Chapter 13
A Decade of Capacity Building Through Roving Seminars on Agro-Meteorology/-Climatology in Africa, Asia and Latin America: From Agrometeorological Services via Climate Change to Agroforestry and Other Climate-Smart Agricultural Practices

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Abstract Climate change hits agricultural production areas hard. There is no knowledge base to counter its effects and this makes education and other capacity building in adapting to climate change imperative.

In the course of the last quarter of the twentieth century, applied agrometeorology/agroclimatology started to focus on traditional knowledge and agrometeorological services in agriculture. Since 2005, "Agromet Vision" offers Roving Seminars (RSs) of 2–5 days for university staff, professional agrometeorologists and extension intermediaries. They are particularly useful for training of extension trainers. To date, 37 RSs have been successfully delivered in 13 countries.

The first RSs offered were "Agrometeorological Services: Theory and Practice" and "Agrometeorology and Sustainable Development", followed from 2011 by "Reaching Farmers in a Changing Climate". In 2013 "What Climate Change Means for Farmers in Africa" was added, while in 2015 "Agroforestry and Climate Change" was included. This paper wants to review the need for and the contents of these RSs and reports on local evaluation by the institutes involved. Applied agrometeorology should not start with agrometeorology but with the conditions

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of where it should be applied, the livelihood of farmers. In the development of such RSs elsewhere, our experience could be of much value.

Keywords Agroclimatology • Capacity building • Roving Seminars • Sustainable development • Climate change

Introduction: Education and Capacity Building

Climate change as an environmental disaster, upsetting among others all farming communities, must be considered through its three sides from where the danger comes: (i) global warming; (ii) increasing climate variability; (iii) more (and often more severe) weather and climate extreme events (Stigter and Ofori 2014a). Experience in and development of doing so, must be transferred via new educational and capacity building commitments, among others in agrometeorology and agroclimatology (Stigter 2011). RSs are one way to do this very explicitly related to farmers' livelihoods (Stigter 2006a, 2015a, b).

This paper wants to review the need for and the contents of these RSs and it reports on their local evaluation by the institutes that were involved. The approach developed emphasizes that applied agrometeorology should not start with agrometeorology but with the conditions of where it should be applied, the livelihoods of farmers (Stigter 2010, 2015a, b). In the development of such RSs elsewhere, our experience could be of much value.

RSs in the form of very limited single "farmer days" were held by the World Meteorological Organization (WMO) since 2008, but they were never evaluated (Tall et al. 2014). Farmers have valuable traditional and more recent empirical knowledge but are unfamiliar with much new environmental knowledge. Our experience in Indonesia (e.g. Winarto and Stigter 2011; Stigter et al. 2013) learns that long periods of regular contacts have to be organized to get this new knowledge understood and applied. Farmers need strong support in this agrometeorological learning process.

This means that the new knowledge must first and for all go to university staff, professional agrometeorologists and extension intermediaries in (rural) supporting organizations. This was also the idea behind the author's book "Applied Agrometeorology" (Stigter 2010), of which parts are strongly related to the contents of the first two RSs dealt with below. These RSs are at a level that trainers of extension intermediaries would particularly benefit because the material shows what can be offered that can reach and change the livelihoods of farmers and how.

Adopting a new approach, since 2005, the authors' one man consultancy bureau "Agromet Vision" has developed and delivered RSs of 2–5 days with local evaluations. To date, Agromet Vision has delivered 37 RSs in 13 countries (including four trials and three mixes). The first two subjects were "Agrometeorological Services: Theory and Practice" and "Agrometeorology and Sustainable Development". The complete list of which RSs were held where and when is in Table 13.1.

