THE CHALLENGES TO AGRICULTURAL PROFESSIONALS

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INTRODUCTION

Ladies and Gentlemen, my task today is to present some ideas on the challenges to agricultural and environmental professionals. Allow me to start by saying that I feel very honoured to have been asked to address you today. It makes me happy and proud that we now have such a large and flourishing international community here in Wageningen, which brings us so many new ideas and links us to the rest of the world.

Some kid asked me the other day whether I knew the difference between Wageningen and Yoghurt. The answer was: yoghurt has culture.

I protested. It is true, Wageningen does not have an opera house, and I do not think the average inhabitant excels in his/her interest in literature, music or modern painting. Our indigenous sculpture is a cross between a phallic symbol and a budding plant. But if you take 'culture' in a slightly wider sense, we are now a multi-cultural society. So the difference between Yoghurt and Wageningen is that Wageningen has many cultures.

When I turn to the exploration of challenges to agricultural professionals, I do so from a deeply-felt realization that my perspective on the future is strongly coloured by my own culture. That is why I will start explaining my perspective on the future as a continuation of the Copernican Revolution, so that you can assess my future for yourself. I will proceed from there by elaborating on the role of professionals in that future. I will end by using soil fertility management as an example.

Overview
- my future: continuation of the Copernican Revolution;
- what it means to be an agricultural professional in the future;
- the key to professionalism: learning;
- example: soil fertility management.

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MY FUTURE: CONTINUATION OF THE COPERNICAN REVOLUTION

The Copernican Revolution is named after Copernicus, the 16th Century Polish astronomer who demonstrated that, contrary to the Ptolemaic belief at the time, the Earth is not the centre of the universe. Instead, we find ourselves turning around an undistinguished star in one of thousands of galaxies in an immense and unknown space, a cold void which provides no comfort or security.

Since then a series of intellectual revolutions have reinforced what Copernicus started (Tarnas, 1991). Darwin showed that, instead of having been created and elected by a higher Being, we evolved from lower life forms just like all other organisms. It took us many years to accept the evidence of fossil humanoids. And even now the Dutch National Secondary School Exam never sets questions about evolution because students at denominational schools are not told about it. But of course, Darwinism and genetics are important foundations of modern agriculture.

Then Freud came. He shocked us by making plausible the idea that our behaviour is not governed by our manifest will and intellect, but to a large degree by a subconscious which has its roots in a murky animal past.

And now we are in the midst of the latest instalment of the Copernican Revolution. We once thought that we could build a body of objectively true knowledge and effective technology with which we could master our planet and control our environment. That, of course, was the core idea of the Enlightenment. We are now beginning to realize that such a body of knowledge cannot exist (e.g., Knorr Cetina, 1995). Instead, people use language to socially construct knowledge which hopefully leads to effective action. If it does not, they have to de- and re-construct. Our survival mechanism is learning. If we do not learn, we are done for. A fixed body of knowledge is suspicious, it is dangerous to depend on it.

We are in the midst of discovering that our efforts to master and control our environment are turning against us. As a result, we live in a 'risk society' (Beck, 1994), governed by great uncertainty about issues for which the stakes are high (Funtowisz and Ravetz, 1993). We realize that science and technology have greatly improved our lives, but also that they have got us into trouble. As a result we are trying to rethink how we can survive and to reformulate our paradigms and principles. But we are still largely groping in the dark, and most of our technologies, institutions and policies bear witness to the momentum of obsolete enthusiasms.

A great deal of self-renewal is going on and that makes our times very exciting. But it is by no means certain that we will be able to learn our way to a new future. If one looks at the green history of the planet (Ponting, 1991), there is little reason for optimism. We are indeed remarkable intentional and sense-making beings on a finite globe floating in a far corner of an immense space. We create opportunities for living by our wits. Our biggest problem is our greed, our biggest opportunity our ability to learn and collaborate.

That, ladies and gentlemen, is the future as I see it. As you can imagine, such a perspective has many consequences for the challenges which arise to agricultural and environmental professionals. You might well disagree with my view of the future, but I am stuck with it. So let me continue with my exploration of what it means to be a professional in that future.

WHAT IT MEANS TO BE AN AGRICULTURAL PROFESSIONAL IN THE FUTURE

We seem to have four main ways of making a living (e.g., Habermas, 1984 and 1987): technology, strategy, collective action and spirituality. Let me briefly explain each, because they are at the heart of professionalism.

Ways of 'making a living'
- technology
- strategy
- collective action
- spirituality

Technology

Especially in Wageningen, technology has always been seen as a key route to, and the core of, professionalism. Technology allows us instrumentally to manipulate causal relationships. People have been incredibly clever in devising technologies to control the environment so as to make it productive, provide protection and comfort, and remove enemies and competitors, whether other people, animals, plants or diseases.

