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**REPORT ON RESPONSES TO THE
QUESTIONNAIRE ON CLIMATE SERVICES FOR
AGRICULTURE IN REGIONAL ASSOCIATION V
(SOUTH-WEST PACIFIC)**

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Geneva, Switzerland

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Introduction

The WMO Regional Association V (South-West Pacific) Working Group on Climate Services agreed in November 2011 to produce a review document on the current provision and use of climate information and services for agriculture in RA V.

Representatives from the National Meteorological and Hydrological Services (NMHSs) in RA V were asked to complete a questionnaire to assess the level of such services across the region and to help identify any gaps.

The questionnaire is based on the work of Dr Andrew Tait, Theme Leader on Use of Improved Tools for Operational Agrometeorology, WMO RA V Working Group on Climate Services (WG- CLS), aided by My Ravind Kumar, member of the same working group.

A total of 15 responses were gathered from NMHSs in RA V, over the period between 2012 and 2014. Respondents were: Australia, Cook Islands, Fiji, FSM: Chuuk, FSM: Pohnpei, Indonesia, Kiribati, New Zealand, Niue, Papua New Guinea, Samoa, Singapore, Solomon Islands, Tonga, and Vanuatu.

This document is a summary of these responses. For each of the sections under which questions posed a synthesis of the responses is presented. An overall synthesis is also presented at the end. The Appendix includes the full questionnaire responses from all the countries who participated.

General Information

Respondents were asked to list the number of NMHS staff involved in providing climate services, and the number of operational rain gauges and climate stations in their country (total, and in agricultural areas). The numbers vary greatly across the region, as is shown the following table (NR = 'No Response').

Country	Number of staff providing climate services	Number of rain gauges (total, ag. areas)	Number of climate stations
Australia	~53	~5400, ~1960	~191, NR
Cook Islands	9	15, most of them	5, most of them
Fiji	8	40, most of them	22, NR
FSM: Chuuk	5	11 (not differentiated), 0	
FSM: Pohnpei	8	9 (not differentiated), 0	
Indonesia	60	~6000 (not differentiated), NR	
Kiribati	3	18, 0	5
New Zealand	20	~500, ~450	~150, ~130
Niue	4	0, 0	1
Papua New Guinea	8	~50, NR	~21, ~5
Samoa	10	42 (all in villages)	30, 3
Singapore	20	28, NR	1
Solomon Islands	6	30, most of them	5, most of them
Tonga	4	6, NR	6
Vanuatu	6	91, 84	3

Climate Information and Services

Respondents were asked to give examples of the kind of climate data, information and services currently provided generally, and to the agricultural sector in particular. They were also asked whether these services were provided freely, or charged for.

As expected based on the information in the previous section, there is a wide range of services being provided across the region. However, most countries produce monthly climate summaries and seasonal outlooks and have some web-based material that is updated as appropriate (e.g. information on ENSO, climate change). Furthermore, most countries have well-established mechanisms in place for disseminating such information to representatives from the agriculture sector (at least to the relevant government department, e.g. the Ministry for Agriculture). Services involving requests for information other than simple data queries are usually charged for, but these charges are generally kept to a minimum. Most watches and warnings are weather- rather than climate-related, but some countries do issue ENSO, tropical cyclone risk, and drought warnings. There is generally limited direct (one-to-one) involvement with the agricultural industry, although some countries do have strong links to commercial agricultural organizations.

Delivery mechanisms

Respondents were asked to provide examples of the way they deliver information to end users in general, and to users in the agricultural sector in particular (if relevant).

All countries receive (e.g. via personal visit, telephone or email) and respond to (using the same mechanism) general enquiries from the public for data and explanations/clarifications concerning their climate outlook. Many also utilize the web and email lists for dissemination of their monthly climate reports and outlooks, and most issue media releases and/or respond to media enquiries. The production and delivery of specific client enquiry-based reports, often involving an analysis of climate data, are part of most countries regular activities (the number of reports being highly

dependent upon the number of clients and the number of capable NMHS staff). Such services are charged for, based on the time needed to produce the report.

Public talks are listed by all countries as a mechanism for educating people about the climate of their country, as well as on topics like climate change. Most countries do not have specific staff who are responsible for advising clients (agricultural or otherwise) on climate matters. However, all NMHSs are actively engaged with other government departments (in particular, those involved in Disaster Management and Response) and NMHS representatives often sit on and provide input to all-of-government committees. Intra-governmental MoUs have been written in many cases. There are limited cases of NMHS staff working directly with farm advisors or agricultural extension agents.

Use of climate information

Respondents were asked to list any examples of the use of climate information they provide, in particular by agricultural sector users.

Many users of climate information were listed, with all countries providing several examples of people who are interested in and using their climate data and information. Often the principal users were other government departments (especially Disaster Management and Response), but other common users are the general public, students, fishermen, farmers, contractors, NGOs (such as Red Cross), researchers, and insurance agencies.

Most of these users have a general (rather than specific) interest in the information, but specific uses included risk assessment (e.g. drought risk for water resources and agriculture; or tropical cyclone risk for disaster management), hydropower generation optimization, agricultural production / harvest timing forecasting, student projects, analysis of extreme event return periods and trends, and pest and disease risk assessment. Often the use of climate information waxes and wanes depending upon the time of year (e.g. tropical cyclone season), or whether an El Niño or La Niña is forecast.

Usefulness of climate information

Respondents were asked to provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning.

There are plenty of examples of NMHSs receiving general feedback on the value of their climate data and information (e.g. for raising awareness, educational extension purposes, planning, some operational adjustments). The Disaster Management and Response users were frequently listed as providing feedback to NMHSs, saying they valued their input into planning meetings and strategic documents. This is particularly around the assessment of seasonal drought and tropical cyclone risk. However other than this, there are relatively few examples of users providing detailed feedback on the usefulness of climate products and services. Some respondents qualify this by saying that more training on the use of climate information by end-users is required (see next section).

Gaps and needs

Respondents were asked if they were aware of any gaps and needs in the provision of climate information and services for your country, and if they could suggest ways to improve the use of climate information, in particular for agriculture.

Here is a list of key gaps and needs:

- There is little or no feedback from the agricultural sector as how seasonal forecasts can be used in decision making.
- There is a lack of awareness programs regarding the usefulness of climate information.
- There is a lack of understanding or training of climate for agriculture staff especially those who are out in the field with the farmers.
- There are not enough climate observation sites (or they do not provide real-time and accurate data), especially in agricultural areas.
- There is a need to develop more tailored products.
- There is a need more manpower / funding / training / equipment.
- There is a need for more research on the impacts of large-scale atmospheric/oceanic drivers/processes on the climate in the region (ENSO, IOD, MJO, etc.) on various timescales (including two-weekly and monthly).
- There is a need for more ways of communicating information (more than email and few face-to-face meetings). Could use SMS. Weather forecasts are now using "SmartMet, which could be adapted for climate information.
- More use could be made of GIS data/maps to show current conditions and the difference from normal.
- There is a need for more personal interaction / briefings with end users (e.g. NCOF, or maybe video briefings).

Overall Synthesis

As expected, there is a wide range in the level of climate services provided in the region which is strongly related to the number of staff and financial resources of each NMHS. However, despite this disparity, all countries are providing at least a basic level of climate service that includes data provision, summary statistics, and climate outlooks, and many countries are providing very detailed information using multiple mechanisms, most commonly the internet. All countries are actively and frequently disseminating climate information (particularly monthly summaries and seasonal outlooks) to multiple users, who all value the service.

Relationships between NMHSs and the agriculture sector are often limited to a high level engagement with the relevant government ministry, but in some cases extend to direct engagement with the industry. There is a recognized need to improve these relationships through greater exposure to the products, more tailoring of products, more one-to-one engagement, and more training on the use of products and data.

All-in-all, the NMHSs in the region are providing useful climate services to the agriculture sector (as well as to several other users) although there remain many gaps and needs.

Appendix

The following pages include all the responses from the 15 countries who participated in this survey.

A.1 Australia

General Information

Please complete the following information:

Country name:	Australia	
Respondent name:	Jeff Sabburg	
Respondent organization:	Bureau of Meteorology	
Number of staff involved in providing climate services:	Approximately 53 mainstream staff	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: Rain gauges: Approximately 5400 Climate Stations:191	In agricultural areas: Rain gauges:Approximately 1960

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? is data access free, or at a cost?	The primary channel for accessing Bureau information is through the Internet. The main source of climate data is via our Climate Data On-line (CDO) website (http://www.bom.gov.au/climate/data/). All data on our website is free. If data is not available on our website, there is a cost recovery charge for its provision (see http://www.bom.gov.au/climate/data-services/ for more information).
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	An extensive range of data products are provided through the Internet. Examples of the kind of climate products, such as maps, can be seen at our general 'Climate and past weather' website: http://www.bom.gov.au/climate/
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	The seasonal outlooks website can be found at: http://www.bom.gov.au/climate/ahead/ . The Bureau's seasonal climate outlooks are general statements about the likelihood of wetter or drier than average weather, and the chance of exceeding the average maximum and minimum temperatures over the entire three-month outlook period. The probabilities are generated from the Predictive Ocean Atmosphere Model for Australia (POAMA), the Bureau of Meteorology's dynamical climate model. The tropical cyclone outlook is produced using

	<p>statistical relationships between tropical cyclone numbers and two indicators: the Southern Oscillation Index (SOI) and the Niño3.4 sea surface temperature index (NINO3.4 SST). The Bureau of Meteorology also supports Pacific Island countries in their seasonal climate outlook services including through a forecasting system, communication, outlook forums, applications with key sectors, training and capacity building. See http://www.bom.gov.au/cosppac/comp/index.shtml for further information.</p>
<p>If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.</p>	<p>Examples of these kinds of products, such as climate – reports and summaries, can be found on our ‘The recent climate – reports and summaries’ page: http://www.bom.gov.au/climate/current. These reports are generally national, but include information on each state and territory as well, and are provided on a monthly, seasonal and annual basis. A range of other products report on time scales which vary from weekly (e.g. Weekly Rainfall Bulletin) through to extended periods (e.g. Drought Statements which reflect the length of time over which serious and severe rainfall deficiencies have occurred). Special Climate Statements which are produced in relation to significant climate events are produced on an ad hoc basis (http://www.bom.gov.au/climate/current/special-statements.shtml). Since 2010 the Bureau, in collaboration with CSIRO, has produced a biennial State of the Climate report, focusing on observed trends in key climate variables and greenhouse gas concentrations.</p>
<p>What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?</p>	<p>Such information is contained mainly in the ‘Climate change and variability’ website: http://www.bom.gov.au/climate/change/, which incorporates a Climate Tracker; as well as in our ENSO Wrap-up information: http://www.bom.gov.au/climate/enso/, which provides a fortnightly overview of the current state of the Pacific and Indian Ocean, as well as links to additional background information on climate drivers impacting on Australia’s climate. The information is available directly to the public and also indirectly via the media.</p>
<p>What kind of scheduled reports and/or advisories do you produce?</p>	<p>Scheduled reports currently include a weekly rainfall update, weekly tropical climate note, fortnightly ENSO wrap-up and monthly Seasonal Climate Outlooks, climate summaries and weather reviews. Advisories include special climate and drought statements. The Bureau also supports Pacific Island countries in their reports/advisories to their stakeholders</p>
<p>What kind of watches and warnings or alerts do you issue, if any?</p>	<p>The Bureau has recently introduced an “ENSO Tracker” service which provides for a graded system of watches and alerts in relation to El Niño or La Niña (http://www.bom.gov.au/climate/enso/tracker/) There are currently no other specific climate watches, warnings or alerts issued (as distinct to shorter term weather alerts such as heat waves).</p>

<p>Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?</p>	<p>The Water and the Land (WATL) website (http://www.bom.gov.au/watl/index.shtml) was developed as a one-stop-shop, primarily for weather and climate information, for people involved in primary production and natural resource management. Currently there are no other specific climate reports or services for the agricultural sector, however, farmers can access relevant product and services via email alerts and Rich Site Summary (RSS) feeds.</p>
<p>Anything else (other climate services)?</p>	<p>The Bureau also has an 'Australian Climate and Weather Extremes Monitoring System' (http://www.bom.gov.au/climate/extremes/), which provides comprehensive and timely information about climate and weather extremes of temperature and rainfall. The Bureau provides briefings on recent and current climate conditions and outlooks, as well as pre-severe weather season briefings to policy and decision makers, including Australian governments and key agencies.</p>

