

Opening address

Geo-information for sustainable land management? Questions to be answered

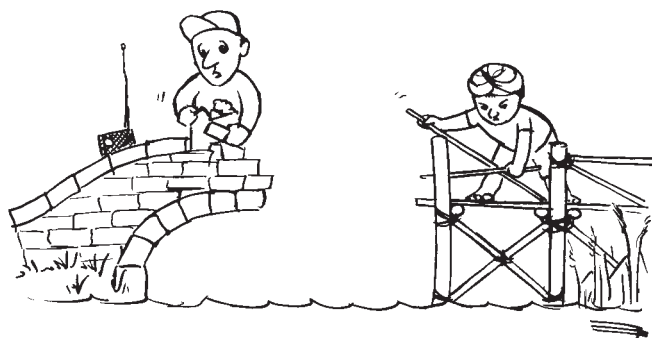
Klaas Jan Beek¹

Welcome to our conference on geo-information for sustainable land management.

When moving into this splendid new building, the ITC directorate asked each of the three scientific departments to organize a conference to allow colleagues and ITC alumni to become familiar with our new environment. Participation in this conference is limited by the size of our auditorium, and I apologize that some of you are seated less comfortably on the extra chairs. We wanted to accommodate as many as possible. Still, some 500 ITC alumni, contributing more than 100 papers, could not attend for financial reasons. We did receive generous support from several public and private institutions to sponsor 42 participants from developing countries: 24 participants were sponsored by the Ministry of Development Cooperation, the others were financed by ITC, the contractors and architects of our new building, DISH hotels, our accountants Deloitte and Touche, and Macandra Apartments.

I thank you all for your efforts to be here today, and for your willingness to share your experience with us through papers and discussions and thus widen our horizons.

Since 1950, ITC has become known for its experience in aerial survey—later called aerospace survey of the land resources. Rapid technologic and societal change made us extend our horizons from map making to geo-information production and management. Environmental concerns and the pursuit of sustainable land use systems are generating questions on how the survey and mapping community has been carrying out its business in the past and how they should act in the future. I expect that much discussion during this conference will be on building bridges:



- bridges between disciplines in the study of integral land use systems, where much is expected of the new tools of systems engineering and information technology

- bridges between the different stakeholders influencing land use planning and land management decisions.

We are fortunate to have with us participants with great responsibilities for the wise use of natural resources in their countries, including large countries such as Brazil, Canada, China, India, Indonesia, Russia and several African countries. And we are also honoured by the participation of international organizations and task managers of Agenda 21, such as FAO, World Bank, IBSRAM, ISNAR and ICIMOD, as well as Dutch institutions committed to education and research in the field of sustainable land management, such as Wageningen Agricultural University and related institutes. Many have expressed the wish to communicate their ideas on the conference themes through oral or poster presentations.

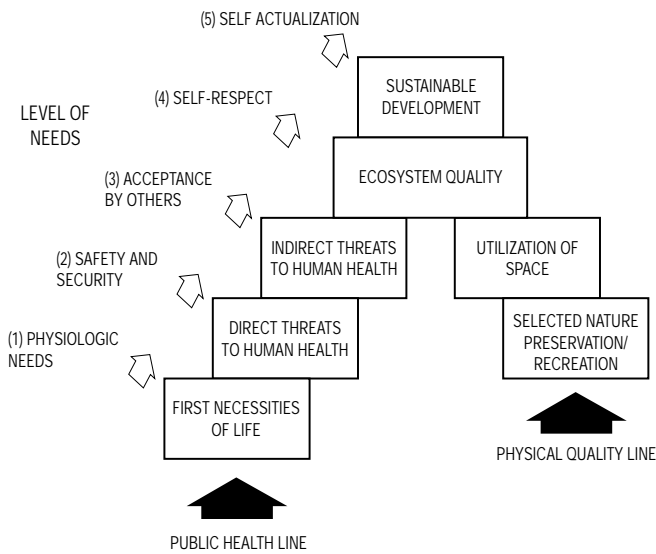
To avoid a somewhat fragmented perception of the core issues, three workshops will be held during the last afternoon. These workshops will address geo-information needs for planning sustainable land management at regional, project and farm levels. The outcome will be discussed in the final plenary session chaired by Professor J A Zinck. Now, I should like to give you a brief preview of the programme and of some issues that I believe deserve our attention.

During the first session this morning, Dr H Hurni and Dr J Dumanski will provide us with the necessary common ground on the rather vague concepts of sustainable development and sustainable land management. Clear definitions of principles, criteria and indicators should help us structure further discussions.



In the second session, several presentations will analyze the kind of geo-information that land use planners and land users really need in order to make informed decisions on sustainable land management.

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Our former Minister of Environment, Dr P Winsemius, once introduced the term “environmental hierarchy of needs” [1]. He referred to the psychologist Abraham Maslow, who suggested that in this hierarchy a person can only move to the next level of sustainability after fulfilling his/her needs at a lower level, *ie*, one step at a time. Winsemius applied this to the two most essential human needs: public health and physical environmental quality. If within a society certain categories of land use fail to fulfil needs at a lower level (*eg*, hunger is not satisfied, food security), then land use practices and the degree of sustainability are dominated by this unfulfilled need. The obvious question that arises is:

How do we incorporate the perceived needs of farmers in our sustainability criteria?



Apart from this social hierarchy of needs, Dr C Pieri will raise the question of the administrative hierarchy of information needs: when matching socio-economic information with biophysical information we are confronted with the problem of integrating the administrative hierarchy of scales and geographic boundaries with biophysical processes, which have their own scales and boundaries.

Dr F Muchena will emphasize the need for negotiating different land use options with the people at farm level, who are directly affected by a particular technologic solution for sustainable land management. He raises the question:

Where do top-down and bottom-up land use planning processes meet—if they meet at all?