Most of the staff and students in Wageningen are engaged in technology in one way or another. This used to be even stronger in the past. In fact, the main mission of the University used to be to develop 'the best technical means' to increase productivity and efficiency. Every problem had its technical fix. And science was the source of technical innovation. In fact, technology was, and often still is, defined as applied science. My own field was popular because it focused on technology transfer and multiplied the work of the scientist.

All in, we had a very consistent world view. The university was the top of a scientific pyramid. It was engaged in fundamental research which discovered the secrets of nature. Somewhere down the line were institutes of applied research, experimental stations and experimental farms. The farmers and other natural resource managers were the users of what we had developed. We trained scientists and technical professionals, who could be deployed along the science-practice continuum, the arena for development.

Since then a lot has happened. Wageningen still focuses on technology in many ways, and most of the international students are enroled in technical subjects. But the nature of the focus has changed. In the first place, we now realize that technology is not the only route to professionalism and also recognize professionals in such fields as economics, marketing, and participatory approaches to rural development. In the second place, a narrow technical focus has become unprofessional. The technologist has to be able to take into account socio-economic and political dimensions. In the third place, the nature of technological thinking itself is changing. Let me explain that third point.

We used to focus on simple equations which allowed us to optimize single variables, such as yield, and suppress everything else. We have realized that this approach is unsustainable. We are now dealing with complex, evolving, discontinuous, chaotic, non-linear, if not self-organizing, systems, which require adaptive management, that is, 'flexible diverse and redundant regulation, monitoring that leads to corrective responses, and experimental probing of the continually changing external reality' (Holling, 1995). In other words, the latest instalment of the Copernican Revolution is rapidly replacing simple instrumental thinking also in technical fields, especially where agriculture, ecology, natural resources and environment, our core interests, are concerned.

I see the helping society coming to grips with adaptive management as a major emergent challenge to agricultural professionals.

Strategy

The second way of making a living is strategy. Strategy is not directed at the bio-physical environment, but at other people. In the struggle for scarce opportunities, we use strategy to maximize utility in competition with others.

I still remember the time when the extension service in the Netherlands shifted from technology diffusion to 'enterprise development'. It was sometime in the early sixties. Instead of focusing on only introducing single component technologies, such as fertilizers, the task expanded to helping farmers run their farms as a business. In addition to technology, economic thinking became an important element in the arsenal of the professional. It was no longer enough to be technically competent, one had to be businesslike as well. But technical innovation remained an important condition for staying in the market place. In other words, strategy was added to technology.

Where technology leads to productivity, it leads to profit and competitive advantage. We live in a period marked by enthusiasm for liberalization and the belief that free market forces will automatically guide a society composed of strategic actors in the right direction, much like Darwin expected selective pressures to lead to the survival of the fittest.

Many have realized, however, that the market fails in a number of key areas. It does not ensure that we deal with natural resources in a sustainable manner (e.g., Van Ierland, 1996). It does not

ensure equity and poverty alleviation. It does not ensure development of the South. And it does not ensure that farmers will receive a parity income. In other words, cracks are appearing in the international consensus about the blissful effects of liberalization. I see as the second major emergent challenge to professionals the support of effective and negotiated trade-offs among productivity, competitive advantage, equity, and sustainable use of natural resources (Conway, 1994). These trade—offs will also require adaptive management, and they will require more than the manipulation of incentives through fiscal and other policies which appeal to the selfish, utility maximizing, actors thought to make up society.

Collective action

I believe we are rapidly moving into a period in which the third way of making a living, collective action, is added to the other two as an indispensable dimension of survival. Collective action is needed to deal with two major challenges.

In the first place, the collective effect of our individual activities to control the environment is increasingly seen to have a negative impact on our health and wealth. We are destroying our fishery stocks; clean water is rapidly becoming our scarcest resource; chemical pollution is threatening the reproductive capacity of organisms everywhere, including that of human males; we are losing the genetic diversity of our crops; our traffic is seizing up; our soils are degrading; our climate is disturbed, and so forth. In other words, our own activities are rapidly becoming the major threat to our way of life, if not to our survival.

In the second place, we are becoming all too aware of the fact that there are simply not enough resources on the planet to allow everyone the way of life we have developed in the North. Maintaining our share of the world's resources, and hence global inequity, is a recipe for political instability, war, and moral corruption. That moral corruption is already felt by some of our foreign students in their encounters with European immigration officials. Also in this sense, our way of life is becoming a major threat to itself.

