Policy paper prepared for consideration under points 7. and 8. of the provisional agenda of the Second Meeting of the Management Group of CAgM in Guaruja, Brazil, 30/3 - 2/4, 2005, by Kees Stigter (Ed.)

SUPPORT SYSTEMS IN POLICY MAKING FOR AGROMETEOROLOGICAL SERVICES: THE ROLE OF INTERMEDIARIES

To the memory of Vladimir Pervitsky (Krasnodar) and Ivan Khudenko (Kazhakstan) who showed the production advantages of using intermediaries attached to the land

In Washington I presented and explained the diagnostic and conceptual framework of Figure 1 (Stigter, 2003). Here in Brazil, where it was much supported, I want to show how training intermediaries between those delivering weather and climate products and those supposed to use them is a solution to the lack of agrometeorological services. I am only using parts of what is in the draft Chapter 1 of the Guide to Agricultural Meteorological Practices (GAMP) and one issue available on the INSAM website on funding of agrometeorological research.

1. Agrometeorological research (basic, applied and derived operational research as tools)

Basic research in agricultural meteorology is an important part of the group of basic support systems of the C-domain. Applied agrometeorological research has played an important role in developing many of the other (E1) supportive tools that we will further discuss below. However, our acknowledgement of the existence of a B-domain and the recognition of the realities of the A-domain, in which agrometeorological services have to be made supportive to the actions of producers (E2), make it necessary to also characterise another class, of "derived operational" research. In the B-domain this operational research is derived from the necessity to constructively bring together and use the three building blocks of agrometeorological services. In the establishment of supportive agrometeorological services in the A-domain, this research is derived from the necessity to get such services operational for and with the farmer communities concerned, to better prepare them for disasters.

Many suitable research findings or products based on such findings are not at all transferred to the farmer's field through extension (Stigter, 1999). Too many of the products of research lay idle and will never be used supportively (Sivakumar et al., 2000a). Agrometeorological research as a support system particularly needs constant regional, national and local prioritisation, but as long as farmers do not get benefits out of need solving extension services based on research output, the latter remains limited to E1 support systems only (Murthy and Stigter, 2004). The Accra symposium derived the following research needs (Stigter et al., 2000):

- efficiencies of the use and management of resources, including the whole production environment: climate, water, light, nutrients, space (above and below the soil surface), germplasm, biomass;

- research on agrometeorological aspects of management in agriculture at different scales for different purposes;

- validation and application of models (e.g. phenology; morphological predictions; yields), limitations of models, models for specific users;

- research methods and approaches at the eco-regional level, including the assessment of socio-economic effects of weather/climate variability on food production;

- determination of the impact of climate change/variability and matters of climate forecasting and prediction in general;

- research on the reduction of impact of natural disasters (including pests and diseases);

- consideration of ways to ensure that results of research are adopted by farmers: holistic, interdisciplinary field studies, of sufficient duration and coordination, on the operational scale;

- natural climate variability.

The new draft GAMP attempts to show how much of the above is presently already attended to and how much the present research trends should change to become better in line with the above. The wording of the above research needs also confirms the necessity of more research work in the B-domain and the A-domain. It

has been suggested that a database of sound and dependable supportive ("derived") research results should be developed by agrometeorologists in various application fields. Ongoing research programs may have to be recast by looking much more functionally into the problems and priorities for developing and organising operational agrometeorological services for specific farming systems (Murthy and Stigter, 2004). This has consequences for research funding in agrometeorology (Appendix 1).

2. Policy matters related to agrometeorology (initial and boundary conditions set by socio-economics and the environment)

All the major international conventions, to which most countries are now committed, emphasize that governments should implement policies aimed at greater sustainability (Sivakumar et al., 2000b). The various projects implemented under the WMO Agricultural Meteorological Programme covered some of the key issues in such sustainable agriculture (WMO AMP WebPages).

