

**Education and Training in
Agricultural Meteorology**

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I had the real pleasure of working with Prof. Stigter

- Professor Stigter was elected as the President of the Commission for Agricultural Meteorology (CAgM) at the Tenth Session of the CAgM held in Florence in 1991. He served as the President of CAgM till 1999. He continued to serve as the Member of the Advisory Working Group of CAgM from 1999.
- I had the pleasure of working with Prof. Stigter from 1996 to 2008 when I was working as the Chief of the Agricultural Meteorological Division in the World Meteorological Organization (WMO). When I started working as the Director of the Climate Prediction and Adaptation Branch in 2008, I continued my work with Prof. Stigter.
- At the Thirteenth Session of the CAgM which I organized in Ljubljana in 2002, Prof. Stigter was nominated as the Coordinator for the support systems for policy making.

International Society for Agricultural Meteorology (INSAM)

- As the Chief of the Agricultural Meteorology Division of WMO, I worked with Dr Kees Stigter to establish the International society for Agricultural Meteorology (INSAM) in 2001 to promote the science and applications of agricultural meteorology at the international level.
- Currently, INSAM is a Web-based society and membership is free of charge. INSAM serves as a clearing house for information on agricultural meteorology worldwide and all agrometeorologists are encouraged to become members.
- All national societies for agricultural meteorology are invited to become members of INSAM so as to provide strong leadership to develop agricultural meteorology in the future.

Contributions of Prof. Stigter to CAgM

- At the Fourteenth Session of the CAgM (CAgM-14) held in New Delhi in 2006, Prof. Stigter presented the topic of “Capacity Building in the Area of Agrometeorological Services through Roving Seminars” in the Open Forum. The CAgM-14 session extended his role as the Coordinator for support systems for policy making. CAgM-14 also appointed him as the Leader of the Expert Team on the Guide to Agricultural Meteorological Practices.
- The Fifteenth Session of CAgM (CAgM-15) held in Brazil in 2010, acknowledged the work of Prof Kees Stigter as the Coordinator for Policy Support in Capacity-Building. The session also congratulated Dr Kees Stigter on his excellent work as ET Leader for the Guide to Agricultural Meteorological Practices. In the Open Forum of this session, Prof. Stigter made a presentation on the International Society of Agricultural Meteorology (INSAM).

Importance of Agricultural Meteorology

- Agriculture is probably the most weather-dependent of all human activities. Variations in climate have been, and continue to be, the principal source of fluctuations in global food production, particularly in the semi-arid tropical countries of the developing world.
- Agricultural planning and the use of agricultural technologies require agricultural meteorology applications.
- The increasing frequency of natural disasters, including pests and diseases, and growing climate variability and climate change are having an impact on the natural resource base, crop yields and incomes. There are increasing demands for improved preparedness and prediction to deal with these issues.

Advances Agricultural Meteorology

- Agrometeorological applications and services in agriculture, forestry, rangelands and fisheries have grown enormously in recent times is probably the most weather-dependent of all. These include the following:
 - a) Specific weather forecasts and seasonal to interannual climate predictions in agriculture for better risk management;
 - b) Microclimate management or manipulation;
 - c) Establishment of measures to reduce the impacts and mitigate the consequences of weather- and climate-related natural disasters for agricultural production;
 - d) Monitoring and early warning;
 - e) Development and validation of adaptation strategies to deal with increasing climate variability and climate change;
 - f) Application of crop models ranging from the field level to the country level.

Farming Community Needs

- The level of education and skills of farmers, especially in developing countries, is insufficient to cope with new or aggravating problems, and there is a clear need for trained intermediaries who are equipped with services to assist the farming community in effectively dealing with these problems.
- Effective education and training in agricultural meteorology at the postgraduate level can ensure a continuous stream of well-informed intermediaries to serve the farming community.

Needs and Perspectives for Agricultural Meteorology in the 21st Century

- In February 1999, as the Chief of the Agricultural Meteorology in WMO, I organized the “International Workshop on Agrometeorology in the Twenty-first Century: Needs and Perspectives”, in co-sponsorship with a number of national, regional and international organizations, which was held in Accra, Ghana.
- Prof. Kees Stigter and others (2000) summarized the needs and perspectives for agricultural meteorology in the twenty-first century under two major headings:
 - (a) Agrometeorological services for agricultural production;
 - (b) Agrometeorological support systems for such services:
 - Data
 - Research
 - Policies
 - Education/training

Need for Education and Training

- There is now an urgent need to review carefully the curricula in agricultural meteorology at the undergraduate and postgraduate levels and to ensure that the curricula are fully revised to include new and emerging issues, and that adequate education and training material is prepared to serve the revised curricula.
- As the Chief of the Agricultural Meteorology Division in WMO, I organized the Expert Meeting on Review of Curriculum in Agricultural Meteorology in March 2007 in collaboration with the American society of Agronomy, the Accademia dei georgofili of Italy and the National Academy of Agricultural sciences of India, to develop a revised curriculum as well as recommendations for its effective implementation.
- Sixteen experts from Austria, Brazil, Canada, India, Indonesia, Italy, the Netherlands, the United states of America and Zimbabwe attended the meeting.