Table 13.1 Agromet Vision Roving Seminars (chronologically for each seminar)

Roving Seminar		Period of delivery	Countries of delivery	Number of times delivered
1	Agrometeorological Services, Theory and Practice	2005–2012	Iran (Tehran) India (mix with 2, trial) Brazil/Venezuela (id., trial) South Africa (Bloemfontein) Indonesia (Yogyakarta) Lesotho (Maseru) Swaziland (Mbabane) Argentina (Buenos Aires) South Africa (Bloemfontein) Lesotho (Roma) (id., trial) Zambia (Monze) Zimbabwe (Harare) Sudan (Gedaref)	13 (of which three mixed trials)
2	Agrometeorology and Sustainable Development	2005–2012	Iran (Gorgan) South Africa (Bloemfontein) Indonesia (Yogyakarta) Brazil (Piracicaba) South Africa (Bloemfontein) Zimbabwe (Harare) Sudan (Khartoum)	7 (not counting three mixed trials already mentioned under 1)
3	Extension Agrometeorology (developed for Iran)	2011 to the present	Qazvin Shiraz	2 sofar
4	Reaching Farmers in a Changing Climate	2011 to the present	Indonesia (Depok) South Africa (Bloemfontein) Iran (Esfahan) Iran (Gorgan) Zimbabwe (Harare) Sudan (Wad Medani) Cuba (Havana) Indonesia (Bogor) South Africa (Bloemfontein)	9 sofar
5	What Climate Change Means for Farmers in Africa (developed for Africa)	2013 to the present	Zimbabwe (Harare) South Africa (Pretoria) Sudan (Wad Medani)	3 sofar
6	Agroforestry and Climate Change	2015 to the present	Sudan (Khartoum, trial) Sudan (Khartoum) Zimbabwe (Harare)	3 sofar (of which one trial)

This includes from 2011 onwards a third Roving Seminar "Extension Agrometeorology", with material that was partly derived from the former two and partly from additional sources, developed for training extension intermediaries in Iran and delivered twice so far. In 2011 also the RS "Reaching Farmers in a Changing Climate" was added, while there are two more recently developed RSs as well that have been started in 2013 (What Climate Change Means for Farmers in

Africa) and 2015 (Agrometeorology and Climate Change) respectively (Table 13.1).

The conceptual framework was given by Stigter (2006b, 2007a, 2008) where he defined, between the two domains of (i) farmers' livelihoods and (ii) the scientific support systems of available knowledge and understanding, a third domain in which applied scientists, product intermediaries and farmer facilitators work on solutions of agricultural production problems as suffered by farmers. In this domain of the use of products of for example applied agrometeorology and climatology, these products are jointly made operational for establishment as climate services with farmers in their fields (Stigter 2007b, c). The extension behind these processes was described in Stigter and Winarto (2013) and Stigter et al. (2013). The Roving Seminars deal for their audience with describing the conditions under which science can be used that way, from the point of view of making applied science operational and from the angle of farmers' livelihood and its conditions that determine absorption and use of services as well as blending of the new knowledge with their traditional knowledge (e.g. Stigter et al. 2005; Zuma-Netshiukhwi et al. 2013). The RSs make use of a lot of case studies that illustrate difficulties with, consequences of and successes with these approaches.

This paper provides an overview of the "Agromet Vision" RS series. The early RSs, with a focus on agrometeorological services and development, are first briefly reviewed before discussing the more recent training that focuses on adapting to climate change. Experience with such knowledge transfer will be particularly of use in training of extension officers everywhere in Africa, Asia and Latin America in developing and establishing similar education and capacity building programmes.

All RSs, when given in 4 or 5 days, train their audience in discussions in small groups to answer specific questions after each presentation. The audience is distributed over groups of four to six participants and each group discusses the same questions. Then, in a plenary reporting on the proposed answers, conclusions are drawn on establishing services with farmers in their fields and problem solving in their livelihoods. It is our intention that these extra-curricular efforts to participate in the RSs bring applied science and its products much closer to problem solving with smallholders. Whether the audiences are related to extension training or to extension policy and practice issues in ministries, institutes and/or organizations, the local evaluations learn that reaching farmers is considered more within one's power than before the RSs.

