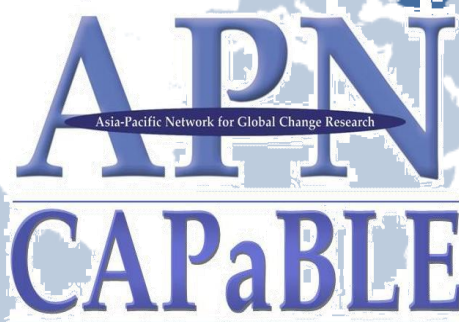


FINAL REPORT for APN PROJECT
Project Reference Number: CBA2010-08NSY-Salinger



- Making a Difference -

Scientific Capacity Building & Enhancement for Sustainable Development in Developing Countries

Project Title

Addressing the Livelihood Crisis for Farmers

The following collaborators worked on this project:

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

Professor Alexander Kleischenko, National Institute of Agricultural Meteorology, Russian Federation, cxm_diz@obninsk.org

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

Dr Christopher Bartlett, SPC-GTZ, Port Vila, Vanuatu, Christopher.bartlett@giz.de

Peter Napwatt, Vanuatu Agricultural College, Luganville, Vanuatu, nikamatu@gmail.com



Vanuatu Agriculture College
Self Reliance through Agri-Business

Project Title

Addressing the Livelihood Crisis for Farmers: Weather and Climate Services for Sustainable Agriculture – Development of Tools

**Project Reference Number: CBA2010-08NSY
Final Report submitted to APN**

PAGE LEFT INTENTIONALLY BLANK

OVERVIEW OF PROJECT WORK AND OUTCOMES

Non-technical summary

The workshop was developed to take stock of a number of important issues facing the agricultural communities around the world including rising populations with the consequent increase in demand for food; the pressures on the world's food producers due to climate variability and change, as well as socio-economic conditions; the need to use natural resources productively, but sustainably; and the need within the agriculture communities for increased knowledge and better tools for risk management and adaptation. The workshop was organized into seven technical sessions, and a set of key recommendations were developed and adopted at the fifteenth session of the Commission for Agricultural Meteorology, particularly while prioritizing the future work of the Commission for the upcoming 2011-2013 period. A follow on workshop was held in Luganville, Santo, Vanuatu from 11-13 December 2010 where farmers from each province of Vanuatu met with climate change scientists and agricultural advisers to devise strategies to help cope with climate variability and climate change.

Objectives

The present projects main objectives are:

1. To review weather and climate services for the farming community (e.g. climate forecasts for on-farm decisions, climate strategies to adapt to climate, crop/climate planning);
2. To identify current and new ways to implement and/or communicate with appropriate tools for climate products in developing countries and those vulnerable to climate extremes;
3. To evaluate climate change risk management tools for reducing vulnerability to climate;
4. To also develop and assess climate risk management tools in APN developing countries.

Amount received and number years supported

The Grant awarded to this project was:

US\$20,000 for Year 1:

Activity undertaken

1. Arrange for participation of those selected from APN developing countries.
2. Organisation of 26 papers on addressing the livelihood crisis for farmers, and distribution of these on a CD-RoM prior at the workshop.
3. International Workshop, 12-14 July 2010, Belo Horizonte, Brazil.
4. Follow-on workshop, 11-13 December 2010, Luganville, Santo, Vanuatu.

The format of the Belo Horizonte workshop was as follows:

1. Opening Session with keynote addresses.;
2. Seven technical sessions covering different objectives of the workshop. In each session there were presentations by invited speakers, each of which were followed by comments from discussants from developing countries;
3. A final session for discussion on the conclusions and recommendations of the workshop.

Keynote papers and sessions were on:

1. Livelihood crisis of farmers – regional perspectives, with particular reference to weather and climate risks and uncertainties;

2. Weather and climate services for the farming community;
3. Provision of weather and climate services to the farming community;
4. Change Adaptation – and a special symposium;
5. Risk management and weather risk insurance strategies and schemes;
6. A farmers' forum on improving weather and climate services for the farming community;
7. Enhancing Weather and Climate Services for farmers – Policy options.

The follow on workshop in Vanuatu December 2010 to brought together experts, media and farmer users to design strategies to assist agriculture cope with climate variability and change, and to interview Santo farmers on changes they have seen in agricultural production in the last ten years.

Results

There are 450 million smallholder farms in the world and several weather and climate issues in the recent years are threatening their very livelihoods. The frequency and intensity of natural disasters such as floods, droughts, tropical cyclones, wild fires and heatwaves have been rising in the recent years. Climate change is very likely contributing to increasingly frequent weather extremes and ensuing natural catastrophes. In order to address the livelihood crisis of farmers, there is an urgent need to increase productivity on their farms. 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. Various weather and climate services for the farming community, communication methods and ways to implement new tools for dissemination of the weather and climate products and services, especially in regions most vulnerable to weather and climate extremes were identified. This provided 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, and also assisted policy-makers and civil society in responding effectively to varying weather and climate conditions.

Relevance to the APN Goals and Science Agenda, Scientific Capacity Development and Sustainable Development

The provision of better weather and climate services to farmers can help them make better decisions by avoiding or reducing the impact of extreme climatic events on their agricultural production and therefore could lead to positive outcomes for their livelihoods. These services however, need to be properly communicated and disseminated and need the support of policy makers in every country.

The attention of the policy makers to the conclusions and recommendations of the workshop were drawn in the following way: through the Fifteenth Session of the Commission for Agricultural Meteorology of WMO which brought together participants from over 50 countries around the world and met immediately following the workshop. Participants from APN countries were encouraged to promote the linkages between science and policy discussed during the workshop. The workshop also promoted linkages between various national, regional and international institutions participating in the workshop and such linkages are crucial for improving weather and climate services.

Self evaluation

One hundred and thirty four participants from fifty-seven countries participated in the workshop. The workshop developed a set of recommendations to address the livelihood crisis for farmers for user training, liaison and communications; for NMHSs, extension services and partners; research, seasonal climate forecasting for farming communities, roving seminars and policy and cross cutting issues.

The principal recommendations include the following:

1. Develop and enhance two-way dialogue between providers of products and services and the farmers to ensure that user requirements are understood and met (e.g. via RCOFs); face-to-face interaction is critical;
2. Improve information delivery systems, especially for remote areas, through traditional systems (e.g. drums) as well as use of modern tools (e.g. SMS, Internet, e-boards);
3. Further develop the World Agrometeorological Information Service (WAMIS);
4. Establish and maintain an adequate density of high quality meteorological and agrometeorological observing stations, to provide the data necessary for services, products, forecasts, modeling, assessments, insurance, etc., especially in developing countries;
5. Collect/provide data from all relevant sources: e.g. meteorological, agrometeorological, soils, phenology, crop conditions, remote sensing, and agricultural statistics;
6. Strengthen the institutional and technical capacities of National Meteorological and Hydrological Services (NHMSs), agronomic and agrometeorological research institutions, agricultural extension services and community based organizations (CBOs);
7. Develop localized climate services, products, forecasts and assessments with high spatial and temporal resolution (e.g. mine the long-term records for historical risk/hazard trends and patterns; conduct analysis of meteorological, climatic and crop data; make assessments of the temporal and spatial dimensions of climate impacts; provide forecasts of crop yield, crop growing period, of plant diseases and insect/pests, etc.)
8. Improve the integration of climate, meteorology, and agroclimatology tools with livelihoods zone maps and baselines to improve information on vulnerability to weather and climate phenomena;
9. Study the sensitivity of farm incomes to climate variability and change and the accumulated effects on livelihoods of repeated climate-related impacts over time;
10. Include farmer livelihood assets in climate impacts assessments and in development of response strategies;
11. Mainstream climate information, including seasonal forecasting, into agricultural research and development strategy;
12. Develop the capacity to effectively use existing climate information and demand new information to meet emerging needs;
13. Ensure that farmers and the agricultural sector have ownership and an effective voice in the development of climate information products and services;
14. Ensure that climate services target and foster coordination among an expanded set of applications of seasonal forecast information, (e.g. coordinating input and credit supply, food crisis management, trade, and agricultural insurance).
15. Systematize the dialogue between the technical services and the rural community on weather and climate and their impacts on the rural activities;
16. Establish a more adapted methodology for the realization of these seminars in Regions where they have not yet been conducted;
17. Ensure the involvement of media/communications experts;

18. Develop the concept of weather and climate services as a public good, and ensure adequate funding and mandates to NMHSs to carry this out;
19. Ensure that national policy treats meteorological data as a free public good and a resource for sustainable development across sectors;
20. Foster a philosophy of protection of vulnerable and food-insecure people, the environment, land and water; reduced consumption of energy and natural resources; and development of people's resilience against climate hazards, to ensure sustainable development;
21. Develop the resolve, urgency and leadership to handle the world's increasing requirement for food, in a changing world.

Potential for further work

The attention of the policy makers to the conclusions and recommendations of the workshop were brought through a summary of the workshop to the Commission for Agricultural Meteorology, and discussions at the Fifteenth Session of the Commission for Agricultural Meteorology of WMO in Brazil, July 2010. A number of WMO projects were developed as a result which focus especially on disaster prevention and management. Specifically, two work programmes are focussing 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 (please write the complete citation)

http://www.wmo.int/pages/prog/wcp/agm/meetings/walcs10/walcs10_present.html

CD-ROMS, Presentations for the International Workshop were prepared and distributed at the end of the workshop.

References

- FAO (2009) Crop prospects and Food situation No. 3, July 2009.
- Sivakumar, M.V.K. and Mothas, R. P. (Eds.) (2007). Managing weather and climate risks in agriculture. Springer, 503 pp.
- Stone, R. C. And Meinke, H. (2006). Weather, climate and farmers: An overview: Commission for Agricultural Meteorology Special Report. World Meteorological Organization, Geneva CH 1211, Meteorological Applications 13, 1, 7-21.
- Wilhite, D. A., Sivakumar, M. V.K. and Wood, D.A. (2000). Early warning systems for drought preparedness and drought management. AGM-S, WMO/TD No. 1037, World Meteorological Organization, Geneva, Switzerland.

Acknowledgments

Other funding to support attendance at the workshop was provided by the United States Department of Agriculture (USDA), the Food and Agriculture Organization (FAO), Météo France, the National Centre for Agricultural Meteorology (NCAM) of Korea and the International Federation of Agricultural Producers (IFAP); and for the Vanuatu workshop from SPC-GTZ Vanuatu and the Vanuatu Agricultural College.

TECHNICAL REPORT

Minimum 15-20 pages (excluding appendix)

Preface

The workshop brought together leading experts in the field to prepare and present state-of-the-art discussion papers to address the objectives of the workshop. The programme of the meeting engaged all participants in discussions on topics of their interest to facilitate interactive dialogue and develop appropriate recommendations. The presentations took stock of a number of important issues facing the agricultural communities around the world. Key recommendations were developed and adopted at the fifteenth session of the Commission for Agricultural Meteorology. A follow on workshop was held in Luganville, Santo, Vanuatu from 11-13 December 2010 where farmers from each province of Vanuatu met with climate change scientists and agricultural advisers to devise strategies to help cope with climate variability and climate change.

Table of Contents

1.0 Introduction	7
2.0 Methodology	8
3.0 Results & Discussion	8
3.1 Belo Horizonte Workshop	8
3.2 Vanuatu Workshop	11
3.3 APN Participants Feedback	12
4.0 Conclusions	14
5.0 Future Directions	15
Appendix	
International Workshop on Addressing the Livelihood Crisis for farmers	16
Workshop on improvement of interfaces with Vanuatu farmers	46
Funding Sources Outside APN	49
List of Scientists Supported by APN	50
Glossary of Term	51
Report on Vanuatu Workshop	52

1.0 Introduction

The world population is projected to grow from 6.5 billion today to 8.3 billion in 2030 and nearly 9.2 billion in 2050. All of that growth will be concentrated in developing countries. Global food production will therefore need to increase by more than 50% by 2030, and nearly double by 2050. The latest figures from the Food and Agriculture Organization of the United Nations (FAO) indicate that the cereal stocks-to-utilization ratio in 2008, at 19.6 percent, is at its lowest level in 30 years. The developing countries only recorded an increase of 1.1 percent in cereal production in 2008. In fact, if China, India and Brazil are excluded from the group, production in the rest of the developing world actually fell by 0.8 percent. Agriculture's share of Official Development Assistance fell from 17% in 1980 to 3% in 2006. The international and regional financial institutions saw a drastic reduction in resources allocated to the activity that constitutes the principal livelihood of 70% of the world's poor.