But we have started learning how to deal with the double threat. Technical fixes are recognized to have only limited relevance to these problems. The same can be said for strategies that increase competitive advantage and profit and serve the selfish quest of maximizing utility. In fact, it is technology and strategy that have led to our predicament in the first place. That predicament is a consequence of our success in technology and strategy.

What is required now is collective action to conserve and regenerate the productive capacity of our natural resources. What is required now is negotiated agreement on what we shall call enough and on its distribution. We need to test Ghandi's famous saying that there is enough for everyone's need, not for everyone's greed. Facilitating collective action is the third challenge to agricultural professionals that I see emerging. This professionalism will, again, not replace

technology and economics, but certainly will become an indispensable part of the professional repertoire.

Spirituality

I come to the final way of making a living: spirituality. At present, the enthusiasm for collective action is just beginning to gain momentum in such areas as common property resource management, consensual approaches to conflict resolution, interactive policy development, and global equity. But during the period we are talking about, i.e., the period up to 2015, the enthusiasm for collective action is likely to develop its own cracks. We shall learn that collective action can only solve some of the problems we are facing. What's more, collective action will certainly generate problems of its own, much like technology and strategy have done.

What is beyond collective action is a bit of a guess at the moment. I mention spirituality for two reasons. One is that, in my favourite position as a gatekeeper to higher qualification, I meet young people (e.g., Van Eijk, in prep.) who are keenly interested in spirituality as an essential ingredient of professionalism. The second reason is that, if the biggest threat to our survival is our own behaviour, and if collective action to agree on more sustainable behaviour proves inadequate, then the only recourse is to change our intentionality, our greed. Then we must grapple with the question how we can be happy and fulfilled without making increasing claims on our environment. That is why I mention spirituality.

But perhaps I am totally mistaken in emphasizing it. Perhaps there is a technical fix after all, in that we shall develop electronic virtual reality to a point where we can indulge in consumption and get all our kicks without it having environmental consequences. By developing such virtual gratification for the poor, the rich would be able to continue to enjoy the real thing.

Later today, Professor Van den Bor will elaborate on some of the routes we might take. For me, it is time to draw the lessons for the more concrete challenges facing agricultural professionals. (20 minutes)

FOCUS ON LEARNING

Until some ten years ago, a professor in Wageningen had the honorific title of 'Very Learned Gentleman', a Doctor was called a 'Learned Gentleman', and the MSc a 'Nobly Sincere Gentleman'. Apart from the Queen, there was no need to take women into account. These titles signified that people who had academic qualifications were something very special, elites, and above all, experts, who could solve problems for the rest of us. There was a tremendous difference between those who were learned and everybody else, and professors allowed themselves eccentricities, otherwise only seen among nobility.

Alas, those good old days are definitely gone. Professionals can no longer operate on the basis of acquired status. The knowledge they have gained soon becomes obsolete. The life cycle of expertise is not longer than that of a new generation of computers. The diversity of problems is such that uniform solutions cannot be imposed. What is more, the people for and with whom professionals work are increasingly aware of the value of their own knowledge and increasingly educated to boot. Furthermore, they are increasingly sceptical about expert advice.

In Wageningen we have experienced this, for example, in the international courses organized by the IAC. I have been associated with them since 1970. In the course of those years, the sophistication, the level of knowledge and the self-awareness of the average international participant has continued to rise to a point where the value of what we have to offer is no longer self-evident. Instead of thinking of ourselves as experts, we have come to accept that we can at most help others to learn, and that only if we are prepared to learn ourselves.

There are a number of important consequences for professionals. The first is that instead of only knowledge as regards content, the professional will increasingly need process skills in order to understand the development and interactive processes in which he or she is involved. Such an understanding is essential for making a professional contribution.

The second is that the professional needs to be adaptive. One's tendency is to redefine problems so that they fit what one knows. But increasingly, the challenge is to adapt what one knows to the nature of the problems.

Third, our understanding of the complexity of systems and of the potential of exploiting diversity have made us recognize the need for adaptive management, as I mentioned earlier. This has far-reaching consequences. It means that we cannot, as professionals, rely on uniform solutions which blanket large recommendation domains. Instead, the natural resource managers who are our clients, whether they are farmers, foresters, drinking water company directors, food processors or others, must be looked upon as experts themselves, able to apply principles in diverse situations.

A typical example is the first principle of Integrated Pest Management: the farmer is an expert. IPM is not achieved by experts transferring rules to farmers, but by helping farmers to become experts at adaptive management themselves. From the professional this requires asks not only sound knowledge, but especially an ability to create learning situations for farmers and to learn interactively with them. Instead of FOR, professionals will have to work WITH their clients.