Early Agrometeorological Roving Seminars

Applied agrometeorology/agroclimatology started to focus on traditional knowledge and climate services in agriculture in the last two decades of the twentieth century (Stigter 2006a). The Commission of Agricultural Meteorology (CAgM) of the WMO became instrumental in advocating capacity building in these directions (WMO 2006). The first RS was for the first time given as a Training Course in November 2005 in Tehran, Iran (Table 13.1). Table 13.2 shortly hints at the

Table 13.2 Overview of Roving Seminar 1 "Agrometeorological Services: Theory and Practice" (Stigter 2006a, 2015a)

Presentation	Synopsis/rationale
Intro: Some history	The history of why and how my opinions got formed that I want to get across in this course
1. Zoning & mapping as agrometeorological services in developing countries	From examples of zoning and mapping in among others China, Portugal, Sudan and Ecuador, as climate services for agriculture, preconditions and requirements were derived for a checklist for action on assisting farmers with such services
2. Farming systems, agrometeorology and agrometeorological services	An introductional survey to define and connect these action fields illustrated with case studies from Africa (slides) with as issue: designs of protective structures as agrometeorological services
3. The place of agrometeorological services in the livelihood of farmers	Use of a diagnostic and conceptual framework to explain the lack of operational agrometeorological services and knowledge that can make a difference in the livelihood of African farmers
4. Agrometeorological services for user communities, some lessons learned	Interpretation of case studies from Brazil and China showing conditions to be met for serving communities with climate knowledge effectively and what may prevent it
5. Using traditional methods and indigenous technologies for coping with climate variability	Options that Low External Input Sustainable Agriculture (LEISA) farmers have, what they do and may do with water, heat and crops combining traditional and scientific knowledge
6. Research and reality	Considering time scales and spatial scales with services to help reduce the impacts of natural disasters, with questions that have to cover the reality of research in funding research (education) proposals
7. Policies and preparedness	Beyond climate forecasting of flood disasters. Using an end to end framework to understand agrometeorological components of coping with flood disasters and policy implications
8. Agrometeorological services making a difference for poor farmers. I. Why it does not happen. II. How it can be done	No extension agroclimatology was developed to assist the majority of marginal farmers in the design of their production systems. With examples from Africa and China it is illustrated how to solve problems with agrometeorological components in the livelihood of farmers

The full presentations have recently been made available on ResearchGate under contributions from the author composition of its presentations. See Rahimi (2005) for a report and evaluation. The history of its development was given in Stigter (2015a), where also the literature supporting its presentations was reviewed.

The second RS was given for the first time in a Provincial Workshop in the same month in Gorgan, Iran (Table 13.1). Table 13.3 hints again at the composition of its

Table 13.3 Overview of Roving Seminar 2 "Agrometeorology and Sustainable Development" (Stigter 2006a, 2015b)

Presentation	Synopsis/rationale
1. Introduction to the approach	Agrometeorological services to prepare farmers for climate extremes and climate use. Examples from Africa, China, India, Indonesia and Vietnam how not to do it and how it should be done
2. What is sustainable development?	Means of communication & education are part of sustainable development. Developing a response farming approach, with forecasting capabilities that change and improve in the course of time, is a condition for sustainable development
3. The role of agricultural research in establishing agromet services	We need globalization as to the availability of methods, tools of research, but we need localization as to strategies, adaptation of research to local realities, problem identification and local innovations
4. Examples of agrometeorological services in the literature	African case studies confirmed that traditional adaptation strategies can be insufficient or may have degraded, that contemporary science is very often available on-shelf and that inappropriate policy environments do often exist
5. Preparation of farmers for climate extremes and climate use	Case studies confirm that (i) traditional adaptation strategies may fail, (ii) contemporary science is very often available on-shelf and (iii) inappropriate policy environments often prevent decisions and dissemination of locally obtained successes
6. Actual needs of farming systems and their farmers: some case studies	For other developing countries than China a similar farmer differentiation will be valid, but the stories that belong to each of their income groups and rural occupations will differ and the implications also
7. The role of civil servants and NGOs in preparing farmers	For actual agrometeorological services you need applied scientists to develop them, and extension or NGO intermediaries with sufficient knowledge to establish them with farmers in their fields
8. Training of agromet intermediaries to prepare farmers as end users	The education and in service training of agrometeorological extension intermediaries is an essential part of the new approach, that appears necessary in education, training and extension in agricultural meteorology
9. Conflicts of interests in a bottom-up approach in agrometeorology	Examples from Sudan illustrate that the use of science (agrometeorology) is not neutral but a matter of policies that can lead to conflicts. What is a disaster in one place may be a blessing elsewhere (*Eucalyptus, Acacia tortilis, Prosopis juliflora*)