There are 450 million smallholder farms in the world and several issues in the recent years are threatening their very livelihoods. The frequency and intensity of natural disasters including floods, droughts, tropical cyclones, heatwaves and wild fires have been rising in the recent years. In 2008, Cyclone Nargis and Typhoon Fengshen caused significant damage to lives and property and 2008 was the tenth warmest year since the beginning of routine temperature recording and the eighth warmest in the northern hemisphere. The number of tropical cyclones in the North Atlantic in 2008 was much higher than the long-term average, and in terms of both the total number of storms and the number of major hurricanes, 2008 was the fourth most severe hurricane season since reliable data have been available. Climate change is very probably contributing to increasingly frequent weather extremes and ensuing natural catastrophes.

Added to the impacts of increasing natural disasters on agriculture, prices for fertilizer, seeds and animal feed have risen by 98, 72 and 60 percent, respectively since 2006. On average, the FAO input price index doubled in the first four months of 2008, compared to the same period in 2007; US dollar prices of some fertilizers more than tripled. Small subsistence farmers in developing countries are always particularly hard-hit by soaring input prices: they had to pay a lot more for the seeds, fertilizer and diesel they need without being able to benefit from high output prices. After months of rising prices, governments in the developing countries had to draw on their budget reserves and households on their savings.

In order to address the livelihood crisis of farmers, there is an urgent need to increase productivity on their farms. This can only be accomplished through most efficient use of the three natural resources, soil, crop and climate, important for agricultural productivity. The agriculture and water resources sectors are probably the primary users of weather, climate and water information. In many countries, the National Meteorological and Hydrological Services (NMHSs), in partnership with academic and private sector service providers, provide a wide range of information and advisory services, including the following: historical climate data and products; current information (weather, climate, air quality, streamflow, etc.); weather, climate, air quality, and river forecasts; warning services (for all forms of meteorological, hydrological and oceanographic hazards); projections and scenarios of future human-induced climate change; and scientific advice and investigations. In order to meet the food, fodder, fibre and renewable agri-energy needs of rapidly growing populations, especially in developing countries, information generated by the NMHSs is a vital element for ensuring the sustainable use of natural resources.

But the challenge is that there is a lack of awareness in the farming community in developing countries, in particular the least developed countries, of the available and potential weather and climate services. In addition there is a lack of capacities and specialized competencies in NMHSs of developing countries to deliver timely and relevant services in order to better meet the needs of the

farming community. Projections of climate change and climate variability have generated a growing sense of urgency for continued but closer collaboration and engagement between the farming community and NMHSs in the development of products and services; improved communication and coordination in the development, use, assessment and improvement of these products; and the development of partnerships between climate and water scientists to improve water management and water use efficiency to manage events such as droughts and floods.

It is with this background that WMO, the Instituto Nacional de Meteorologia (INMET), Brazil, FAO, and the United States Department of Agriculture (USDA) organized, along with several other co-sponsors, an International Workshop on Addressing the Livelihood Crisis of Farmers: Weather and Climate Services. The workshop was held from 12 to 14 July 2010 in Belo Horizonte, Brazil, in conjunction with the 15th Session of the Commission for Agricultural Meteorology of WMO.

The main aims were:

1. To review weather and climate services for the farming community (e.g. climate forecasts for on-farm decisions, climate strategies to adapt to climate, crop/climate planning);
2. To identify current and new ways to implement and/or communicate with appropriate tools for climate products in developing countries and those vulnerable to climate extremes;
3. To evaluate climate change risk management tools for reducing vulnerability to climate. Weather and climate can be some of the biggest risk factors impacting on farming performance and management.

2.0 Methodology

Thirty three papers were presented. One hundred and thirty four participants from fifty-seven countries participated in the workshop (Appendix 4). The program of the workshop was covered in seven technical sessions with the following topics: Livelihood crisis of farmers – regional perspectives, with particular reference to weather and climate risks and uncertainties; weather and climate services for the farming community; provision of weather and climate services to the farming community; climate change adaptation – a special symposium; risk management and weather risk insurance strategies and schemes; farmers’ forum on improving weather and climate services for the farming community; and enhancing weather and climate services for farmers – policy options. From these sessions conclusions and recommendation were developed and presented in the final plenary session.

3.0 Results & Discussion

A number of useful recommendations were developed by the workshop address the livelihood crisis for farmers in six different areas.

3.1 Belo Horizonte Workshop

3.1.1 User liaison/training/communications:

1. Develop and enhance two-way dialogubetween providers of products and services and the farmers to ensure that user requirements are understood and met (e.g. via RCOFs); face-to-face interaction is critical;
2. Improve information delivery systems, especially for remote areas, through traditional systems (e.g. drums) as well as use of modern tools (e.g. SMS, Internet, e-boards);
3. Further develop the World Agrometeorological Information Service (WAMIS);
4. Improve capacity building, knowledge and awareness amongst agricultural communities;
5. Enhance outreach;
6. Promote networking between farmers and relevant user sectors (e.g., water resources);
7. Develop targeted capacity building initiatives as an essential component of the communication process;

8. Extend to other countries the success of Mali in increasing the budget and recognition for the NMHSs through improved relationship with and services to the agricultural communities;
9. Introduce appropriate agrometeorological concepts to primary and secondary schools for students' awareness and further dissemination;
10. Develop training modules for vocational agriculture training institutes and integrate them into farmer training programmes, for `Train-the-Trainer` accreditation.

3.1.2 NMHSs, Extension Services and Partners:

1. Establish and maintain an adequate density of high quality meteorological and agrometeorological observing stations, to provide the data necessary for services, products, forecasts, modeling, assessments, insurance, etc., especially in developing countries;
2. Collect/provide data from all relevant sources: e.g. meteorological, agrometeorological, soils, phenology, crop conditions, remote sensing, and agricultural statistics;
3. Strengthen the institutional and technical capacities of National Meteorological and Hydrological Services (NMHSs), agronomic and agrometeorological research institutions, agricultural extension services and community based organizations (CBOs);
4. Develop localized climate services, products, forecasts and assessments with high spatial and temporal resolution (e.g. mine the long-term records for historical risk/hazard trends and patterns; conduct analysis of meteorological, climatic and crop data; make assessments of the temporal and spatial dimensions of climate impacts; provide forecasts of crop yield, crop growing period, of plant diseases and insect/pests, etc.);
5. Improve weather and climate information and products (e.g. user-friendly formats, explanations of probabilistic outputs, more skilful and timely predictions) and their delivery mechanisms to suit the capacities of the broad range of farmers;
6. Conduct capacity building activities to develop a mechanism to integrate data from Automatic Weather Stations (AWS) with Geographical Information Systems (GIS);
7. Promote the use of weather index insurance; monitor and evaluate insurance products, and to continually improve these, to increasingly address the needs of the farmers;
8. Promote best practices in the use of climate information in agricultural decisions;
9. Strengthen agrometeorological extension services for increased interpretation of weather and climate information for agricultural users, adapted to local conditions and tailored to farmers' needs;
10. Increase collaboration between the agriculture, weather, climate and water resources communities;
11. Explore the use of agroclimatic zoning for use in crop insurance systems and in setting crop security policies;
12. Collect and disseminate examples of best practices in agrometeorological and agroclimatological services, to promote their implementation broadly, where applicable;
13. Encourage NMHSs to monitor and evaluate insurance products, and continually improve these, to address the needs of the farmers;
14. In addition to provision of raingauges to farmers, also provide thermometers for monitoring both rain and temperature, in support of better agricultural modelling and agroclimatic zoning exercises;
15. Explore the concept of National Climate Services, including all relevant partners, with a coordinated approach to user communities, and the policy changes that will foster this integrated approach;
16. Build strong relationships between service providers and researchers, so that achievements of research can be quickly applied, to benefit farmers and increase food production;
17. Develop an approach for provision of services to the agricultural community for special circumstances of recovery from crisis (e.g. war, major hazards, etc.).

3.1.3 Research:

1. Improve the integration of climate, meteorology, and agroclimatology tools with livelihoods zone maps and baselines to improve information on vulnerability to weather and climate phenomena;
2. Study the sensitivity of farm incomes to climate variability and change and the accumulated effects on livelihoods of repeated climate-related impacts over time;
3. Include farmer livelihood assets in climate impacts assessments and in development of response strategies;
4. Enhance agroclimatic characterization using GIS;
5. Transfer scientific advances into operational and practical applications;
6. Through interaction with humanitarian, Disaster Risk Reduction, development and other key stakeholders, develop and apply tools for practical applications of risk management strategies including disaster risk reduction and preparedness;
7. Improve the models, GCMs, and resultant forecasts.

3.1.4 Seasonal Forecasts for Farming Community:

1. Mainstream climate information, including seasonal forecasting, into agricultural research and development strategy;
2. Develop the capacity to effectively use existing climate information and demand new information to meet emerging needs;
3. Ensure that farmers and the agricultural sector have ownership and an effective voice in the development of climate information products and services;
4. Ensure that climate services target and foster coordination among an expanded set of applications of seasonal forecast information, (e.g. coordinating input and credit supply, food crisis management, trade, and agricultural insurance);
5. Realign National Meteorological Services, if necessary, and ensure they are resourced and trained to be providers of services for development and as participants in the development process;
6. Ensure that Regional Climate Outlook Forums (RCOFs) are more relevant to agricultural users by having users assist in the design of COF process, COF timing and products.

3.1.5 Roving Seminars:

1. Systematize the dialogue between the technical services and the rural community on weather and climate and their impacts on the rural activities;
2. Establish a more adapted methodology for the realization of these seminars in Regions where they have not yet been conducted;
3. Ensure the involvement of media/communications experts;
4. Expand the program (beyond the roving seminars) to include a systematic weather, climate and crop monitoring component in the vulnerable regions;
5. Carry out surveys on local traditional knowledge and how it can complement the information system.

3.1.6 Policy and cross-cutting issues:

1. Develop the concept of weather and climate services as a public good, and ensure adequate funding and mandates to NMHSs to carry this out;
2. Ensure that national policy treats meteorological data as a free public good and a resource for sustainable development across sectors;
3. Foster a philosophy of protection of vulnerable and food-insecure people, the environment, land and water; reduced consumption of energy and natural resources; and development of people's resilience against climate hazards, to ensure sustainable development;

4. Develop the resolve, urgency and leadership to handle the world's increasing requirement for food, in a changing world;
5. Encourage Governments to appropriately invest in the establishment and maintenance of high density networks of high quality meteorological stations;
6. Develop the required policy initiatives to foster the paradigm shift in agriculture from productivity to sustainability;
7. Foster new and innovative models of cooperation and partnerships among UN agencies, international, regional, and national institutions;
8. Develop improved adaptation strategies in a timely manner to ensure resilient agricultural systems;
9. Promote strategies for climate change mitigation for agricultural systems;
10. Place priority on mechanisms of compensation to small farmers for environmental services that they provide;
11. Promote the need for inclusion of both agriculture and agrometeorology curricula in all agricultural training institutes.

The workshop and the conference website with presentations are at:

http://www.wmo.int/pages/prog/wcp/agm/meetings/walcs10/walcs10_present.html

This website contains links to introductory note and the workshop brochure, lists the co-sponsors and has pdfs of the presentations.

CD-ROMS

Draft papers for the International Workshop were distributed after the workshop.

3.2 Vanuatu workshop

A follow up workshop was held from 11-13th December 2010 in Luganville, Santo in Vanuatu. This was to improve the interface between Vanuatu farmers, experts and climate change. The report of this workshop is in Appendix 5.

While climate change can have extreme consequences, the scientific evidence shows that there are actions that local communities and local farmers today can take to minimize impacts. This workshop focused on the positive actions that Vanuatu's agricultural community can implement to ensure the maintenance of livelihoods and food security. Vanuatu farmers from six provinces worked together with scientists to form climate change adaptation strategies to suit local conditions in their communities and islands. This unique local climate change adaptation knowledge was captured in radio, video and television segments that are being disseminated around the islands and the world for people to view.

The workshop brought together climate change, agricultural and media experts with the goal of empowering indigenous communities to develop their own creative solutions that acknowledge and treasure local traditions.

Objectives included:

1. To strengthen and institutionalize the relationships among climate change and agricultural experts, the media and farmers;
2. To improve communication and information dissemination about climate change and adaptation in agriculture;
3. To develop and formalize the systematic collection of data on and monitoring of climate impacts

- on and adaptive strategies for agriculture;
4. To produce a 10 minute radio segment targeted at users on El Niño/Southern Oscillation (ENSO) awareness and adaptation strategies;
 5. To produce a 3-4 minute video segment targeted at the international community for awareness on the issue of climate variability, change and adaptation in Vanuatu;
 6. To generate public and media interest and the dissemination of print articles on the event;
 7. To provide communities the understanding and ability to create their own multimedia stories.

3.3 APN Participants Feedback

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.

