FINAL REPORT for APN PROJECT
CBA2009-05NSY-Salinger

APN
Asia-Pacific Network for Global Change Research

CAPaBLE

- Making a Difference –

Scientific Capacity Building & Enhancement for Sustainable Development in Developing Countries

International Workshop on the Content, Communication and Use of Weather and Climate Products and Services for Sustainable Agriculture

PROJECT LEADER

Dr Jim Salinger, University of Auckland, New Zealand
j.salinger@auckland.ac.nz

PROJECT COLLABORATORS

Professor A Kleschenko
National Institute of Agricultural Meteorology, Russian Federation
cxm-dir@obninsk.org

Dr L Rathore, Indian Meteorological Department, India
lsrathore@ncmrwf.gov.in

Professor R Stone
University of Southern Queensland, Australia
stone@usq.edu.au

A Ngari
Cook Islands Meteorological Service, Cook Islands
angari@met.gov.ck

Australian Government Bureau of Meteorology

THE UNIVERSITY OF AUCKLAND NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

NIWA

WMO OMM

USQ AUSTRALIA

Government of South Australia

SARDI RESEARCH AND DEVELOPMENT INSTITUTE

International Workshop on the Content, Communication and Use of Weather and Climate Products and Services for Sustainable Agriculture

Project Reference Number: CBA2009-05NSY-Salinger
Final Report submitted to APN

PAGE LEFT INTENTIONALLY BLANK

OVERVIEW OF PROJECT WORK AND OUTCOMES

Non-technical summary

The workshop engaged the participants to develop appropriate recommendations. Participants will be encouraged to be discussants to facilitate this interactive dialogue. The workshop provided an opportunity for APN scientists to learn about varying weather and climate conditions imposing pressure on farming systems, developing adaptation strategies to increasing climate variability and change, decision support systems or similar for on-farm applications, communication strategies by which weather and climate products can be supplied to farmers with improved capability in the development and delivery of decision/discussion support systems. A follow-up pilot workshop was held 11-13 January 2010 in Rarotonga, Cook Islands which successfully empowered local farmers and technical experts to understand and use media products to communicate messages from the Cook Islands Meteorological Office and Ministry of Agriculture on climate variability and impacts on agriculture.

Objectives

The main objectives of the project were:

1. To review and evaluate the use of agrometeorological products (DSS; crop calendars; combined climate-ag forecast systems (eg: date of last frost; crop yield forecasts) by region, provide guidance on agrometeorological applications to farmers and extension services, and make recommendations for improvements in advisories and forecasts for both short-term daily operational decisions and long-term strategic planning at the farm level;
2. To review the collation and application of case studies from Member countries of successful applications of weather and climate products for agriculture, and review the strengths, weaknesses and limitations for more general use;
3. To develop and propose recommendations for enhancing more effective transfer and dialogue for training and demonstration between agrometeorological services and farmers at the local level to provide better services to farmers;
4. To review the current means of communication of agrometeorological products and services to the farming sector in different regions;
5. To identify the needs for improving the current systems of communication of weather and climate products and services for promoting sustainable agriculture;
6. To evaluate the feasibility of implementing new and/or appropriate tools for communication and dissemination of weather and climate products and services and assess the socio-economic and environmental impacts of these new tools on agriculture in different regions.

Amount received and number years supported

The Grant awarded to this project was:
US$ 25,000 for 1 Year 2009/2010:

Activity undertaken

1. Arrange for participation of participants from APN developing countries.
2. Organisation of 33 papers on agrometeorological risks and uncertainties, and distribution of these on a CD-RoM prior at the workshop.
3. International Workshop, 18-20 May 2009, Toowoomba, Queensland, Australia.
4. Pilot workshop, 11-13 January 2010, Rarotonga, Cook Islands.

The format of the Toowomba workshop was as follows:

- Opening Session with keynote addresses.

- Five technical sessions covering different objectives of the workshop. In each session there will be presentations by invited speakers, each of which will be followed by comments from discussants from developing countries.
- A final session for discussion on the conclusions and recommendations of the workshop.

Keynote papers on:

a) Climate and Weather Products for Farmers and Extension Services: Review and Evaluation
b) Climate and agriculture analyses: gaps and limitations - regional perspectives
   Africa
   Asia
   Pacific
   South America
   North America, Central America and the Caribbean
   Europe
c) Communication of Weather and Climate Products for Farmers and Extension Services: Status and Needs for Improvements
d) New products and Tools for Communication and Dissemination of Climate and Agriculture Products and Services and their Impacts
e) Enhancing Interactions between Weather and Climate Services and Farmers

The pilot workshop in the Cook Islands in January 2010 to bring together experts, media and farmer users and their communities to improve communication of important climate information to end users and develop ways of interfacing these climate tools via various media communication technologies.

Results

The workshop brought together leading experts in the field who prepared and presented state-of-the-art discussion papers to address the objectives of the workshop. The programme was designed to engage all participants in discussions on topics of their interest to facilitate interactive dialogue and develop appropriate recommendations. The dramatic growth in human population is imposing enormous pressure on existing farming production systems. In addition, farmers are expected to manage the more insidious effects of long-term climate change that may now be occurring at an unprecedented rate. These demand appropriate methods to include development of improved meteorological tools for farmers and improved understanding and use of and appropriateness of weather and climate information for farmers globally. The project has provided scientists, particularly from emerging and developing countries to interact with experts from different regions. Capacity building in the area of strategies for more targeted weather and climate information and forecasting for increased preparedness to sustainable agricultural development, especially in the Asia-Pacific region. Recommendations will also enable the development to assist policy-makers and civil society in responding effectively to varying weather and climate conditions. Leading experts in several fields presented discussion papers to address the projects objectives. Over the course of the pilot workshop in the Cook Islands, two experts/trainers led experts and users in creating media products (video/radio/print) which attempted to communicate issues of importance to local farmers

about preparing for climate variations (especially El Nino events) that impact crop production.

Relevance to APN's Science Agenda and objectives

Improved use of climate knowledge and technology, both traditional and advanced, is one of the most effective ways of helping both the farming community cope with climate risks and uncertainties to make agricultural more sustainable under a changing climate. The structural and non-structural measures to reduce the impacts of the variability (including extremes) of climate resources on crop production will be discussed and enhance the capacity of leading researchers and aspiring scientists to adapt agriculture to climate and make it more resilient to variability, especially in developing countries.

The attention of the policy makers to the conclusions and recommendations of the workshop is being drawn through promoting linkages between various national, regional and international institutions participating in the workshop and such linkages are crucial for the successful implementation and communication of appropriate case services and products for various climatic risk management strategies to make both subsidence and cash agriculture more sustainable.

Self evaluation

The workshop concluded that agrometeorological products are valuable to farmers and national economies because agriculture is always sensitive to climate and there is unmet demand for climate information in all countries. Despite the advances made in improving weather and climate forecasts, the application of these products at the field level has not been "up to the mark" because of the lack of effective contact between the providers of weather and climate information and farming communities. There remains a need for greater interaction with the farming community to ensure greater agricultural productivity, the National Meteorological and Hydrological Services (NMHSs) have not been allocating adequate resources to meet this need.

A number of useful recommendations were developed by the workshop to improve the content, communication and use of weather and climate products and services for sustainable agriculture. The principal recommendations include the following:

- Countries and institutions with highly developed skills should share their knowledge with developing countries to develop better weather and climate forecasts for farming communities world-wide.
- In order to help farming communities cope with the impacts of climate change, climate change projections should be incorporated into agrometeorological products.
- Communication of agrometeorological information to any country, culture or user needs to be relevant, timely, targeted and reliable.
- All NMHSs should develop and implement communication plans including media training and effective feedback from users
- Popular print, broadcasting and Internet media should be used to alert farmer users to all available expert information.
- Increased effort needs to be placed on enhancing the availability of information to the user communities through farmer fairs, traditional festive occasions, media contacts, Internet, advanced learning systems ("e-Learning"), roving seminars, open days and other interactive events.
- Introduce curriculum of meteorology and climate change at the school level and involve school teachers in agrometeorological extension.

- Identify and promote champion farmers at the local level who can interact closely with NMHSs and provide information to his/her community.
- Farmer associations/industry organizations should be encouraged to identify a *focal point* who can interact with weather and climate service providers for product development and dissemination of agrometeorological information.

Potential for further work

The attention of the policy makers to the conclusions and recommendations of the workshop through a report to the Commission for Agricultural Meteorology, and discussions at the Fifteenth Session of the Commission for Agricultural Meteorology of WMO in Brazil, July 2010 which will bring together experts from over 64 countries around the world. A number of WMO projects are being developed as a result which focus especially on disaster prevention and management. Specifically, two work programmes are focusing on:

1. Identification of critical areas where agricultural production is sensitive and vulnerable to climate change and variability in different regions, and suggests monitoring strategies for early detection, as well as summarizes coping strategies to climate risks in agriculture.
2. Reviewing the increasing frequency and severity of droughts and extreme temperatures globally, and assessing the current status of monitoring and predicting droughts including the use of drought indices in different regions to improve drought monitoring and prediction.

Participants from APN countries are promoting the linkages between science and policy discussed during the workshop.

Publications

http://www.wmo.int/pages/prog/wcp/agm/meetings/wocaps09/index_en.html

CD-ROMS

Presentations for the International Workshop were prepared and distributed at the end of the workshop.

Website for pilot products for Cook Islands Farmers: www.climatecookislands.com.