The full presentations have recently been made available on ResearchGate under contributions from the author presentations. See Asadi (2005) for a report and evaluation. The history of its development was given in Stigter (2015b), where also the literature supporting its presentations was reviewed.

The conclusions on the above early "Agromet Vision" RSs in local evaluations have been that these RSs as educational commitments were suitable to get extension planners and trainers aware of the necessities of further establishment and use of climate services for agriculture (e.g. Kadi et al. 2011; Stigter 2011; Tall et al. 2014; WMO 2015). This was making use of policy trends of improved services climates in rural areas for which funds appear to become available, at least in some countries (e.g. Donnges 2003). Particularly due to the sufferings related to climate change, both background RSs had relevancy to all emerging countries (Stigter 2008, 2010, 2011; Stigter et al. 2007). However, during RS question and discussion periods, gradually the need was expressed for an agrometeorological/-climatological extension approach more directly related to adaptation to climate change in a second set of RSs to be developed (e.g. Winarto et al. 2008, 2010; Stigter 2011).

Roving Seminars Focused on Climate Change

In many countries or regions of Africa, Asia and Latin America, agriculture is still the backbone of societies, economically and in creating work. Climate change hits these production areas hard (e.g. Stigter 2010, 2011) and this creates new livelihood conditions in which climate services for agriculture need a new approach (Stigter et al. 2014a, b, c, 2015). Because of this and the above mentioned developments, the early RSs gradually got company from new RSs from 2011 till 2015 that were even more directly related to the needs for adaptations to climate change.

Reaching Farmers in a Changing Climate

Our early work on awareness raising and resilience improvement related to climate change with (largely female) farmers in Gunungkidul, Indonesia (e.g. Winarto et al. 2008, 2010, 2011; Winarto and Stigter 2011; Stigter and Winarto 2012a, b, c; Stigter 2012), added a strong extension flavor to the new RS "Reaching farmers in a changing climate". The target groups are the same as for the earlier Seminars, for the same reasons of existing extension needs as explained there, and it is again not country-specific. There is more emphasis on extension agrometeorology. Stigter and Winarto (2012c) pictured extension agrometeorology as a contribution to sustainable development and defined it as agrometeorology that attends to (i) local suffering from weather and climate and persistent ways to diminish it, and (ii) windows of opportunity that (micro)climate offers "on farm". Because this fourth RS (Table 13.1) is still currently delivered, we have given the information on the contents of this RS below in a somewhat more extensive form (Table 13.4) than that of Tables 13.2 and 13.3.