Dr Zhenlin CHEN

Sponsored by the APN, and as Director-General of the Department of Emergency response, Disaster Mitigation and Public Services, China Meteorological Administration (CMA) in I participated in the workshop. A presentation was made on public meteorological service delivery and disaster risk management for the farming community of China. The presentation was strongly echoed by participants. The financial support by APN was acknowledged and highly appreciated during the session.

Much was learned from the informative workshop. After attending the workshop, valuable experiences of other countries were gained for the meteorological and agricultural community in China. Another presentation was made on the outcomes of the workshop at a regular forum of CMA, and proposed a set of recommendations on how to enhance public services to farmers' community for the purpose of both improving income and reducing natural disaster risk. Discussions were also organized on integrating climate and weather services in CMA in order to better serve the agricultural production and climate change adaptation. More efforts will be made by CMA to implement the follow-up actions of the workshop.

Mr Azhar ISHAK

The workshop has achieved its objectives especially in knowing what is the farmers (farmers representation feedback from India and Australia) expectation on weather and climate risks and uncertainties at their farm level. They need timely information and accurate on weather and climate forecasts to facilitate on-farm operational decisions. Various weather and climate services such as agro-meteorological monitoring, agro-meteorological adaptation strategies to cope with climate change and agro-climatic zoning for crop planning that presented by the speakers during the workshop has given us in depth knowledge on how the services if necessary could be implemented to our farmers. The objective to review and summarize the current means of communication of various weather and climate services to the farming community was also been discussed and very good suggestions were given in terms of ways and means to implement tools for dissemination of the weather and climate products and services.

The workshop has enhanced my knowledge in knowing what actually the farmers expectation and what information should be given to them in order to enhance the productivity of crops on their farms. At this juncture, the example of products to farmers given by the developed countries during the workshop can be used to suit it with our farmers requirement but with some methodology adjustment.

The climate change risk management in adapting strategic plans to reduce the potential impacts of climate change for farmers has been deeply discussed. These strategies plans are being

implemented to some extent in our country. The use of weather risk insurance strategies and schemes to reduce the vulnerability of the farming communities to weather and climate risks is very new to Malaysia. Most of the time the government provides subsidies to farmers in the event of weather deterioration such as flood and drought.

Information and advisory services on agro-meteorological products to farmers need to be improved. Farmers need accurate, timely, reliable information / weather forecast which are easy to understand. Agro-climatic zoning for crop planning by farmers and stake holders is being updated in web based GIS approaches covering the whole country of Malaysia. It is expected to complete by early 2012. Closer collaboration between the farming community and NMHS for Malaysia need to be done to help them in term of providing various range of information and advisory services information. We realize that there is a communication gap between farmers at the grass root and the agro-meteorologist. Their comments and useful feedback of our products could help us to give better information.

The use of weather risk insurance strategies and schemes to reduce the vulnerability of the farming communities to weather and climate risks need to be highlighted in details. The participation of Malaysia under the APN funding has helped us in term of knowledge enhancement gained to improved our services to farmers on the likelihood crises of weather and climate.

Prof Alexander KLESHCHENKO

The content of the reports presented on the workshop and the speeches of the participants completely correspond to the objectives of the workshop. There are a lot of ideas and information which are of the great importance for me.

As I am the Director of the National Institute on Agricultural Meteorology the received information will be disseminated within the Russian Federal service of Hydrometeorology and Environment Monitoring as well as the agro-meteorologists of the country.

New indices concerning the agricultural insurance will be tested in our institute and in some insurance companies, and if the results are positive these will be included in the corresponding documents. The international workshop recommendations will be translated into Russian and these recommendations are to be sent to all regional bodies of the Russian Federal service of Hydrometeorology and Environment Monitoring. The main ideas of the international workshop about providing farmers and other agricultural workers with weather and climate information are to be presented at the regional workshops and meetings of farmers, agricultural producers and agro-meteorologists throughout the country as well as the corresponding the annual meetings held by our institute. Some changes resulting from the international workshop are to be made in the web-based agricultural and agro-meteorological system developed in our institute. The system provide farmers in some regions with relevant information.

Ms Nelly RIAMA

to identify and assess the weather and climate risks and uncertainties in different regions of the world which affect the livelihoods of farmers; review and summarize various weather and climate services for the farming community; review climate change risk management in adapting strategic plans to reduce the potential impacts of climate change for farmers; asses through appropriate case studies, the use of weather risk insurance strategies and schemes to reduce the vulnerability of the farming communities to weather and climate risks; obtain feedback from farmers from different regions of the world on the extent to which current weather and climate services assist them in coping with various weather and climate risks and enhance the productivity of crops on their farms;

and to discuss and recommend suitable policy options to enhance weather and climate services for the farming community in different parts of the world.

The workshop enhanced my knowledge on appropriate services and technologies for farming communities in adaptation of climate change and weather risk; obtain higher consideration on policy options to enhance weather and climate services for farming; extended of networking to the international community of people who deals with weather and climate related to agriculture sector; and now developed stronger community network.

Vulnerability and resilience vary widely around the world, so Indonesia must consider the appropriate policy and strategy to cope the situation to support the farmers ; use lessons learnt to enhance the dialogue between providers and users of climate-relevant information so the information can understand and reach the users in appropriate time; and consider early warnings and use agrometeorological services to play a key role in reducing disaster risks and improving the living standards. Communication to all stakeholders which deal with farming community at all levels (regional to international) will be activated; more involvement on studies or research of weather and climate services for farming related with adaptation and mitigation of climate change will occur; and facilitation of changing the system of information dissemination to fulfil the need of farmers who require accurate, understandable and easy to access site-specific information, delivered in a systematic and timely manner will be commenced.

More workshops or meeting to improve capacity building, knowledge and awareness amongst agricultural communities are required; and promotion of networking between farming communities including scientist, government official and other sector related like water sector. Increased synoptic and agrometeorological station densities, especially in developing countries are required, and the extension to other countries of the success of others in increasing the budget and recognition for the NMHSs through improved relationship with and services to the agricultural communities. There also needs to be further development of strategies for climate change mitigation for agricultural systems.

4.0 Conclusions

The main aims were:

1. To review weather and climate services for the farming community (e.g. climate forecasts for on-farm decisions, climate strategies to adapt to climate, crop/climate planning);
2. To identify current and new ways to implement and/or communicate with appropriate tools for climate products in developing countries and those vulnerable to climate extremes;
3. To evaluate climate change risk management tools for reducing vulnerability to climate. Weather and climate can be some of the biggest risk factors impacting on farming performance and management.

The Belo Horizonte 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 Vanuatu workshop successfully empowered local farmers and technical experts to understand and use video and radio broadcast products to communicate messages from the Vanuatu Meteorological Service and Ministry Agricultural and Rural Development on climate variability and

impacts on agriculture. This initiative needs to be maintained and facilities made available for growers and technical experts to develop further video clips and radio stories in Bislama that can be taken around the provinces.

Growers collectively had a lot of knowledge about climate, water and crop management, but that this information needs to be gleaned to facilitate widespread implementation of such knowledge. They felt that Government and overseas donors could assist in the development and resourcing of such groups.

Farmers also need improved communication about future climate events in non technical language. It was recommended that a monthly climate update be prepared for radio or local newspaper. This could also be disseminated as SMS text messages.

It was also suggested that local schools could be involved in education on climate, and that at least rain gauges could be installed and monitored as part of a network of stations around the islands. Students might also be encouraged to develop monitoring products for local communities.

Local media are should be encouraged to seek stories on climate and agriculture from Government departments and local growers on a regular basis, and run these in Bislama.

5.0 Future Directions

The attention of the policy makers to the conclusions and recommendations of the workshop were brought through a summary of the workshop to the Commission for Agricultural Meteorology, and discussions at the Fifteenth Session of the Commission for Agricultural Meteorology of WMO in Brazil, July 2010. A number of WMO projects will be developed as a result which focus especially on disaster prevention and management. Specifically, two work programmes focusing on:

1. Identification of critical areas where agricultural production is sensitive and vulnerable to climate change and variability in different regions, and suggest monitoring strategies for early detection, as well as summarize 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.

From the Vanuatu workshop the videos prepared will be taken around the provinces to farmers meetings so as to impart knowledge on strategies for agriculture to adapt to climate variability and change for more sustainable agriculture production.

References

FAO (2009) Crop prospects and Food situation No. 3, July 2009.

Sivakumar, M.V.K. and Mothas, R. P. (Eds.) (2007). Managing weather and climate risks in agriculture. Springer, 503 pp.

Stone, R. C. And Meinke, H. (2006). Weather, climate and farmers: An overview: Commission for Agricultural Meteorology Special Report. World Meteorological Organization, Geneva CH 1211, Meteorological Applications 13, 1, 7-21.

Wilhite, D. A., Sivakumar, M. V.K. and Wood, D.A. (2000). Early warning systems for drought preparedness and drought management. AGM-S, WMO/TD No. 1037, World Meteorological Organization, Geneva, Switzerland.

Appendix

Conferences/Symposia/Workshops

1. International Workshop on Addressing the Livelihood Crisis of Farmers: Weather and Climate Services Belo Horizonte, Brazil 12–14 July 2010

PROGRAMME

MONDAY, 12 JULY 2010

08:00 - 09:30 hrs Registration at Minascentro

09:30 hrs Welcome

Antonio Divino Moura

Permanent Representative of Brazil with WMO

09:35 hrs Address

Jim Salinger

President, Commission for Agricultural Meteorology (CAgM) of WMO

09:45 hrs Address

Mannava Sivakumar

Director, Climate Prediction and Adaptation Branch

World Meteorological Organization (WMO), Switzerland

09:55 hrs Address

Pedro Arraes

President, Brazilian Agricultural Research Corporation (EMBRAPA)

10:05 hrs Keynote Address

Ajay Vashee

President, International Federation of Agricultural Producers (IFAP)

10:20 hrs Workshop Opening Address

Gilman Viana Rodrigues

Secretary of Agriculture, Minas Gerais State

10:35 hrs Vote of Thanks

Luiz Claudio Costa

Rector, Federal University of Viçosa, Brazil

10:45 hrs Group Photograph and Tea/Coffee Break

11:15 hrs Livelihood Crisis of Farmers – Overview

Michele Bernardi

FAO

11:45 hrs Perspectives from Africa – Adaptation to Uncertainty due to Climate and Other Changes

Sue Walker

University of Free State, South Africa

12:15 hrs Perspectives from Asia – Public Meteorological Service Delivery and Disaster Risk Management for the farming Community of China

Zhenlin Chen

Chinese Meteorological Administration, China

12:45 hrs Lunch

14:00 hrs Perspectives from South America

Luiz Claudio Costa

Federal University of Viçosa, Brazil

14:30 hrs Perspectives from North America, Central America and the Caribbean

Harlan Shannon and Ray Motha

United States Department of Agriculture (USDA), USA

15:00 hrs Perspectives from Australia and the South-West Pacific

Roger Stone

University of Southern Queensland, Australia

15:30 hrs Tea/Coffee Break

16:00 hrs Perspectives from Europe

Federica Rossi

National Research Council (CNR), Italy

16:30 hrs Discussion

17:00 hrs Adjournment

18:00 hrs Workshop Reception

TUESDAY, 13 JULY 2010

08:30 hrs Short, Medium and Extended Range Weather Forecasts for the Farming Community

Biswajit Mukhopadhyay

India Meteorological Department, India

09:00 hrs Seasonal to Inter-Annual Climate Forecasts and their Applications in Agriculture

James Hansen

International Research Institute (IRI), USA

09:30 hrs Agrometeorological Monitoring and Forecasts for Pest and Disease Control

Simone Orlandini

University of Florence, Italy

10:00 hrs Agroclimatic Zoning for Crop Planning

Orivaldo Brunini

Agronomic Institute, Agrometeorology Information Center (CIAGRO), Brazil

10:30 hrs Tea/Coffee Break

11:00 hrs Climate Services for the Farming Sector

Mannava Sivakumar

World Meteorological Organization (WMO), Switzerland

11:30 hrs Discussion

12:00 hrs Lunch

13:30 hrs Meeting Farmers Needs for Agrometeorological Services – Overview and Case Studies

Kees Stigter

Agromet Vision, Netherlands

14:00 hrs Roving Seminars for Farmers on Weather, Climate and Agriculture in West Africa: Means for Adaptation to Climate Variability and Climate Change

Daouda Diarra

National Meteorological Service, Mali

14:30 hrs Roving Seminars for Farmers on Weather and Climate: India and Sri Lanka

Vasiraju Radhakrishna Murthy

Acharya N G Ranga Agricultural University (ANGRAU), India

15:00 hrs Training of Trainers on Weather and Climate Information and Products for Agricultural Extension Services in Ethiopia