Acknowledgments

Other funding to support attendance at the workshop was provided by the Bureau of Meteorology (Australia), World Meteorological Organization (WMO), National Oceanic and Atmospheric Administration (NOAA), Land and Water Australia, Managing Climate Variability Program and Peanut Company of Australia. The workshop, hosted was hosted by the University of Southern Queensland. The Cook Islands Meteorological Service provided support for the pilot workshop in Rarotonga.

TECHNICAL REPORT

Preface

Farmers and farming communities throughout the world have, in most instances, survived and developed by mastering the ability to adapt to widely varying weather and climatic conditions. However, long-term climate change and variability demand the use and appropriateness of weather and climate information for farmers globally. Capacity building in the area involved strategies for more targeted weather and climate information and forecasting for increased preparedness to sustainable agricultural development, especially in the Asia-Pacific region. The workshop engaged the participants to develop appropriate recommendations. The workshop provided an opportunity for APN scientists to learn about varying weather and climate conditions imposing pressure on farming systems and appropriate coping strategies.

1.0 Introduction

Weather and climate can be some of the biggest risk factors impacting on farming performance and management. Extreme weather and climate events such as severe droughts, floods, or temperature shocks often strongly impede sustainable farming development, particularly in the tropics and sub-tropics. Factors such as climate variability and change contribute to the vulnerability of individual farms, as well as on whole rural communities. This also particularly impacts on regional and world food security. Recent weather and climate research efforts have demonstrated the importance of targeted forecasting and scenario analyses in increasing overall preparedness of farmers and farm business managers, leading to substantially better outcomes overall.

Farmers and farming communities throughout the world have, in most instances, survived and developed by mastering the ability to adapt to widely varying weather and climatic conditions. However, the dramatic growth in human population is imposing enormous pressure on existing farming production systems. In addition, farmers are expected to manage the more insidious effects of long-term climate change that may now be occurring at an unprecedented rate. Against the very unfavourable economic scenarios of the last decades, farmers have been struggling to maintain their income by continuously trying to increase yields in their production systems. Such increased productivity may be associated with increased economic and environmental risk as the farming system becomes more vulnerable to climate variability and climate change. These existing pressures will demand the development and implementation of appropriate methods to address issues of vulnerability to weather and climate. These methods will need to include ways of developing improved content of meteorological products produced for farmers and improved understanding of the use and appropriateness of weather and climate information for farmers globally.

More targeted weather and climate information and forecasting can increase preparedness and lead to better economic, social, and environmental outcomes for farmers. However, these types of outputs are just some of many risk management tools that play an important role in farming decision-making. More effective approaches in relation to the communication and the delivery of climate and weather information, including forecasting systems, to farmers may need the incorporation of more effective cross-disciplinary approaches that bring together research and development institutions, relevant disciplines, and farmers as partners to reap the benefits from weather and climate knowledge. Developments of improved weather and climate information and forecasts can provide insights into meteorological and climatological processes.

However, appropriate decision support systems (including so–called ‘discussion support systems’)

need to be developed in order to address the multitude of extension and decision-making processes involve din farming world-wide. Additionally, farm management needs to be seen within a wider context: Decisions made by a farmer at a point (farm) in the landscape can have wider implications. Hence, environmental and societal risks such as run-off, drainage, erosion, salinity, nutrient and pesticide movements, health impacts, and employment implications also need to be considered and quantified.

Furthermore, farmers are now asking for more effective systems to help them cope with climatic change. According to IPCC, there are many potential ways to help farmers overcome some of the issues associated with climate change. Suggested adaptation strategies include changing varieties and/or species to those with more appropriate thermal time and vernalisation requirements and/or increased resistance to heat shock and drought, promoting wider use of technologies to 'harvest water', conserve soil moisture (e.g. crop residue retention) and to use water more effectively in areas with rainfall decreases, altering the timing or location of cropping activities, diversifying income by integrating other farming activities such as livestock raising, improving the effectiveness of pest disease and weed management practices and making better use of seasonal climate and crop yield forecasts to reduce production risks. Nevertheless, in spite of these types of measures being potentially valuable to farmers it is suggested considerable work needs to be done globally on improving content, communication methods and associated delivery of core products that are or could be disseminated by meteorological and associated institutions that supply information to farmers. This includes improved capability in development and delivery of decision-support systems that are being constructed in attempts to assist in decision-making by farmers.

It is with this background that the World Meteorological Organisation (WMO) proposed to organize, jointly with NIWA, the Australian Managing Climate Variability Research and Development Program, and the University of Southern Queensland an International Workshop on the Content, Communication and Use of Weather and Climate Products and Services for Sustainable Agriculture at the University of Southern Queensland, Australia, from 18 to 21 May 2008, in conjunction with two expert team meetings of the Commission for Agricultural Meteorology with WMO.

There were six main objectives of the workshop:

1. To review and evaluate the use of agrometeorological products (DSS; crop calendars; combined climate-ag forecast systems (eg: date of last frost; crop yield forecasts) by region, provide guidance on agrometeorological applications to farmers and extension services, and make recommendations for improvements in advisories and forecasts for both short-term daily operational decisions and long-term strategic planning at the farm level;

2. To review the collation and application of case studies from Member countries of successful applications of weather and climate products for agriculture, and review the strengths, weaknesses for more general use;
3. To develop and propose recommendations for enhancing more effective transfer and dialogue for training and demonstration between agrometeorological services and farmers at the local level to provide better services to farmers;
4. To review the current means of communication of agrometeorological products and services to the farming sector in different regions;
5. To identify the needs for improving the current systems of communication of weather and climate products and services for promoting sustainable agriculture;
6. To evaluate the feasibility of implementing new and/or appropriate tools for communication and dissemination of weather and climate products and services and assess the socio-

economic and environmental impacts of these new tools on agriculture in different regions.

2.0 Methodology

The following work was undertaken:

1. Arrange for participation of participants from APN developing countries.
2. Organisation of 33 papers on agrometeorological risks and uncertainties, and distribution of these on a CD-RoM prior at the workshop.
3. International Workshop, 18-20 May 2009, Toowoomba, Queensland, Australia.
4. Pilot workshop, 11-13 January 2010, Rarotonga, Cook Islands.

The format of the Toowoomba workshop was as follows:

- Opening Session with keynote addresses.
- Five technical sessions covering different objectives of the workshop. In each session there will be presentations by invited speakers, each of which will be followed by comments from discussants from developing countries.
- A final session for discussion on the conclusions and recommendations of the workshop.

Keynote papers on:

f) Climate and Weather Products for Farmers and Extension Services: Review and Evaluation
g) Climate and agriculture analyses: gaps and limitations - regional perspectives

Africa
Asia
Pacific
South America
North America, Central America and the Caribbean
Europe

h) Communication of Weather and Climate Products for Farmers and Extension Services: Status and Needs for Improvements
i) New products and Tools for Communication and Dissemination of Climate and Agriculture Products and Services and their Impacts
j) Enhancing Interactions between Weather and Climate Services and Farmers

The pilot workshop in the Cook Islands from 11-13 January 2010 brought together experts, media and farmer users and their communities to improve communication of important climate information to end users and develop ways of interfacing these climate tools via various media communication technologies.

3.0 Results & Discussion

Thirty three papers were presented. The program of the Workshop was covered in seven technical sessions with the following topics: Agrometeorological Products for Farmers and Extension Services; Communication of Weather and Climate Products for Farmers and Extension Services; Case Studies of Applications of Weather and Climate Products for Agriculture; Agrometeorological Analyses: Gaps

and Limitations; New products and Tools for Communication and Dissemination of Agrometeorological Products and Services and their Impacts; Enhancing Interactions between Weather and Climate Services and Farmers. Of special note, there was a Farmer's Roundtable Session with six Australian farmers. The farmers represented a range activities and interests including the Australian grain and peanut industry, the Queensland Farmers Federation, organic farming, horticulture (flowers and speciality vegatables), cattle ranching, and wheat farming. They obtain their weather and climate information from a broad range of sources including the Australian Bureau of Meteorology, local agricultural radio programs, local TV, and the Internet (CPC, IRI, SSTs forcasts, etc). During this roundtable session, the farmers were asked if free and accurate weather and climate forecasts were more important than free seed and fertiliser. Most of farmers indicated that they would prefer the free and accurate climate forecasts over free seed and fertiliser. There was a Working Group (WG) Discussion Session with three WGs: Agrometeorological Products (including Agrometeorological Analysis) and their Applications for Farmers and Extension Services; Effective Communication of Weather and Climate Products for Farmers and Extension Services; Enhancing Interactions between Weather and Climate Services and Farmers. Each of the WGs, presented conclusions and recommendation in the final plenary session.

A number of useful recommendations were developed by the workshop to improve the content, communication and use of weather and climate products and services for sustainable agriculture. The principal recommendations include the following:

- Countries and institutions with highly developed skills should share their knowledge with developing countries to develop better weather and climate forecasts for farming communities world-wide.
- In order to help farming communities cope with the impacts of climate change, climate change projections should be incorporated into agrometeorological products.
- Communication of agrometeorological information to any country, culture or user needs to be relevant, timely, targeted and reliable.
- All NMHSs should develop and implement communication plans including media training and effective feedback from users
- Popular print, broadcasting and Internet media should be used to alert farmers users to all available expert information.
- Increased effort needs to be placed on enhancing the availability of information to the user communities through farmer fairs, traditional festive occasions, media contacts, Internet, advanced learning systems ("e-Learning"), roving seminars, open days and other interactive events.
- Introduce curriculum of meteorology and climate change at the school level and involve school teachers in agrometeorological extension.
- Identify and promote champion farmers at the local level who can interact closely with NMHSs and provide information to his/her community.
- Farmer associations/industry organizations should be encouraged to identify a *focal point* who can interact with weather and climate service providers for product development and dissemination of agrometeorological information.