Table 13.4 Some representative conclusions/recommendations in presentations of the Roving Seminar "Reaching Farmers in a Changing Climate"

Introduction to the third Roving Seminar
The introduction is based on a review of the experience from the Mali agrometeorological pilot projects on serving farmers with agrometeorological knowledge. This project concluded that the Sahelian farmer can be technically assisted to reduce climate risk for his/her production. This project has after all made the activities of the National Meteorological Service better visible. It has strengthened the credibility of meteorology with the public at large as well as with the Government Services and the political authorities of Mali (e.g. Stigter 2010). It serves as example elsewhere (e.g. Winarto and Stigter 2011).
Presentation 1. *Applied agrometeorology: addressing the livelihood crises of farmers*
Science, and not only climate change science, has a role to play. But only when acknowledging the present livelihood crises of the poor and giving priority to policy preparations and policy mandate matters related to those crises; and to science only in that context. Especially in-service trained extension intermediaries are needed between the weather products (maps, forecasts, warnings, response proposals) as well as design rules (advisories on coping with weather and climate impacts) and their rural potential clients that are vulnerable and mostly have relatively low formal education (Stigter 2010).
Presentation 2. *Coping with climate change and disasters: "Intelligence does not solve problems" (Tagore)*
What the mainstream misses is in the undercurrent of applied agrometeorology: data, research, education/training/extension and policies, used/carried out in action as priorities in the undercurrent of applied agricultural meteorology. The developments in Low External Input Sustainable Agriculture (LEISA) research of the last 20 years show what is possible if norms and values in science show a paradigm shift. A shift towards valuing the basic issues in the undercurrent: realistic assessments of the environment and considerations of the plights of poor people (Stigter 2010).
Presentation 3. *New agrometeorological services: (i) (2006–2008)*
Services based on products generated by operational support systems in which understanding of farmer livelihood conditions and farmer innovations have been used. What we need is institutionalization of science supported establishment and validation of such services. We want to get into a situation in which, in a "farmer first paradigm", livelihood problems and farmer decision-making need to actually guide the bottom-up design of actual services (Stigter 2010).
Presentation 4. *New agrometeorological services: (ii) China (2007–2010)*
A comparison of a "Climate Field Classes" approach with the "cascade" down coming of extension information in China would be a great last phase of pilot projects started. Instead of this top down teaching, bringing new knowledge to farmers should preferably be done in dialogues between scientists, extension and farmers (e.g. Stigter and Winarto 2012d).
Presentation 5. *Agrometeorology of low inputs and scarce resources: Farmer differentiation*

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Table 13.4 (continued)

A massive investment in agriculture is indeed required. This should be primarily focused on the creation of knowledge that does justice to the local variation in water and nutrient availability. It should aim to empower farmers to experiment and be innovative, and remake agricultural extension and agricultural engineering (Stigter et al. 2014b). These adaptation solutions must be distinguished for the following main categories: type of farmer (farming system); natural resource management; markets and opportunities of economic activities; institutional opportunities; additional aspects.
Presentation 6. *First connecting principle: Agroforestry & other multiple cropping as multi-functional agriculture*
Agroforestry (+ other multi-functional agriculture) connects water and fertility issues (when introduced in monocropping and multiple cropping without trees); it does so by restoring (i) biological resources and natural capital (soil fertility, water, forests, etc.); (ii) livelihoods (nutrition, health, culture, equity, income); and (iii) agroecological processes (nutrient and water cycles, pest and disease control, etc.) (Stigter et al. 2014c).
Presentation 7. *Second connecting principle: Communication*
Much of the research and development needed for less-favoured lands does not involve high science. But rather the spread and adaptation of indigenous knowledge and practical innovations. NGOs have been very successful in pursuing this agenda. They work with local communities to overcome social and institutional constraints. There is a need for more participatory ways of innovative communication to test new technologies which shall be adopted by the small farmers. Climate services for agriculture! (Stigter et al. 2014c).
Presentation 8. *Science field shops and extension agrometeorology*
There are a number of important social outcomes from extension trainings. Farmers gain self-confidence, they start to work together to solve community problems, and they develop a different relationship with local government. As scientists we are supposed to propose and prepare policies. So in agricultural and social sciences we should among others care for policies of managing the rural response to climate change and of institutionalization of that response (Stigter and Winarto 2013).