Policy matters when considered as tools may not be explicitly in the present terms of reference of CAgM, but one of the challenges of the Commission derived in section 1.3 (of the GAMP) was: "to fill the gaps between the producers of agrometeorological knowledge and the actual agrometeorological services in the livelihood of farmers". The framework in Appendix IB (of the GAMP, here Figure 1) was developed to show the gaps and the mechanisms to fill them. Policy matters occur twice. Under the basic support systems, basic policies should be considered to be any policy matters that foster the development and application of other relevant agrometeorological tools. The preceding sections have exemplified such tools as well as their limitations as far as farming was concerned. The optimum operational use of agrometeorological knowledge in agrometeorological services developed in the domain of the livelihood of farmers is the key function to which these tools have to contribute. Proper incorporation of agroclimatic considerations in the development of improved farming strategies requires a much longer time frame than has been used in the past (Sivakumar et al., 2000b).

Appropriate policy environments are given as one of the building blocks of agrometeorological services in the B-domain, in which initial and boundary conditions are determined for solving well identified problems in the livelihood of farmers through such services. In general these initial and boundary conditions are set by the prevailing social and economic concerns/constraints and by environmental considerations (see also the sections on resources assessments below). Norse and Tschirley (2000) worded the paradigm transformation that

technological change should no longer be driven by science but by environmental objectives and social concerns, like farmer innovations are, operating through the market where appropriate. This way knowledge should be made most operational (also Appendix 1).

Suitable policies for the determination of the most appropriate preparedness and adaptation strategies, to improve and protect crops/forests/animals, their yields and income generation, have to do with local, (biased) international and global markets and prizes as well as their manipulation. They have to do with infrastructural and other facilities (such as for education/training/extension and related to health services, see also Appendix I of this policy paper) as well as with the basic policies mentioned above. Social and environmental constraints in preparedness strategies have to be met by special policies as tools that can make those farmers that do need this most also benefit most from agrometeorological services. Without in this way changing the initial and boundary conditions in problem solving, marginal and poor farmers will remain without proper operational services geared to their particular needs.

3. Agrometeorological services

Agrometeorological services were recently defined and exemplified for our purposes by Murthy and Stigter (2004). A positive influence on management operations, through the application of weather based decision systems would be one of the most practical contributions, through Agenda 21 principles, to sustainable development. The Ministry of Agriculture, Fisheries and Food (now DEFRA) in the UK has, for example, promoted the protection of air, water and soil through the adoption of codes for Best Management Practices. The creation of an accessible database, consisting of an inventory of proven, practical techniques (including information and communication techniques) and effective agrometeorological services, would be very useful.

Presently, the proven urgent need for better on-farm preparedness (Stigter et al., 2003) is equivalent to a revival of response farming with relevant innovations. These improved preparedness strategies, for (a) the chronic deficiencies of weather, its micro-variability in time and space, and (b) more, and more serious, extreme events in weather and climate, are creating an additional and growing demand for agrometeorological services. This is again true for industrial and non-industrial countries alike, but again with very different emphases due to the very different modes of production.

Also in agrometeorological services it is a remaining challenge to define our priority beneficiaries. In most countries, there has never been any serious market research to identify potential customers of agrometeorological services, including commercial customers (Gommes, 2003). The US, where the potential user can these days get a menu of choices from private services, is one exception for the latter case. Plantations, livestock and other commercial farmers, land and ocean fisheries, banks, traders etc. might also elsewhere be in a position to pay for services and, indirectly, fund activities aimed at poorer customers (Weiss et al., 2000).

In recent years, mostly in industrialised countries, there has been a host of systems introduced which address such diverse issues as pest and disease control, livestock housing and welfare, work days for machinery planning, crop storage and drying, bespoke agricultural weather forecasts and fire risk management for range-lands and forests. The reason why there is a need to assess the economic value of such agrometeorological services is that policy-makers need to know whether such services are really useful. Since most policy-makers are familiar in making decisions based on their economical returns/values, the best approach agrometeorologists should take is to evaluate their services in terms of success, gain and profit. To do so is not easy and one needs to quantify effects but a commonly used method is the cost/benefit analysis.