Other outputs included:
Workshop and conference website:
http://www.wmo.int/pages/prog/wcp/agm/meetings/wocaps09/index_en.html
This website contains links to introductory note and the workshop brochure, and lists the co-sponsors.
CD-ROMS
Draft papers for the International Workshop were distributed after the workshop.

A follow up workshop was held from 11-13th January 2010 in the Cook Islands. This was to develop interfaces to improve communication of climate information to farmers and farming communities. The report of this workshop is in Appendix 4.

The workshop successfully empowered local farmers and technical experts to understand and use media products to communicate messages from the Cook Islands Met office and Ministry of Agriculture on climate variability and impacts on agriculture. This initiative needs to be maintained and facilities made available for growers and technical experts to develop media stories. Growers collectively had a lot of knowledge about weather, water and crop management, but suggested that grower groups be formed to facilitate widespread implementation of such knowledge. They felt that Government could assist in the development and resource mobilization of such groups.

Farmers also need improved communication about future weather and climate events. It was recommended that a weekly weather forecast and climate update be prepared for TV, radio or local newspaper. The media products will be posted online allowing users a further forum to circulate information and initiatives for climate preparedness. It was also suggested that local schools could be involved in education on climate, and that met stations could be installed and monitored as part of a network of stations around the island. Students might also be encouraged to develop media products for local communities.

It was also recommended that Cook Island Government assist communities in the development of bores and wells to supply water in times of drought. However, it is important that this groundwater resource is monitored and managed carefully. Farmers will also need good education on efficient use of water to irrigate crops to prevent wastage. Local media should be encouraged to seek stories on climate and agriculture from Government departments and local growers on a regular basis. A website was developed for products for Cook Island farmers: www.climatecookislands.com

4.0 Conclusions

The workshop concluded that agrometeorological products are valuable to farmers and national economies because agriculture is always sensitive to climate and there is unmet demand for climate information in all countries. Despite the advances made in improving weather and climate forecasts, the application of these products at the field level has not been “up to the mark” because of the lack of effective contact between the providers of weather and climate information and farming communities. There remains a need for greater interaction with the farming community to ensure greater agricultural productivity, the National Meteorological and Hydrological Services (NMHSs) have not been allocating adequate resources to meet this need.

The follow-on pilot workshop brought together experts, media and farmer users and their communities to improve communication of important climate information to end users and develop ways of interfacing these climate tools via various media communication technologies. A number of useful recommendations were developed by the workshop to improve the content, communication and use of weather and climate products and services for sustainable agriculture.

5.0 Future Directions

The attention of the policy makers to the conclusions and recommendations of the workshop through a report to the Commission for Agricultural Meteorology, and discussions at the Fifteenth Session of the Commission for Agricultural Meteorology of WMO in Brazil, July 2010 which will bring together experts from over 64 countries around the world. A number of WMO projects are being developed as a result which focus especially on disaster prevention and management. Specifically, two work programmes are focusing on:

- Identification of critical areas where agricultural production is sensitive and vulnerable to climate change and variability in different regions, and suggests monitoring strategies for early detection, as well as summarizes coping strategies to climate risks in agriculture.
- Reviewing the increasing frequency and severity of droughts and extreme temperatures globally, and assessing the current status of monitoring and predicting droughts including the use of drought indices in different regions to improve drought monitoring and prediction.

Participants from APN countries are promoting the linkages between science and policy discussed during the workshop.

References

Meinke, H. and Stone, R.C., (2005). Seasonal and inter-annual climate forecasting: the new tool for increasing preparedness to climate variability and change in agricultural planning and operations. Climatic Change 70, 221-253

Stone, R.C., Sivakumar, M.V.K., and Burt, P.J.A. (2006) Meteorological Applications: Special Supplement on Weather, Climate and Farmers. World Meteorological Organisation - COST – European Science Foundation, 13, 1, 93pp.

Stone, R.C. and Meinke, H. (2006) 'Weather, Climate, and Farmers: An Overview: Commission for Agricultural Meteorology Special Report'. World Meteorological Organisation, Geneva, CH. Meteorological Applications 13, 7-21

Stone, R.C., Meinke, H., and Williams, A. (2005) 'Climate Information, Climate Forecasting and Food Production: An Overview' Technical Conference on Climate as a Resource, 1-2 November 2005 Beijing: Secretariat to the World Meteorological Organization, Geneva, 2005.

Appendix

Conferences/Symposia/Workshops

INTERNATIONAL WORKSHOP ON CONTENT, COMMUNICATION AND USE OF WEATHER AND CLIMATE PRODUCTS AND SUSTAINABLE AGRICULTURE

Toowoomba, Queensland, Australia 18-20 May 2009

0800-0900	**Registration -** Harvard Rooms Foyer, Level 5 Q Block
0900-1000	**Session 1 – Opening –** Allison Dickson Lecture Theatre Foyer
	Master of Ceremonies – Professor Roger Stone Director, Australian Centre for Sustainable Catchments, University of Southern Queensland **Opening Address** – Mr Gary Foley – Permanent Representative of Australia, World Meteorological Organisation **Toowoomba City Welcome** – Councillor Peter Taylor Mayor of Toowoomba **USQ Welcome** – Mrs Bobbie Brazil Chancellor **Commission Welcome** – Dr Jim Salinger President, Commission for Agricultural Meteorology **WMO Division Welcome** – Dr M V K Sivakumar Chief, Agricultural Meteorology Division
1045-1115	**Keynote Address** – Harvard Rooms, Q Block, Level 5 (Q501/502) Professor Jean Palutikof Director, National Climate Change Adaptation Research Facility Griffith University *Adapting to the impacts of climate change: Australia on the front line*
1115-1130	Discussions
1130-1450	**Session 2 - Agrometeorological Products for Farmers and Extension Services: Review and Evaluation -** Harvard Rooms, Q Block, Level 5 (Q501/502) **Chair:** Dr Jim Salinger **Rapporteur:** Mr Jim Davidson
1130-1150	Professor Alexander Kleschenko Institute of Agricultural Meteorology of ROSGIDROMET, Russian Federation *The System for Providing Farmers with Agro-Meteorological Information on the Base of Web-Technology*
1150-1210	Professor Roger Stone University of Southern Queensland, Australia

	WMO – USQ Online climate change education project
1210-1230	Dr Orivaldo Brunini Instituto Agronomico, Brazil *Examples of successful applications of weather and climate products for agriculture in South America*
1330-1350	Dr Philippe Frayssinet Météo-France, France Proposed: *Examples of successful applications of weather and climate products for agriculture in Europe*
1350-1410	Dr Yvette Everingham Senior Lecturer, Faculty of Science, Engineering and Information Technology, James Cook University *Value of agrometeorological information to the sugar industry* (Everingham Y[1], Park S[2]) [1] James Cook University, Queensland Australia; [2] CSIRO Sustainable Ecosystems, Canberra, Australia
1410-1430	Howard Diamond, US Global Climate Observing System Director, US National Climatic Data Center, Asheville, North Carolina *The Global Climate Observing System (GCOS) in the Southern Hemisphere*
1430-1450	Discussions
1520-1720	**Session 3 - Communication of Weather and Climate Products for Farmers and Extension Services: Status and Needs for Improvements -** Harvard Rooms, Q Block, Level 5 (Q501/502) **Chair:** Dr Michael Coughlan (or nominee), Assistant Director, Bureau of Meteorology **Rapporteur:** Associate Professor Mark Porter, Deputy Director (Research), Australian Centre for Sustainable Catchments – TBC
1520-1540	Dr L S Rathore Vice-President of CAgM, India Meteorological Department, India *Indian Experience on District Level Agromet Services*
1540-1600	Dr Peter Hayman South Australian Research and Development Institute (SARDI), Australia *Risky communication: uncertain climate information and imperfect decision makers*
1600-1620	Dr Andrew Watkins National Climate Centre, Bureau of Meteorology *The Water and the Land project: balancing farmer needs, atmospheric science, and information delivery.*
1620-1640	Mr Deusdedit Kashasha Tanzania Meteorological Agency, United Republic of Tanzania *The use of forecasts and advisories for decision making (operational and strategic) at the farm level in Africa*
1640-1700	Discussions

1700-1720	Mr Sid Plant Owner/Manager, 'Samarai', Acland *What has to be done to improve the communication of weather and climate information for the benefit of farmers?*