What Climate Change Means for Farmers in Africa

An even more recent RS (5, Table 13.1) is based on three recent papers (Stigter and Ofori 2014a, b, c), runs since 2013 and has only been given three times as yet (Table 13.1). It was developed specifically for Africa (Table 13.5).

Table 13.5 Some representative conclusions/recommendations in presentations of the Roving Seminar "What Climate Change Means for Farmers in Africa: Facts, Impacts/Consequences and Possible Approaches Towards Adaptation"

Presentation 1. *Part One: Introductional Facts and a Start with Looking at Consequences of Global Warming for African Farmers A: Some Introductional Issues*
The issues are: (i) global warming, (ii) increasing climate variability, (iii) more (and possibly more severe) meteorological and climatological extreme events. The basis of our approach should be: listening to the farmers concerned in a "farmer first" paradigm in a participatory approach. Scientists should basically be the connection between applied science and the actual production environment.
Presentation 2. *Part One: Introductional Facts and a Start with Looking at Consequences of Global Warming for African Farmers B: Issues of Reality*
Once the period of a few years of "Science Field Shops" is over, scientists may return to their back-up functions. Coping with climate change adaptation must this way be seen as a matter of farmers and their communities, extension (so government) and applied scientists alike. We have to look beyond "adaptation to current climate variability". We must target the basic vulnerability factors of communities.
Presentation 3. *Part One: Introductional Facts and a Start with Looking at Consequences of Global Warming for African Farmers C: Talking Consequences*
Increases in maximum temperatures can lead to severe yield reductions and reproductive failure in many crops. Maize germplasm presently available in Africa is not suitable for projected climate change conditions. The economic and nutritional arguments for the diversification of agricultural production in Africa are now joined by climatological arguments.
Presentation 4. *Part Two: Increasing Climate Variability and a Response Approach for African Farmers A: El-Niño Southern Oscillation*
The combined forces of ENSO and global warming are likely to have dramatic, and currently largely unforeseen, effects on agricultural production and food security in Sub-Saharan African countries. We need an assessment of climate-related uncertainties associated with global warming and ENSO dynamics. Difficulties in making reliable climate predictions should resort to more response farming to climate but in the end they should be combined.
Presentation 5. *Part Two: Increasing Climate Variability and a Response Approach for African Farmers B: Response Farming*
Intercropping, adapting crops, crop varieties and crop densities to the expected season, and the traditional use of trees are examples of response farming developed by farmers. To get optimal preparations, farmers get new knowledge, through extension intermediaries, backed by scientists. New response farming approaches must be built on traditional knowledge and indigenous technology, using climate science as connections.
Presentation 6. *Part Three: Climate Extremes and Society's Responses, Including Mitigation Attempts as Part of Preparedness of African Farmers A: Extremes, Responses, Preparedness*
There is projected to be an increase in the number of days with heavy precipitation, but the number of dry days will also increase. New funding should enable delivery of enough drought tolerant maize seed to benefit 30–40 million people in sub-Saharan Africa. Farmer preparedness for extremes must be raised and established on-farm in a permanent way.
Presentation 7. *Part Three: Climate Extremes and Society's Responses, Including Mitigation Attempts as Part of Preparedness of African Farmers B:Research and Policy Responses; Contributions from Agriculture in Diminishing Greenhouse Gases*
What climate change brings is not new but it is more serious, so we should respond more seriously as well. Policies aimed at promoting farm-level adaptations need to emphasize the critical role of farmers' education, provision of improved climate, production and market knowledge and the means to implement adaptations through affordable credit facilities. Soil

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Table 13.5 (continued)

carbon sequestration has a higher mitigation potential than emission reductions in African agriculture, although both may be important.
Presentation 8. *Maize and Climate Change. A Choice From What a Recent Summary Says and Some Critical Additions*
Its high yields (relative to other cereals) make maize particularly attractive to farmers in areas with land scarcity and high population pressure. The adverse effects on maize production in southern Africa by the 2030s are projected to reach 50 % of the average yield levels in 2000. The world's many cultures must adapt to the changing dinner menu forced upon them by climate change.