Robert Stefanski

World Meteorological Organization (WMO), Switzerland

15:30 hrs Tea/Coffee Break

16:00 hrs New Tools for Disseminating Weather and Climate Products and Services

Byong Lee

Korea Meteorological Administration, Republic of Korea

16:30 hrs Discussion

17:00 hrs Adjournment

18:00 hrs Reducing Potential Impacts of Climate Change on Farmers

Jim Salinger and Zhai Panmao

University of Auckland, New Zealand and

China Meteorological Administration, China

18:30 hrs Water Management Strategies for Climate Change Adaptation

Helvecio M. Saturnino and Lineu Rodrigues

Brazilian National Committee for ICID

19:00 hrs Role of Extension Services in helping Farmers Cope with Climate Change

Alysson Paulinelli

Brazil

19:30 hrs Vulnerability, Disasters and Social Protection Aspects of Climate Change Adaptation

Carlo Scaramella

World Food Programme (WFP), Italy

20:00 hrs Discussion

20:30 hrs Adjournment

WEDNESDAY, 14 July 2010

08:30 hrs Weather Risk Insurance for Small Farmers in Malawi

Adams Chavula

Malawi Meteorological Service, Malawi

09:00 hrs Potential for Weather Index Insurance for Risk Management

Richard Choularton

World Food Programme (WFP), Italy

09:30 hrs Discussion

10:00 hrs Tea/Coffee Break

10:30 hrs Perspectives from Farmers around the World

12:00 hrs General Discussion

12:30 hrs Lunch

13:30 hrs Policy Options for coping with Agrometeorological Risks and Uncertainties

Paulo Afonso Romano

Government of the State of Minas Gerais, Brazil

14:00 hrs Ensuring Global Framework for Climate Services (GFCS) for Farming Communities around the World

R. S. Paroda

Asia Pacific Association of Agricultural Research Institutions (APAARI)

14:30 hrs Panel Discussion on GFCS

*Mr Michel Jarraud (WMO); A.D. Moura (Brazil);
R.S. Paroda (India); Mama Konate (Mali); Michele Bernardi (FAO);
Carlo Scaramella (WFP); Sid Plant (Farmers Representative South
West Pacific)*

16:00 hrs Tea/Coffee Break

**16:30 hrs Addressing the Livelihood Crisis of Farmers: Workshop Summary
and Recommendations**

*Mannava Sivakumar, Jim Salinger and Luis Claudio Costa
World Meteorological Organization, Switzerland; University of
Auckland, New Zealand and Federal University of Viçosa, Brazil*

17:00 hrs Discussion

17:20 hrs Vote of Thanks on behalf of Co-Convenors

*Mannava Sivakumar
World Meteorological Organization, Switzerland*

17:30 hrs Vote of Thanks from Host Country

*Luiz Claudio Costa
Federal University of Viçosa, Brazil*

17:40 hrs Workshop closure

*Gilman Viana Rodrigues
Secretary of Agriculture
Minas Gerais State*

Final list of participants

Algeria

Mr Negri Cherif

Institut National des Sols de l'Irrigation et du Drainage
Rue Pasteur BP 148
Oued Smar
Tel: 00213 21825457
Fax: 00213 21 825739
Email: negridz<at>yahoo.fr

Argentina

Mrs Liliana Nomei Nunez

National Meteorological Service
25 de mayo 658
Buenos Aires
Argentina
Tel: 005411 51 676767- 18270
Fax: 005411 51676711
Email: lnunez<at>smn.gov.ar or lilianann13<at>yahoo.com.ar

Mr Leonel Plugel

IPS NOTICIAS

Mr Roberto Angel Seiler

Universidad de Rio Cuzato
Rutznac 36, km 601
Rio Cuzato-CBZ

Argentina
Tel: 0054 358 4676191
Email: rseiler<at>ayv.umrc.edu.ar

Armenia

Mrs Valentina Grigoryan
Armstatehydromet
54 Leo Street
Yerevan
0002 Armenia
Tel. +37477017010
Fax: +37410 532952
Email: valent_g2000<at>yahoo.com/ armstate<at>meteo.am

Australia

Mr Perry Robert Wiles
Bureau of Meteorology, GPO Box 1289
(700 Collins St)
Melbourne VIC 3001
Tel: +61 3 96694664
Fax:+61 411 11 2950
Email:p.wiles<at>bom.gov.au

Mr Sid Plant
Samarai Farming Co.
Tel: +37259422286
Email:samarai1<at>bigpond.com

Mr Roger Stone
ACSC, University of Southern Queensland
West Street, Toowoomba
Australia, 4350
Tel: +61 746 312 736
Mobile: +680 437349168
Email: roger.stone<at>usq.edu.au

Mr Vernon Carr
Bureau of Meteorology, GPO Box 1289
(700 Collins St)
Melbourne VIC 3001
Tel: +61 3 96694546
Fax:+61 422 899223
Email:v.carr<at>bom.gov.au

Bahamas

Dr Kenneth Richardson
Ministry of Agriculture and Marine Resources
Dept of Agriculture

PO Box N3028
Nassau
Bahamas
Tel: +242 361 4370
Mobile:+242 424 9166
Fax:+242 341 0271
Email: kvarichardson<at>hotmail.com

Bhutan

Mr Tashi Samdup

Council for RNR Research of Bhutan
P.O Box 119
CORRB
Ministry of Agriculture and Forests
Thimphu
Bhutan
Tel: +975 325 801
Mobile: +975 17114221
Fax. +975-2- 322504
Email: tashi_samdup2001<at> yahoo.com/ t_samdup<at>moa.gov.bt

Bolivia

Mr Edgar Imana

Servicio Nacional de Meterorologia e Hydrologia
San Isidro bajo calle 4 No. 398
Oficina Calle Buene 585
La Paz
Bolivia
Tel: 00591 2 2200433
Mobile: +591 606 56144
Fax: +591 2 2392413
Email: edgaimana<at>hotmail.com/agromet<at>entelnet.bo

Brazil

Mr Marco Tulio Silva Araujo

INMET
Tel: 31 3291 1502
Mobile: 31 9725 1307
Email: marco.silva<at>inmet.gov.br

Mrs Ana Claudia Albanez

EMATER MG
Belo Horizonte MG
Email: aclaudia<at>emater-mg.gov.br

Mr Amarildo Kalil

Secretaria de Estado de Agricultura, Irrigacao e Abastecimento
Adress : Rua Claudio Manoel, 1205. Funcionarios

Belo Horizonte MG
Tel: 31 3215 6580
Mobile: 31 9737 8324

Mrs Miriam Pederneiras

ONG Corpo Cidadao

Mrs Magda Luzimar de Abreu

Universidade Federal de Minas Gerais (UFMG)
Departamento de Geografia
Av. Antonio Carlos, 6627, Campus Pampulha
Belo Horizonte - MG
Tel: 31 34096233
Mobile:+3198145008
Email: magda<at>csr.ufmg.br

Mr Alysson Paolinelli

Brazil

Mrs Sandra Caires Saboia

Grupo Pão de Açúcar
E-mail : sandra.caires<at>grupopaodeacucar.com.br

Mr Almir José Rebho Oliveira

Clube Amigos da Terra do Plantio Direto
Tupanciretá - RS
Tel:
Mobile:
E-mail: almirjro<at>brturbo.com.br

Mr Frederico Franz Lopes Bastos

CIB Conselho de Informações sobre Biotecnologia
Tel: +11 8011 61 16
Mobile: +11 5504 8236
E-mail: frederico.franz<at>cib.org.br

Mr Fernando Lemos

Adress: Rodovia LMG KM 18 – UFV
Campus Universitário Florestal
Viçosa - MG
Tel.: +31 9317 1769
Mobile: +31 3536 3396
E-mail: cflemos<at>hotmail.com

Mrs Cintia Melo Primo

Ecologist Journalist
Tel.: +31 3481 7755
Mobile: +31 9163 6522
E-mail: cintiaibeco<at>terra.com.br

Mrs Silvana Louback

Instituto Nacional de Meteorologia
E-mail: silvana.louback<at>inmet.gov.br

Mr Milton Nogueira

Adress: Rua Tomé de Souza, nº 300.
Belo Horizonte - MG
Mobile: +31 8828 3225
E-mail: nogueiramilton<at>yahoo.com.br

Mrs Vívian Nunes

Universidade Federal de Viçosa (UFV)
Av. PHRofls, s/ n
Campus Universitário. Ed. Artur Bernardes
Viçosa - MG
Tel: +31 3899 2142
Mobile: +31 8791 9922
E-mail:vivian.nunes<at>ufv.br

Mr Francisco E. Sobreiro

UFV
Rua Leopoldina, nº 187, apto 201.
E-mail: sobreiro<at>ufv.br

Mrs Natalia Renato

Departamento de Engenharia Agrícola da
UFV. Av. PHRofls, s/ n, Centro Universitário.
Viçosa-MG
Mobile : +31 8707 2713
E-mail : natalia.renato<at>ufv.br

Mr Graziela Sant'Ana Reis

Journalist
Address: Av. Getúlio Vargas, 291. Funcionários
Belo Horizonte - MG
Tel : +31 3263 5138
E-mail : graziela.reis<at>gmail.com

Mrs Rômula Fernandes da Silva

Mobile: +31 9318 7276
E-mail: rosfero<at>yahoo.com.br

Mr Helvecio Mattana Saturnino

Presidente da ABID (National C. OFICID)
r. Sergipe 1313 Apt. No. 504
30130-171 Belo Horizonte, MG
Mobile:+31 99 76 7890
Email:helecio<at>gcsnet.com.br

Mr Paulo H. Lopes Gonçalves

Estudante de Doutorado da UFV
Mobile: +31 9252 3387

E-mail: paulo.lopes<at>ufv.br

Mrs Luciana Cristina de Sousa Vieira

Estudante de Mestrado da UFV

Mobile: +31 9417 3750

E-mail: anjof15<at>yahoo.com.br

Mr Antônio Divino Moura

INMET – Eixo Monumental Via 51

CEP: 70680-900

Brasília - DF

Tel: +61 3344 3333

E-mail: diretor.inmet<at>inmet.gov.br

Mr Maurício Petenusso

Engenheiro da Itambé

Mobile: +31 9301 1181

E-mail: mauricio.petenusso<at>itambe.com.br

Mr Evandro Chaves de Oliveira

UFV

Departamento de Engenharia Agrícola - UFV

Viçosa-MG

Mobile: +31 9353 8068

E-mail: evandro.chaves<at>ufv.br

Mr Marcelo Franco

Secretaria d'Estado de Ciência e Tecnologia

Belo Horizonte - MG

Tel: +31 3247 2028

E-mail: marcelo.franco<at>tecnologia.mg.gov.br

Mr Crispim Moreira

Convidado

Mobile: +61 9321 0043

E-mail: crispim.moreira<at>mds.gov.br

Mr Vinícius Brandão Gois

ABID/Item Magazine

Rua São Gonçalo, 857. Bairro Nova Floresta

Belo Horizonte - MG

Mobile: +31 8422 7419

E-mail: viniciusbrangoh<at>gmail.com

Mr Walter Batista Junior

UFV

Departamento de Engenharia Agrícola da

UFV. Campus Universitário da UFV. CEP : 36570-000

Viçosa - MG

Tel: +31 3899 1901

Mobile: +31 8565 3141

E-mail: walter.jr<at>ufv.br

Mr Reinaldo Lúcio Gomide

Presidente da SBA-EMBRAPA

Tel: +31 3027 1328

Mobile: +31 9776 1228

E-mail: gomide<at>sbagro.org.br / gomide<at>cnpms.embrapa.br

Mr Gustavo Mozzer

Convidado

Brasília - DF

Tel: +61 3448 4452

Mobile: +61 8154 1118

E-mail: gustavo.mozzer<at>embrapa.br

Mr José Maria Nogueira da Costa

UFV

Departamento de Engenharia Agrícola da UFV.

Campus Universitário da UFV. CEP : 36570-000

Viçosa - MG

Mobile: +31 8887 7102

E-mail: jmnccosta<at>ufv.br

Mr Guilherme Ferreira

Sectes

Rua São Gotardo, 166. Bairro Santa Tereza

Belo Horizonte - MG

Tel: +31 3247 2209

Mobile: +31 8864 6372

E-mail: guidorai<at>yahoo.com.br

Ms Amanda Santana Toledo

UFV

Condomínio Acamari, 44.