Tuesday, 19 May 2009

Time	Session
0900-1200	**Session 4 - Case studies of applications of weather and climate products for agriculture –** Harvard Rooms, Q Block, Level 5 (Q501/502) **Chair:** Mr Jim Davidson, Regional Director (Queensland) Bureau of Meteorology **Rapporteur:** Dr Peter Hayman, Principal Scientist, Climate Applications, South Australian Research and Development Institute
0900-0920	Mr Rition Kabunateiti Acting Climate Officer, Kiribati Meteorological Service *Roles of Kiribati Meteorological Service*
0920-0940	Dr Nabansu Chattopadhyay India Meteorological Department, India *Operational Agrometeorological Service in India and associated RA countries in the workshop*
0940-1000	Dr Oscar Solano Instituto de Meteorologia, Cuba *Examples of successful applications of weather and climate for agriculture in North America, Central America and the Caribbean*
1000-1020	Dr Celia Reyes and Dr Hilario Flaviana Philippine Institute for Development Studies (PIDS) and Philippine National Met Office PAGASA *Using ENSO information for Policy decisions – an example of rice importation in the Philippines*
1040-1100	Dr Daniel Rodriguez Agricultural Production Systems Research Unit, Queensland Department of Primary Industries & Fisheries *The intrinsic plasticity of farm businesses and their resilience in the face of change* (Rodriguez D[1], deVoil P[1], Cox H[1], Crimp S[2], Meinke H[3] [1] Queensland Primary Industries and Fisheries, Agricultural Production Systems Research (APSRU IV) & APSIM JV, Toowoomba Qld Australia - Corresponding author: daniel.rodriguez@dpi.qld.gov.au; [2] CSIRO Sustainable Ecosystems, Canberra, Australia; [3] Centre for Crop Systems Analysis (CCSA), Wageningen University and Research Centre, The Netherlands)
1100-1120	Dr Yahya Abawi Chief Scientist, Queensland Climate Change Centre of Excellence, Office of Climate Change (AUSAID for ACIER Projects)

	Developing climate resilient systems in the Asia-Pacific Region
1120-1140	Dr Jai Gawander Manager, Fiji Sugar Research Institute *Impact of climate on sugar production at two mills*
1140-1200	Discussions
1200-1425	**Session 5 – Agrometeorological analyses: gaps and limitations -** Harvard Rooms, Q Block, Level 5 (Q501/502) **Chair:** Dr John Sims, Bureau of Rural Sciences **Rapporteur:** – Professor Roger Stone, Director, Australian Centre for Sustainable Catchments, University of Southern Queensland
1200-1220	Mr Bob Hansen Chief Executive Officer, Peanut Company of Australia *Managing climate variability and climate change in the business world*
1220-1240	Adjunct Professor, Dr Peter Best Managing Director, Cindaul Pty Ltd and Adjunct Professor to the University of Southern Queensland *Agricultural resilience for extreme weather events- taking stock of meteorological dependencies and history* (Best P[1], Mushtaq S[2] - [1]& [2]University of Southern Queensland, Queensland Australia)
1340-1400	Mr Col Creighton Program Leader, Managing Variability Program, Land and Water Australia *An Overview of the Managing Climate Variability Program in Australia*
1400-1420	Discussion
1420-1710	**Session 6 - New products and Tools for Communication and Dissemination of Agrometeorological Products and Services and their Impacts -** Harvard Rooms, Q Block, Level 5 (Q501/502) **Chair:** Dr L S Rathore, India Meteorological Department **Rapporteur:** Dr Stephen Lellyet, Deputy Regional Director (NSW), Bureau of Meteorology
1420-1440	Jan Sinclair University of Auckland *Circulating information: media-public interactions in communication processes*
1440-1500	Ms Almaz Demessie National Meteorological Agency, Ethiopia *Communicating agro climatic information in Africa*
1530-1550	Mr Edgar Imaña Servicio Nacional de Meteorología e Hidrologia, Bolivia *Examples of the successful communication of agrometeorological products in Bolivia and other RA III countries*
1550-1610	Dr Harlan Shannon United States Department of Agriculture (USDA), USA *Review of Communication of Agrometeorological Products and Services in*

	RA-IV
1610-1630	Dr Walter Trampf Deutscher Wetterdienst, Germany *Content, Communication and Use of Agrometeorological Products and Services of the Dep. Agrometeorology of DWD and met services in other RA VI countries*
1630-1650	Mr Neal Moodie Australian Bureau of Meteorology, Australia *Talking about the weather with farmers – Experiences in Australia and Pacific Islands*
1650-1710	Discussions

Wednesday, 20 May 2009

0900-1200	**Session 7 - Enhancing Interactions between Weather and Climate Services and Farmers -** Harvard Rooms, Q Block, Level 5 (Q501/502) **Chair:** Alexander Kleschenko, ROSHYDROMET **Rapporteur:** Dr Robert Stefanski, WMO, Geneva
0900-0920	Dr Stephen Lellyett Member, ICAS – RA V and Deputy Regional Director (NSW), Bureau of Meteorology *User perceptions of the quality attributes of weather and climate services from the Australian Bureau of Meteorology - some generic implications for communication, service content, design and evaluation*
0920-0940	Dr Alan Porteous National Institute of Water and Atmospheric Research (NIWA), New Zealand *Case studies of initiatives to improve the application of climate forecast information for agricultural production in New Zealand and Samoa*
0940-1000	Dr Andrew Tait NIWA National Climate Centre, New Zealand *Developing climate data products for on-farm management decisions in New Zealand*
1030-1050	Dr K.R. Kim National Institute of Meteorology Research (NIMR)/KMA, Republic of Korea *The opportunities and challenges for communicating agroclimatic information in Asia*
1050-1110	Prof Canesio Predo (VSU) and Edna Juanillo (PAGASA) Department of Economics, Visayas State University (VSU), Philippines and Philippine National Met Office PAGASA *Interaction between Philippine Met Services and Corn Farmers in the Southern Philippines*
1110-1200	Farmer's Roundtable **Facilitator:** Dr Peter Hayman

1300-1500	**Session 8 - Concurrent Working Group Discussions -** Harvard Rooms, Q Block, Level 5 (Q501/502) and Q402 (TBC) **Chairs:** Dr Jim Salinger, Professor Alexander Kleschenko and Dr L Rathore **Rapporteur:** Professor Roger Stone, Dr Peter Hayman, Mr Howard Diamond
1530-1630	**Session 9 - Plenary Session -** Harvard Rooms, Q Block, Level 5 (Q501/502) **Conclusions and Recommendations**
1630-1700	**Session 10 - Closing Session -** Harvard Rooms, Q Block, Level 5 (Q501/502)
	Dr Jim Salinger President, Commission for Agricultural Meteorology Dr M V K Sivakumar Chief, Agricultural Meteorology Division Professor Graham Baker Deputy Vice-Chancellor (Scholarship), University of Southern Queensland Professor Roger Stone Director, Australian Centre for Sustainable Catchments, University of Southern Queensland

Participant list

Note: To avoid spam email to these addresses, the @ has been replaced with <at>.

Dr Orivaldo BRUNINI
Sao Paulo State Government
Instituto Agronomico
Rua Fernao de Magalhaes 1080
Bairro Parque Taquaral
13087-130 Campinas
SAO PAULO
Brazil
Tel: +5519 32415188
Fax: +5519 32425230
Email: brunini<at>iac.sp.gov.br

Dr Nabansu CHATTOPADHYAY
India Meteorological Department
Agricultural Meteorology Division
Shivajinagar
PUNE 411005
India
Tel: +9120 25513102 / 65102647/ 09225569519
Fax: +9120 25535953
Email: nabansu_nubur<at>yahoo.com

Mrs Almaz DEMESSIE
National Meteorological Agency
P.O. Box 21082
Code 1000
ADDIS ABABA
Ethiopia
Tel: +251 911 197120
Fax: +25111 6625292
Email: almzds<at>yahoo.com

Mr Philippe FRAYSSINET
Météo-France/DP/Services
42, Avenue Gaspard Coridis
31057 Toulouse Cedex 1
France
Tel: +335 61078087
Fax: +335 61078079
Email: philippe.frayssinet<at>meteo.fr

Dr Peter HAYMAN
Climate Applications Unit
South Australian Research and Development Institute (SARDI)
Waite Research Precint

GPO Box 397
ADELAIDE SA 5001
Australia
Tel: +618 83039729
Fax: +618 83039378
Email: hayman.peter<at>saugov.sa.gov.au

Mr Edgar IMAÑA
Servicio Nacional de Meteorologia e Hidrologia
Calle Reyes Ortiz No. 41
LA PAZ
Bolivia
Tel: +5912 2200433
Fax: +5912 2392413
Email: edgaimana<at>hotmail.com or agromet<at>entelnet.bo

Mr Deusdedit A.R. KASHASHA
Tanzania Meteorological Agency
P.O. Box 3056
DAR ES SALAAM
United Republic of Tanzania
Tel: +255 22 2460706
Fax: +255 22 2460735
Email: dkashasha<at>hotmail.com

Dr Kyu Rang KIM
Meteorological Application Research Laboratory
National Institute of Meteorological Research (NIMR)/KMA
45 Gisangcheong-gil, Dongjak-gu
SEOUL 156-720
Republic of Korea
Tel: +822 67120451
Fax: +822 8345922
Email: krk9<at>kma.go.kr

Prof. Alexander KLESHCHENKO
Institute of Agricultural Meteorology of ROSGIDROMET
Lenina Str 82, Kaluga Region
OBNINSK 249039
Russian Federation
Tel: +7484 3964706
Fax: +7484 3944388
Email: kl_al2009<at>yahoo.com or cxm-diz<at>obninsk.org

Mr Stephen LELLYETT
NSW Regional Office
Australian Bureau of Meteorology
P.O. Box 413
DARLINGHURST, NSW 1300
Australia
Tel: +612 92961501 Switchboard: +612 92961555
Mobile: +614 08023687
Fax: +612 92961506
Email: s.lellyett<at>bom.gov.au