Sessions in the Expert Meeting on Review of Curriculum

- In the Opening Session of this meeting, welcome addresses were given by the representatives of the four co-sponsors of the Meeting: myself from WMO; Dr J.L. Hatfield, President of the American society of Agronomy; Dr S. Orlandini from the Accademia dei georgofili of Italy; and Dr V.P. Gupta from the National Academy of Agricultural sciences of India.
- The first technical session reviewed the developments made in agricultural meteorology over the years with presentations on agricultural meteorology at the global level by myself and on agricultural meteorology over the years and new priorities and consequences for curricula by Prof Kees Stigter.
- In the next session on the Current Status of Agricultural Meteorology, seven presentations were made by experts from Zimbabwe, Brazil, USA, Canada, Indonesia, Austria, and Italy.
- Presentations were made on the Agricultural meteorology programmes for masters and doctoral degrees that are offered at the following five universities in India:
 - Tamil Nadu Agricultural University (TNAU);
 - Punjab Agricultural University (PAU);
 - Anand Agricultural University (AAU);
 - Acharya N.G. Ranga Agricultural University (ANgRAU);
 - Indian Agricultural Research Institute (IARI).

Courses proposed in the expert meeting (a)

- The meeting proposed agricultural meteorology courses for undergraduate programmes and postgraduate programmes as well as some courses for the intermediaries involved in communicating information to farmers.
- The following courses are proposed for the undergraduate programme:
 - (a) Introductory agricultural meteorology;
 - (b) Climate change and its impacts on society.
- The following courses are proposed for the postgraduate programme:
 - Basic courses:
 - (a) Fundamentals of meteorology and climatology;
 - (b) Weather, climate and crops;
 - (c) Weather, climate and livestock;
 - (d) Meteorological hazards in agriculture;
 - (e) Agrometeorological measurements and instrumentation;
 - (f) Micrometeorology;
 - (g) Analytical tools and methods for agricultural meteorology.

Courses proposed in the expert meeting (b)

- Applied courses proposed for the postgraduate programme:
 - (a) Strategic use of climate information;
 - (b) Coping with climate variability and climate change;
 - (c) Coping with extreme meteorological events;
 - (d) Tactical decision-making based on weather information;
 - (e) Development of risk management strategies.
- Training Intermediaries
 - (a) An agricultural meteorology-related syllabus for the in-service training of AEIAs (A-Domain Agrometeorological Extension Intermediaries);
 - (b) An agricultural meteorology-related syllabus for the in-service training of AEIBs (B-Domain Agrometeorological Extension Intermediaries).

The meeting discussed the detailed syllabuses and the core competencies for the different courses and finalized the syllabuses and core competencies.

Training

Training for the User Communities

- Agrometeorological Training for user communities can cover the spectrum from institutions and governments to farmers at the subsistence level.
- In-service training plays a significant role in updating the NMHS personnel with recent technologies and methods and in refreshing the knowledge and methods gained by agmet personnel
- Methods, procedures and techniques for disseminating agrometeorological information to cooperative extension services and other users, that understand its value.

Potential Training Modules for NMHS Personnel

- Data management tools
- Mapping tools
- Climate Drought Indices
- Remote Sensing
- Yield Forecasting
- Bulletin Design & Layout
- Internet/web technology

Enabling Institutions and Governments

- Integrating perspectives on climatic risks in current national policies in different sectors will lead to increased adaptive capacity to current as well as future climatic variability.
 - water resources management
 - disaster management
 - land use
 - biodiversity conservation
 - agricultural development

Roving Seminars on Weather, Climate and Farmers

- **The objective of Roving Seminars is to make farmers become more self-reliant in dealing with weather and climate issues that affect agricultural production on their farms.**
- **Typically the Roving Seminars are of one-day duration and bring together farmers from a group of villages to a centralized location in any given region. The programme for the Seminars consists of two parts:**
 - **Part I – Weather and Climate of the Farming Region, Climate Change and Farming Risks**
 - **Part II – Farmer Perception of Weather and Climate Information Provision and Feedback**

My organization of Roving Seminars on Weather, Climate and Farmers in West Africa

- I organized a Four-year pilot project from 2008 to 2011 in West Africa which involved 15 countries and organized over 140 seminars.
- 5,700 farmers participated in these Roving Seminars including 1,000 rural women.
- 3,000 rain gauges were distributed to 2,800 villages in West Africa.

Conclusions

- Agrometeorology evolved into a mature science today and there are exciting opportunities to help agricultural world cope better with weather and climate issues.
- There is a growing demand for agrometeorological services and the modern technologies make it possible to provide these services in a timely and efficient manner.
- The changing nature of agrometeorological research and applications necessitates a thorough reevaluation of the agrometeorology curriculum at the university level.
- Agrometeorologists must collaborate actively with agronomists, soil scientists and crop protection specialists.

Conclusions (contd.)

- Communication with farmers and policymakers must be improved to enhance applications at the field level. There is a need for more active collaboration with social scientists.
- Number of agrometeorologists worldwide is small, hence active efforts should be made to forge strong links at both the national and international level.
- INSAM and CAgM are making efforts to bridge this gap at the international level, but much needs to be done to promote agrometeorology as a science at all levels.

**Thank you very much for your
attention**