Agrometeorological information/products and services need to be developed to best meet the needs of clients (Rijks and Baradas, 2000). In industrialized countries, agrometeorological information can be made easily and rapidly available to a wider spectrum of users by using modern Information and Communication Technology (ICT). Considerable agrometeorological information is now available in the websites of NMHSs. Some of the information is also accessible by telephone and e-mail. Near real-time data should be rapidly disseminated so that farm-level decisions can be made to avert negative effects of unfavorable weather and to benefit optimally from favorable weather (Sivakumar et al., 2000b).

However, we repeat that agrometeorological information and services for governments and private organizations are different from those that were developed, or need to be developed, directly for and/or by various groups of farmers. This has mainly to do with facilities and education, and therefore with absorption capacity for information and services (see also Appendix 1). In non-industrialized countries, training of intermediaries would go a long way in solving these problems for various groups of all but the richest and best educated farmers (section 1.5 of the GAMP).

4. Training, education and extension in agricultural meteorology as support systems to agrometeorological services

4.1 General

The Commission for Agricultural Meteorology continuously reviews the requirements for training, education and extension in agricultural meteorology and recommends developments in programs of higher education, programs of training for agrometeorological technicians, and at other vocational levels where agrometeorology is involved. So far it did this only sporadically and not very explicitly at the level of end-users (for example farmers in field-classes). It also encourages the development of teaching materials for use in workshops and seminars and by visiting lecturers. However, while the scientific principles are the same in all countries, the potential applications and the conditions under which they have to be used vary greatly between countries in different climates and at different stages of development. Hence this also applies to education, training and extension to put them into effect. Training programs at all levels must therefore be adapted to national and regional needs (Lomas et al., 2000). In recent operational developments this includes developing extension agrometeorology around the establishment of agrometeorological services, particularly in non-industrialized countries (Stigter, 2003).

A major responsibility of WMO/CAgM is to encourage training in agrometeorology and to assist in co-ordinating the training of agrometeorological personnel of all grades. There are requirements for training personnel at a number of levels, from carrying out well-established routines to using and developing the tools and mechanisms in section 1.4 (of the GAMP). The latter personnel works mainly in NMHSs, generating the products in agricultural meteorology that are to be used by decision makers, be it governments, private organizations or farmers. They also have to be able to develop new applications of agricultural meteorology in interaction with agriculturists. However, in non-industrialized countries they should not be the ones in direct contact with the agricultural communities. That should be the task of agrometeorological intermediaries.

4.2 Training at the intermediate level

At the intermediate level, education and training for agrometeorological extension has been proposed to be in two steps (Stigter, 2003). The first class of agrometeorological intermediaries would be close to the centers where the agrometeorological information products useful for decision-makers in agricultural production are generated. Forecasts of weather and climate, monitoring and early warning products for drought, floods or other calamities,

advisories for agrometeorological services that could increase the preparedness of the population long in advance, all have to be made into products that can be absorbed. This has to be done in the B-domain. Such extension intermediaries need a good education in farmers' needs as well as in how agrometeorology can be used in the A-domain, using information from the B-domain. They should themselves work in the B-domain, guiding establishment of agrometeorological services to support actions of producers or their advisors (E2).

The second class of (agrometeorological) extension intermediaries should be closest to the farmers and operate exclusively in the A-domain, establishing and using agrometeorological services (E2). They should learn to articulate the needs of the farmers' communities better and seek for agrometeorological components that need attention. They should match this with what is or should become available as agrometeorological services, in strong contact with the first class of intermediaries rather than with the generators of the raw weather/climate products and general advisories (E1). In this two step approach, meeting points for the two classes of intermediaries have to be created by the government and/or NGOs. The NMHSs should organize the first class, while the existing extension services, the government and NGOs should organize the second class of intermediaries and their contacts with the farmers.