Mr Neal MOODIE
Public & Agriculture Weather Services
Australian Bureau of Meteorology
GPO Box 1289
MELBOURNE, Vic 3001
Australia
Tel: +613 96694768
Fax: +613 96694515
Email: nealm<at>bom.gov.au

Mr Alan PORTEOUS
National Institute of Water and Atmospheric Research (NIWA)
P.O. Box 14-901
KILBIRNIE, WELLINGTON
New Zealand
Tel: +644 3860533
Fax: +644 3860341
Email: a.porteous<at>niwa.co.nz

Dr L.S. RATHORE
India Meteorological Department
603, Mausam Bhavan, Lodi Road
NEW DELHI 110 003
India
Tel: +9111 24619844
Fax: +9111 24629766
Email: lsrathore<at>ncmrwf.gov.in / lrathore<at>gmail.com

Dr James SALINGER
School of Environment
University of Auckland
Private Bag 92019
AUCKLAND
New Zealand
Tel: +649 3737599 ext 84932
Fax: +649 3737434
Email: j.salinger<at>auckland.ac.nz

Dr Harlan SHANNON
United States Department of Agriculture
1400 Independence Avenue, Room 4441 – SD
WASHINGTON, D.C. 20250-3812

United States of America
Tel: +1202 7204771
Fax: +1202 6901805
Email: hshannon<at>oce.usda.gov

Dr Oscar SOLANO
Instituto de Meteorologia
Apartado 17032, CP 11700
LA HABANA
Cuba
Tel: +537 8670714
Fax: +537 8668010
Email: oscar.solano<at>insmet.cu

Prof. Roger STONE
Australian Centre for Sustainable Catchments
University of Southern Queensland
TOOWOOMBA, QUEENSLAND 4350
Australia
Tel : +617 46312736 / 61437 349168
Fax: +617 46315581
Email: stone<at>usq.edu.au

Mr Walter TRAMPF
Deutscher Wetterdienst
Abt. Agrareteorologie
Franufurter Str
D-63067 OFFENBACH
Germany
Tel: +4969 80624408
Fax: +4969 80624482
Email: walter.trampf<at>dwd.de

Bronya ALEXANDER
South Australian Research and Development Institute
Climate Applications Unit
PO Box 397
ADELAIDE
SA 5001
Australia
Tel: wk- 08 83039413 / Mobile: 0419373350
Email: alexander.bronya<at>saugov.sa.gov.au

Kep COUGHLAN
PO Box 596
ANNERLEY
QLD 4103
Australia
Tel: +617 38486421
Email: kepcoughlan<at>mac.com

Ms Rosalina DE GUZMAN
Philippine Atmospheric, Geophysical and Astronomical
Services Administration (PAGASA)
QUEZON CITY
Philippines
Tel: +632 4342698
Email: rdeguzmanph<at>yahoo.com

Ms Kathrina GONZALES
Philippine Institute for Development Studies (PIDS)
Philippines
Tel: +632 892 7385
Email: grina<at>pids.gov.ph

Mr Rotacio GRAVOSO
Visayas State University (VSU)
Baybay, Leyte 6521-A
Philippines

Dr Flaviana HILARIO
Philippine Atmospheric, Geophysical and Astronomical
Services Administration (PAGASA)
QUEZON CITY
Philippines
Tel: 632 929 1953
Email: fhilarioph<at>yahoo.com

Ms Edna JUANILLO
Philippine Atmospheric, Geophysical and Astronomical
Services Administration (PAGASA)
Philippines
Email: ejuanillo<at>yahoo.com

Ms Jennifer LIGUTON
Philippine Institute for Development Studies (PIDS)
Philippines
Email: jliguton<at>pids.gov.ph

Mr Christian MINA
Philippine Institute for Development Studies (PIDS)
Philippines

Ms Eva MONTE
Visayas State University (VSU)

Baybay, Leyte 6521-A
Philippines
Email: 06.evam<at>gmail.com

Ms Daisy ORTEGA
Philippine Atmospheric, Geophysical and Astronomical
Services Administration (PAGASA)
Philippines
Tel : +632 434 0955
Email :

Dr Remberto PATINDOL
Visayas State University (VSU)
Baybay, Leyte 6521-A
Philippines
Email: rpat85<at>yahoo.com

Prof. Canesio PREDO
Visayas State University (VSU)
Baybay, Leyte 6521-A
Philippines
Email: cdpredo<at>yahoo.com or cpredo<at>gmail.com

Dr Celia REYES
Philippine Institute for Development Studies (PIDS)
Philippines
Email: creyes<at>mail.pids.gov.ph

Mr Robert HAMILTON
MetService New Zealand
30 Salamanca Road
Kelburn
WELLINGTON
New Zealand
Tel: 04 4700700
Email: Robert.hamilton<at>metservice.com

Mr Azhar Bin ISHAK
Malaysian Meteorological Department
Jalan Sultan
46667 Petaling Jaya
SELANGOR DE
Malaysia
Tel: +603 79678221
Email: azhar<at>met.gov.my

Mr Didit NURYADI
Indonesia
Email: bintaro2001us<at>yahoo.com

Prof. Jean PALUTIKOF
NCCARF
Room 2.07
G34 Chancellery Building
Griffith University
Nathan, QLD
Australia
Tel: +617 55527734
Email: j.palutikof<at>griffith.edu.au

Lloyd TAHANI
Principal Meteorological Officer (Climatology)
Solomon Islands Meteorological Service
PO Box 21
HONIARA
Solomon Islands
Tel: 00677 24218
Fax: 00677 23029
Email: l.tahani<at>met.gov.sb

Dr Yahya ABAWI
QCCCE
203 Tor Street
TOOWOOMBA, QLD 4350
Australia
Email:
yahya.abawi<at>climatechange.qld.gov.au

Howard DIAMOND
NOAA/National Climate Data Center
1100 Wayne Avenue, Suite 1202
Silver Spring
MARYLAND USA 20910
Tel: +1 301 427 2475
Fax: +1 301 427 0033
Email: howard.diamond<at>noaa.gov

Simon McGREE
Fiji Meteorological Service
Private Mail Bag NAP0351
Nadi Airport
Fiji Islands
Tel: 679 6724888
Email: simon.mcgree<at>met.gov.fj

Arona NGARI
Cook Island Met Service
P O Box 127
RAROTONGA
Cook Islands
Tel: 682 20603
Email: angari<at>met.gov.ck

Kaniaha Salesa NIHMEI
Vanuatu Meteorological Service (VMS) - Government Institution
Vanuatu Meteorological Service
PMB 9054
Port Vila
Vanuatu
Tel: +678 23866
Email: skaniaha<at>meteo.gov.au

Alexandre PELTIER
Meteo France / New Caledonia Met Office
5 Rue Vincent Auriol
BP 151
NOUMEA CEDEX
98845 NOUMEA
Tel : +687-27 93 08
Email: alexandre.peltier<at>meteo.fr

Mr Sunny SEUSEU
Head of Climate Prediction & Forecasting Section
Ministry of Natural Resources & Environment
Meteorology Division
Private Mail Bag
APIA
Samoa
Tel: +685 7792434
Email: sunny.seuseu<at>mnre.gov.ws

Jan SINCLAIR
Department of Film, Television and Media Studies
University of Auckland
AUCKLAND
New Zealand
Tel: 64 9 373 7599 ext 87464
Email: j.sinclair<at>auckland.ac.nz

Dr Andrew TAIT
NIWA National Climate Centre
Private Bag 14901
WELLINGTON
New Zealand
Tel: 164 4 386 0562
Email: a.tait<at>niwa.co.nz

Ms Beverley WILSON
NIWA, Auckland, New Zealand
Private Bag 99940
NEWMARKET
Auckland 1149
New Zealand
Tel: +649 375 2033
Email: b.wilson<at>niwa.co.nz

Dr M.V.K. SIVAKUMAR
Agricultural Meteorology Division, Climate and Water Department
World Meteorological Organization
7bis Avenue de la Paix, Case postale 2300
CH-1211 GENEVA 2
Switzerland
Tel: +4122 7308380
Fax: +4122 7308042
Email: msivakumar<at>wmo.int

Mr R. STEFANSKI
Agricultural Meteorology Division, Climate and Water Department
World Meteorological Organization
7bis Avenue de la Paix, Case postale 2300
CH-1211 GENEVA 2
Switzerland
Tel: +4122 7308305
Fax: +4122 7308042
Email: rstefanski<at>wmo.int

Mr Kep COUGHLAN
Tel: 61 7495 84775
Fax: 61 418 225894
Email: colinmwnrm<at>bigpond.com

Mr Col CREIGHTON
Program Leader
Managing Climate Variability Program
Australia
Email: colin.creighton<at>lwa.gov.au

Mr Jim DAVIDSON
Regional Director (Queensland)
Bureau of Meteorlogy
GPO Box 413
Brisbane Qld 4001

Australia
Tel: 07 32398739
Email: j.davidson<at>bom.gov.au

Mr Peter DEUTER
Senior Principal Horticulturist
Horticulture and Forestry Science
Queensland Primary Industries and Fisheries
Department of Employment, Economic Development and Innovation
Gatton Research Station
Locked Bag 7, M/S 437
Gatton 4343
Australia
Tel: 07 54 662222
Fax: 07 54 623 223
Email: peter.deuter<at>dpi.qld.gov.au

Ms Yvette EVERINGHAM
James Cook University
Email: yvette.everingham<at>jcu.edu.au