Three times is only a start. Several countries are in the programme outlook for the coming years. So far invariably the reaction has been that the future looked much worse than the audience expected. The author recently participated in a meeting in Nairobi of the Food Security, Agriculture and Land Section of the United Nations Economic Commission for Africa (UNECA) with a group of scientists of the World Agroforestry Centre (ICRAF) working on a new book on "Farming systems and food security in Africa: Priorities for science and policy under global change". It appears that many of such farming systems have trees that particularly combine protective and productive functions (e.g. Stigter 2015c). Knowing of these trends I last year produced the latest RS as below.

Agroforestry and Climate Change

Most recently a new RS (6, Table 13.1), "Agroforestry and climate change", was developed, based on Stigter (2015c), and tried out and then fully delivered in Khartoum (Sudan) in February 2015 and in Harare (Zimbabwe) in March 2015 (Table 13.1). Because this RS is based on a book chapter not yet published, although I handled the printing proofs, and was so far only given in 2 days RSs, Table 13.6 takes again the abbreviated form of the Tables 13.2 and 13.3.

Table 13.6 Overview of Roving Seminar 6 "Agroforestry and Climate Change" (Stigter 2015c)

Presentation	Synopsis/rationale
1. Trees outside forests	Integrating all existing and new landscape eco-systems into a complex climate adaptation-oriented resilience approach appears highly promising
2. Trees and what they change at the micro-level	A participatory approach now must supplement the more traditional aspects of tree improvement and is seen as an important strategy towards the Millennium Development Goals
3. Agroforestry and agriculture I. Interactions; II. What agroforestry provides	Quantity of nutrients provided by tree prunings is determined by production rate & nutrient concentrations of biomass, which depend on climate, soil type, tree species, plant part, tree density and pruning regime
4. What we already know about agroforestry and climate change I. Implications; II. Details	The way forward is through focusing on the ability of agroforestry to boost food production and provide benefits for adaptation to climate change
5. Recent progress and additions in agroforestry; A. Foundations to build on; B. Strategic use of climate services for agroforestry	We know that trees can: (i) enhance understorey and improve water use efficiency; (ii) increase rainfall utilisation compared to annual crops; and (iii) have a direct impact on local and regional rainfall patterns
6. C. Coping with increasing climatic variability using agroforestry; both people and trees can adapt to change on various time scales	Increasing variability in rainfall is associated with lower tree cover in moist tropical forests. Effects of climatic variability in tropical dry lands appear to depend on the balance between extreme wet and dry events, and the opportunities for trees to grow during rainy periods
7: D. Coping with extreme weather and climate events using agroforestry; disaster risk reduction can lead the way	Agroforestry improves the quality of life of farmers by increasing real-time income due to the multiple harvests and sale of products from the various components of the system so providing regular income throughout the year. Science contributes on all these fronts, particularly in its many applications
8: E. Meteorological advisories/services of weather forecasting in agroforestry; F. Developing strategies to cope with risks in and with agroforestry	It was concluded that agroforestry can be used as an effective component within a broader development strategy to help subsistence farmers reduce their vulnerability to climate-related hazards

Conclusions

Ten years of RSs organized by "Agromet Vision" for various Universities, Institutes and Organizations appear to be a recommendable training of trainers of extension intermediaries or farmers in agrometeorology and -climatology, in which long term contacts with trainers of farmers and farmers themselves is promoted. Climate services for agriculture of many kinds have been exemplified and the trainers have been comforted in their attempts to establish these services with farmers in their fields. Many examples of (agro)meteorological and (agro) climatological products have been defined and discussed for operational use by farmers under conditions of a changing climate. The future is in expansion of such approaches, but existing extension systems need to be completely overhauled and new systems need to be developed.

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