4.3 Challenges

The education and in-service training (Lomas, 1999; Murthy and Stigter, 2004; Walker, 2004) of these two classes of agrometeorological extension intermediaries is an essential part of the new challenging approach that appears necessary in education, training and extension in agricultural meteorology. In spite of the efforts by WMO and NMHSs, local progress in agrometeorological support systems and services is often hampered by a lack of suitably trained personnel at all levels. This problem is particularly serious in non-industrialized countries where economic development and the level of food production depend to a large extent on the assessment of their resources through surveys and on the on-farm implementation of agrometeorological services. These assessments of resources were mentioned as tools under sections 1.4.8 till 1.4.11 (of the GAMP). Lomas et al. (2000) gave three reasons for the scant use of agrometeorological services in agriculture, of which one, the absence of economic benefits, is contradicted by much new information in Sivakumar et al. (2000a) and Salinger et al. (2004). More likely reasons are therefore the other two:

- lack of co-operation between the institutions providing information and relevant advisories and those responsible for their transfer to the farming community;

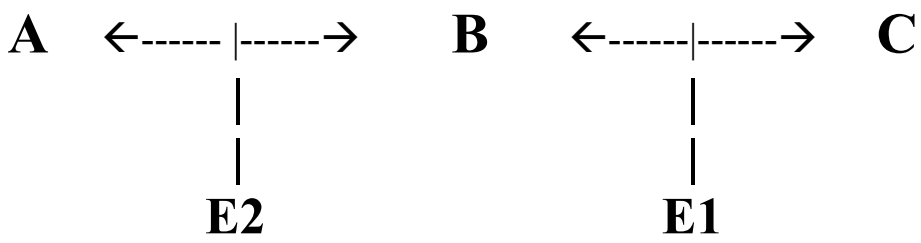
- insufficient education and training of the user community, including the farm advisory services, that provide specific agricultural advice from general weather information.

The challenge is to use the training of intermediaries to address these serious problems. The usefulness of the advice to farmers, foresters and other users depends considerably on their ability to interpret, absorb and apply extension messages intelligently. There is thus a major need for instruction in agricultural meteorology to non-meteorologists (e.g. Lomas, 1999), to create extension agrometeorologists and intermediate people that can make the existing products more client-friendly. This training could be done at institutes where advanced agricultural education is already provided or in special training courses comprising agricultural and meteorological components. These people must then also be able to deliver the agrometeorological aspects of users' training through field classes which appear to be a fruitful approach (Murthy and Stigter, 2004).

A = Sustainable livelihood systems

B = Local adaptive strategies (knowledge pools based on traditional knowledge and indigenous technologies) + Contemporary knowledge pools (based on science and technology) + Appropriate policy environments (based on social concerns and environmental considerations, scientifically supported and operating through the market where appropriate)

C = Support systems to agrometeorological services: data + research + education/training/extension + policies



E1 = Agrometeorological Action Support Systems on Mitigating Impacts of Disasters

E2 = Agrometeorological Services Supporting Actions of Producers

Figure 1. Diagnostic and conceptual framework presented in Washington (Stigter, 2003)

5. Short indications on literature used

Gommes, 2003. Agrometeorological policy between necessity and fashion. Newsletter of the European Society for Agronomy No. 25

Lomas, 1999 in the special on Agrometeorology in the WMO Bulletin 48 (4)

Lomas et al., 2000 in Sivakumar et al. (Eds.), Proceedings Accra Workshop

Murthy and Stigter, 2004. Paper presented by Murthy in Manila and available on the INSAM web site as well as on CD-ROM from WMO/FAO/PEGASA

Norse and Tschirley, 2000. Links between science and policy making. Agriculture, Ecosystems and Environment 82, 15-26

Rijks en Baradas, 2000 in Sivakumar et al. (Eds.), Proceedings Accra Workshop

Salinger et al., 2004. Proceedings Ljubljana Workshop

Sivakumar et al. (Eds.), 2000a. Proceedings Accra Workshop

Sivakumar et al., 2000b in Sivakumar et al. (Eds.), Proceedings Accra Workshop

Stigter, 1999 in the special on Agrometeorology in the WMO Bulletin 48 (4)

Stigter, 2003. Policy paper Washington meeting CAgM Management Group

Stigter et al., 2000 in Sivakumar et al. (Eds.), Proceedings Accra Workshop

Stigter et al., 2003. Opening lecture for Course on "Flood risk management", Beijing. Available on CD- ROM from ADPC (Bangkok) and the INSAM web site