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

<p>How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?</p>	<p>Currently we promote the public to use our 'Data Services' website (http://www.bom.gov.au/climate/data-services/) in the first instance. If they can't find what they are looking for, they are encouraged to use our web-based forms (links found at the previous website), such as 'Send a Data Request' and 'Send an Enquiry'. If they wish to phone in to the Bureau, a list of contact numbers is provided (to avoid interstate call charges), and if they would like to email us, they are provided with the following email address: climatedata@bom.gov.au. We then respond via email.</p>
<p>Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.</p>	<p>Yes: http://www.bom.gov.au/climate/</p>
<p>How do you provide information / warnings /alerts to the media (which media, e.g. radio, newspaper, TV?)</p>	<p>Most products contain contact details for the media: media@bom.gov.au (03) 9669 4057, and media-alerts are provided for some of our more important products, such as our SCO (no distinction is made as to print, radio or TV).</p> <p>The Bureau also provides a website for Media Releases: http://www.bom.gov.au/announcements/media_releases/ho</p>
<p>Do you produce client reports for specific users? Is this a service for which they pay?</p>	<p>Any reports for specific users are generally provided on a cost recovery to a full commercial basis, depending on the client. An Online Storm Confirmation Tool was developed for the insurance industry (http://www.bom.gov.au/climate/storms/) with a more comprehensive service provided on a commercial basis.</p>

<p>Do you provide special data access to some (paying) customers? If yes, can you give an example?</p>	<p>Any information that is available on the Bureau's web-site is free, but full-cost recovery is applied for any other information or services. This applies to all clients, and the charges are clearly displayed at our website: http://www.bom.gov.au/climate/data-services/charges.shtml. A quotation for complex requests is provided.</p>
<p>Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?</p>	<p>Talks and presentations are usually focused around stakeholder events rather than to the general public per se. Where appropriate this is done on a "whole of Bureau" approach, i.e. including weather, climate and water information. Example are presentations delivered in March to ABARES Outlook 2014 (the major annual agricultural sector conference in Australia) by the Bureau's Director, Dr Rob Vertessy ("Environmental intelligence for managing climate and weather extremes") and by the Bureau's Climate Monitoring Manager, Dr Karl Braganza ("State of the Climate 2014"). In the case of climate change, the Bureau's focus is on observed trends in the climate record, and other agencies, such as the CSIRO, generally present in relation to climate projections.</p>
<p>Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?</p>	<p>The Bureau has a climate liaison section which is tasked with coordination of the provision of climate advice; including assisting senior Bureau staff with providing advice, primarily to departments and agencies, across both Australian Commonwealth and State governments, including agriculture and emergency services.</p>
<p>Do you have specific contracts with other ministries or departments? Which ones?</p>	<p>The Bureau has established Memorandum of Understandings (MOU's) with some agencies. Examples are Department of Agriculture, ABARES, NOAA, the Antarctic Data Centre (at the AAD), ANSTO, the World Radiation Data Centre (WRDC) and the British Antarctic Survey (BAS).</p>
<p>Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?</p>	<p>In some cases yes, but mostly on an ad hoc basis. State government funded extension agents have generally significantly diminished in number. The Bureau does provide webinar's to agricultural agencies in some states, and ad- hoc training to extension staff and farmers has been occasionally provided in the past. Our monthly National Climate and Water Briefings in Canberra provide advice on current conditions and outlooks to national policy and decision makers. Also the Bureau holds Agricultural Consultative Committees (which meets usually on a six-monthly basis) in most States.</p>

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

<p>Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?</p>	<p>There are many clients that access the Bureau's information, but the Bureau seeks to aim its information to those where it can make most impact and inform decisions. Key examples are: the agricultural sector, including individual farmers, emergency services, resource agencies, water managers, financial agencies (including insurance).</p>
<p>Examples of the use of climate information:</p>	<p>Many farmers access our Seasonal Climate Outlooks (SCO) and ENSO Wrap-up products, in conjunction with other climate data, such as climatology's (from our CDO service), to help plan their future cropping decisions and assist in managing climate risks.</p>

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

<p>Examples of the usefulness of climate information</p>	<ol style="list-style-type: none"> 1. A report was commissioned by the Bureau to determine the potential worth of climate information, and in particular seasonal forecasting, to the Australian economy. The report suggests that about 5% of the Australian gross domestic product (GDP) is sensitive to climate variability. That equated to around \$A58 billion variation in economic activity per year for the 10 year period from 2001-1010. 2. A study in southwest Western Australia using POAMA to explore two different farming strategies – one varying nitrogen application using POAMA forecasts as guidance – showed that using an event moderately skilful forecast model (in this case, 19 out of 27 years 'correct') and a realistic conservative management strategy can increase farm profits significantly. Using such a forecast would pay off in 7 years at 95% certainty, and 3 years with 80% certainty. 3. One of the growing areas of advice is our intra-seasonal information relating to the Madden Julian Oscillation (MJO). We have had positive feedback from the agricultural sector (both government and commercial) about how useful this information is, especially during the northern Australian wet- season. In the case of cattle farmers, for example, it allows information to supplement seven day forecasts, and three monthly outlooks.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

<p>What are the gaps and needs you have for providing climate services?</p>	<p>There is a large amount of climate data that has yet to be digitized into our databases. Other gaps include multi-week and multi-month forecasts, and longer term decadal outlooks/projections. With the move to a dynamic model to underpin our seasonal forecasting services, the Bureau now has the capability to start to bridge the gap between the seven day weather forecasts and the three month seasonal outlook. A one month outlook is expected to be introduced in the second half of 2014 with further additions as resources allow.</p>
<p>How could climate services (in particular for agriculture) be improved in your country?</p>	<p>The most significant improvement will come with improved seasonal forecasts, with an accompanying improving capability to forecast weather and climate extremes on the timeframes of days through weeks and months. There is a need for an increased focus on communication, education and training so that climate information, especially seasonal forecast information, is used correctly and with understanding within a risk management framework. In addition, increasing delivery of data and information through the internet and increasingly through mobile platforms will improve access and uptake.</p>

A.2 Cook Islands

General Information

Please complete the following information:

Country name:	Cook Islands	
Respondent name:	Arona Ngari	
Respondent organization:	Cook Islands Meteorological Service	
Number of staff involved in providing climate services:	9	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: 15 rain (7 in outer islands) 5 climate	In agricultural areas: Most of them

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Data is provided upon request. For tailored reports (to end user requirements), there is a cost.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	Bar charts (rainfall) and line charts (temperature). Wind roses. Summary statistics tables.
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	Get both the Island Climate Update and Seasonal Climate Outlook for Pacific Island Countries (SCOPIC) products. These are redistributed (including some comments; i.e. get in touch for clarification) to an email list.
If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.	Yes, produce monthly summaries (via Climate Data for the Environment (CliDE)) and report on extreme events (e.g. hotter/colder than normal)
What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?	No currently, but need to include this kind of information on the webpage. When an El Nino is forming, we include background information in our email dissemination. This goes out via email (with an encouragement to pass it on to others), plus media.

What kind of scheduled reports and/or advisories do you produce?	Monthly summaries, outlooks plus try to get experts (e.g. scientists) to advise on current conditions whenever possible.
What kind of watches and warnings or alerts do you issue, if any?	Rainfall and climate outlooks.
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	No, but Agriculture have been advised of the importance of information (e.g. ENSO). We provide the information so they can put in place their actions.
Anything else (other climate services)?	Promoting products (e.g. book on the history of tropical cyclones (TCs)). This included sections on <ul style="list-style-type: none"> • the importance of collecting data • the importance of maintenance • interviews with elders in outer islands • working with Disaster Management.

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	Usually with a follow-up phone call, then specific data/reports supplied on letterhead (at a cost), with a request to acknowledge MetService and provide copies of any reports.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	Yes, http://www.met.gov.ck/ Yes, it is kept updated.
How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	Live broadcasts via radio, TV, and email. We are formalizing a relationship with Cook Islands News. Info sent to National Disaster Management Committee.
Do you produce client reports for specific users? Is this a service for which they pay?	Yes, though number of products is not large. There are a few bugs in the CliDE system which are being worked on.
Do you provide special data access to some (paying) customers? If yes, can you give an example?	Only to aviation.

Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	Expert talks at library, University of the South Pacific (e.g. evening talks open to public) After tropical cyclone outlook, sometimes give presentation if there are other talks about TCs etc, then MetService will help promote these.
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	There is a SCOPIC climate officer on staff.
Do you have specific contracts with other ministries or departments? Which ones?	MoUs with air traffic control (to provide climatology). Also with Fiji MetService regarding early warning bulletins. MoU with University of South Pacific (student access to data).
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	Yes. We send our outlooks to the Growers Association / Ag Department (who have an Agromet advisor).

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	Govt agencies, Developers (tourism), Farmers and pearl farmers, Water-related sectors (e.g. freshwater bottlers, soft drink industry), Research sector (e.g. Agricultural research).
Examples of the use of climate information:	Developers use TC frequency to map risk (e.g. for outer islands) Others use climatologies.

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

Examples of the usefulness of climate information:	Crop performance statistics – Ag sector will enquire mid-season how they can make changes if crops aren't going so well.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

What are the gaps and needs you have for providing climate services?	Need more monitoring sites Need to develop a climate early warning system Would be good to resurrect agromet stations in outer islands
How could climate services (in particular for agriculture) be improved in your country?	Understanding historic ENSO events and impacts (e.g. over the last 50 years) would produce a timeline to show cycles/relationships If we had a Climate Early Warning System (CLEWS) / CLlimate Data for the Environment Services application Client (CLIDEsc) If we had ready access to products (e.g. from NOAA / BoM).

A.3 Fiji

General Information

Please complete the following information:

Country name:	Fiji	
Respondent name:	Arieta Daphne	
Respondent organization:	Fiji Meteorological Services (FMS)	
Number of staff involved in providing climate services:	8	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: Rain gauges: 40 Climate Stations: 22	In agricultural areas: Agriculture Research: 9 FSC Mills: 4 FSC Rainfall Sectors: 39

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Data request and agreement forms are currently being provided to all clients and once all required information have been provided, data are supplied at no cost upon the approval of the Director of Meteorology. It must be first established that data that is provided by FMS meets the needs of the clients and is most relevant to the user needs. However, there may be certain clients who will have to pay for services should FMS get reformed in future.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	Data products are plotted on maps (rainfall plots) and also displayed on graphs and processed datasets as required by the clients. FMS uses mostly difference from normal and have plans to provide this information as visualized maps. We use Excel Spreadsheet to produce graphs, and rainfall maps and tropical cyclone tracks using MapInfo software for our climate products. FMS also processes raw data into Information Sheets.
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	At the moment, we are using the Seasonal Climate Outlook for Pacific Island Countries (SCOPIC) model to generate seasonal rainfall and temperature outlooks for the ongoing three months and the following three months. For instance, in March, we will be generating rainfall and temperature outlook for March to May and also for June to August. The SCOPIC model uses the SOI and SST as predictors of rainfall and temperature, using the different stations historical rainfall and temperature data. FMS also extensively uses other GPC