The last point I want to raise here is that professionals are likely to work increasingly in institutional contexts which are different from the centralized bureaucratic structures most of us have been used to. Professional values and bureaucracy have never been very compatible. But increasingly, the monolithic public structures for research, extension and other professional endeavors are being abolished in favour of decentralized networks, marketing chains, projects, matrix structures, and other shifting temporary arrangements. That implies an ability to work in teams of professionals with complementary skills and perspectives.

To bring it all together, I summarize the challenges for the agricultural and environmental situating, by saying that:

the professional has
- an ability to learn rather than a body of knowledge;
- an aptitude for adaptive management rather than a focus on instrumental control
- an orientation towards trade-off among different goals, rather than towards optimization of one goal;
- an ability to mediate collective action as a way of dealing with natural resource dilemmas, rather than a focus on technical control;
- an ability to help others become experts, rather than being an expert oneself;
- an ability to work in teams, rather than in bureaucratic institutions.

SOIL FERTILITY MANAGEMENT AS AN EXAMPLE

Let me conclude my presentation with an example. I have chosen soil fertility management, not only because it is an increasingly critical issue, but also because it is an issue about which we are learning very fast, also here in Wageningen.

Until fairly recently, soil was basically seen as a solution in which a number of nutrient minerals were dissolved. If they had been used up by crops, they needed to be replenished by fertilizers. As a result of this perspective, the focus of research was on the responses of crops to fertilizers. First this focus was purely technical: the best fertilizer dosage was the one that gave the highest yield. Later on, economic considerations led to a revised choice: the recommended dosage was based on the point of highest economic return. The yield gap between experiment station and best farmer practice was adjusted to including what was considered economic sense from the farmers' point of view.

In the field, professionals promoted the adoption of fertilizer as a component technology. At one time, the FAO had a fertilizer programme which used the slogan 'fertilizer is the spear head of development'. We have a course at the IAC, now called 'soil fertility management' which had its origins in those days. It was called 'the fertilizer course'.

The fertilizer recommendations were uniform and blanketed immense areas. One recommendation covered the entire Island of Java in Indonesia, which has a hundred million inhabitants. Even now there are organizations, such as Global 2000, which claim that the only solution to the world's food problems is the use of fertilizers. Farmers are expected to follow the recommendations of scientists and extension workers. The expectation is definitely not that they experiment themselves to figure out what is best in their circumstances. Of course, many of them do. It is interesting to

study what farmers actually do. But that was of no interest to the professionals of those days. They promoted the recommendations based on their expertise, whatever the farmers' situation.

The old approach is still with us in many ways. But things are changing rapidly. In the first place, soils are now considered much more complex than a solution of nutrients. Organic matter and its interaction with the minerals in the particles of the soil is an important source of variation. Soil life, including mycorrhiza, is considered to play a vital role in the ability of the plant to use the available nutrients. Trees are recognized for their ability to bring nutrients from deep layers and make them available to crops. Nitrogen fixation by plants and algae is an area of immense research interest. In other words, complexity, diversity, discontinuity across seasons and rotations, and other complications are now inherent attributes of soil systems. The indigenous knowledge of farmers is considered a potential source of insight into this complexity.

The economic reality is that farmers, especially the poor ones who need to feed their families from as little as a quarter of a hectare in many countries, cannot afford fertilizers. Subsidies have been removed under the impact of structural adjustment. Meanwhile soil fertility is declining rapidly, as is access to biomass.

The FAO (19**) and others (Pretty, 1995; Smaling et al, in prep.) are now engaged in developing an approach called 'integrated nutrient management' (INM) which borrows many aspects from integrated pest management (IPM). INM is no miracle cure. But it is a sophisticated approach which recognizes the need to make use of diversity and farmers' intimate knowledge of that diversity. In other words, INM depends on farmers being experts at managing their soils.

INM does not deny the potential contribution of fertilizers, but recognizes that they are beyond reach of most of the world' s farmers. Fertilizers are simply not feasible so it is no use to keep on saying that they are the only solution. Hence soil fertility is pursued by developing a basket of possible approaches, including recycling, the use of cover crops, animal-crop combinations, agro-forestry, etc.

INM poses many new challenges to the professional. He or she must be technically sophisticated to be in command of the basket of possibilities. But a key additional skill of the INM professional is to help farmers experiment, learn and become experts in their own situation. And INM does not stop at the farm level. Many of the major constraints must be addressed at the watershed, or village territory level and require collective action. The INM professional must be able to recognize and realize the opportunities which can be captured by collective action.

All in, the challenges INM poses to the professional are very different from the days when fertilizer was the core point of development. It is now more difficult to be a good professional, but also much more exciting. With that, ladies and gentlemen, I would like to conclude my presentation.

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