Viçosa - MG

Tel: +31 3899 1890

Mobile: +31 8419 9388

E-mail: asantanatoledo<at>yahoo.com.br

Mr Flávio Justino

UFV

Av. PHRolfs, s/ n°,

Campus Universitário. CEP : 36570 - 000

Viçosa - MG

Tel: +31 3899 1870

E-mail: fjustino<at>ufv.br

Mr Henrique Augusto Reis

SEAPA

Rua Silvio de Oliveira Martins,

n°20, apto 102. Bairro Buritis

Belo Horizonte - MG
Tel: +31 3047 6999
Mobile: +31 9847 8816
E-mail: henrique.reis<at>agricultura.mg.gov.br

Ms Genoveva Ruisdian

Journalist –ABID – Revista ITEM
Rua Turfa, 109 Bairro Prado
Belo Horizonte - MG
Tel: +31 3334 7293
Mobile: +31 9993 7293
E-mail: rvisdias<at>mkm.com.br

Mr Paulo Romano

Secretaria de Agricultura de Minas Gerais
Rua Claudio Manoel, 1205 8º
andar CEP : 30140 – 100
Belo Horizonte - MG
Tel: +31 3215 6511
Mobile: +31 9737 6324 / 8898 2373
E-mail: paulo.romano<at>agricultura.mg.gov.br

Mr Helvécio Magalhães Ribeiro

Observador
Adress: Praça Civica n
100 Bairro Centro CEP : 74003 - 010
City: Goiânia - GO
Tel: +62 3223 5230

Mr Paulo César Sentelhas

Observador
Av. Pádua Dias, 11 Bairro Agronomia CEP : 13418 - 900
Piracicaba - SP
Tel: +19 3429 4283
Mobile : +19 8112 2701
E-mail: pcsentel<at>esalq.usp.br

Mr Glauco de Souza Rolim

IAC
R. Comendador
Luiz José Pereira de Queiroz, 170 apto 63
Campinas - SP
Mobile: +19 8109 4331
E-mail: glaucorolim<at>gmail.com

Mr Orivaldo Brunini

Convidado / IAC
Av. Barão de Itapura,
1481 CEP : 13020 - 902
Campinas - SP
Tel: +19 3233 8035

Mobile : +19 9120 7137
E-mail: brunini<at>iac.sp.gov.br

Mr José Maria Brabo Alves

Fundação Cearense de Metrologia
E-mail: brabo<at>funceme.br

Mr Luiz André Santos

Instituto Nacional de Metrologia - INMET
Eixo Monumental, via 51, Sudoeste
Brasília - DF
Tel: +61 2102 4774
E-mail: luiz.santos<at>inmet.gov.br

Mr José Geraldo Ferreira da Silva

INCAPER
Av. Afonso Sarlo, 160 Bairro Bento Ferreira CEP 29052 - 010
Vitória - ES
Tel: +27 3137 9839
Mobile: +27 9860 0602
E-mail: jgeraldo<at>incaper.es.gov.br

Ms Léa Medeiros

Journalist
Mobile : +31 9795 0594
E-mail: medeiros<at>ufv.br

Mr Fabio Morais

Tel: +21 2262 1704
Mobile: +21 7874 7255
E-mail: fabioacm<at>gmail.com

Ms Maria Cristina Lourenço

Prefeitura de Belo Horizonte
Belo Horizonte
Mobile: +31 8888 3189
E-mail: cristina.lourenco<at>pbh.gov.br

Ms Marilene de Lima

EPAGRI
Tel: +48 3239 8066
Mobile: +48 9928 1120
E-mail: marilenel<at>epagri.sc.gov.br

Mr Gabriel Constantino Blain

IAC
R. Hilário Magro Junior
55 apto 93 CEP: 13026 - 123
Campinas - SP
Tel: +19 3305 6172
Mobile : +19 9354 8535

E-mail: gabriel<at>iac.sp.gov.br

Ms Maria Terezinha Galhardo de Castro

Journalist - INMET

Address: Eixo Monumental Via 51, Sudoeste

Brasília - DF

Tel: +61 2102 4609

E-mail: terezinha.castro<at>inmet.gov.br

Mr Fabio Cunha Conde

INMET

Eixo Monumental Via 51, Sudoeste

Brasília - DF

Tel: +61 2102 4775

E-mail: fabio.conde<at>inmet.gov.br

British Caribbean Territories

Mr Adrian Trotman

Caribbean Institute for Meteorology and Hydrology

PO Box 130, Bridgetown

Barbados

Tel: 246-230-7199

Fax: 246-424-4733

Email:atrotman<at>cimh.edu.bb

Burkina Faso

Ms Bienvenue Judith Sanfo

Direction de la Meteorologie

06 BP 10014

Ouagadougou 06

Burkina Faso

Tel: 00226 503 560 32/39

Mobile:+226 7845 2183

Fax: +226 50356039

Email: sanfo_b<at>yahoo.com

Canada

Mr Raymond Desjardins

960 Carling Ave

Ottawa KIAOC6

Canada

Mobile: +613 601 1610

Email: Desjardins<at>agr.gc.ca

Mr Allan Howard

408, 1800 Hamilton Street. Regina.

Saskatchewan, Canada. S4S 4L2.

Tel: 011 (306) 780 5499

Email: allan.howard<at>agr.qc.ca

Cape Verde

Mr Joao Moreno Spencer Semedo

Institut National de la Metereologie et Geophysique

B.P 467 Praia

République de Cap Vert

Tel: +238 2617891

Mobile: +238 995 1646

Fax: +238 2 617892

Email: jm_spencer<at>yahoo.fr

China

Mr Chen Zhenlin

Department of Emergency Response, Disaster Mitigation and Public Services

China Meteorological Administration

46 Zhongguancun Nandajie,

Beijing 100081

China

Tel: +86 10 68406531

Mobile: +86 13 911 097 662

Fax: +86 10 62174797

Email: cdccc<at>cma.gov.cn

Mr Liao Jun

Director for Public Services

Department of Emergency Response, Disaster Mitigation and Public Services

China Meteorological Administration

46, Zhongguancun Nandajie

Beijing 100081

China

Tel: +86 10 58994471

Mobile: +86 13 717917471

Fax: +86 10 62174797

E-mail: liaojun<at>cma.gov.cn

Cote d'Ivoire

Mr Koffi KOUASSI

Direction de la Météorologie Nationale

15 BP 990 Abidjan 15

Cote d'Ivoire

Tel. +225 07 838115

Fax: +225 21 277344

Email: kofantony<at>yahoo.fr

Croatia

Mrs Višnjica Vučetić

Meteorological and hydrological Service

Grič 3

10000 Zagreb
Croatia
Tel: +385.1.4565 686
Mobile:+385 91 4565 686
Fax: +385.91. 4565630
Email: vucetic<at>cirus.dhz.hr

Dominican Republic

Mrs Solangel Gonzalez
Oficina Nacional de Meteorologia (ONAMET)
Avenida Juan Moline 1
Santo Domingo Este
Tel: +809788 1122 / 238223236
Mobile: +809 663 3386
Fax: +8095979842
Email: solangel1530<at>yahoo.com

Ecuador

Mrs Gilma Carvajal Mera
Instituto Nacional de Meteorologia e Hidrologia
Inaquito N36-14y Corea
Quito
Ecuador
Tel: +593.2244407
Mobile: +835 99 680
Fax: +593 2241874
Email: gcarvajal<at>inamhi.gov.ec

Ethiopia

Mr Tesfaye Gissila Aboye
National Meteorological Agency
PO Box 1090
Addis Abeba
Ethiopia
Tel: +251. 11.6615791
Fax: +251.11.6625292
Email: nmsa<at>ethionet.et
tesfayegissila<at>yahoo.co.uk

Mr Tsegaye Ketema Haile
National Meteorological Agency
PO Box 1090
Addis Abeba
Ethiopia
Tel: +251.11.6615779
Fax: +251.11.6625292
Email: tsegaye2020<at>yahoo.com

France

Mr Emmanuel Cloppet

Meteo-France
42, Avenue Coriolis
31057 Toulouse
France
Tel.: +33 5 6107 8381
Mobile: +33 6 0754 5761
Email: emmanuel.cloppet<at>meteo.fr

Gambia

Mr Peter Gibba

Department of Water Resources
7 Marina Parade
Banjul
Gambia
Tel: +220 422 4122
Mobile: +220 992 3245 / 344 7571
Email: p_gibba<at>yahoo.com / dwr.mofwrnam<at>gov.gm

Georgia

Mr Ramaz Chitanava

PR of Georgia with WMO
Head of the NMHS of Georgia
150 David Agmashenebeli Ave
0112 Tbilisi
Georgia
Tel: +995 32 439550
Fax: +995 32 439 550/31
Email: ramazchitanava<at>gmail.com

Germany

Mr Ulrich Otte

Deutscher Wetterdienst
National Meteorological Service
Dept. of Agricultural Meteorology
Frankfurter Str. 135
D-63067 Offenbach / M
Germany
Tel: +49 698 06244 03
Mobile: +49 173 666 1334
Fax: +496980624482
Email: Ulrich.otte<at>dwd.de

Mrs Cathleen Fruehauf

Deutscher Wetterdienst
Zentrum für Agrometeorologische Forschung

Bundesallee 50
D-38116 Braunschweig
Germany
Tel: +49 531 25205 41
Email: Cathleen.fruehauf<at>dwd.de

Ghana

Mr Andrews Nkansah
Ghana Meteorological Agency
PO Box LG 87
Legon- Accra
Ghana
Tel: 00233 277410493
Fax: 00233 21 511981
Email: a.nkansah<at>meteo.gov.gh

Guinee

Mr Yaya Bangoura
Direction Nationale de la Météorologie
Face Jardin 2 Octobre
BP 566
Conakry
République de Guinée
Tel: +224 30477442
Mobile: +224 605 64191 / +224 6054 5488
Fax: +224 30413577
Email: alphayaya2009<at>yahoo.fr / bangoura.y<at>hotmail.com

Guinee Bissau

Mr Francisco Gomes
Direction Generale de la Météorologie Nationale
Avenue du Brésil
Case postale 75
1038 Cedex-Bissau
Guinea Bissau
Mobile: +245 633 9830
Email: frcogomes<at>gmail.com

Indonesia

Mrs Nelly Florida Riama
The Agency for Meteorology, Climatology and Geophysics of Indonesia
JL Angkasa I No 2, Kemayoran
Jakarta 10720
Indonesia
Tel: +62.21. 424 6321
Mobile:62811873247
Fax: +62 21 424 6703

Email: nelly<at>bmg.go.id

Italy

Mr Richard Choularton (WFP)

Via C.G. Viola 68/70

Rome, 00148

Italy

Mobile: +34 346 7600 703

Email: Richard.choularton<at>wfp.org

Mr Carlo Scaramella (WFP)

Via C.G. Viola 68/70

Rome, 00148

Italy

Mobile: +39 349 582 8596

Email: carlo.scaramella<at>wfp.org

Mr Michel Bernardi (FOA)

Viale Terme di Caracalla

00153 Rome

Italy

Tel: +39 06 57052442

Mobile: +39 331 86 7122

Email: michel.bernardi<at>fao.org

Ms Federica Rossi

Consiglio Nazionale delle Ricerche- Institute of Biometeorology - CNR IBIMET

Via Gobetti 101

40129 Bologna

Italy

Tel: +39 051 6399007

Mobile: +39 348 312 45 512

Email: f.rossi<at>ibimet.cnr.it

Simone Orlandini

Department of Plant, Soil and Environmental Sciences

University of Florence

P.le delle Cascine 18

50144 Firenze

Italy

Tel: +39 055 32 88257

Mobile: +39 339 66 83 557

Email: Simone.orlandini<at>unifi.it

India

Mr Bimal Bhattachary

Sci./Eng –SF CMK/AFELE/RESA

Space Applications Centre (ISRO)

Ahmadabad, Gujarat, 380015

India
Tel: +91 79 26914334/4377
Mobile:+ 942 752 1076
Email: bkhattachary<at>sac.isno.gov.int

Mr Rajendra Paroda
Chairman TAAS
Avenue 11 Pusa Campus
New Delhi-10012
India
Mobile: +91 980191486
Email:raj.paroda<at>yahoo.com

Mr Peddanna Pentyala
45 HIG, Huda Colony
Chandanagar, Hyderabad, 500050
India
Tel: +9140 230 35009
Mobile: +91 44 06 21594
Email:vijetaff<at>yahoo.com

Mr Bishwajit Mukhopadhyah
India Meteorological Dept
Lodi Road Mausam Bhavan
Delhi 110003
India
India
Mobile: +91 981 831 7044
Email:mukhoddg<at>gmail.com

Mr Radha Krishna Murthy Vasiraju
Professor (Academic), Angr Agricultural University
Hyderabad – A.P.
India 500030
Email:vrkmurthy11<at>hotmail.com