	<p>products both dynamical and statistical outputs from global and regional climate models. The seasonal outlook can be viewed at: http://www.met.gov.fj/climate_services.php</p> <p>FMS has started to issue seasonal Tropical Cyclone (TC) outlook from 2010 for the Fiji RSMC area of responsibility (160E to 120W and Equator to 25S) and is prepared around late September to early October. This outlook is presented to tropical cyclone forecasters within FMS during the pre- Tropical Cyclone season briefing. This briefing takes place before the TC season starts in November. Analysis for TC outlook is carried out using the historical TC data, taking into consideration the current ENSO phase and other regional to global climatic pattern that may influence the tropical cyclone genesis in the RSMC area of responsibility. The outlook can be viewed at: http://www.met.gov.fj/aifs_prods/RSMC_Nadi_2011_12_Tropical_Cyclone_Season_Outlook.pdf</p>
<p>If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.</p>	<p>FMS have been preparing climate reports on a monthly basis over the last three decades. The first report was prepared in 1980 and it was called "Weather Summary" where the weather conditions of the past month compared to previous years and normal was compared.</p> <p>Over time this report has been re-named and currently as "Fiji Islands Climate Summary" that is released monthly, to solely describe the different climate and weather conditions experienced during the past month. Elements incorporated include; rainfall, temperatures (maximum, minimum & mean), sunshine, radiation, wind, evaporation and satellite images and any extreme values.</p> <p>In case of an extreme event, such as hail storm, swells, tropical cyclone, heavy rainfall, dry spell or drought, an additional page is included in the bulletin to describe the event. The monthly climate summary can be viewed at: http://www.met.gov.fj/climate_services.php</p>
<p>What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?</p>	<p>There is also an Annual Climate Summary prepared at the beginning of a new year, to summarize the different; weather patterns, rainfall, temperature pattern and any extreme or rare events for the previous year. This product can be viewed at: http://www.met.gov.fj/climate_services.php</p> <p>The extent of information available for our staff to depict long term climate patterns comes from the knowledge of major climate drivers of the region and their annual and seasonal mean positions. The major drivers are the South Pacific Convergence Zone (SPCZ), Trade winds and sub-tropical Highs and on occasions Monsoonal Troughs.</p> <p>These climatic features are influenced by the El Nino Southern Oscillation (ENSO) phenomena.</p> <p>Information on the current ENSO phase in the region, together with the Global Climate Model Predictions for the on-coming months on the likely status of the event, that is,</p>

	<p>information on different phases of ENSO provides a good guidance of relative position and associated expected climate anomalies over Fiji.</p> <p>Analogues on ENSO impacts (El Niño and La Niña) on the country are incorporated into the bulletins. Information is emailed to stakeholders and is also freely available on our website: http://www.met.gov.fj/climate_services.php</p> <p>FMS provides an ENSO Update bi-monthly, which provides information on the current and its likely impacts on Fiji's rainfall and temperature. It also provides observations and rainfall patterns currently being experienced and the pattern expected. ENSO Update can be viewed at: http://www.met.gov.fj/aifs_prods/ENSO%20Update.pdf</p> <p>However, there is very little literature available on the impacts of El Niño and La Niña on Fiji. Progress is being made to overcome this.</p> <p>For more specific and technical information, clients are encouraged to contact FMS.</p>
<p>What kind of scheduled reports and/or advisories do you produce?</p>	<p>Scheduled Reports and Frequency of Publication (brackets)</p> <ul style="list-style-type: none"> • Climate Summary (Monthly) • Seasonal Outlook (Monthly) • Special Sector Outlook • Sugar Industry (Quarterly) • Renewable Energy (Monthly) • AgTrade (Quarterly) • Enso Update (Bi- monthly) • Annual Climate Summary (Annual) • Seasonal Tropical Cyclone Outlook (Tropical Cyclone Season) <p>FMS monitors meteorological drought in different parts of the country, and issues advisories on the prevailing situation and expected developments for specific sector needs and more so for the National Disaster Management Office.</p> <p>However, there is no systematic drought warning system in place for Fiji currently. A pilot study on early drought warning is being proposed at a catchment level.</p>
<p>What kind of watches and warnings or alerts do you issue, if any?</p>	<p>There is no systematic drought warning system in place for Fiji currently. A pilot study on early drought warning is being proposed at a catchment level.</p>
<p>Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?</p>	<p>At the moment, we currently tailor make a special bulletin for the Fiji Sugar Industry. This information is used at different levels.</p> <ul style="list-style-type: none"> • At the milling level, the Fiji Sugar Corporation (FSC) uses this information to plan and decide when to start or end the milling;

	<ul style="list-style-type: none"> • At the marketing level, FSC can determine whether they can meet the required quota of sugar for the existing markets for the year; • If the season looks good and surplus sugar expected, then search for new market; • At the farming level, the information flows down to farmers through Sugar Cane Growers Council and the FSC field officers; • Farmers make decision when to plant and allocate resources; • Decisions are made on fertiliser application and weed control. <p>This information within the industry is used in a variety of ways and above a few to mention. The product can be viewed at: http://www.met.gov.fj/aifs_prods/SOutlook.pdf</p> <p>FMS also contributes a page in the “Fiji AgTrade Bulletin” prepared by the Department of Agriculture. This information is widely used for Agricultural purpose. It can be viewed at: http://www.agriculture.org.fj/resources/main/files/FijiAgTrade%20Volume%202,%202011.pdf</p>
Anything else (other climate services)?	<p>Other climate service includes:</p> <ul style="list-style-type: none"> • Monitoring and Prediction • Climate Change • Risk Management

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	<p>There are several modes of receiving the client requests into FMS. This includes by direct approach, telephone, fax and e-mail.</p> <p>On every enquiry, clients are asked to fill out two forms one of which is the ‘Data and Product Request’ and the other is the ‘Product Agreement Form’, which contains an agreement between the organization and the client with regards to the usage of the data.</p> <p>The mode of delivery to the clients entirely depends on the clients. Most of them prefer to be sent by e-mail while others prefer to collect themselves.</p>
Do you have a general climate information webpage (and does it get regularly)	<p>We do have the FMS web page, which is; http://www.met.gov.fj and the climate products are loaded onto the ‘Climate Data & Products’, which is a section on the</p>

<p>updated)? If yes, please provide the link.</p>	<p>web page. All recently released climate bulletins are loaded onto this site: http://www.met.gov.fj/climate_services.php</p> <p>The products on the FMS website get regularly updated every month by 1st or 2nd week.</p>
<p>How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)</p>	<p>All interaction with media is handled by the Director of Meteorology. The Climate Services Division prepares information and the Director turns the contents into a media release.</p> <p>This goes to the print, voice and visual media groups. For further information, they get in touch with the Director.</p>
<p>Do you produce client reports for specific users? Is this a service for which they pay?</p>	<p>Upon request, FMS tailor makes specific information to suit the cliental needs.</p> <p>FMS does not have a charging policy at the moment and all information is provided at no cost.</p>
<p>Do you provide special data access to some (paying) customers? If yes, can you give an example?</p>	<p>No, this option is not available currently.</p> <p>However, in near future, clients will have options to subscribe to a set of products.</p>
<p>Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?</p>	<p>Yes, public talks are part of our outreach programme. We make presentations to the public on various topics and one of the most common is the climate of Fiji and observed climate change in Fiji.</p> <p>We participate in number of workshops and meetings locally and asked to provide presentations on influence of climate, variability and change.</p> <p>Climate change science is one of the most popular topics that many organization and national forums request FMS to talk on.</p> <p>Recently, a very interesting one was organized by the Wildlife Conservation (WWF) on Building Resilience on Climate Change, which involved the members of the local community and also representatives from some government departments. It involved representatives from the different districts and provinces to understand our changing climate.</p> <p>At the climate change country team level, FMS provided climate change science to be part of the Climate Change Policy.</p> <p>As a government agency, FMS has been mandated to provide information on climate and climate change science and plays an advisory role in this area.</p>
<p>Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?</p>	<p>FMS provides consultative service and this depends on the type of information the client needs. We have clients who prefer to talk one-on-one regarding the various climate data, products and services and also enquire for specialized services.</p>

	<p>These clients come from various sectors such as agriculture, construction, tourism, planning and design, transport, education, government, land use, research, offshore industries to name a few.</p> <p>There is a high demand for climate data and hydro-meteorological extreme events information for climate change adaptation and disaster risk planning.</p> <p>Many of the clients need technical information and they come to FMS on regular basis and form a partnership to develop project proposals of common interest, etc.</p>
<p>Do you have specific contracts with other ministries or departments? Which ones?</p>	<p>We are yet to go into specific contracts with our clients, however, we do have memorandum of agreement or letter of understanding with the Pacific Climate Change Science Program (PCCSP) and Pacific Islands Climate Predictions Project (PI-CPP). We are now formulating MOU or MOA for government ministries and other stakeholders so that information could be exchanged more freely.</p> <p>At the moment FMS is working with a draft MOU with Ministry of Foreign Affairs and Ministry of Health.</p> <p>Not only this, FMS is also working on a Service Level Agreements for services required.</p>
<p>Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?</p>	<p>No, FMS do not directly work with extension agents. FMS works with agencies and these agencies have their network of extension officers that take tailored and simplified information to the farmers.</p> <p>This is the platform used for the sugar industry and agriculture. Similar plan of action is suggested for the water managers for the efficient and effective management of water resources FMS works with agencies and these agencies have their network of extension officers that take tailored and simplified information to the farmers.</p> <p>This is the platform used for the sugar industry and agriculture. Similar plan of action is suggested for the water managers for the efficient and effective management of water resources</p>

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

<p>Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?</p>	<p>We have a variety of users in our domain. These are mostly planners, engineers, construction companies, environment consultants, government agencies, education and research and so on.</p>
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<p>Examples of the use of climate information:</p>	<p>In the agricultural sector, there have been several requests for adaptation planning for crop diversification such as potatoes and Mushroom farming.</p> <p>Sugar cane farmers use climate information to maximize their production, plan fertilizer application and do weed controlling. Also use when to plant and where to plant and what to plant.</p> <p>In the energy sector, the planners use climate information to make best use of water for the hydropower generation by maximizing use of water and minimizing use of fossil fuel.</p> <p>In the construction industry, the industry uses climate information to plan their work and work out delays and apply for extension of contracts. The above are few examples.</p>

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

<p>Examples of the usefulness of climate information:</p>	<p>The usefulness of the climate information cannot be over- emphasized.</p> <ul style="list-style-type: none"> • Data is needed for research and to validate models • Research on new varieties of crops • Breeding of new varieties • Change livestock breed • Reduce sell/buy • Maximize profits and minimize loss • Make decisions based on expected climate • Planning of resources and workforce • Input management • Change crop or change crop mix • Change planting dates • Marketing of agricultural products
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

<p>What are the gaps and needs you have for providing climate services?</p>	<ul style="list-style-type: none"> • Lack of skilled staff in agricultural sector who can downscale climate information to farming levels; • Inconsistencies in long term data to establish climatological averages, means and variances over time; • Lack of appropriate statistical and analytical tools for agricultural information development such as production of climatic maps, which could assist farmers in decision making; • Poor distribution of agro-meteorological sites and most of the sites are in coastal areas; • No agro-climate exists for the highlands and this makes difficult to establish any opportunities under changing climate; • Lack initiatives for agro-climate monitoring to provide agro-meteorological service; • Lack of feedback mechanism from agricultural sector as how seasonal forecasts are utilized in decision making; • Lack of systematic implementation of early climate warning for Agriculture; • Lack of knowledge and community awareness on the usefulness of climate information; • Validation of agro-met. Models to assist the scientific and research for current and future changes in agro-climatology.
<p>How could climate services (in particular for agriculture) be improved in your country?</p>	<p>Climate services could be improved if the above gaps identified are addressed.</p>

A.4 Federated States of Micronesia (FSM): Chuuk

General Information

Please complete the following information:

Country name:	Federated States of Micronesia (FSM)	
Respondent name:	Johannes Berdon	
Respondent organisation:	Weather Service Office, Chuuk	
Number of staff involved in providing climate services:	5	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: 11	In agricultural areas: None

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Rainfall data, temperatures (daily, monthly, and annually) data is available free; in some cases data are provided by United States National Center for Environmental Information (NCEI-formerly NCDC).
How could climate services (in particular for agriculture) be improved in your country?	Climate services could be improved if the above gaps identified are addressed.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	Brochures, graphs, table, charts
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	We currently using the Pacific ENSO Applications Climate (PEAC) Center seasonal climate outlook for a three month period; observation is focused on rainfall and temperature.

If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.	We use climate projections being issued by the ENSO update: https://www.weather.gov/peac/ For instance, during the month of August 2013 the projection for rainfall for Chuuk was below average throughout most of the islands. Namonuito and the Hall Islands have experienced dry enough to cause concerns for water supplies.
What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?	ENSO, for most of the past decade, and ongoing again this year, the climate and weather of the Pacific typical of La Nina even when ENSO indices are in the neutral range; this information is available to most of the stakeholders.
What kind of scheduled reports and/or advisories do you produce?	Most of our reports and advisories are issued by Weather Forecast Office in Guam.
What kind of watches and warnings or alerts do you issue, if any?	Watches/warnings are issued by Weather Forecast Office (WFO), Guam the relay to the Weather Service Offices in the FSM.
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	Only when requested by the agriculture department; please also note that the local contractors use the information upon requests; (the Chuuk road construction has consistently come to the station to get rainfall forecast daily).
Anything else (other climate services)?	The office in coordination with the Forecast in Guam has an outreach program in climate which discusses impacts of sea level rise, storm surges, and possible risks of land slides in vulnerable areas.