Mr Dan GALLIGAN
CEO / Queensland Farmers Federation
PO Box 12009
George Street
Brisbane Qld 4003
Australia
Tel: 07 3837 4747
Email: qfarmers<at>qff.org.au or dan<at>qff.org.au

Mr Jai GAWANDER
Chief Executive Officer
Sugar Research Institute of Fiji
Tel: 679 666 1839
Fax: 679 666 1082
Email: gawanderjai<at>hotmail.com & jai<at>smit.org.fj

Dr John GRAY
Senior Scientist
Climate Impact Sciences
Bureau of Rural Sciences
Department of Agriculture, Fisheries and Forestry
GPO Box 858
Canberra
Tel: + 612 627 25381
Fax: + 612 627 25992
Email: john.gray<at>brs.gov.au

Mr David MCRAE
Queensland Climate Change Centre for Excellence
Tor Street
Toowoomba Qld 4350
Email: David.Mcrae<at>climatechange.qld.gov.au

Mr Peter PERKINS
Policy Officer
Queensland Farmers Federation
PO Box 1200
Brisbane QLD 4003
Australia
Email: qfarmers<at>qff.org.au

Mr Sid PLANT
'Samarai'
Oakey-Cooyar Road
Oakey
Queensland 4401
Tel: +61 7 46 928205
Email: samarai1<at>bigpond.com

Dr Daniel RODRIGUEZ
Principal Scientist, Focus Team Leader
Agricultural Systems Modelling
Agricultural Productions Systems Research Unit
203 Tor Street
Toowoomba 4350
Tel: 07 4688 1437
Fax: 07 4688 1193
Email: Daniel.Rodriguez<at>dpi.qld.gov.au

Mr Gary SANSOM
President
Queensland Farmers Federation
PO Box 12009
Brisbane Qld 4003
Australia
Email: gary<at>qff.org.au

Dr George SMITH
Director
Condamine Alliance
3 Clifford Street
Toowoomba Qld 4350
Australia
Email: gdbasmith<at>gmail.com

Dr Andrew WATKINS
Bureau of Meteorology
Tel: 61 3 9669 4360
Fax: 61 3 9669 4678
Email: a.watkins<at>bom.gov.au

Assoc Prof Armando APAN
Program Leader, Spatial Analysis and Modelling
Australian Centre for Sustainable Catchments
University of Southern Queensland
Toowoomba Qld 4350
Tel: 61 7 4631 1386
Email: apana<at>usq.edu.au

Adjunct Professor Dr Peter BEST
Australian Centre for Sustainable Catchments
University of Southern Queensland
Toowoomba Qld 4350
Tel: +61 7 3844 1777
Email: cindualpk<at>bigpond.com

Dr Ian CRAIG
Lecturer/Researcher
Faculty of Engineering and Surveying (Foes)
University of Southern Queensland
Toowoomba Qld 4350
Tel: 0746 31 5395
Email: craigi<at>usq.edu.au

Dr Tek MARASENI
Research Fellow
Australian Centre for Sustainable Catchments
University of Southern Queensland
Toowoomba Qld 4350
Email: porter<at>usq.edu.au

Dr Shahbaz MUSHTAQ
Research Fellow
Australian Centre for Sustainable Catchments
University of Southern Queensland
Toowoomba Qld 4350
Tel: 07 9631 2019
Email: mushtaq<at>usq.edu.au

Assoc Prof Mark PORTER
Deputy Director (Research)
Australian Centre for Sustainable Catchments
University of Southern Queensland
Toowoomba Qld 4350
Tel: 617 4631 5560
Email: porter<at>usq.edu.au

Mr Andries POTGEITER
Agricultural Productions Systems Research Unit
203 Tor Street
Toowoomba 4350 Qld 4350
Tel: +61 746 881417
Email: andries.potgeiter<at>dpi.qld.gov.au

Prof Jim TAYLOR
University of Southern Queensland
Toowoomba Qld 4350
Tel: 07 4631 2880
Email: taylorj<at>usq.edu.au

Mr Bob Hansen
Managing Director
Peanut Coy of Australia
Tel: 61 741 626311
Mob: 61 419 643145
Email: bhansen<at>pca.com.au

Dr Jeff Sabburg
Regional Climate Services Manager
(Queensland)
Bureau of Meteorology
GPO Box 413
Brisbane Qld 4001
Tel: 07 3239 8660
Email: sabburg<at>bom.gov.au

WORKSHOP 11-13 JANUARY 2010: DEVELOPMENT OF INTERFACES TO IMPROVE COMMUNICATION OF CLIMATE INFORMATION TO FARMERS AND FARMING COMMUNITIES; COOK ISLANDS PILOT

Venue: Titikaveka Kent Hall, Rarotonga, Cook Islands

Workshop aims:

- To strengthen relationships between experts, media and users for future improvements in communication of expert climate information to users.
- To produce print stories and articles, radio stories and programmes, and short video products communicating specific information to farmer users.

Media products:

- Print: stories about the workshop's two information tasks
- Radio: stories/interviews about the two information tasks
- Video: brief clips, from 30 seconds to 3 minutes' duration, about the two information tasks.

Day One

Venue: Titikaveka Kent Hall

8.30 – 9.00
Prayer (Village pastor)
Welcome:
Cook Islands Met Office, Cook Islands Dept of Agriculture

9.00 – 10.00
Introduction:
Workshop aim of liaising with users to discover ways of best communicating expert information using local media. *Dr Jane Adams, Workshop Facilitator*

Workshop information communication tasks:
Cook Islands Met Office and Dept of Agriculture:
Summary of three-monthly climate outlooks and their potential assistance to users.

10.30 – 11.00:
What the media do
The media, their role in communicating expert information to users, basic techniques used. *Phoebe Fletcher, University of Auckland*

11.00 – 12.30:
Workshop task Small group work to discuss:
Communicating expert information about El Niño which could help farmers in specific agricultural planning and practices
Review of group outcomes.

1.00 – 2.00:
Using visual media to communicate expert information: uses of video and internet; skeleton storyboards and direction suggestions: *Phoebe Fletcher, University of Auckland*

1.30 – 3.00: Form small production teams to work on media products for communicating workshop information tasks: Print, radio, video. Teams discuss ideas for communicating workshop information tasks, plan preliminary questions, filming ideas.

3.00 – 5.00:
Introductions, explanations to village. (30 mins)
Production teams break out to discuss ideas, filming, radio recording. Teams visit plantations, discuss implications of expert information for farming planning, preliminary filming.

Day Two:

Venue: Titikaveka Kent Hall

8.30 – 9.30:
Group discussion
Expert understandings of information of use to village. Media ideas of how to approach communication of this information. User ideas of how information might (or might not) be used, and current understandings of expert information.

9.30 – 3.00
Production teams: draw up storyboards, discuss filming/editing approaches
Filming, interviews, preparation of media products.

3.30 – 4.30: Brief presentations from production teams of planned products, difficulties, suggestions. Discussion/feedback from experts/media/users.

4.30 – 5.30: Group work: production teams refine planning, editing ideas, arrange next day's schedule.

Day Three:

8.30 – 9.00: Travel to village and other sites for interviews.

9.00 – 3.30: Production teams prepare draft versions of media products which attempt to communicate workshop information tasks.

3.45 – 4.45: Presentations of work in progress.

4.45 – 5.45: Panel discussion: debrief, lessons learned, way forward.

Participants

Sonny Williams Secretary of Culture

William Wigmore Department of Agriculture, Director of Research

Patu Katu, Department of Agriculture, Researcher

Tavake Karika, Department of Agriculture, Researcher

Brian Tairea, Tereora College, Science and Agriculture Teacher

William Hosking, Titikaveka Growers Association (TGA)

Makiroa Suniamina (TGA)

Joseph Karika (TGA)

Nga Kino (TGA)

Poaru Lua (TGA)

Louis Caffery (TGA)

Tuakana Samuel (TGA)

Walter Marearai (TGA)

Teava Iro (TGA)

Robert Wigmore Deputy Prime Minister and Minister of Agriculture (TGA)

Funding sources outside the APN

Co-Funding	(US $)
Bureau of Meteorology (Australia)	10,000
World Meteorological Organization (WMO)	40,000
Land and Water Australia, Managing Climate Variability Program	10,000
Peanut Company of Australia	5,000
NOAA GCOS Program	12,000

In-kind Support

Host Country Australia

University of Southern Queensland, Australian Centre for Sustainable Catchments

(i) Provision of conference facilities including a large hall for the opening Session ;
(ii) Provision of transport facility between the hotels to workshop venue;
(iii) Workshop dinner .

New Zealand, National Institute of Water and Atmospheric Research (NIWA)

(i) Provision of scientists time and expertise in preparation of workshop programme, abstracts and arrangement of sessions in collaboration with WMO;
(ii) Assistance with arrangements to bring participants from countries to the workshop from the Asia-Pacific region.

University of Auckland, School of Environment

(i) Provision of research fellows time and expertise in preparation of workshop reports in collaboration with WMO;
(ii) Arrangement of Cook Islands pilot workshop for the development of end user interfaces.

List of Young Scientists

The funds were used to support 5 participants from developing countries. The funds were largely used to support their air-fares, accommodation and per diem costs to travel to Toowomba, Queensland to attend the 3-day international workshop. Feedback from the participants outlining their fields of interest and how the conference was valuable for their career agendas, especially for networking and capacity building is summarised below.