Mr Das Haripada
INSAM
A/40, Mont Vert 11
Pashan Sus Road
Pune-21
India

Libya

Mr Jamal Amar Eldu Dilhi
National Meteorological Centre
Eswani-El Krimia
17 kms, PO Box 5069
Tripoli
Libya

Tel: +218 215 623061-65
Mobile: +218 925 939 398
Fax: +218 215 621 772
Email:jamal_hm<at>yahoo.com

Malaysia

Mr Azhar Ishak

Malaysian Meteorological Dept.
Jalan Sultan,
46667 Petaling Jaya
Selnagor
Malaysia
Tel: +603 7967 8221
Mobile: +6013 310 4130
Fax: +603 7955 0964
Email: azhar<at>met.gov.my

Malawi

Mr Adams Chavula

Climate Change and Meteorological Services
P.O. Box 1808 Blantyre
Malawi
Tel: +2651824712
Mobile : 265 888877784
Fax:+2651822215
Email: customercare<at>metmalawi.com or adams.chavula<at>hotmail.com

Mali

Mr Mama Konate

Direction Nationale de la Meterologie
BP 237 Bamako
Mali
Tel: +223 20 20 5152
Mobile:+223 66 74 10 90
Fax: +223 20202110
Email: konatmama29<at>gmail.com

Maurtiania

Mr Hamidou Coulibaly

Office national de la Meteorologie de Mauritanie
BP 1330 Nouakchott
Mauritania
Tel: +222 524 3532
Mobile: +222 2098146
Fax: +222 524 3530
Email: coulibaly_hamidou<at>yahoo.fr

Mauritius

Mr Premchand Goolaup

Mauritius Meteorological Services

St Paul Road

Vacoas

Mauritius

Tel: +230 686 1031

Mobile: + 230 786 0838

Fax: +230 686 1033

Email: meteo<at>intnet.mu or Premgoolaup<at>intnet.mu

Moldova

Mrs Tatiana Mironova

State Hydrometeorological Service

2060 Tpaian 2/ I ap go

Chisinau

Republic of Moldova

Tel: +384010773647

Fax: 00373.22.773529/3636

Email: intern<at>meteo.md; agro<at>meteo.md

Mozambique

Mr Berino Francisco Silinto

National Institute of Meteorology

Rua de Mukumbura 164

PO Box 256

Maputo

Mozambique

Tel: +258 21491150

Mobile: +258 8422 63890

Fax: 0025821491150

Email: berino_s<at>inam.gov.mz

Namibia

Mr Emmanuel N. Z. Kambueza

PI Bag 13224 Windhoek

Namibia

Tel: +264 61 2877002

Mobile: +264 (0) 81268 9836

Fax: +264 61 2877009

Email: kambuezae<at>meteona.com

Netherlands

Prof Kees J. Stigter

Agromet Vision

Groenesstraat 13

5314 Aj Bruchen,
The Netherlands
Tel: +31 418642906
Email: cjstigter<at>usa.net

Dr Geert Sterk

University Utrecht
Department of Physical Geography
Heidelberglann 2
P.O. Box 80155
3508 TC Utrecht
Netherlands
Tel:+31302533051
Mobile: +31649328073
Email: g.sterk<at>geo.uu.nul

New Zealand

Dr Jim Salinger

Honorary Research Associate
School of Environment
University of Auckland
Private Bag 92019
Auckland
New Zealand
Tel: + 64 9 373 7599
Mobile: +64 27 521 9468
Fax: + 64 9 373 7434
Email: j.salinger<at>auckland.ac.nz

Peru

Mr Constantino Alarcon

National Meteorology and Hydrology Service
Jr Cahuide 785 Jesus Maria
Lima 11
Peru
Tel: +51 1614 1413
Fax: +51 1 471 7287
Email: calarcon<at>senamhi.gob.pe

Mr Ramiro Escobar Crue

La Republica Newspaper
Email:meditamundo<at>gmail.com

Philippines

Mrs Flaviana Hilario

Phil. Atmospheric, Geophysical and Astronomical services administration (PAGASA) Science
Garden Complex
BIR Road, Diliman

Quezon City
Philippines 1101
Tel: +632 929 19 53
+6391 9613 8957
Fax: 632 4347698
Email: flhilarioph<at>yahoo.com

Romania

Dr Elena Mateescu

National Meteorological Administration
Sos Bucuresti –Ploiesti 97
Bucharest 013686
Romania
Tel: +40 3183240 Ext. 173
Mobile: +40724247129
Fax: +40.21. 316 3143
Email: elena.mateescu<at>meteoromania.ro; mateescu.elena<at>gmail.com

Russia Federation

Prof Alexander Kleschenko

National Institute on Agricultural Meteorology of Rosgidromet
82 Lenin Street,
Dninsk
Kaluga Region
249030 Russia
Tel: +7-48439-64706
Fax: +7-48439-44388
Email: cxm-dir<at>obninsk.org; kl_al<at>yahoo.com

Republic of Korea

Dr Byong-Lyol Lee

National Center for AgroMeteorology
599 Gwanak-ao, sillim-dong
Seoul National University CALS 201-401
Seoul 151-921
Republic of Korea
Tel: +82 10 4901-1988
Fax: +82 2 871 1361
Mobile: +82 10 4901 1988
Email: blleesnu<at>snu.ac.kr

Slovakia

Mr Pavol Nejedlik

Slovak Hydro-Meteorological Institute
Jeseniova 17
83315 Bratislava
Slovakia

Tel: +421 25 9415324
Mobile: +421 918 806 108
Fax: +42 125 44771058
Email: pavol.nejedlik<at>shmu.sk

South Africa

Ms Kentse Setshedi

Department of Agriculture, Forestry and Fisheries
Private Bag x250
Pretoria 0001
South Africa
Tel: +27 12 319 7148
Mobile: +27 83 664 2967
Fax: +27 12319 6711
Email: kentses<at>daff.gov.za

Ms Mosidi Lekalakala

Department of Agriculture, Forestry and Fisheries
Private Bag x250
Pretoria 0001
South Africa
Tel: +97 12 336 6820
Mobile: +27 082 941 9512
Fax: +27 123366820
Email: Jenniferl<at>daff.gov.sa

Mr Ikalafeng Kgakatsi

Department of Agriculture, Forestry and Fisheries
Private Bag x250
Pretoria 0001
South Africa
Tel: +27 12 319 7955
Mobile: +27 8288 66303
Fax: +27 12319 6711
Email: dadrm<at>daff.gov.za

Dr Lawrence Themba Dube

South Africa Weather Service
442 Rigel Avenue South
Erasmusrand
Pretoria
South Africa
Tel: +27 12 367 6077
Mobile: +27 84 510 3918
Email: Themba.Dube<at>weathersa.co.za

Spain

Mr Antonio Mestre

Agencia Estatal de Meteorologia de Espana (AEMET)

c/ Leonardo Prieto Castro 8
28040 Madrid
Spain
Tel: +91 5819705
Fax: +91 5819767
Email: amestreb<at>aemet.es

Sudan

Mr Elijah Mukhala

Info Systems & Capacity Building
Southern Sudan Sub-Programme
FAO, Juba
Southern Sudan
Tel: +249 121 725 617
Fax: +249 926 671 214 - +249 955 012 558
Email: elijah.mukhala<at>fao.org

Swaziland

Mr Mduduzi Sunshine Gamedze

National Metereological Service
P.O Box 2652
Mbabane
Swaziland
Tel: +268 40 46 274
Mobile: +268 76 04 5976
Email: gamedze<at>gmail.com/[sunshine<at>swazinet.gov.sz](mailto:sunshine@swazinet.gov.sz)

Tanzania

Mr Deusdedit Kashaha

Tanzania Meteorological Agency
PO Box 3056
Dar Es Salaam
United Republic of Tanzania
Tel: +255 22 2460706
Mobile: +255 784 64 5341
Fax: +255 222460735
Email: dkashasha<at>hotmail.com

Thailand

Mr Wirat Waranuchit

Meteorological Dept.
4353 Sukhumvit Road
Bang Na
Bangkok 10260
Thailand
Tel: +662 3992322
Fax: +662 3931682

Email:imvirat<at>yahoo.com

Ukraine

Mr Viacheslav Lipinskyi

State Hydro-Meteorological Service of Ukraine

6, Zolotovoritska str

01034 Kiev

Ukraine

Tel: +380 44 239 9333

Mobile: +380 95 521 17 76

Fax: +380. 44 278 1375

Email: lipins<at>ukrweather.kiev.ua

Uruguay

Mr Dutour Pedro

Diario el Observador

United States of America

James Hansen

IRI Columbia University, Lamont Campus

61 Route 9W, Palisades, NY, 10964-800

USA

Tel: +1 845 680 4410

Mobile: +845 309 6008

Email:jhansen<at>iri.columbia.edu

Mr Harlan Shannon

1400 Independence Ave, SW

Room 4441 South Building

Washington DC 20250-3812

USA

Tel:+1 202 7204771

Email:hshannon<at>oce.usda.gov

Mr Raymond Motha

1400 Independence Ave, SW

Room 4441 South Building

Washington DC 20251

USA

Tel: +1202 720 8651

Mobile: +703 209 8839

Email: rmotha<at> oce.usda.gov

Vanuatu

Peter Napwatt

Chief Executive Officer

Vanuatu Agriculture College

P.O Box 218 Luganville Santo
Vanuatu
Tel: 678 37817 (O) 678 5485801(M)
Fax: 00678 37812
Emai: nikamatua<at>gmail.com

Zambia

Mr Mukufute Mapongo Mukelabai
Meteorological Department
PO Box 910144
Mongu
Zambia
Tel:00260. 211.252728
Fax: 00260 211 252728
Email: mukolabaim<at>googlemail.com

Zimbabwe

Mr Barnabas Chipindu
Department of Physics, University of Zimbabwe
P.O. Box MP 167 MT Pleasant,
Harare
Zimbabwe
Tel: +2634 307155
Mobile: +263 912 364 036/+263712976668
Email: chipindu<at>science.uz.ac.zw

Media releases

WMO Press Release No. 895

For use of the information media

Not an official record

15th Session of the WMO Commission for Agro-Meteorological Commission Begins (Belo Horizonte, Brazil, 15 – 21 July 2010)

Belo Horizonte/Geneva, 15 July 2010 (WMO) – Representatives of National Meteorological and Hydrological Services from WMO 189 member States and Territories are gathered in Belo Horizonte, Brazil, from 15 to 21 July for the 15th – quadrennial – session of the WMO Commission for Agricultural Meteorology.

In his opening address, the President, Mr Jim Salinger, said the Commission had the incredibly important mandate with assisting food and fibre production so as to help achieve four major societal goals. These were to enhance food security, reduce the impacts of natural hazards (droughts, heatwaves, floods etc) on agriculture, forestry and fisheries, promote sustainable land management, and devise strategies to cope with climate variability and change and their impacts on agriculture, forests and fisheries. He expressed the hope that the Commission would convert into an action plan key recommendations from the international workshop of agro-meteorologists and farmers that had preceded its session (see press releases no [891](#) and [894](#)).

The discussions will be geared towards efficient use and application of climate forecasts and predictions, especially in developing countries. Communication and capacity-building are key factors. “Scientific expertise is only of use in improving food security if it is understood and implemented by the people who produce and harvest the food”, Mr Salinger stressed.

WMO Secretary-General Mr Michel Jarraud stated that global climate change was causing concern among scientists, agronomists and decision-makers, since crop growth could be impacted by significant changes in principal climatic variables such as temperature and precipitation, and agricultural production and food security might be affected globally and locally, especially in the vulnerable developing world, where climate risks include floods, droughts and heatwaves with the potential to limit crop yield.

He stressed the urgent need to increase agricultural productivity through a more efficient use of soils, crops and climate, especially in the developing countries. Awareness in the farming community on the benefits of weather and climate services was increasing and collaboration between the agricultural and meteorological communities was growing.

In his welcome address, H.E. Mr Jose Gerardo Fontelles, Acting Minister and Executive Secretary of the Ministry of Agriculture, Livestock and Supply, Brazil, noted that the Commission[s session was the major international meeting of agro-meteorologists ever held in the region. He mentioned the contribution of the National Institute for Meteorology (INMET) of Brazil to agricultural development in the country. Other dignitaries of Brazil present at the opening session include Dr Antonio Divino Moura, Permanent Representative of Brazil with WMO, Dr Luiz Claudio Costa, Rector, Federal University of Vicosa and Dr Gilman Rodrigues, Secretary of the Ministry of Agriculture of the Minas Gerais state.