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	Either by persons who come to the station, or when doing outreach programs in the schools and community, by phone (but limited).
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	No, but we do access climate information through PEAC, WFO Guam
How do you provide information / warnings / alerts to the media (which	We receive information/warnings from WFO Guam and pass on to the State Disaster Office; government radio can only activate when notified.

media, e.g. radio, newspaper, TV?)	
Do you produce client reports for specific users? Is this a service for which they pay?	Yes, we do; however when we can't provide the information, we refer to our colleagues at WFO Guam for assistance; we do not apply charges for any of the services we do.
Do you provide special data access to some (paying) customers? If yes, can you give an example?	No.
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	Yes, as mentioned we run an outreach program in the schools and in the community; Mr. Chip Guard of WFO Guam comes to the islands annually to conduct tsunami awareness and typhoon preparedness workshops; most of the stakeholders have participated.
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	Yes, we do discuss climate issues with the Governor, the Disaster Coordinator, and other science people who visited the station (these are done on a one to one case).
Do you have specific contracts with other ministries or departments? Which ones?	No, at this moment our services are free. However, we maintain close collaborations with other agencies in addressing issues that have great impact to our island nation.
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	No, but we do provide climate information to the agriculture department upon request. The agriculture department is one of the active stakeholders in our mission to promote disaster awareness to the public. We now part of the 'Water for Life' campaign in the nation, where we stress the importance of conserving water resources.

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	Fishermen, farmers, mariners, government agencies (agriculture and Fisheries departments), schools, contractors, hotels, aviation, scientists (foreigners).
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Examples of the use of climate information:	Fishermen need to know the wind strength, the strongest wind of the year (months). Contractors need to know when is the wettest period of the year.
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Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

Examples of the usefulness of climate information:	Most of the islands in Micronesia are low and flat; therefore they are vulnerable from every front whether from the ocean or the land. Any changes in sea surface height may have a great impact on food security since inundation becomes a major impact to taro plantation; Constructions need to know the rain outlook annually for planning purposes.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

What are the gaps and needs you have for providing climate services?	<ul style="list-style-type: none"> • Training and building capacity in human resources (climatologists), • Internet bandwidth needs to improve accelerate outreach programs.
How could climate services (in particular for agriculture) be improved in your country?	<ul style="list-style-type: none"> • There is a need to improve collaboration between the WSO and the agriculture department in order to identify areas of improvements, for instance, how to better gear climate services information toward agriculture. • A need for trained people in climatology as stated above.

A.5 FEDERATED STATES OF MICRONESIA (FSM): POHNPEI

General Information

Please complete the following information:

Country name:	Federated States of Micronesia (FSM)	
Respondent name:	Eden H. Skilling	
Respondent organisation:	Weather Service Office (WSO), Pohnpei	
Number of staff involved in providing climate services:	08	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: 09	In agricultural areas:none

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Temperature data, rainfall data (collected daily, monthly annually) data are provided by United States National Center for Environmental Information (NCEI-formerly NCDC), data is available for public request.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	Charts, table, graphs and brochures.
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	All stations in Micronesia, we currently using peac seasonal climate outlook for a three month period; observation is focused on rainfall and temperature.
If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them	We use climate projections being issued by the ENSO update; https://www.weather.gov/peac/

What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?	The Climate and weather of the Pacific typical of La Nina even when ENSO indices are in the neutral range; this information is available to most of the stakeholders.
What kind of scheduled reports and/or advisories do you produce?	Most of our reports and advisories are issued by Weather Forecast Office (WFO) in Guam.
What kind of watches and warnings or alerts do you issue, if any?	Watches, warning are issued by WFO, Guam relay to the Weather Service Offices in the FSM.
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	Only when requested by the agriculture departments, also local contactors use the information upon request.
Anything else (other climate services)?	In coordination with the WFO in Guam has an outreach program in climate which discusses impacts of sea level rise, storm surges, and possible risks of landslides in vulnerable areas.

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	Doing outreach programs in the schools, and community, by phone.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	No, but we do access climate information through the Pacific ENSO Applications Climate (PEAC) Center and WFO Guam.
How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	We received information/warning from WFO Guam and pass on to the State Disaster Office; government radio can only activate when notified.
Do you produce client reports for specific users? Is this a service for which they pay?	Yes we do; however when we can't provide the information, we refer to WFO Guam for assistance; we do not apply charges for any of the services we do.

Do you provide special data access to some (paying) customers? If yes, can you give an example?	No.
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	Yes, we run an outreach program in the schools and in the community; Mr Chip Guard, Warning Coordination Meteorologist from WFO Guam comes to the island annually to conduct tsunami awareness and typhoon preparedness workshops.
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	Yes, we do discuss climate issues with governor, the State Disaster Coordinator, other science people who visited the station.
Do you have specific contracts with other ministries or departments? Which ones?	No, at this moment our services are free. We also maintain close collaborations with other agencies that have great impact to our island nation.
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	No, but we provided climate information to the agriculture departments upon request. We now part of "water for Life" where we stress the importance of conserving water resources.

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	Fishermen need to know the wind strength, the strongest wind of the year (months). Contractors need to know when is the wettest period of the Year.
Examples of the use of climate information:	Fishermen need to know the wind strength, the strongest wind of the year. Contractors need to know when is the wettest period of the year.

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

Examples of the usefulness of climate information:	Most of the islands in Micronesia are low and flat; therefore they are vulnerable from every direction whether from the ocean or the land. Sea surface height may have a great impact of food security since inundation becomes a major impact to taro plantation. Constructions need to know the rain outlook annually for planning purposes.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

What are the gaps and needs you have for providing climate services?	More training and building capacity in human resources. Internet bandwidth needs to improve. Accelerate outreach programs.
How could climate services (in particular for agriculture) be improved in your country?	There is a need to improve collaboration between the WSO and the agriculture department in order to identify areas of improvements, how to better gear climate services information. A need for trained people in climatology.

A.6 INDONESIA

General Information

Please complete the following information:

Country name:	Indonesia	
Respondent name:	Dava Amrina	
Respondent organisation:	Indonesian agency for Meteorology, Climatology and Geophysics (BMKG)	
Number of staff involved in providing climate services:	60	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: 6000 Meteorology and Climate station : 1	In agricultural areas:

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Data request and agreement forms are currently being provided to all clients. Once all required information have been provided too. Clients can access analytical climatology data by request and admitted by Director of Center for Climate, Agroclimate and Marine Climate. Data are supplied at no cost intended for support research. However it must be first established that data is provided by BMKG appropriate the needs of the clients and most relevant to the user needs.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	BMKG provide forecasting data that are plotted on maps for example rainfalls plots, dry spell, wet spell, ocean waves, wind surface and also sea current. We use ArcView or ArcGIS for process data into .shp file. The other climate data produced by excel being graphs to analyzed monthly or three-monthly.
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	We were used SCOPIC software to analyzed dry spell based on Standardized Precipitation Index (SPI) method from WMO. Besides that, we were used ARIMA, ANFISH and WAVELET which are methods that has been developed by BMKG to analyzed the seasonal forecast uses rainfall data. Other analysis process use MATLAB for analyzed by Kriging and Co Kriging method. Interpolation with mathematical formulas also used to seasonal prediction.

<p>If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.</p>	<p>BMKG was preparing climate reports monthly over the last three decades from 1981 until now. Climate information product consist of monthly rainfall prediction, seasonal climate prediction, monsoon onset and seasonal rain characteristic, monitoring of ENSO, IOD and SST also marine meteorology products.</p> <p>Monsoon onset observation aims to dry season forecast product include characteristic of dry season product appropriate season zoning in Indonesia.</p> <p>BMKG also provide about agroclimate information to improve food security in Indonesia and released monthly.</p>
<p>What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?</p>	<p>Yes.</p>
<p>What kind of scheduled reports and/or advisories do you produce?</p>	<p>Season prediction (six monthly) for dry season (February) and wet season (August) Agroclimate bulletin (monthly) Website for maritime information system application (update daily).</p>
<p>What kind of watches and warnings or alerts do you issue, if any?</p>	<p>BMKG was development Climate Early Warning System (CEWS) and will be operation this year. CEWS include drought early warning system and flood early warning system based on seasonal prediction analyzed.</p>
<p>Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?</p>	<p>We provide products not only for farmer's client but also other sector. These are mostly engineers, government agencies, education, research, etc.</p>
<p>Anything else (other climate services)?</p>	<p>Climate service include:</p> <ol style="list-style-type: none"> 1. Monitoring and prediction season 2. Climate Change 3. Air Quality

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

<p>How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?</p>	<p>There are several methods of receiving client request into BMKG by direct approach, telephone, fax and email. Client are asked to fill out two forms one which is 'Data and Product Request' and other Product Agreement Form which contains agreement between the organization and the client to the usage of the data.</p>
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	The mode of delivery to the clients entirely depends on the clients. Most of them prefer to be sent by email while others prefer to collect themselves.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	BMKG have several climate web pages. Please go to: http://www.bmkg.go.id/?lang=EN And click on "Climate" on the top menu. For specific information about agroclimate is on the website. We also recently released agroclimate bulletin monthly.
How do you provide information/warnings/alerts to the media (which media, e.g. radio, newspaper, TV?)	All interaction with media handled by Division of Public Relation of Meteorology, Climatology and Geophysics Agency. Climate information was prepared by Climate Centre to turns into media release.
Do you produce client reports for specific users? Is this a service for which they pay?	BMKG have a charging policy have been regulated on the provision of non-tax state revenue rates.
Do you provide special data access to some (paying) customers? If yes, can you give an example?	No.
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	We participate in number of workshop and meetings locally and asked to provide presentations on influence of climate, variability and change. BMKG often invited many organizations to talk about climate change. Dissemination of climate information for agroclimate to farmers held in climate field school at district level. At the climate change country level, we provide to be a part of the climate change policy and mandated to provide information on climate change science and plays an advisory role.
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	Yes we have. We had advisors from several sectors such as salt farmers, farmers, also Ministry of Agriculture.
Do you have specific contracts with other ministries or departments? Which ones?	We have memorandum of agreement or understanding with other institution or stakeholders so that information be exchanged more freely.
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	Yes we do. BMKG work directly with The Ministry of Agriculture to hold Climate Field School and coordinating to made Agro Suitable Map. Recently we held Focus Discussion Group (FGD) with other stakeholders establishes cooperation and coordinating to discuss about marine climate.

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	We have variety of users' information. These are mostly companies, government agencies, research and so on. Currently we focus to agroclimate information to provide farmer's needs.
Examples of the use of climate information:	In the agriculture sector, there have been several requests for adaptation planning for harvest diversification. For example, seasonal forecasts provide information to farmers for controlling growth season.