Mr Robert HAMILTON
MetService New Zealand
30 Salamanca Road
Kelburn
WELLINGTON
New Zealand
Tel: 04 4700700
Email: Robert.hamilton@metservice.com
No report

Mr Azhar Bin ISHAK
Malaysian Meteorological Department
Jalan Sultan
46667 Petaling Jaya
SELANGOR DE
Malaysia
Tel: +603 79678221
Email: azhar@met.gov.my
The international workshop has met the overall objectives especially the recommendation for enhancing more effective transfer and dissemination of agrometeorological information, services and products to farmers at the local level through identification a focal point by farmer associations and industry organizations. Close contact to farmer focal point with current systems of communication could make the delivering of products more quicker and direct to the grass root - the farmer. The recommendations for improvements in advisories and forecasts for long-term strategic planning at the farm level is very important. As for Malaysia, we have not yet produced the seasonal climate forecasts. The World Climate Conference-3, which is being held from 31 August to 4 September 2009 in Geneva, Switzerland, that will address the needs related to the connections between climate variability, climate change and agriculture and the tools that have been developed by WMO and its members to help farmers make better decisions by using seasonal climate forecasts is really good news for developing countries such as Malaysia. We are looking forward to the tools that are going to be available soon for implementation. To enhance knowledge sharing between countries of WMO especially the developed countries, Malaysia needs experts and technical support in the advances of seasonal climate forecasts of the country as a new section will be formed in Malaysian Meteorological Department with regards to this Seasonal Climate Forecast. Finally, I would like to thank you the President, Commission for Agricultural Meteorology of WMO, University of Southern Queensland, Australia, and APN for the financial support of my attendance to this international workshop.

Prof Alexander KLESHCHENKO
Institute of Agricultural Meteorology of ROSGIDROMET
Lenina Str 82
Kaluga Region
OBNINSK
RUSSIA

Email: cxm-diz@obninsk.org
Russia has a huge area of agricultural land. Russia's main agricultural region extends from the Central district in European Russia, bordering Ukraine and Belarus, to western Siberia 3,000 miles to the east. Of the country's nearly 200 million hectares of agricultural land, roughly 120 million is planted to row crops (chiefly grains, annual or perennial forages, sunflowers, potatoes, and vegetables) or temporarily fallow. The remainder is devoted to permanent meadow or pasture. As a result Russian agriculture covers all kinds of continental climate zones from the Arctic, to the dry deserts of the south. Many of the largest risks and uncertainties to Russian agriculture arise from climate change and variability, and climate extremes such as heatwaves, winterkill from severe frosts and snow, floods, and large areas of severe drought, cyclonic systems, heat waves and dust/thunderstorms, frosts. Coping with the range of climate variability and extremes is very important for crop and livestock production and yields. This will also affect coping strategies with climate warming which is likely to produce mixed effects – with more wild fires, droughts and floods as permafrost areas melt. The three day workshop, it very interesting and I do not regret that I have participated that workshop. There is a special system for agricultural users and farmers in Russia and the workshop results would be included in that system. The improved system would be used by the increasing number of farmers. The round table within the workshop with the inviting of people who had the different knowledge and belong to different strata was very useful and the participants received a lot of information. That experience would be repeated in Russia at the activity of our institute.

Prof. Jean PALUTIKOF
NCCARF
Room 2.07
G34 Chancellery Building
Griffith University
Nathan, QLD
Australia
Tel: +617 55527734
Email: j.palutikof@griffith.edu.au
No report

Dr L.S. RATHORE
India Meteorological Department
603, Mausam Bhavan, Lodi Road
NEW DELHI 110 003
India
Tel: +9111 24619844
Fax: +9111 24629766
Email: lsrathore@ncmrwf.gov.in / lrathore@gmail.com
The workshop helped me on following aspects;
1. To build capacity to better understand and use AgroMet products.
2. To interact with participants from various Institutions with a high level of capacity and skill in forecasting to share their knowledge and deliver better meteorological forecasts.

On my presentation of paper entitled 'Indian Experience on District Level Agromet Services' in the session 3 of the workshop, very useful comments were received regarding improving the integrated agromet advisory services being organized and operated in India. Various components of agromet services, its dissemination system and economic benefits were shared.

Lloyd TAHANI
Principal Meteorological Officer (Climatology)
Solomon Islands Meteorological Service
PO Box 21
HONIARA
Solomon Islands
Tel: 00677 24218
Fax: 00677 23029
Email: l.tahani@met.gov.sb
The workshop provided me with more Seasonal Climate information that is useful to the farmers and other stakeholders which, can be applied in my country Solomon Islands. Knowledge and skills were gained on the Seasonal Climate forecasting and Climate information that is essential for farmers and other stakeholders. And also, how to strengthen relationship and strong bond with farmers and other stakeholder especially, on their specific climate information needs.
.

REPORT ON WORKSHOP HELD JANUARY 2010: DEVELOPMENT OF INTERFACES TO IMPROVE COMMUNICATION OF CLIMATE INFORMATION TO FARMERS AND FARMING COMMUNITIES; COOK ISLANDS PILOT

Background

In May 2009 the World Meteorological Organisation sponsored a workshop in Toowoomba, Queensland to enable experts to discuss the content, communication and use of weather and climate products and services for sustainable agriculture. The workshop concluded that to have more effective communication of climate information to farmers required that they be more involved in discussions of their needs and concerns, and that the media could be more productively used to communicate expert information to farmers and communities. Funds were available from the APN and NOAA grants to explore the development of more effective user interfaces for climate information.

It was decided to hold a pilot workshop in the Rarotonga, Cook Islands with local farmers and climate experts, facilitated by media and technology transfer specialists, to identify effective means of communication of the implications to farming of climate variations, especially those associated with El Nino events. The goals, programme and objectives for the pilot workshop were designed by Jan Sinclair, at the Department of Film, Television and Media Studies, University of Auckland at the University of Auckland. In December Dr Salinger visited Rarotonga to organize the January event workshop with Arona Ngari, Cook Islands Meterological Service and William Wigmore, Ministry of Agriculture. The preliminary visit also included a visit and briefing of local media and the Titikaveka village, both to encourage participation, and to inform participants of involvement and benefits.

The workshop was hosted by Arona Ngari, Director, Cook Islands Meteorological Service. The target audience for the workshop was local technical and scientific staff and local village farmer's skills.

Workshop Objective

To bring together experts, media and farmer users and their communities to improve communication of important climate information to end users and develop ways of interfacing these climate tools via various media communication technologies.

Date and Venue

The workshop was held Monday 11th January to Wednesday 13th January, 2010 at Kent Hall, Titikaveka, Rarotonga, Cook Islands, with field work in the surrounding farming communities and Government offices.

Topics

Over the course of the workshop, two experts/trainers led experts and users in creating media products (video/radio/print) which attempted to communicate issues of importance to local farmers about preparing for climate variations (especially El Nino events) that impact crop production.
The three day programme is appended (Appendix 1).

Attendees

Sonny Williams Secretary of Culture
William Wigmore Department of Agriculture, Director of Research
Patu Katu, Department of Agriculture, Researcher
Tavake Karika, Department of Agriculture, Researcher
Brian Tairea, Tereora College, Science and Agriculture Teacher
William Hosking, Titikaveka Growers Association (TGA)
Makiroa Suniamina (TGA)
Joseph Karika (TGA)
Nga Kino (TGA)
Poaru Lua (TGA)
Louis Caffery (TGA)
Tuakana Samuel (TGA)
Walter Marearai (TGA)
Teava Iro (TGA)
Robert Wigmore Deputy Prime Minister and Minister of Agriculture (TGA)

Report of workshop activities.

Director of the Cook Island Meteorological Office Arona Ngari welcomed participants to the workshop. Jane Adams, adult education facilitator and horticultural consultant, introduced the aims of the workshop and highlighted the need for weather and climate experts to find more effective ways of communicating to farmers and local communities climate variability and its implications for crop production and agriculture.

Ngari explained the expected impacts of El Nino and La Nina events on the weather in the Northern and Southern Cook Islands. He explained that El Nino events brought drier weather during November to March in the Southern Cook Islands and a greater risk of cyclones while in Northern Cook Islands, El Nino events were associated with increased rainfall during the 'wet' season of November to March. With global climate change it is expected that El Nino and La Nina events may occur more frequently, and that cyclones may become more intense.

The presentation from the Met Service was followed by one from Phoebe Fletcher, Department of Film, Television and Media Studies, University of Auckland and Journal Coordinator of *AlterNative: An International Journal of Indigenous Peoples,* who introduced participants to media products and explained how they are used around the world to communicate ideas and information. There was a short discussion on the use of media and the concept of 'citizen journalism' now made possible by the Internet. She explained that on completion of the project, the finished media products would be uploaded online to a blog (web log) which the farmers would be able to access and use. The skills required for continued access would be little more than required for Microsoft Word. As 42% of the Cook Island population has internet penetration, social networking will be a growing area of information exchange for weather information.[1] Computer literacy is an area that the United Nations ICT Task Force has identified as a major issue inhibiting the economic growth of developing

[1] Internet World Statistics, http://www.internetworldstats.com/pacific.htm.

nations, and as such the workshop also provided the opportunity for capability building in this area. Using the internet to circulate this information would also provide a way of further connecting the Pacific Islands in locally based initiatives.