WMO Press Release No. 894

For use of the information media

Not an official record

Pioneering Meeting of Meteorologists and Farmers To Boost Practical Use of Climate Information

Belo Horizonte/Geneva, 15 July 2010 (WMO) – Climate threats to food security and to livelihoods bolstered the first-ever meeting of meteorologists and farmers at the global level. The three-day discussions (12-14 July) among some 150 participants from more than 50 countries from all geographical regions led to a comprehensive set of recommendations aimed at exploiting the full potential of weather and climate services for reducing the vulnerability of farming communities. The recommendations will be considered by the Commission for Agricultural Meteorology of the World Meteorological Organization (WMO) which today began its 15th (quadrennial) session (15 to 21 July). Both events are hosted by Brazil, in Belo Horizonte.

The recommendations result from an extensive discussion among farmers and agro-meteorologists from all over the world: the former explained their concerns caused by climate change and variability and the kind of information they need to address those concerns; the latter explained what weather and climate information is currently available and what is needed to do more.

National meteorological services need to be further resourced to take part in the development process. “No adaptation in socio-economic sectors can be implemented without the work of the National Meteorological and Hydrological Services”, Mr Mama Konate stressed. Mr Konate is Director-General of the National Meteorological Service of Mali, and Chair of the UNFCCC/SBSTA,

one of the two main Commissions for negotiations among Parties to the UN Framework Convention on Climate Change, which will hold its 16th session (COP 16) in Cancun, Mexico, later this year.

Many social and economic factors affect agricultural vulnerability, but climate was among the main factors shaping the livelihood strategies of farmers. The workshop agreed on the need to strengthen the two-way dialogue between the providers of weather and climate information and the farmers to ensure that user requirements are understood and met. WMO Regional Climate Outlook Forums were a useful platform for such interaction. Farmers should have ownership and an effective voice in the development of weather and climate products and services. Weather risk insurance schemes for small farmers should be promoted and improved, for instance through better use of weather indexes.

According to the recommendations, agro-meteorological station density should be increased, especially in developing countries. There was need for more localized climate forecasts and assessments with high spatial and temporal resolution. In this context, the following products were mentioned: historical risk/hazard patterns; analysis of meteorological, climatic and crop data; assessments of the temporal and spatial dimensions of climate impacts; crop yield forecasts; crop growing period forecasts; forecasts of plant diseases and insect/pests.

Capacity-building and communication were critical to ensure optimal use of climate science and predictions. Information delivery systems, both traditional systems and modern tools, need to be enhanced, especially for remote areas. At the same time, more effort should go into developing farmers' knowledge and awareness about climate services and how to use them. WMO roving seminars for farmers were cited as an effective means for such engagement.

Mr R.S. Paroda, member of the High-level Taskforce for a Global Framework for Climate Services (GFCS), presented the work being undertaken to shape the Framework. He considered the workshop as a perfect example of the much needed dialogue among providers and users of climate services. Wide support for the GFCS was expressed with several organizations expressing keen interest in contributing to global efforts to protect the livelihood of farmers, and to enhance food security.

The international workshop on "Addressing the Livelihood Crisis of Farmers: Weather and Climate Services" was organized by WMO, the Instituto Nacional de Meteorologia (INMET-Brazil), University of Viçosa, the Secretaria de Estado de Agricultura, Pecuária e Abastecimento de Minas Gerais, the Secretaria de Ciência, Tecnologia e Ensino Superior de Minas Gerais, FUNDAG, FUNARBE, FAPEMIG and the Sociedad Brasileira de Agrometeorologia, together with co-sponsors including FAO, the International Federation of Agricultural Producers (IFAP), the Asia Pacific Network for Global Change Research (APN), Météo-France, the United States Department of Agriculture and National Center for AgroMeteorology (NCAM) in the Republic of Korea. (See also press release no [891](#))

2. Workshop to Improvement of the Interfaces between Vanuatu farmers, experts and Climate Change
Luganville, Santo
Vanuatu 13-15 December 2010

Venue: Vanuatu Agricultural College Monday 13 December

Time	Activity	Description
8.30am	Prayer & welcome	Village pastor
9am	Introduction	Workshop goals and format (Dr Christopher Bartlett, GTZ)
9.15	El Niño and La Niña in the islands	Summary and overview of El Niño/Southern Oscillation and its impacts on the islands (Dr. Jim Salinger, University of Auckland/Salesa Kaniaha, Vanuatu Meteorological Service)
9.35	Vanuatu Meteorological Service	Climate communication on the islands, Salesa Kaniaha, Vanuatu Meteorological Service
10am	<i>Morning Tea</i>	
10.20am	Group discussion on ENSO conditions in Vanuatu	Identifying climate impacts; challenges and adaptive strategies for agriculture (Julie Beierlein, GTZ)
10.50am	Groups report findings to class	
11.05am	Climate change adaptation	Climate change impacts on agriculture Vanuatu – Dr Christopher Bartlett, GTZ Summary and overview of how agriculture can adapt to climate change Dr Jim Salinger Discussion of draft climate adaption options for Vanuatu Julie Beierlein , GTZ
1pm	<i>Lunch</i>	
2pm	What the media do	An overview of how news is selected and chosen, what is 'newsworthy' and how to choose an angle for your story (Phoebe Fletcher, University of Auckland)
2.45pm	<i>Afternoon tea</i>	
3.05pm	Production groups	Divide into production groups for radio and video; identify potential people to interview (including a range of witnesses and experts); appoint directors, interviewers and editors; storyboard production and list tasks. Each group is to appoint a 'documenter' who takes photos of progress.
4pm	Production groups	Further planning, ring to arrange interviews
4.45pm	Groups report back	Groups explain strategy to workshop

Tuesday 14 December

Time	Activity	Description
9am	Group briefing	A brief discussion of the events for the day
9.20am	Groups leave for filming/recording	
11am	<i>Morning tea</i>	
11.20	Recording/filming	
1pm	<i>Lunch</i>	

2pm	Recording/filming	
3pm	Workshop	Systematic collection and analysis of climate information and impacts/adaptive strategies for agriculture and impacts of El Niño and La Niña events Salesa Kaniaha, Vanuatu Meteorological Service
3.30pm	<i>Afternoon tea</i>	
4.45pm	Groups report back	Group discussion of impacts of climate variability on crops and livestock
5 pm	Close	

Wednesday 15 December

Time	Activity	Description
9am	Production preparation	Production teams interview local farmers on impacts of ENSO on crops
11am	Morning tea	
11.20am	Production preparation	Production teams prepare draft versions of media products
1pm	Lunch	
2pm	Production preparation	Visit to Vanuatu Agriculture Research Centre
3.00pm	Conclusion	Infrastructure and processes for provision of climate information to agricultural end users

Participants

Livo Mele, Director, Department of Forestry

Benuel Tarilonggi, Director, Department of Livestock Services

Ridly Tari, Penama Farmer

John Freddy, Agriculture Advisory Officer, Department of Agriculture and Rural Resources, Port Vila

Charley Manua, Pele farmer

Fernand Massing, Department of Agriculture and Rural Resources

Keith Mala, farmer

Lorenzo Beru, Malapoa student

James Silas, Aneityum farmer

Charles Ling, Torba farmer

Joe Kabaliu, Tafea farmer

Joe Kapua, farmer

Ephron Jimmy, fisher

Johnny Kalohwia, Sub farmer

Joe Noclum, Teauma farmer

P Philip, Department of Agriculture and Rural Resources

Oniel Dalesa, Department of Agriculture and Rural Resources

Ioan Vijki, Department of Forests

Dick Tonker, Department of Forests

Touri Molisale, Department of Agriculture and Rural Resources

Darryl Sasang, Vanuatu Agriculture College

Ruben Markward, Department of Agriculture and Rural Resources

Jimmy Mangawai, Vanuatu Meteorological Service
Michael Kailes, Paunagisu Farmers Association, Nefate
John Willie, Agricultural Officer, Department of Agriculture and Rural Resources
Thele Toto, Santo farmer
Timothy Tahopat, Malanpa farmer
Kalen Abbie, Malanpa farmer
Gilbert Roy, Sanma Agricultural Officer, Department of Agriculture and Rural Resources
Turioro Jacob, Sanma farmer
Keith Amos, Department of Agriculture and Rural Resources
Julie Beierlein, Department of Agriculture and Rural Resources
Peter Napwatt, Vanuatu Agricultural College, Luganville
Salesa Kaniaha, Director, Vanuatu Meteorological Service
Dr Jim Salinger, University of Auckland, Auckland, New Zealand
Dr Christopher Bartlett, GTZ Technical Adviser, Port Vila, Vanuatu
Phoebe Fletcher, Lecturer, Film, Television and Media Studies, The University of Auckland; Ngā Pae o te Māramatanga, University of Auckland, Auckland, New Zealand; political commentator. *Citizen A*, Triangle Television and Stratos
Nga Pae o te Maramatanga, Ngā Pae o te Māramatanga, University of Auckland, Auckland, New Zealand of Auckland
Josephine McClutchie, Nga Pae o te Maramatanga, Auckland, New Zealand

Funding sources outside the APN

World Meteorological Organization (WMO)	150,000
Food and Agriculture Organization (FAO)	10,000
Land United States Department of Agriculture	10,000
Meteo-France	5,000
International Federation of Agricultural Producers (IFAP)	20,000
National Centre for Agricultural Meteorology (NCAM) of Korea	10,000
GTZ Vanuatu	7,300

In-kind Support

Host Country Brazil

Instituto Nacional de Meteorologia (INMET-Brazil)
Brazilian Ministry of Agriculture, Livestock, and Food Supply
Government of Minas Gerais, Brazil
Federal University of Viçosa (UFV), Minas Gerias, Brazil
Brazilian Society of Agrometeorology

University of Auckland, School of Environment

- (i) Provision of research fellows time and expertise in preparation of workshop programme, invitation to participants and reports in collaboration with WMO;
- (ii) Arrangement of Vanuatu workshop for the development of end user interfaces

Vanuatu

Vanuatu Agricultural College – Accommodation costs for participants
Nga Pae o te Maramatanga, University of Auckland, New Zealand

List of Scientists supported by APN

China

Dr Zhenlin Chen

Department of Emergency Response, Disaster Mitigation and Public Services
Chinese Meteorological Administration
46 Zhongguancun Nandajie,
Beijing 100081
China

Email: cdccc<at>cma.gov.cn

Malaysia

Mr Azhar Bin ISHAK

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

Russian Federation

Prof Alexander KLESHCHENKO

Institute of Agricultural Meteorology of ROSGIDROMET
Lenina Str 82
Kaluga Region
OBNINSK
Tel: +7484 3964706
Fax: +7484 3944388
Email: cxm-diz<at>obninsk.org

Indonesia

Mrs N Riama

Agency for Meteorology, Climatology and Geophysics of Indonesia
JL Angkasa No2,
Kemayoran
Jakarta Pusat 10720
Indonesia
Tel: +62 21 4246321 ext 4208

Email: nelly<at>bmg.go.id

Glossary of Terms

Include list of acronyms and abbreviations

Glossary of Terms

ACCPIR	Adaptation to Climate Change in the Pacific Islands Region
APN	Asia Pacific Network for Global Change Research
AWS	Automatic weather station
CBO	Community based organization
CMA	Chinese Meteorological Administration
COF	Climate outlook forum
FAO	Food and Agriculture Organization
GCM	General circulation model
GIS	Geographical information system
IFAP	International Federation of Agricultural Producers
INMET	Instituto Nacional de Meteorologia (Brazil)
NCAM	National Centre for Agricultural Meteorology of Korea
NMHS	National Meteorological and Hydrological Service
RCOF	Regional climate outlook forum
SPC-GTZ	Secretariat of the Pacific Community – GIZ Adaptation to Climate Change in the Pacific Islands
SMS	Short message service
WAMIS	World Agricultural Meteorology Information Service
WMO	World Meteorological Organization

REPORT ON WORKSHOP TO IMPROVE THE INTERFACES BETWEEN VANUATU FARMERS, EXPERTS AND CLIMATE CHANGE, DECEMBER 2010: LUGANVILLE, SANTOS, VANUATU

1.0 Background

In July 2010 the World Meteorological Organization sponsored a workshop in Belo Horizonte, Brazil to take stock of a number of important issues facing the agricultural communities around the world including rising populations with the consequent increase in demand for food; the pressures on the world's food producers due to climate variability and change, as well as socio-economic conditions; the need to use natural resources productively, but sustainably; and the need within the agriculture communities for increased knowledge and better tools for risk management and adaptation.

It was decided to hold a follow-on workshop in Luganville, Vanuatu with local farmers and climate experts, facilitated by media and technology transfer specialists, to devise strategies to help cope with climate variability and climate change. These demand appropriate methods to include development of improved meteorological tools for farmers and improved understanding and use of the use and appropriateness of weather and climate information for farmers globally.