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

Examples of the usefulness of climate information:	We provide early season information for farmers to decided spread seed and controlling growth season.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

What are the gaps and needs you have for providing climate services?	<p>Climate information services nearly always based on land-observation analysis only, while ocean observation was still scarce.</p> <p>Sea observation merely based on satellite with very rare ground observation data for validation.</p> <p>Marine data are scattered among different institutions in Indonesia.</p> <p>The method used for climate prediction mainly statistical methods, need a couple land-sea-atmosphere model.</p> <p>There should be another climate driving factor/indicator for Indonesia climate (other than ENSO, IOD, and SST) which has not been revealed and need more sustainable research in Indonesia. So needs to derive indexes for more accurate climate prediction.</p> <p>Limited number and capacity of human resources in marine meteorology/climatology/oceanography.</p>
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	<p>Deliverable of BMKG climate information services, since the products contain many technical terms which is hard for users to understand.</p>
<p>How could climate services (in particular for agriculture) be improved in your country?</p>	<p>Climate services could be improved to minimize gaps for improve providing climate services.</p> <p>We were held Focus Group Discussion (FGD) as efforts made related to marine climate information services.</p>

A.7 KIRIBATI

General Information

Please complete the following information:

Country name:	Kiribati	
Respondent name:	Ueneta Toorua	
Respondent organisation:	Kiribati meteorological Service	
Number of staff involved in providing climate services:	3	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: 18 rainfall 5 climate	In agricultural areas: 0

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Do not have the Climate Data for the Environment (CLiDE) database. Access to data upon request is free.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	Nothing as yet, but hoping to get CLiDE for the Environment Services application Client (CLiDEsc) soon.
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	We produce a seasonal climate outlook every month, using both the Seasonal Climate Outlook for Pacific Island Countries (SCOPIC) and the Island Climate Update (ICU). The outlook is produced in English and our native language (Gilbertese).
If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.	No such reports are written. We have problems with data access from the climate stations and timing of getting data.
What is the extent of information you have on the long-term climate patterns of your country, and on the	Nothing much. We look at other organizations webpages.

effects of La Niña and El Niño? Is the information available to the public?	
What kind of scheduled reports and/or advisories do you produce?	The climate outlook is produced every month. Advisories depend upon queries that come in (e.g. from the media, ag sector)
What kind of watches and warnings or alerts do you issue, if any?	Drought warning; Severe weather events; Extreme spring tide (from the tide calendar).
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	Provision of data upon request plus the seasonal outlook. These go to the Director of the Agriculture Ministry plus senior staff.
Anything else (other climate services)?	Drought information, based on deciles of rainfall, is provided to the drought committee Information is regularly sent to the Ministry of Public Works, Ministry of Health, and the Disaster Management Office (DMO).

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	We respond back by email or phone.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	www.met.gov.ki Yes, it is regularly updated.
How do you provide information/warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	Mostly via AM radio.
Do you produce client reports for specific users? Is this a service for which they pay?	No.

Do you provide special data access to some (paying) customers? If yes, can you give an example?	No.
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	No, but would do this upon request. Working with Red Cross to train their people on outlooks, climate change then they do the public awareness.
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	No. There are some commercial farmers, but no one-on-one contact with them.
Do you have specific contracts with other ministries or departments? Which ones?	No contracts, but we do talk to several Ministries (see above).
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	Red Cross is used as an agent to get info to communities. Our contact with them is pretty regular.

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	Students (data requests). Information provided to the drought committee.
Examples of the use of climate information:	Analyses of data for student projects. Decision making by drought committee.

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

Examples of the usefulness of climate information:	The drought committee makes plans for water use and restrictions based on the drought report.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? *Can you suggest ways to improve the use of climate information, in particular for agriculture?*

What are the gaps and needs you have for providing climate services?	<ul style="list-style-type: none">• Limited number of climate stations• Large number of islands (difficult to access stations and problem with reliability of data from outer islands)• Dependent upon external agencies
How could climate services (in particular for agriculture) be improved in your country?	<ul style="list-style-type: none">• Need to develop cooperative work with Ag Sector (identify and develop products / services)• Need a plan to sustain services long term

A.8 NEW ZEALAND

General information

Please complete the following information:

Country name:	New Zealand	
Respondent name:	Andrew Tait and Nava Fedaeff	
Respondent organisation:	National Institute of Water and Atmospheric Research (NIWA)	
Number of staff involved in providing climate services:	20	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: ~500 rain gauges, ~150 climate stations	In agricultural areas: ~450 rain gauges, ~130 climate stations

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	NIWA operates CliFlo - a web system that provides access to New Zealand's National Climate Database. This is an archive of climate observations extending as far back as the 1800's. Registration is free.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	<p>Climate maps are available freely on the NIWA website and are updated daily (https://www.niwa.co.nz/climate/daily-climate-maps). Maps are based on data from the National Climate Database and display actual values as well as anomalies in relation to normal (average conditions 1981-2010). Mapped variables include: temperature, rainfall, sunshine, soil moisture and Standardised Precipitation Index.</p> <p>National and Regional monthly, seasonal and annual climate maps have been produced for each climate variable as well as long-term maps (see https://www.niwa.co.nz/climate/research-projects/national-and-regional-climate-maps). Updated plots of current conditions in relation to the long-term average and at the same time in the previous year are produced for a number of climate station sites. Access to these plots is via a subscription service.</p>
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	The New Zealand Seasonal Climate Outlook is published once a month and refers to the upcoming 3 months. For instance, at the start of June an outlook is issued for June to August. The outlook predicts air temperature, rainfall, soil moisture and river flow for the coming season and can be viewed at https://www.niwa.co.nz/climate/sco . The outlooks

	<p>are represented as probabilities for each tercile (normal, above normal, below normal) for six macro-regions of NZ. An outlook validation is also performed each month.</p> <p>NIWA also publishes the Island Climate Update (ICU) on a monthly basis for the Pacific Islands region (http://www.niwa.co.nz/climate/icu). This report includes an outlook for the coming three months on the South Pacific Convergence Zone, rainfall and sea surface temperatures for tropical South Pacific islands.</p>
<p>If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.</p>	<p>NIWA has been producing monthly, seasonal and annual Climate Summaries since the year 2000. These publications summarize temperature, rainfall, soil moisture and sunshine data from across New Zealand.</p> <p>Climate Summary reports include a section on “highlights and extreme events” to describe any significant occurrences. The Climate Summaries are freely available at http://www.niwa.co.nz/climate/summaries.</p> <p>The Island Climate Update is published on a monthly basis and includes a climate summary section for the past month. The summary touches upon El Niño, sea surface temperatures, the South Pacific Convergence Zone as well as the Madden-Julian Oscillation and applies to tropical South Pacific Islands http://www.niwa.co.nz/climate/icu. The Island Climate Update Supplement is published half way through the month and provides Pacific Island nations with an updated summary of climate conditions for the Southwest Pacific region.</p>
<p>What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?</p>	<p>NIWA's 'seven-station' temperature series provides a long term record of temperature for the country and uses homogenised temperature measurements from seven climate stations. The locations were chosen because they provide a representative geographical spread across NZ and have reliable records dating back at least to the early 1900s.</p> <p>The NIWA website provides a section climate variability and change http://www.niwa.co.nz/climate/information-and-resources/climate-variability-and-change. Here the public can freely access pages of information on natural variations in the climate, past climate, the greenhouse effect, greenhouse gas concentrations as well as El Niño Southern Oscillation.</p> <p>For more specific and technical information, clients are encouraged to contact NIWA.</p>
<p>What kind of scheduled reports and/or advisories do you produce?</p>	<ul style="list-style-type: none"> • Climate Summary (Monthly, Seasonal, Annual) • Seasonal Outlook (Monthly) • Island Climate Update (Monthly) • Drought Hotspot advisory (Weekly) <p>Each of the above reports/advisories are published on the web and released to the media.</p>

What kind of watches and warnings or alerts do you issue, if any?	<p>NIWA operates a subscription service called EcoConnect which can be set up to issue weather and hydrological warnings (e.g. for frost or floods).</p> <p>The NZ Meteorological Service also issue severe weather watches and warnings.</p>
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	<p>NIWA operates a subscription service for farmers called FarmMet. This provides weather forecast and climate products for the nearest climate station to a farmer's location.</p> <p>NZ MetService also provides a Rural weather forecasting service.</p>
Anything else (other climate services)?	<ul style="list-style-type: none"> • Meteorological hazard assessments • Analysis of high intensity rainfall • Analysis of trends and drivers of climate variability • Climate change assessments • Presentations to clients, public, community groups. <p style="text-align: center;">-</p>

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	<p>Clients can either phone, fax or email with their climate enquiry.</p> <p>The mode of delivery to the clients entirely depends on the clients (e.g. email, ftp, automated data transfer).</p>
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	<p>NIWA's Climate Centre has its own page on the NIWA website https://www.niwa.co.nz/climate.</p> <p>From here there are links to useful sections such as climate services, climate publications, climate maps, climate news and more.</p> <p>The products on the NIWA website are regularly updated</p>
How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	<p>Information is put on the NIWA website and sent out as a media release. Media enquiries related to NIWA's publications are referred to the contact person for the publication which is listed at the end of all documents.</p> <p>General media enquiries come in to the NIWA comms team and are directed to scientists with the relevant expertise.</p> <p>NZ MetService also send out media releases (e.g. for severe weather warnings).</p>

Do you produce client reports for specific users? Is this a service for which they pay?	NIWA undertakes commercial work and can produce client reports for specific users. The cost of this service depends on the type and amount of information required.
Do you provide special data access to some (paying) customers? If yes, can you give an example?	NIWA operates several subscription-based services. Two of these that are particularly relevant are EcoConnect and FarmMet, which provide weather forecasts and climate information maps and site specific information. NZ MetService also provide detailed forecasts/warnings to paying customers.
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	NIWA scientists regularly give public talks. For example, talks on climate change projections and impacts for NZ to community groups (e.g. Rotary clubs). NIWA regularly briefs the National Adverse Events Committee on the current state of the climate (particularly with respect to drought) and the upcoming seasonal forecast.
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	Scientists with the relevant expertise liaise directly with clients. For example, clients include energy companies, city and regional councils, fertilizer companies.
Do you have specific contracts with other ministries or departments? Which ones?	Neither NIWA nor MetService are part of government ministries or departments. The organisations are stand-alone companies, but they do have government ministers as their shareholders. NIWA provide commercial and free services to many NZ government ministries (in particular: Ministry for Primary Industries and Ministry for the Environment), as well as regional and local governments. MetService have a specific contract with the Ministry of Transport.
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	NIWA scientists work with farm advisors on an ad-hoc project basis. Sometimes projects are funded by the Ministry for Primary Industries, for example.

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	We have a variety of users of climate information. These are mostly planners, engineers, construction companies, environment consultants, government agencies, schools and other research institutes.
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<p>Examples of the use of climate information:</p>	<ul style="list-style-type: none"> • Meteorological hazard assessments (e.g. floods, storms, lightning etc.) for emergency services and national infrastructure companies; • Analysis of high intensity rainfall for the planning and maintenance of urban storm water systems; • Analysis of frost trends in New Zealand and the implications for horticulture; • Providing accurate projections of irrigation demand for regional council water allocation planning; • Identification of potential growing areas for alternate crop and tree species based on climate, soil and topographic information; • Providing accurate projections of weather data and forecasts for unmonitored sites across New Zealand for the dairy industry; • Developing computer simulations of New Zealand's future climate based on global climate model projections. These results were used to create national guidance (risk and planning) manuals for the Government; • Monthly and seasonal climate guidance for the agricultural and energy sectors; • Resource assessments for wind and solar energy.
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Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

<p>Examples of the usefulness of climate information:</p>	<p>Climate data have been used for multiple analyses (e.g. see above) and are our primary resource. It is imperative that NZ maintains a reliable network of climate stations and rain gauges, as well as a world-class climate database, so that such analyses can continue to be performed.</p> <p>The daily, monthly, seasonal and annual climate maps (especially the soil moisture deficit maps) are useful for monitoring the current climate conditions particularly when drought conditions are pending or present. These maps help to identify and confirm which areas of the country are currently experiencing abnormal climate conditions. Such maps provide guidance to the Government when declaring droughts and providing drought assistance.</p> <p>Maps of long-term statistics (e.g. 30-year average) of climate variables are useful for determining suitability for growing crops and tree species. These maps are the basis from which climate change assessments are made.</p> <p>NIWA has received some negative feedback from users who do not want to pay for access to some climate products (e.g. site specific plots of current climate conditions relative to the long-term average). Such information has been provided freely in the past, but this is no longer the case.</p>
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	<p>Climate outlooks are moderately useful for farmers, energy companies and water regulators. The usefulness is 'moderate' as the skill of the outlooks is not very high for NZ.</p> <p>Climate change projections and impact assessments are useful for long-term planning for regional and city government infrastructure development. Weather forecasts are particularly useful to multiple end users.</p>
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

<p>What are the gaps and needs you have for providing climate services?</p>	<p>NIWA has excellent facilities and resources for providing climate services to New Zealanders and Pacific Islanders. However, we still find it difficult to obtain sufficient funding to maintain and service our climate station network and database, and often we are stretched to provide timely information to clients.</p> <p>We have gone down the route of providing subscription- based services for detailed weather and climate information which requires significant investment in computer and technical resources.</p>
<p>How could climate services (in particular for agriculture) be improved in your country?</p>	<p>Some work has been done to produce tailored products and services (e.g. for specific clients such as irrigation companies). More of this kind of development would be good.</p> <p>Our subscription services are developing phone apps which will improve access to products.</p> <p>The seasonal outlooks are only moderately skilful for New Zealand. Any advances in the ability to predict the near-term climate will be greatly beneficial.</p>

A.9 Niue

General Information

Please complete the following information:

Country name:	Niue	
Respondent name:	Rosy Mitiepo	
Respondent organization:	Niue Meteorological Service	
Number of staff involved in providing climate services:	4	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: 1 climate station (plus 3 spares)	In agricultural areas: 0

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Requests are made to the Director for use of climate data. These data are provided at a cost if needed for project work or research.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide.	No maps or plots – no software to do this.
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	Niue Climate Outlook includes: <ul style="list-style-type: none"> • weather summary • climate summary • 3-month rainfall outlook • ENSO/SPCZ/ITCZ/SST update (using information from COSPPAC website)
If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.	See above. We use Seasonal Climate Outlook for Pacific Island Countries (SCOPIC) software for the validation of data (in the Niue Climate Outlook).