Walker, 2004 in Salinger et al., 2004. Proceedings Ljubljana Workshop

Weiss et al., 2000 in Sivakumar et al. (Eds.), Proceedings Accra Workshop

This policy paper presented in Guaruja should be referred to as by
Kees Stigter (Ed.), with contributions from I. Barrie, A. Chan, R. Gommes, J. Lomas, J. Milford, A. Ravelo, K. Stigter, S. Walker, S. Wang and A. Weiss

Appendix 1

BEYOND BETTER FUNDING FOR AGROMETEOROLOGICAL RESEARCH

Kees Stigter, INSAM and Agromet Vision

When I wrote my message "Beyond Climate Forecasting of Flood Disasters" (later on worked into a paper with Das and Murthy), I used a parallel with measures proposed in Japan in preparedness for Earth Quake disasters, taken from a newspaper clipping (INSAM website: "What's new, 3-01-2004").

This time I found a striking resemblance between what an international ministerial summit in Mexico on health care had to say on "Research Funding" and the situation in agrometeorological and -climatological research (Associated Press Release, among others published in the Jakarta Post of 24 November 2004, p. 18).

"*Research is the key to reducing glaring health inequalities worldwide, but only if governments do a better job implementing long-lasting and effective policies based on its findings and communicate what works to their neighbors*". Replace "health" by "agricultural production" and apply it to agricultural research and the equality is striking and certainly also applies to research in agrometeorology and agroclimatology. Research and policies are for example interdependent parts of the basic support systems to agrometeorological services to establish "Agrometeorological Action Support Systems on Mitigating Impacts of Disasters".

However, we have earlier argued, among others in the above-mentioned "Flood Paper", that this was only an important first step. It is comparable to the first issue that the Mexico health summit sought to determine as "*ways to better urge public and private sector researchers to focus their efforts on the most deadly and harmful diseases*". In our parallel this would be a focus on the worst disasters with agrometeorological/climatological components.

But the Mexico health care summit in addition aimed to determine "*the best ways to get vaccines, prescription medications and technologies that already exist to the sick around the globe who need them most*". This is the final step to national health services that would make a difference in the livelihood of marginal people. In the same way as getting existing agrometeorological information, and research results that already exist, applied by the many marginal farmers is the final step to

national agrometeorological services that would make a difference in their livelihood.

In these processes INSAM wants to be a medium "to communicate what works to neighbors". This aim is at the basis of our contests on agrometeorological services. The way WHO was directed by the Mexico meeting to coordinate communication of what was learned to the international community, we at INSAM urge WMO on playing that role for meteorological and climatological disasters and CAgM to join us to do so where agricultural production is involved.

In that context it is also important to listen to the Global Forum on Health Research that was held in Mexico by government and NGO leaders in conjunction with the ministerial meeting. In its closing statement they said that "*simply targeting HIV and AIDS as well as malaria for more study would not slow increased death rates from those illnesses in the developing world*".

Instead, like the ministers, it called for focusing more attention to health systems and services research, saying that "*questions about access to care and* (about) *inequalities could be answered only by countries with the understanding of the full scope of health problems they face*". The parallel for agrometeorology/climatology is clear.

Simply targeting disasters like drought, floods and climate change for more mitigation research will not slow down the suffering they provoke in the developing world. Focusing more attention to research on agricultural systems and on agrometeorological services can do something on policy questions of access and inequalities also only when the full scope of disaster problems is understood.

In the released statement of the health ministers' summit in Mexico they also urged governments "*to put public health decisions in the hands of better-informed officials who are able to work with leaders on a community level to more efficiently implement findings (.....)*". This comes very close to our earlier made requests for training agrometeorological officers at the intermediate level as intermediaries between NMHSs and farmers, to more efficiently implement agrometeorological services.

Developing such training, demands agrometeorological research funding as well. Beyond mere improvement of research funding in agrometeorology there is therefore its focusing on agrometeorological services where they are most needed. Combining science with relevant policies and sustainable local technologies and strategies. This trend is already clearly visible in some recent international environmental funding (GEF etc.) approaches. It should now also be applied to the indeed better research funding that we need in agricultural meteorology and climatology.