Dr Salinger held discussions with Mr Peter Napwatt, Chief Executive Office of the Vanuatu Agricultural College in Luganville on the possibility of the December. Further discussions occurred with Salesa Kaniaha, Director of the Vanuatu Meteorological Service and Dr Christopher Bartlett of SPC-GTZ Adaptation to Climate Change in the Pacific Islands Region (ACCPIR) in Port Vila and the workshop went ahead.

The workshop was hosted by Peter Napwatt at the Vanuatu Agricultural College. The target audience for the workshop was local technical and scientific staff, farmers from all the six provinces of Vanuatu and the media, who would convey information on their findings on to the general public.

2.0 Workshop Objective

To develop systems to monitor climate change and refine the draft adaptation strategies for agriculture in Vanuatu; produce a 10 minute radio segment targeted at locals that raises awareness and strategies to adapt to climate change in agriculture; and to produce a 3-4 minute video segment targeted at the international community raising awareness of climate change in Vanuatu.

The workshop was held Monday 11th to Wednesday 13th December, 2010 at the Vanuatu Agricultural College, Luganville with field work and interviews in the surrounding farming communities in Santo.

3.0 Topics

Thirty-three participants attended the meeting. 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 Niño and La Niña events) that impact crop production. The Director of the Vanuatu Meteorological Service led workshops on identification of impacts and adaptation strategies for crops to El Niño/Southern Oscillation events and climate change.

The three day programme is appended (Appendix 1).

4.0 Report of workshop activities

Like many other island nations, Vanuatu is facing challenges with agriculture due to the effects of climate change. Climate change is caused by the warming of the sea, land and atmosphere that alters weather patterns. Global warming is caused by the way people have and continue to exploit the land and environmental resources like forests and fossil fuels. This means that while Vanuatu is

the world's most ecologically efficient country and has contributed little to the causes of climate change, there is an urgent need to work together to find positive solutions to deal with its effects.

The government of Vanuatu has been very proactive in addressing the changes that climate change has brought and will continue to bring. Climate change is best dealt with by planning ahead and identifying ways that we can adjust our actions for the health and well-being of our communities. This workshop gathered together farmers so that strategies can be identified for adapting to the changes in the environment and ways of circulating this information around the islands. The effects of climate change include rising sea levels, intensity and frequency of tropical cyclones, droughts, water-logged soil and changes in the prevalence of pests and diseases. While these changes are significant, there are many adaptations that are possible. The kastom practices of Vanuatu are very important in defining what these adaptation strategies in agriculture will be.



Dr Salinger explaining ENSO to participants

Director of Forestry Livo Mele welcomed participants to the workshop on behalf of the Vanuatu government. Dr Christopher Bartlett from GTZ acted as facilitator and translated addresses into Bislama. Dr Jim Salinger from School of Environment, University of Auckland 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 change and its implications for crop production and agriculture. Julie Beierlein of SPCOGTZ then outlined the agriculture and climate change assessment that had been carried out in Vanuatu.

Dr Salinger explained the expected impacts of El Niño and La Niña events in the Pacific in general, and Salesa Kaniaha detailed the impacts on the weather and climate in Vanuatu. He explained that El Niño events brought drier weather during November to March in the Vanuatu with a lower risk of cyclones, La Niña events were associated with increased rainfall during the 'wet' season of November to March and a higher frequency of tropical cyclones. With global climate change it is

expected that El Niño and La Niña events may occur more frequently, and that cyclones may become more intense.



The entire group listening to presentations

The presentation from the Met Service was followed by one from Phoebe Fletcher, Lecturer, Department of Film Television and Media Studies, University of Auckland, Ngā Pae o te Māramatanga, 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) and the Ngā Pae o te Māramatanga which the farmers would be able to access and use, and could be used in workshops and presentations in the six provinces.

After these presentations participants formed small groups to discuss their past experiences of La Nina, 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. They went and interviewed key farmers in the Luganville area: a coconut grower and a cocoa grower to investigate the local climate footprint of climate variability and change. From these interviews a 10 minute radio segment targeted at locals that raises awareness and strategies to adapt to climate change in agriculture and to produce a 3-4 minute video segment targeted at the international community raising awareness of climate change in Vanuatu were produced. The radio interviews have subsequently been broadcast on national radio in Vanuatu. These included advice on how farmers might prepare for ENSO events and adapt to climate change.



Interviewing a cocoa farmer

The groups spent day two preparing their storyboard, interviewing and recording their chosen interviewees and editing to produce either a short video or radio programme. During the second day of the workshop, whilst some the team members were editing, others in each team translated the radio programmes into Bislama.

Teams interviewed local farmers Kevin Henderson and Ranga Tataeng, Manager, Vanuatu Copra and Cocoa Exports Ltd. Both spoke of their experience of managing crops and water resources during La Niña floods. They also interviewed a researcher at the Vanuatu Agricultural Research Centre to obtain more information about climate variability (especially El Niño and La Niña events), and impacts on coconuts. 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.

During the workshop media from the *Vanuatu Daily Post* and a local radio station interviewed organisers and participants. They were very receptive to receiving articles and reports from grower groups and the Vanuatu Met Office in the future. The radio shows will be played on Radio FM (61).



Salesa Kaniaha collecting information of impacts of ENSO on crops and livestock

Later in the second day Salesa Kaniaha worked with participants to document the systematic collection and analysis of climate information and impacts/adaptive strategies for agriculture and impacts of El Niño and La Niña events for the crops of bananas, cassava, kumara, island cabbage, taro, vegetables and yams, then later there was a group discussion on impacts of climate variability on livestock (beef cattle). Tables were drawn up of adaptive strategies to be used for each crop for El Niño and La Niña events.

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

1. Participants are still not clear on the duration of ENSO events and associated weather patterns so teachers in schools are to pass on information that can be used to distribute information on predictions and on sign boards;
2. Teams of investigators will investigate impacts of climate on specific agricultural crops as traditional knowledge is not working well;
3. Timing of information on climate variability should coincide with crop planting seasons;
4. Farmers associations in the provinces have extensive rural networks so these should be used to pass on climate and crop information;
5. Use of radio and print media is extremely important but information should be communicated in non-technical language and Bislama;
6. For dissemination of information on climate change and ENSO as the cellphone network in Vanuatu is extensive SMS digital text messaging can be utilised;
7. Rain gauges should be installed in rural areas so farmers can monitor weather patterns;

8. Workshops should be held in provinces on climate variability and change and crop adaptation strategies to provide maximum dissemination to farmers;
9. Farmers should document all traditional and existing knowledge they have on crops and climate as well as monitoring any climate footprints they observe on their crops.

6.0 Conclusions

The workshop successfully empowered local farmers and technical experts to understand and use video and radio broadcast products to communicate messages from the Vanuatu Meteorological Service and Ministry Agricultural and Rural Development on climate variability and impacts on agriculture. This initiative needs to be maintained and facilities made available for growers and technical experts to develop further video clips and radio stories in Bislama that can be taken around the provinces.

Growers collectively had a lot of knowledge about climate, water and crop management, but that this information needs to be gleaned to facilitate widespread implementation of such knowledge. They felt that Government and overseas donors could assist in the development and resourcing of such groups.

Farmers also need improved communication about future climate events in non-technical language. It was recommended that a monthly climate update be prepared for radio or local newspaper. This could also be disseminated as SMS text messages.

It was also suggested that local schools could be involved in education on climate, and that at least rain gauges could be installed and monitored as part of a network of stations around the islands. Students might also be encouraged to develop monitoring products for local communities.

Local media are should be encouraged to seek stories on climate and agriculture from Government departments and local growers on a regular basis, and run these in Bislama.

Farmers take on climate change

Daily Post 22/11/10

FARMERS FROM AROUND Vanuatu will descend on Luganville in December to form strategies to adapt to climate change.

For three days, farmers will exchange their work on the farm to become media producers, producing a radio show and video on the ideas they discuss.

Climate change poses a serious threat to Vanuatu's agriculture, but the emphasis of this workshop is on positive adaptation options and opportunities.

"While the dangers of cli-

mate change are very real, there are many things that communities and farmers can do to plan for its effects and minimize its impact," says climate scientist Dr Jim Salinger. "Vanuatu is one of the world's most ecologically efficient nations, meaning that the people are well placed to make decisions that shape the future of the way we deal with issues that affect the world".

The workshop gathers prominent scientists and media, but it is the farmers who will be a driving force

in determining how Vanuatu responds to climate change. They will be building on the Vanuatu National Advisory Committee on Climate Change's (NACCC) ongoing work to develop adaptation strategies for industries including agriculture. The workshop recognizes that local people possess unique knowledge in planning for these events, built on generations of traditional practice.

The radio and video programmes the farmers produce will be circulated

after the workshop to raise awareness of the active role we can play in planning for changing weather conditions.

The workshop will take place from the 13th - 15th December 2010 at Vanuatu Agricultural College, Luganville, Espiritu Santo.

The workshop is being co-facilitated by The University of Auckland, SPC-GTZ, the World Meteorological Office and Ng Pae o te M ramatanga with the support of the Vanuatu Agricultural College.

Farmers take on climate change

FARMERS from around Vanuatu will descend on Luganville in December to form strategies to adapt to climate change. For three days, farmers will exchange their work on the farm to become media producers, producing a radio show and video on the ideas they discuss.

Climate change poses a serious threat to Vanuatu's agriculture, but the emphasis of this workshop is on positive adaptation options and opportunities.

"While the dangers of climate change are very real, there are many things that communities and farmers can do to plan for its effects and minimise its impact," said climate scientist Dr Jim Salinger. "Vanuatu is one of the world's most ecologically efficient nations, meaning that the people are well placed to make decisions that shape the future of the way we deal with issues that affect the world," he said. The workshop will gather prominent scientists and media, but it is the farmers who will be a driving force in determining how Vanuatu

responds to climate change. They will be building on the Vanuatu National Advisory Committee on Climate Change's (NACCC) ongoing work to develop adaptation strategies for industries including agriculture.

The workshop recognises that local people possess unique knowledge in planning for these events, built on generations of traditional practice. The radio and video programs the farmers produce will be circulated after the workshop to raise awareness of the active

role we can play in planning for changing weather conditions.

The workshop will take place from December 13 -15 at Vanuatu Agricultural College, Luganville, Espiritu Santo.

The workshop is being co-facilitated by The University of Auckland, SPC-GTZ, the World Meteorological Office and 'Ngā Pae o te Māramatanga' with the support of the Vanuatu Agricultural College.

Vanuatu farmers spread climate change adaptation message



Workshop participants celebrate all that they have learned during the week

This week, farmers from each province of Vanuatu met with climate change scientists, the meteorological service, media and Ministry of Agriculture representatives at the Vanuatu Agricultural College to design strategies to help agriculture cope with climate change.

The goal of the three day workshop was to document how the effects of global warming are experienced by Vanuatu farmers and discuss practical solutions.

Climate change is caused when carbon dioxide is trapped in the earth's atmosphere leading to a 'greenhouse effect' that raises the earth's temperature.

While this process has been occurring naturally for thousands of years, pollution caused by humans is speeding up its effects. A change in the temperature by just a couple of degrees can alter the environment we live in. For Vanuatu, this is predicted to result in rising sea levels, stronger tropical cyclones and changes in the way that agricultural crops produce and are affected by pests and diseases.

The workshop participants worked together to document changes in crop production that are occurring in their communities, then went into the field to interview Santo farmers on the changes that they have seen in their agricultural production in the last ten years.

"It is clear from the information provided by farmers that climate change footprints can be seen in the production of crops", said Peter Napwatt, head of the Vanuatu Agricultural College. "The message that we are hearing from farmers is that the seasons for some crops are changing and producing significant variations in yields. To combat this, we can alter the varieties of crops that we grow to find the ones that are most resistant to changes in our environment. By working together with scientists, we hope to position Vanuatu as one of the leading adaptors in climate change technology."

Dr Jim Salinger from the University of Auckland was impressed by the way that many local farmers had noticed these changes and already begun planning for climate change. "Local farmers have an incredible wealth of information that enables them to adapt to the seasons ahead in positive ways to ensure a secure supply of food", he said.

The videos, audio recordings and story clips that the farmers compiled over the week will be shown on local TV, online and the radio and also be put into DVD format to inform other farmers about climate adaptation in Agriculture.

Farmers who are interested in learning more about agriculture climate change adaptation strategies can contact the Vanuatu Agricultural College on 36606, the National Advisory Committee on Climate Change on 23866 or Dr. Christopher Bartlett (VanuatuClimateGTZ@gmail.com).

The workshop was hosted by the Vanuatu Agricultural College in Santo with the support of GTZ Climate Change Vanuatu, APN, The University of Auckland, Vanuatu Meteorological Service, and Nga Pae o te Maramatanga.