What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?	General information from other websites. ICU (Island Climate Update) from NIWA lists current state of ENSO, plus outlook. This is disseminated to “government- all-staff” email list.
What kind of scheduled reports and/or advisories do you produce?	Tropical Cyclone Advisories only.
What kind of watches and warnings or alerts do you issue, if any?	Tsunami Watch. Tropical Cyclone Warnings.
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	Reports are sent via email and radio. These go out to all Stakeholders and the general public.
Anything else (other climate services)?	No.

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	Email and telephone.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	No webpage at the moment, but planning on having one.
How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	Standard format via email. Information sent to BCN (Broadcasting Corporation of Niue), then announced for general public
Do you produce client reports for specific users? Is this a service for which they pay?	No

Do you provide special data access to some (paying) customers? If yes, can you give an example?	No If there is a request for data we will provide it at a cost.
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	We do respond to specific requests for talks. We hope to start a Radio Programme soon.
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	No, but the Director or the senior climate staff can advise.
Do you have specific contracts with other ministries or departments? Which ones?	No
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	No

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	Students (very few) Farmers For government, it is a regular update of climate on a monthly basis
Examples of the use of climate information:	Information on Tropical cyclones, earthquakes (tsunami). Requests for climate science publications.

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

Examples of the usefulness of climate information:	<p>Through a survey given out, they appreciate the information but there has been no detailed feedback.</p> <p>The recent publications on climate science were also highly used for project developments.</p>
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Are you aware of any gaps and needs in the provision of climate information and services for your country?. Can you suggest ways to improve the use of climate information, in particular for agriculture?

What are the gaps and needs you have for providing climate services?	<p>We have little or no feedback from the users.</p> <p>Agriculture would like specific information that we cannot provide, such as soil moisture for areas that we have no observations for.</p>
How could climate services (in particular for agriculture) be improved in your country?	<p>Meet with agriculture and try to build an ongoing relationship such as understanding their specific needs.</p> <p>Explain the types of data we have archived. Find out how data can be used by agriculture.</p>

A.10 Papua New Guinea

General Information

Please complete the following information:

Country name:	Papua New Guinea	
Respondent name:	Samuel Maiha	
Respondent organisation:	PNG National Weather Service	
Number of staff involved in providing climate services:	8	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: ~50 rainfall ~21 climate	In agricultural areas: ~5 climate

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Have the Climate Data for the Environment (CliDE) database. Provide data to users upon request. Statistics like averages are free; more detailed information is charged on a cost-recovery basis.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	Produce time series plots for stations, and have produced station climatologies. Identified met districts, based on climatologies. No maps as yet, but could produce the climatologies (need GIS). No real-time maps produced (e.g. showing current conditions / anomaly).
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	Yes, a seasonal climate outlook is produced. Gather information from multiple sources and produce a regional/provincial statement. Want to produce location-specific outlooks, but not done yet. No outlook maps are produced as yet.
If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.	A monthly brief / advisory is produced which includes a summary of the past month's climate. Drought reports also are prepared.

What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?	PNG is strongly influenced by ENSO. Information is available upon request. There is no website for climate.
What kind of scheduled reports and/or advisories do you produce?	The monthly advisory includes the previous month's summary and the 1 and 4 month climate outlook. This goes out to the Disaster Management Office (DMO), NGOs, other government departments and development partners.
What kind of watches and warnings or alerts do you issue, if any?	Press releases (e.g. on extreme events) go out to the media and the DMO.
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	Yes, if requested. We will produce a tailored report if required (charged for).
Anything else (other climate services)?	No.

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	For simple enquiries (e.g. email, phone, or in person) we just give the data out. For complex enquiries, or where we need to write a special report, then we charge for these services based on cost-recovery.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	Yes, www.pngmet.gov.pg . Note, that from time-to-time there are issues with the website and sometimes problems with the cost of the ISP.
How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	Press releases go out to radio, tv and newspapers. Also, met officers go on talkback radio shows.
Do you produce client reports for specific users? Is this a service for which they pay?	Yes, and yes (cost-recovery).

Do you provide special data access to some (paying) customers? If yes, can you give an example?	Not yet. But we want to begin a subscription service, e.g. for aviation and the oil platform.
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	Yes, to schools and communities (upon request). Sometimes there are open days with stalls and we attend (e.g. to talk about climate change).
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	No. But maybe in the future.
Do you have specific contracts with other ministries or departments? Which ones?	We have a MoU the National Agriculture Research Institute (MetOffice has provided a weather station, and they use the data from the observations). Otherwise just talk to the other ministries.
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	Yes, upon request.

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	Mainly DRR – e.g. the DMO, NGOs and Red Cross Some interest from the agriculture sector, but not very much. Schools, churches.
Examples of the use of climate information:	For DRR, a plan is produced for the coming season. This includes the risk of flooding, disease, wind (TCs)

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

Examples of the usefulness of climate information:	DRR people get weather information from multiple sources, but PNG Met still has a key role. Not so much use of data from agriculture.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

What are the gaps and needs you have for providing climate services?	<ul style="list-style-type: none">• Staffing,• Funding,• Training on spatial analysis• Equipment, and• Software tools
How could climate services (in particular for agriculture) be improved in your country?	Filling in the above gaps. Having a system where staff can be available directly to the sectors.

8.11 SAMOA

General Information

Please complete the following information:

Country name:	Samoa	
Respondent name:	Sunny Seuseu	
Respondent organisation:	Samoa Meteorological Division (SMD) of the Ministry of Natural Resources and Environment (MNRE)	
Number of staff involved in providing climate services:	10	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: 42 rain gauges (in villages) 30 climate stations	In agricultural areas: 3 climate stations

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Data from NOAA-owned stations is available and shared for free (we put the data into Excel). Data from SMD stations goes into Climate Data for the Environment (CLiDE) database, and we extract it and send it to users. Companies, government departments (except for Uni students and some projects with approval from the CEO) are charged, based on a national revenue board cost-recovery fee structure. Currently there is no direct outside access to Clide, but we are developing a website for data access (will have username + password access).
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	Combination of reports and products from CLiDE for the Environment Services application Client (CLiDEsc) – e.g. rainfall accumulation, soil moisture, drought index, fire weather index, climate summary report for past 1 and 3 months. All products are still only available to SMD.
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	Seasonal outlooks (3 and 6 months) are produced monthly based on Seasonal Climate Outlook for Pacific Island Countries (SCOPIC) and checked against Island Climate Update / MetPI. The outlook is emailed to a large email distribution list and also put on the web. Once a year (around the 3 rd /4 th week of October [i.e. start of west season and TC season]) we produce a TC outlook which is emailed, put on web, and sent to media.

<p>If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.</p>	<p>Yes, climate summaries for past 1 and 3 months are produced.</p> <p>Also, severe weather event reports are compiled (in conjunction with weather forecasts). These reports include impacts and maps of affected areas, and are sent to the disaster advisory committee and sometimes to the disaster management council (chaired by the PM)</p>
<p>What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?</p>	<p>We produce an ENSO monthly bulletin derived from multiple sources. This goes out with the climate outlook and past month summary.</p> <p>There is no general information on what ENSO typically means for Samoa on our website (same as for climate change), but it would be good to add this.</p>
<p>What kind of scheduled reports and/or advisories do you produce?</p>	<p>No advisories as such, but we regularly send out our suite of monthly reports (outlooks, summaries, drought watch, TC report, severe weather reports).</p>
<p>What kind of watches and warnings or alerts do you issue, if any?</p>	<p>Drought watch, ENSO watch (started in 2014), Tropical cyclone outlook (risk o occurrence).</p> <p>Note, the forecasting office issues severe weather watches/warnings.</p>
<p>Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?</p>	<p>Yes, some agriculture people are included in the email distribution list.</p> <p>Agriculture sector reps are regularly invited to workshops / project meetings (e.g. NAPA projects)</p> <p>Agriculture sector also invited to attend any village-based seminars/meetings/workshops.</p>
<p>Anything else (other climate services)?</p>	<p>GIS data and maps have been produced, showing climatologies and climate change projections. These can be included with land use data, etc., and have been provided to the Mapping Division.</p>

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

<p>How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?</p>	<p>When we receive an enquiry we pass it on to the Director, then when OK is given we will send them the data/report usually via email.</p> <p>If someone calls (or visits in person) and just wants simple information then we can provide it.</p>
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<p>Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.</p>	<p>Yes, but it's difficult to manage the content because its part of MNRE. SMD is in the process (with help from a consultant) of developing our own website.</p> <p>http://www.samet.gov.ws/</p> <p>Information is updated regularly.</p>
<p>How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)</p>	<p>Media (newspaper, radio, TV) are generally emailed, although sometimes we have a special briefing.</p> <p>They sometimes want an interview to explain what's happening.</p>
<p>Do you produce client reports for specific users? Is this a service for which they pay?</p>	<p>Yes, for example insurance companies sometimes want a special report done. This is done on a user pays basis (cost is governed by the government revenue board). Note, the fees are generally quite small.</p> <p>We have also appeared in court cases as an expert witness.</p>
<p>Do you provide special data access to some (paying) customers? If yes, can you give an example?</p>	<p>When our webpage for data access is available then this will be possible. Could be users from other govt departments as well as outside organizations/people.</p>
<p>Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?</p>	<p>Yes, on recent climate, climate outlook and on climate change. Usually at village-based seminars/workshops.</p>
<p>Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?</p>	<p>Yes, usually this is the senior climate officer.</p>
<p>Do you have specific contracts with other ministries or departments? Which ones?</p>	<p>Not at present. When direct data access is possible we will need to establish MoUs or contracts.</p>
<p>Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?</p>	<p>No. We work at the Ministry (e.g. MAF) level only, and usually only when asked. However, we are looking at developing a regular NCOF (national climate outlook forum), which would be open to many more people.</p>

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

<p>Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?</p>	<p>Mostly other government departments / divisions.</p> <p>Samoa tourism - e.g. wind/tides, rainfall outlook (especially when there is a big event).</p> <p>DMO – e.g. drought outlook, brief the disaster management committee.</p> <p>Students (e.g. from University of South Pacific Ag campus).</p>
<p>Examples of the use of climate information:</p>	<p>General use by public.</p> <p>Some commercial farmers (e.g. compare current condition to normal and provide outlook).</p> <p>DMO have a national emergency plan. Agencies respond to different hazards (e.g. for drought, DMO will interact with other agencies through awareness campaigns and sometimes activate fire bans, water conservation).</p>

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

<p>Examples of the usefulness of climate information:</p>	<p>See above regarding DMO plans.</p> <p>SMD request users of climate data/products to send a copy of their reports to assess usefulness.</p> <p>Information tends to be used for specific projects and when the projects are over there is no more interaction.</p> <p>Often there is a request to SMD for further training or workshops to explain how best to use the data/info, however this is very expensive and not covered by SMD's operational budget.</p>
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

<p>What are the gaps and needs you have for providing climate services?</p>	<p>Need more ways of communicating information (more than email and few face-to-face meetings). Could use SMS. Weather forecasts are now using "SmartMet" (FINPAC project), which could be adapted for climate information.</p> <p>More use could be made of GIS data/maps to show current conditions and the difference from normal.</p> <p>More personal interaction / briefings with end users (e.g. NCOF, or maybe video briefings)</p>
<p>How could climate services (in particular for agriculture) be improved in your country?</p>	<p>There is still a disconnect between the SMD and the end users (e.g. farmers). Need to work together to get better access to data and products in Ag areas – possible even free access to certain product/data levels.</p>