After these presentations participants formed small groups to discuss their past experiences of El Nino, the information they received from Met Office and Ministry of Agriculture to help them prepare for these events, and the type of information they would like to receive in the future. Key points raised were that farmers need climate predictions at least 8 months before planting to ensure they can plan effectively, especially for crops such as pawpaw. There is also a need to set up local climate stations, supported by local grower groups and perhaps schools, so that Met Office data can be interpreted for the local conditions which vary considerably around the island. It was felt that grower groups could play an important role in liaising with the Met Office and Ministry of Agriculture to create the media products to widely communicate weather and climate information and ways of managing crops to cope with drought.

After lunch on the first day Phoebe Fletcher gave a presentation on creating media products, highlighting the importance of keeping messages simple and considering the audience for the message. Late afternoon on the first day, the participants formed two groups to work on media products. One group had the aim to produce a short video story and the other group to produce radio interviews. Both groups also were to produce a print story. The topic both groups chose for their stories was a review of El Nino and its past impacts on farming, and advice on how farmers might prepare for these weather events.

The groups spent the following two days of the workshop preparing their storyboard, interviewing and recording their chosen interviewees and editing to produce either a short video or radio programme. During the third day of the workshop, whilst some the team members were editing, others in each team produced a short written article based on the information from their video or radio interviews for print or website. One of these articles was written in Cook Island Maori, reflecting the group's main target audience of local users.


Participants developing their storyboard on day 2.

Teams interviewed local farmers Tereapii Matapo and Teava Iro. Both spoke of their experience of managing crops and water resources during El Nino droughts. They also interviewed Mr Maara Vaiimene of the Cook Islands Meteorological Office to obtain more information about climate variability (especially El Nino and La Nina events), William Wigmore of the Department of Agriculture

and Deputy Prime Minister and Minister of Agriculture, Robert Wigmore. During the two days of production, the teams met with each other and the facilitators to review progress and comment on each team's products.

Radio team interviewing local farmer Tereapii Matapo on crop management during El Nino droughts.

Brainstorming production ideas

Interviewing Maara Vaiimene at the Meteorological Office


Participants filming mulching practices

During the workshop media from the *Cook Island News* and local TV station interviewed organisers and participants and reported. They were very receptive to receiving articles and reports from grower groups and Met Office in the future.

Summary of comments from participants after group discussions and development of media products.

- Participants appreciated the opportunity to interview Met Office and Department of Agriculture officials to learn more about climate variations and how to prepare for drought and extreme weather events.
- Local farmers felt the workshop empowered them to approach local media with stories and ideas to improve communication about climate and agriculture. Local media also expressed a willingness to be receptive to stories from Met office and growers.
- Farmers suggested that a weekly TV or radio weather forecast, with some climate updates every 2-3 months specifically aimed at farmers would be most helpful and a good way to communicate with all farmers.
- Farmers want to set up more grower groups to help all farmers take action to prepare for climate changes. They recognise that individual farmers often do not take action even if they know about an impending weather event. Grower groups provide the impetus, shared knowledge and resources to implement agricultural and water management practices to prepare for climate events such as El Nino. Setting up and resourcing grower groups was seen as something the Government could help with.
- There is a lot of local knowledge on how to manage crops for drought conditions, and some farmers have implemented good practices such as double-row planting, irrigation systems used at night and in response to plant needs; mulching and composting to improve soil water retention. However, there needs to be better ways of sharing such knowledge and this could be achieved through grower groups and their liaison with media and local schools.
- Most farmers see digging wells and bore holes as a solution to managing drought, but seek assistance from Government for such community developments. It was recognised that the small scale of many farms and high cost prohibited most users from implementing these initiatives individually. It will be important for Rarotonga to measure its fresh groundwater resources and understand the capacity for recharge to successfully utilise this precious resource.
- Farmers also seek new drought-resistant cultivars, which Ministry of Agriculture could assist in importing and developing for the Cook Islands,
- Farmers need long term climate predictions, updated every few months, so they can plan planting especially for crops such as pawpaw. Currently information on climate outlooks

from the Met Office does not seem to be reaching local farmers. Our participants did not seem to have any real problems with understanding 'probability' with respect to weather events, but only a few knew how to access Met Office climate information.

- Farmers wanted access to historic climate data; and also wanted to see more Met stations to record rainfall and temperatures around the island to compare with the Met Office data and allow adaptation of crop management for local conditions.
- It was suggested that local high schools could manage and monitor some weather stations as a tool to educate students on science, weather and agriculture and statistics; and possibly students in social studies classes could help prepare media stories on climate, weather and agriculture for local grower groups.

Conclusions and recommendations

The workshop successfully empowered local farmers and technical experts to understand and use media products to communicate messages from the Cook Islands Met office and Ministry of Agriculture on climate variability and impacts on agriculture. This initiative needs to be maintained and facilities made available for growers and technical experts to develop media stories.

Growers collectively had a lot of knowledge about weather, water and crop management, but suggested that grower groups be formed to facilitate widespread implementation of such knowledge. They felt that Government could assist in the development and resourcing of such groups.

Farmers also need improved communication about future weather and climate events. It was recommended that a weekly weather forecast and climate update be prepared for TV, radio or local newspaper. The media products will be posted online allowing users a further forum to circulate information and initiatives for climate preparedness.

It was also suggested that local schools could be involved in education on climate, and that met stations could be installed and monitored as part of a network of stations around the island. Students might also be encouraged to develop media products for local communities.

It was also recommended that Cook Island Government assist communities in the development of bores and wells to supply water in times of drought. However, it is important that this groundwater resource is monitored and managed carefully. Farmers will also need good education on efficient use of water to irrigate crops to prevent wastage.

Local media should be encouraged to seek stories on climate and agriculture from Government departments and local growers on a regular basis.

Appendix 1: Coverage of the workshop in the *Cook Island News,* 12 January 2010

TUESDAY, JANUARY 12, 2010 Cook Islands News 7

localNEWS nuti no roto i te IPUKAREA

Growers take on climate communications

IMPROVING communication on climate information to growers is one of the aims of a three-day workshop currently being held at the Kent Hall in Titikaveka.

Meteorological service director Arona Ngari says that getting climate data information to growers is important, especially as the country is in the middle of a weak El Nino phase.

The information, says Ngari, will hopefully help growers make decisions about improving or changing their crops during a period of less rainfall, and as to how to use water efficiently.

Ngari says the El Nino phase occurs about every five years, and this brings dry weather to the Southern Cooks, and increases the chances of cyclones in the lower group. The current El Nino is expected to last till about May this year.

The 1982-83 and 1997-98 El Nino phases brought drought-like conditions in the Southern group.

New Zealand-based horticultural scientist and consultant Jane Adams says at a climate variability meeting of policy makers and senior officials in Australia in 2008, it was found that information was not getting through to farmers.

"So this workshop is about improving the method of communication on climate variability to the user groups and ensuring that the message is getting through."

Assisting Adams at the workshop is Phoebe Fletcher who works in the media studies department at Auckland University. Fletcher will help participants to communicate expert information which could help farmers in their planning and practices.

By the end of the workshop tomorrow, participants would have prepared media products – print, radio and TV – which will be able to convey what they have learned at the workshop.

Those who are interested in attending the workshop can do so – sessions begin at 8.30am at the Kent Hall.

■ *Moana Moeka'a*

Jane Adams (standing, left) and Phoebe Fletcher, with a couple of participants, Tavake Manuel (seated left) and Brian Tairea, at yesterday's workshop at Kent Hall. The workshop concludes tomorrow, Wednesday.

Pineapple holiday

Former resident passes away

Appendix 2: Coverage of the workshop in the *Cook Island News,* 14 January 2010

Growers study climate communications

Thu 14 Jan

Making best use of the available climate data and communicating that information properly will go a long way in assisting growers in the country.

Jane Adams (seated right), Patu Katu and Nga Kino (standing at right) watch as Tavake Manuel edits material for a radio programme. 100113/20

A three-day workshop, aimed at improving the communication of climate information to growers during the current weak El Nino cycle, wrapped up at the Kent Hall yesterday.

Horticultural scientist Jane Adams said that there is a lot of data available but it is probably not packaged in a way that is appropriate for the growers.

"It's about empowering growers to take their own initiative.

"Communication is the way you can mobilise groups to take action – collectively you can share information so that everyone benefits," said Adams.

"We showed growers in part how they can use the media to educate other growers on how to manage their crops during the dry season – how they can liaise with the met service and use the information gained to plan appropriately."

Adams said growers came up with a number of ways to use media products to communicate climate data to other growers.

Reviving a weekly radio programme, having regular columns placed in the newspaper, and getting local media to be receptive to grower initiatives, were a few of the ideas brought up at the workshop.

The workshop, said Adams, also got participants thinking about the possibility of tapping into groundwater and devising irrigation schemes.

Auckland University media studies lecturer Phoebe Fletcher suggested posting articles on the internet which would put growers in touch with people who live overseas and share the same interests.

The articles, said Adams, could also help in terms of attracting sponsorship or assistance for local projects.

Nga Kino said that the workshop was good in terms of knowing that there is specific climate information available on the island for growers like him.

Grower Bill Hosking said that growers normally rely on the lunar calendar to predict rain but the monthly weather patterns sometimes do not occur during an El Nino.

Hosking said that he did not realise that the El Nino pattern can occur every two to five years, and he added that he would like to see a return to the weekly agriculture bulletins on national radio.

Kino said that he realised the importance of the media's role in getting information out to the community. He added that the media and growers should work together – especially in the field – to highlight what is going on in agriculture.

■ Moana Moeka'a