of its operational responsibilities, OceanWatch - Central Pacific operates a direct readout station for the acquisition of real-time sea-surface temperature data from the Advanced Very High Resolution Radiometer (POES AVHRR) sensors onboard the NOAA polar-orbiting satellite constellation.

[2. Sea-Surface Temperature Anomalies](#)

Weekly averages of SST anomalies (degrees C) for the past twelve weeks. Analysis is based on the SST Optimum Interpolation (OISST) analysis. This product is updated bi-weekly.

[3. Weekly SST Anomaly Product from the NOAA National Centers for Environmental Information](#)

Weekly sea surface temperature anomaly map from the National Centers for Environmental Information using NOAA's OISST. Anomalies are shown in degrees C, updated weekly.

[4. Equatorial Sub-Surface Temperature Anomaly](#)

This product shows the anomaly in sub-surface temperatures at depths to 450m across the Equatorial Pacific. This product is updated every 5 days.

5. [NOAA Coral Reef Watch](#)

NOAA's Coral Reef Watch Program's satellite data provide current reef environmental conditions to quickly identify areas at risk for coral bleaching, where corals lose the symbiotic algae that give them their distinctive colors. If a coral is severely bleached, disease and partial mortality become likely, and the entire colony may die. Continuous monitoring of sea surface temperature at global scales provides researchers and stakeholders with tools to understand and better manage the complex interactions leading to coral bleaching. When bleaching conditions occur, these tools can be used to trigger bleaching response plans and support appropriate management decisions. Experimental 5-km daily Coral Bleaching Thermal Stress Monitoring products are available and operational twice-weekly 50 km products are summarized in 6-8 below.

6. [Coral Reef Watch Products – Bleaching Alert Areas](#)

The NOAA Coral Reef Watch (CRW) twice-weekly 50-km satellite Bleaching Alert Area product presented here outlines the areas where coral bleaching thermal stress currently reaches various bleaching stress levels, based on our satellite sea surface temperature (SST) monitoring.

7. [Coral Reef Watch Products – Coral Bleaching Hotspots](#)

The NOAA Coral Reef Watch (CRW) twice-weekly 50-km Coral Bleaching HotSpot product presented here measures occurrence and magnitude of instantaneous thermal stress, potentially resulting in coral bleaching. The scale goes from 0 to 5 °C. HotSpot values of 1 °C or more indicate thermal stress leading to coral bleaching and are highlighted in yellow to red colors. Spatial resolution is one-half degree precisely.

8. [Coral Reef Watch Products – Degree Heating Weeks](#)

The NOAA Coral Reef Watch (CRW) twice-weekly 50-km satellite coral bleaching Degree Heating Week (DHW) product presented here shows accumulated thermal stress, which can lead to coral bleaching and death. The scale goes from 0 to 16 °C-weeks. Spatial resolution is one-half degree precisely. The DHW product accumulates the instantaneous bleaching thermal stress (measured by Coral Bleaching HotSpots) during the most-recent 12-week period. It is directly related to the timing and intensity of coral bleaching. Significant coral bleaching usually occurs when DHW values reach 4 °C-weeks. By the time DHW values reach 8 °C-weeks, widespread bleaching is likely and significant mortality can be expected.

9. [Coral reef locations and bleaching information Reefbase](#)

ReefBase's Online Geographic Information System (ReefGIS) allows users to display coral reef related data and information on interactive maps. You can zoom, search, query, and save datasets on coral reefs.

10. [Reef Resilience Toolkit](#)

The Reef Resilience Program is a partnership effort led by [The Nature Conservancy](#) that builds the capacity of reef managers and practitioners around the world to better address the local impacts on coral reefs from climate change and other stressors. The Reef Resilience Program has the following main components: 1) Aggregation, translation and access to new coral reef science and management strategies for coral reef practitioners through this online [Reef Resilience Toolkit](#); 2) Communication to coral reef managers worldwide on new resources and tools for managing for resilience; 3) Virtual capacity-building that is implemented through the Reef Resilience [online course](#), a [webinar series](#), and the [Reef Resilience Network](#); and 4) Case studies in reef management and an online forum and community of practice.

Activity #3 –Develop a Climate Early Warning Strawman

Activity #3 – Develop a climate early warning system strawman using the Ready-Set-Go Framework	
<p>Objective: Using the input from presentations on climate services products and output from Activity #2, participants will develop a climate early warning system strawman.</p> <p>Output: Climate early warning system strawman using ready-set-go framework</p>	<p><i>Participants: broken out by sector if feasible</i></p> <p><i>Materials: Flipcharts, marking pens, sticky dots (various sizes and colors)</i></p> <p><i>Facilitator: guides participants through focus questions</i></p> <p><i>Recorder: prepares summary of the diagnosis for the Climate Story outline</i></p>
<p>Focus Questions:</p> <ul style="list-style-type: none"> • What discoveries did you make? What would you do differently? • What is a proposed climate early warning system strawman for [climate-related event/condition, e.g. drought, coastal inundation, coral bleaching] 	<p>Participants identify areas for improvement, and develop an improved plan for a future similar event.</p> 

Exercise: What should happen? Rewrite for how it should be.

Scenario: The existing climate early warning system is described based on the [climate-related event/condition e.g. drought that occurred from month/year to month/year].

Ready

I learned about the potential for a [event/condition] from [source(s) of information]. I monitored the information starting from [months, weeks, days] before the onset of the [event/condition]. I first communicated information about the potential for a [climate-related event/condition] to [agencies, organizations, communities] on [date or days before onset].

Set

I continued to monitor [source(s) of information] for [duration]. When the conditions got to [a particular threshold or trigger] I decided to inform [agencies, organizations, communities] about the need to prepare for the [climate-related event/condition]. Information on actions to take to prepare were communicated by [types of communication methods] to [agencies, organizations, communities]. Preparedness actions included [types of actions by stakeholder group].

Go

[Emergency response/mandatory action, e.g. evacuation, water rationing] protocols were activated on [date]. Instructions to communities were delivered by [types of communication methods].