8.12 SINGAPORE

General Information

Please complete the following information:

Country name:	Singapore	
Respondent name:	Raizan Rahmat	
Respondent organisation:	Centre for Climate Research Singapore (CCRS) of the Meteorological Service Singapore (MSS)	
Number of staff involved in providing climate services:	Around 20 staff in CCRS directly (frontline) and indirectly (research, outreach) involved in providing climate services.	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: Rain gauges: 28 Climate station: 1	In agricultural areas: 1

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	<p>We publish general climate statistics online at: http://www.weather.gov.sg/climate-detailed-view/</p> <p>For customized information: Subject to agreement of conditions for restricted use/safeguarding of information, we provide: data free or at cost recovery to local government agencies and local/international research institutes in collaborative projects, data at cost recovery to commercial entities (building and construction, legal, insurance, etc.).</p> <p>Details can be found here: http://www.weather.gov.sg/climate-climate-of-singapore/</p>
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	<p>Majority of clients require information in text/ascii format for raw information (daily, hourly, monthly, etc) or derived statistical values (means, normals, extremes, return periods, standard deviations, etc). If requested, plots can also be generated.</p> <p>Details can be found here: http://www.weather.gov.sg/climate-historical-daily/</p>

<p>Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.</p>	<p>CCRS provide seasonal climate outlook (for local rainfall and for the next 6 individual months) to our internal users, i.e. colleagues from our sister department (operational weather services) and local government agencies. These local seasonal predictions are made using statistical tools i.e. the Climate Predictability Tool (CPT/IRI) and SCOPIC based on SST as predictands.</p> <p>We also publish probabilistic rainfall forecasts for the Southeast Asia region using CPT for the next 3-month season . This is published on the site: http://asmc.asean.org/home/ as part of MSS' role as the host of the ASEAN Specialised Meteorological Centre (ASMC).</p> <p>We are currently exploring generating similar products based on GloSea5 (UK Met Office's latest LRF model).</p>
<p>If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.</p>	<p>We produce Annual Weather Review reports on the web: http://www.weather.gov.sg/climate-trends/ http://www.weather.gov.sg/climate-annual-climate-reports/</p> <p>We also provide shorter term review (and outlook) on fortnightly basis on: http://www.weather.gov.sg/weather-fortnightly-outlook/</p>
<p>What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?</p>	<p>One main and known driver for long-term, local climate patterns is ENSO. Previous studies have correlated ENSO with occurrences of anomalous weather patterns (mainly rainfall) - the extent of which differs according to seasons. Impact of ENSO on local weather patterns are communicated to the public through the fortnightly and annual weather review reports (mentioned above). Such associations are at times brought to the public's attention through media queries.</p> <p>Currently, research is being conducted to study the impact of subseasonal drivers (MJO) and decadal drivers of local and regional climate (temperature and precipitation).</p>
<p>What kind of scheduled reports and/or advisories do you produce?</p>	<p>Annual and fortnightly weather reviews are as described above. We provide advisories for shorter time-scale weather phenomena e.g. tropical cyclones (1-2 days ahead), prolonged heavy rain due to the winter Northeast Monsoon surge (2-4 days ahead).</p> <p>We are currently researching if it is feasible to provide advisories of wet/dry conditions locally and in the region for longer lead times (1-3 months ahead) for applications in hydrology (drainage and water resource management) and risk of trans-boundary haze.</p>
<p>What kind of watches and warnings or alerts do you issue, if any?</p>	<p>Short duration heavy rain warnings, lightning risk alerts.</p> <p>TC warnings for various users (in public, aviation, maritime sectors) in various formats.</p>
<p>Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)?</p>	<p>No. We do not have a significantly-sized agricultural community in Singapore and have limited activities in this sector (see http://www.un.org/esa/agenda21/natinfo/countr/singapor/natur.htm).</p>

Who are these users?	But we have interest in knowing overly drying conditions in the agricultural areas in the region for risk of trans-boundary haze and how conditions in the region can affect the quality and price of our imported food supply.
Anything else (other climate services)?	We generate climate change projections for local government agencies responsible for future infrastructure planning and development, and maintaining existing infrastructure. We conduct climate studies to understand and explain weather/climate anomaly and trend patterns in the past.

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	We provide our email, telephone and postal address for the public to enquire about climate information and entertain enquiries through all these channels.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	Yes, and they are updated regularly. http://www.weather.gov.sg/climate-detailed-view/
How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	We disseminate: <ul style="list-style-type: none"> • Routine public weather forecasts to the media via internet and facsimile, • Heavy rain warnings, strong wind advisories/warnings to TV and radio stations via telephone and facsimile, • Heavy rain warnings to newspapers via SMS.
Do you produce client reports for specific users? Is this a service for which they pay?	Yes. Usually on ad hoc basis and the service is chargeable.
Do you provide special data access to some (paying) customers? If yes, can you give an example?	Yes, some good examples are provided here: https://data.gov.sg/group/environment
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	Yes, to school, various government agencies, and to specific groups from aviation, military and maritime industries. Talks are usually lightweight and non-technical and are meant to create awareness of climate change. We also give science talks but these are usually limited to more technical users such as local scientists and/or domain experts in sectors connected to climate change (e.g. hydrology, public health, infrastructure, and environment)

Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	Yes. We advise government agencies responsible for maintenance and development of public infrastructures, and which have concerns about weather/climate anomalies on different timescales (e.g. risk floods, droughts, trans boundary haze, dengue) that can affect their operations and long-term planning .
Do you have specific contracts with other ministries or departments? Which ones?	<p>Our working arrangements with other ministries or departments are in the form of collaborative cross-ministerial and cross-departmental projects. For projects related to future climate change, various departments and ministries (e.g. environment, health, transport, and infrastructure) are involved.</p> <p>For one-to-one projects, we usually work with water resource managers and the people from the environment sectors as they usually have shorter term (month-to-month or year-to-year) concerns.</p>
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	We work with the government agency which is the local authority in agri-food and veterinary matters on an ad-hoc basis.

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	We have a wide-range of users, but information are most often sought after by government agencies and the news media for operational-type issues; schools for educational purposes.
Examples of the use of climate information:	<p>Anomalous and extreme weather/climate patterns locally and in the region for likelihood of flood/drought trans boundary haze.</p> <p>Strong winds, high temperatures and sea-level rise are also some of the information that specific users have interest in.</p>

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

<p>Examples of the usefulness of climate information:</p>	<p>As mentioned above, our agricultural sector is small.</p> <p>For other applications,</p> <ul style="list-style-type: none"> • Assess impact of possible overly dry/wet conditions on their reservoir levels, • Help in planning for drainage capacities, • Assess risk of trans-boundary haze (warm/dry conditions and direction of winds), • Help in planning and constructing of flood and coastal barriers, • Assess impacts on public health, and surrounding nature's biodiversity.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

<p>What are the gaps and needs you have for providing climate services?</p>	<p>For the Southeast Asia/Maritime Continent region, relatively very little research is conducted/limited research skill is available/no critical mass of scientists to assess:</p> <ul style="list-style-type: none"> • Performance of seasonal/climate models for this region, • Impacts of large-scale atmospheric/oceanic Drivers/processes on the climate in the region (ENSO, IOD, MJO, etc) on various timescales.
<p>How could climate services (in particular for agriculture) be improved in your country?</p>	<p>We don't have a particularly large agricultural sector. In general, these can be improved by addressing the gaps above. We are aiming to fill in some of these gaps through our research in these areas and in collaboration with local, regional and international scientists.</p>

8.13 SOLOMON ISLANDS

General Information

Please complete the following information):

Country name:	Solomon Islands	
Respondent name:	David Hirasia	
Respondent organization:	Solomon Islands Meteorological Service	
Number of staff involved in providing climate services:	6	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: 30 rainfall (some not so reliable) 5 climate	In agricultural areas: Most of them

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Access is free upon request (a formal letter is required).
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide?	Nothing at the moment, but potentially plots and maps using CLImate Data for the Environment Services application Client (CLIDEsc).
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	The seasonal outlook is based on Seasonal Climate Outlook for Pacific Island Countries (SCOPIC).
If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.	Yes, summary reports are prepared describing recent climate and events, plus some analysis.

What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?	Some basic information on our website.
What kind of scheduled reports and/or advisories do you produce?	Monthly reports – climate summaries and outlooks.
What kind of watches and warnings or alerts do you issue, if any?	Drought monitoring plus alert (based on SCOPIC). Tropical Cyclone outlook (based on Island Climate Update).
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	Information gets sent to Ministry of Agriculture, plus the Oil Palm plantation (a commercial company).
Anything else (other climate services)?	Information on climate change (particularly on sea level rise) has been provided to the Ministry of Infrastructure.

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	Mostly email. The procedure is: a request, followed by a formal letter, then respond by email.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	Yes, www.met.gov.sb . Yes it is updated regularly with the monthly reports plus daily weather info.
How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	Media outlets are included in the distribution list via email. This is followed up (mostly by phone) if interpretation or additional information is requested. Sometimes send out press statements.
Do you produce client reports for specific users? Is this a service for which they pay?	Not at the moment.

Do you provide special data access to some (paying) customers? If yes, can you give an example?	No.
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	Yes. Mostly schools and communities.
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	Not currently.
Do you have specific contracts with other ministries or departments? Which ones?	Yes, we have a contract to provide data to the Ministry of Health specifically for their monitoring of malaria. We could investigate this further (with other ministries) when we have CLIDEsc.
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	This is planned when we have CLIDEsc (e.g. through the Ministry of Agriculture). Their extension agents go into farming communities.

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	Engineers Farmers, Students, Tourism operators.
Examples of the use of climate information:	There is generally no follow up after info is distributed.

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

Examples of the usefulness of climate information:	Outer islands use info to set rainwater restrictions. Drought warnings.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

What are the gaps and needs you have for providing climate services?	We currently don't know how our information is passed on to others (beyond our dissemination). Don't know how the information is being used Need to develop more products. Need more manpower / funding.
How could climate services (in particular for agriculture) be improved in your country?	Looking forward to having CLIDEsc (a mechanism for product generation) Training of extension officers / field officers, so relevant information gets to farmers.

8.14 TONGA

General Information

Please complete the following information:

Country name:	TONGA	
Respondent name:	SELUVAIA FINAULAHI	
Respondent organisation:	TONGA METEOROLOGICAL SERVICE	
Number of staff involved in providing climate services:	4	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: Rain gauges: 6 Climate stations: 6	In agricultural areas:

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Access to climate information can be found at the Tonga Met service web site: http://www.met.gov.to where it is free or data requests are made through the telephone or emails.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from Normal) do you provide?	Climate data provided depends upon request made from clients. Data products represented in Plots or graphs which are mostly rainfall plots that are requested otherwise raw data is requested and these are provided in excel spreadsheet.
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	Seasonal rainfall outlook is currently produced using the model generated outlook, Seasonal Climate Outlook for Pacific Island Countries (SCOPIC) and POAMA model. TMS also refers to the Island Climate Update (ICU) from NIWA when generating its seasonal rainfall outlooks
If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.	<p>Monthly climate summary is produced on a monthly basis and posted on the website. In the events of an extreme event such as drought, heavy rainfall, or cyclone, it is also included in the monthly summary as an extreme or significant event.</p> <p>TMS also refers to ICU from NIWA and the latest ENSO status updates from the Bureau of Meteorology when generating its seasonal rainfall outlooks and monthly climate summary. An annual climate summary is also produced at the beginning of every year where an overall summary of weather, climate data and extreme events is presented.</p>

What is the extent of information you have on the long-term climate patterns of your country, and on the effects of La Niña and El Niño? Is the information available to the public?	The knowledge that the South Pacific Convergence Zone (SPCZ) as the major drivers on the long term climate patterns in the region including Tonga, information on the current ENSO status from the Bureau of Meteorology, information from the ICU as mentioned above and information from other global climate models provides TMS with useful information and guidance on the current climate status and in the expected climate patterns likely to affect Tonga. The present climate pattern remains in a neutral state. El Niño is often, but not always, associated with below normal rainfall for Tonga. This useful climate information is incorporated in the monthly climate summary and is available at: http://www.met.gov.to free of charge.
What kind of scheduled reports and/or advisories do you produce?	Reports and Schedule (brackets) <ul style="list-style-type: none"> • Climate summaries (monthly) • Rainfall outlooks (monthly) • Annual climate summary (annual) <p>Drought advisories are issued when the situation is expected.</p>
What kind of watches and warnings or alerts do you issue, if any?	Drought watches are issued using the drought watch analysis in SCOPIC but there is no systematic drought warning in place.
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	When there is an event that is declared eg. Drought, a press release is provided to the public through television and radio and to stakeholders not only to government but to NGOs. Agriculture sector is one of our main stakeholders.
Anything else (other climate services)?	

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	Climate enquiries are mainly made through emails, over the telephone and in person. <p>A data request form is to be filled by clients for approval before the request is being processed. This form also contains "Copyright to Tonga Meteorological Office, Ministry of Infrastructure, and Government of the Kingdom of Tonga. All data provided in this document is the property of the Government of the Kingdom of Tonga, and shall not be reproduced in any way without the express permission of the Tonga Meteorology Office, Ministry of Infrastructure, and Government of the Kingdom of Tonga."</p>
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	The request is processed immediately and is send according to request made.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	Tonga Met service web site: www.met.gov.to .Excess to website is free where climate information for students can be found and updated climate summaries.
How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	The Director of Meteorology is the main media spoke person in making Warnings which are made in a press release, and announced on the radio and television.
Do you produce client reports for specific users? Is this a service for which they pay?	Currently all service provided is free. Reports are made according to client request.
Do you provide special data access to some (paying) customers? If yes, can you give an example?	No
Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?	Public talks are made upon request. Eg. Requests from schools or from community through awareness programs with the Ministry of Environment or for organizations like US Peace Corps or Tonga Red Cross. Talks are mainly about Climate of Tonga, Tropical cyclone, etc. Various climate workshops in country or other climate related meetings can also be a good communication and public awareness where the Director of senior Met staff are able to give a presentation or climate talk to the public.
Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?	
Do you have specific contracts with other ministries or departments? Which ones?	We work closely with other Government Ministries and Departments like NEMO, Ministry of Lands Natural Resources, MAFF but no specific contract has been made.
Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?	No.

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?	Private companies, construction, government agencies, students, including water and energy sectors etc.
Examples of the use of climate information:	<p>Information is used for long term planning and for analysis.</p> <ul style="list-style-type: none"> • Renewable energy, the planners use climate information when deciding if the project is valuable for Tonga, • Some of the construction companies require information to claim insurance and for planning purposes, • Agriculture sector uses climate information for planning purposes and informing public especially when there is a drought over their radio programs, research and training sessions when having field visits, • Planning and Management Unit uses climate information during their data collection and survey so that better decision makings can be carried to various development projects, • Budgetary & procurements for airports, • Plan to avoid risk of push fire around airports security fence when temperatures rise etc, • Students request climate data and information for their research and analysis and many more.

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

Examples of the usefulness of climate information:	<p>Climate information used for:</p> <ul style="list-style-type: none"> • Decision making based on the expected climate to maximize profit or minimize loss etc. • Planning, budgeting of resources and workforce, • Research and training, • Awareness programs.
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

What are the gaps and needs you have for providing climate services?	There is lack or no feedback mechanism from agricultural sector as how seasonal forecasts can be used in decision making. <ul style="list-style-type: none">• Lack of awareness programs in the usefulness of climate information,• Lack of understanding or training of climate for Agriculture staff especially those who are out in the field with the farmers,• Lack of climate observation sites and therefore lack of available data,• No agro-climate monitoring to provide agro-met service.
How could climate services (in particular for agriculture) be improved in your country?	Climate services could be improved if the above gaps are addressed and implement.

8.15 VANUATU

General Information

Please complete the following information:

Country name:	Vanuatu	
Respondent name:	Philip Malsale	
Respondent organization:	Vanuatu Meteorology and Geo-hazards Department	
Number of staff involved in providing climate services:	6	
Number of rain gauges / climate stations (total, and in agricultural areas):	Total: 91 rain gauges - 3 climate sites	In agricultural areas: 84 rain gauges

Climate Information and Services

Please give examples of the kind of climate information and services currently provided generally, and to the agricultural sector in particular. Please provide links to webpages, or provide other supporting information, if possible.

What kind of access to climate data do you provide? Is data access free, or at a cost?	Climate data request forms are provided to those who wish to have climate data which is then approved through the climate division. Climate data provided to students is free while those who intend to use data for project or other uses have to pay a fee. Climate data is accessed through a database and data and climate information can be provided through soft or hard copy.
What kind of data products (e.g. plots or maps showing current climate conditions, and/or the difference from normal) do you provide.	Raw data are provided to clients. Value added information can also be provided depending on client's request. The data can be in a form of information, tables or simple graphs to meet specific purposes.
Please describe the seasonal climate outlook (including tropical cyclone outlook) material you provide, if any.	The seasonal Outlook bulletin generated from SCOPIC is normally produced on a monthly basis including current ENSO state, ENSO indicators, Model Outlook, past rainfall in Vanuatu and rainfall outlook in the next three months. The TC outlook is done annually before start of TC season and it provides information on TC events predicted for the SW Pacific region and specifically for Vanuatu.
If you produce reports on the climate of the previous month or season, or on recent extreme events, please describe them.	The climate division produces reports on ENSO events. The report consists of the science of the event as well as the impacts collected using the Vanuatu Rainfall Volunteers and other networks. The information is collected by the ENSO desk.
What is the extent of information you have on the long-term climate patterns of	Climate division recently has a good climate science publication produced by PCCSP project funded by AusAid where Australian scientist worked with in-country scientist to produce this first ever Vanuatu climate science publication.

your country, and on the effects of La Niña and El Niño? Is the information available to the public?	The report is translated to Bislama and is available on the web and hard copy.
What kind of scheduled reports and/or advisories do you produce?	On a monthly basis, a climate update is release to the general public. Quarterly reports are done every three months to monitor and evaluate the progress of the annual climate business plan. The TC seasonal outlook are done every October and a climate summary at the end of the year. There is also annual report that is done every end of each year.
What kind of watches and warnings or alerts do you issue, if any?	The climate division produces ENSO watch and drought monitoring every month. It also provides tropical cyclone seasonal outlook and a monthly climate update
Do you provide any of the above information directly to users in the agricultural sector (perhaps as a special report or service)? Who are these users?	Yes, the monthly climate update and ENSO watch and warnings are provided to the agriculture sector. The users are the farmers at the community level.
Anything else (other climate services)?	The climate division also engages in climate variability and climate change awareness in schools and communities apart from the core services provided.

Delivery mechanisms

Please provide examples of the way you deliver information to end users in general, and to users in the agricultural sector in particular (if relevant). Please provide links to webpages, or provide other supporting information, if possible.

How do you respond to direct enquiries about the climate from the public (e.g. via an email or telephone service)?	The climate information is delivered to end user using different medium and networks. First, by using the government email systems which the IT division sends to all government email users. The information is also send by email to ENSO group which consist of focal person in different sectors. This information is then sending through their network such as the agriculture, Red Cross networks. The information is then uploaded to the department website and intranet. The hard copies are also sending to synoptic sites in the provinces to be place on the provincial notice board. The information are also send to the Vanuatu rainfall network on a monthly basis.
Do you have a general climate information webpage (and does it get regularly updated)? If yes, please provide the link.	Yes the climate division have a climate information page that is updated monthly: http://www.vmgd.gov.vu/vmgd/index.php/climate/
How do you provide information / warnings / alerts to the media (which media, e.g. radio, newspaper, TV?)	The climate division provides climate alerts to the media through media release especially during extreme climate events such as El Nino and La Nina or beginning of tropical cyclone season.

<p>Do you produce client reports for specific users? Is this a service for which they pay?</p>	<p>The climate division is starting to provide agro-met services which is still in infant stage but as the department progresses, it will be really beneficial to have client oriented reports which will come at a cost as information provided are value-added..</p>
<p>Do you provide special data access to some (paying) customers? If yes, can you give an example?</p>	<p>No, the climate division does not provide data access to customers. Customers apply for data and the division provides these data on a certain timeframe. The types of data provided are either in annual or monthly average. Daily figures are not provided to the public. But there are some web portals that Vanuatu's climate data are uploaded where customers can have access to graphs and data such as the Pacific Climate Change Data Portal http://www.bom.gov.au/climate/pccsp/ .</p>
<p>Do you give public talks related to the recent climate or on climate change? If yes, can you give examples of the title of the talk and the kind of audience?</p>	<p>Yes, the relationship between climate division and media is really good and activities such as media release, news item in TV, radio talk back shows are organized. The department have climate change window every Tuesdays and Thursdays in radio program where issues of climate change are discuss. So the climate division takes this as an opportunity to air some of its programs such as agro-met program, TC seasonal outlook and climate seasonal outlook and extreme events. The target group depending on the activities can range from locals in the communities, school, government officials and the general public either during talk back shows or awareness programmes.</p>
<p>Do you have advisors who brief clients one-on-one on climate matters? If yes, what kind of clients are these?</p>	<p>There are some cases which involve extreme events that cause damage to certain properties so insurance company have to find detail information on the climate event to look into client's claim. These types of issues are deal one to one with climate officers.</p>
<p>Do you have specific contracts with other ministries or departments? Which ones?</p>	<p>It is always difficult for other ministries and department to use climate related products. However, the climate division have strengthened this area through signing of MOAs that's outline roles and responsibilities of department and how one can complement the other. This has been trialed with the agriculture department on how to use seasonal forecast in agriculture sector to help farmers on a monthly basis and depending on its success, the division can move further to have MOAs with other sectors.</p>
<p>Do you work directly with extension agents, such as farming advisors? If yes, do you have regular meetings, or is it more ad-hoc?</p>	<p>Yes the climate division work with extension agents but through MOA, an agriculture officer is directly involved with climate related issues. Training has targeted these extension groups so they can train the people under their responsibility. This is done on ad hoc basis depending on availability of funding. The recent agro-met summit proposed a community based training will be more appropriate and effective than training extension agents.</p>

Use of climate information

Can you provide any examples of the use of climate information you provide, in particular by agricultural sector users?

<p>Who are the people most interested in your information (e.g. farmers, students, engineers, government agencies)?</p>	<p>The general public generally do not link climate information with certain activities they engage with but gradually with more awareness on the importance of information, people become more aware of these linkages. People who are interested in climate information are mostly farmers and the general public at large. Student and engineers are more into climate data to carry out research or for infrastructure designing purposes.</p>
<p>Examples of the use of climate information:</p>	<p>Examples of climate information include information on tropical cyclone seasonal outlook use for cyclone preparation, ENSO warnings and agro-met information for farmers and for general planning. However, the climate division is looking into using the information to establish a nearly warning system for malaria and dengue fever in the future.</p>

Usefulness of climate information

Can you provide any examples of feedback from users, particularly in the agricultural sector, where the provision of climate data, information and/or services has been useful to their operations and planning?

<p>Examples of the usefulness of climate information:</p>	<p>The climate data and information are useful to the agriculture sector by knowing what had happen in the past months and years using past climate data. With the seasonal outlook, it can help farmers to make good decision such as where and what to plant or taking other low cost action.</p>
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Gaps and needs

Are you aware of any gaps and needs in the provision of climate information and services for your country? Can you suggest ways to improve the use of climate information, in particular for agriculture?

<p>What are the gaps and needs you have for providing climate services?</p>	<p>The gaps that exist in the climate services are to have a continuous thorough climate science analysis every four years that can help provide Vanuatu specific climate trend in climate variables in relation to what global models are predicting. The second issue is the establishment of climate sites that can provide valuable information on the level of productivity in potential agricultural areas. Lastly, there is the need to automate rain gauge in the rainfall network to feed into databank which climate division can use as an early warning system that can help in providing timely information to farmers on extreme climate events.</p>
<p>How could climate services (in particular for agriculture) be improved in your country?</p>	<p>The improvement will include having specific crop threshold especially on rainfall, temperature etc. that climate division can use to provide specific crop early warning for farmers. Otherwise for short term benefits it will be best to link the seasonal forecast to activities farmers engage with to improve productivity on a monthly basis.</p>