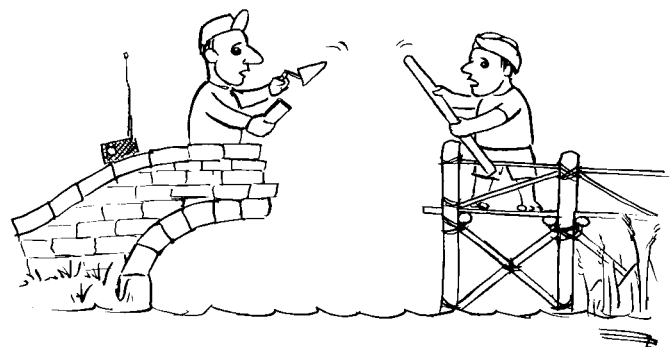


Professor P Burrough’s presentation on the effects of scale on geo-information needs reiterates that the fundamental hydro-, bio- and morpho-dynamic processes, which underlie the sustainability of most land use systems and are by implication elements of simulation and modelling of the biophysical environment, are scale-independent, whereas land use planning has also to take into account the various scale levels of the administrative hierarchy. The questions that arise are:

How can we identify the physical and economic processes pertinent to sustainable land management and how can we identify the levels of spatial and temporal resolution, and the corresponding data needed to characterize these processes?

To this, I should like to add the question:

How can we build bridges between the disciplinary models of natural phenomena and the practical integral land use planning models for management and decision support?

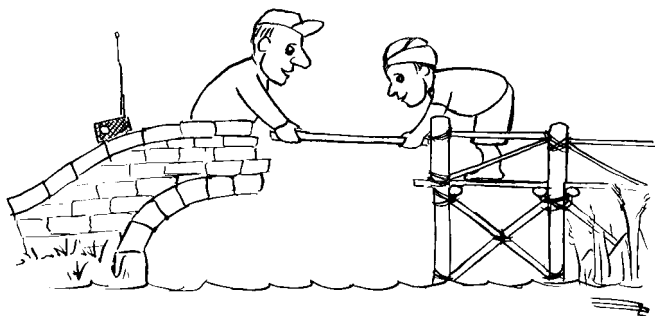


In session 3, “Land use systems approach to sustainable land management”, we again face the need to build bridges between the technology-oriented land resources specialists concerned with the systematic analysis of the present and future performance of land, represented by Professor J Bouma and Professor P Driessen, and the human-oriented (social) scientists concerned with the land user and his well being, represented by Professor N Rölöng. The question that arises is:

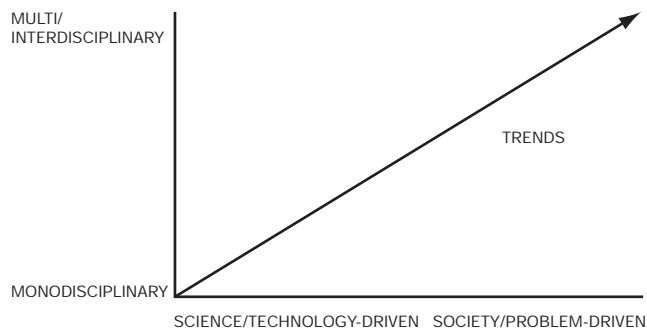
Can we reach agreement on principles, criteria and indicators for sustainable land management at different scale levels, which do justice to not only the biophysical carrying capacity of the land but also the socio-economic sustainability?

This, according to Röling, has to be negotiated, learned and agreed upon, in line with the conclusion of Muchena during the second session.

In session 4, "Integrating biophysical and socio-economic analysis", we will cross bridges that already exist between disciplines and see what has been achieved. Professor M Keyzer has had 25 years of experience in this field, and I look forward to his conclusions.



When participating in the early stages of his research, I remember that the leading biophysical scientists in Wageningen, Professor C T de Wit and Professor P Buringh, complained that economists like Keyzer of the Free University in Amsterdam (partner in a worldwide food and population study) never asked the kinds of question they were able to answer, and vice versa. I trust that much has changed for the better.



Regarding integrated studies at regional level, Indonesia embarked years ago on ambitious programmes of decentralized planning, according priorities to institutional strengthening in the evaluation, planning and management of its land and marine resource base and to the security of land titles and the social functions of land. We are fortunate that Professor J Rais (ITC Honorary Fellow in recognition of his great dedication to human resources development in these fields) and Dr S Maryudi, who have chaired many of these programmes, will share their experiences with us.

At the project level, FAO has developed a new integrated approach to land use planning—after realizing that their *Framework for land evaluation* of the 1970s had been successful mainly in small-scale agroecologic zoning and in predicting production potentials. The rea-

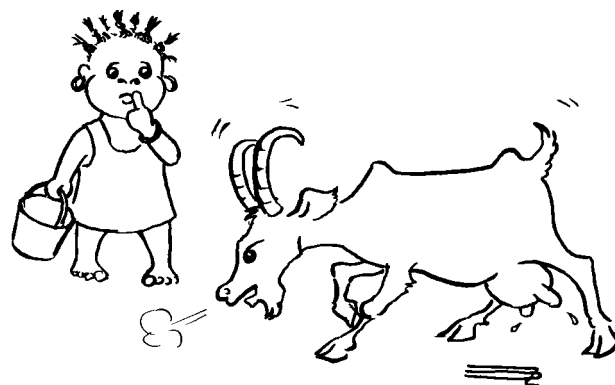
son is that land evaluation has been carried out mainly by soil scientists and agronomists.

Most publications of the 1980s showed significant advances in the development of tools such as crop growth simulation models and GIS linked with economic models. The question that bothers many of us is:

Why do farmers apply their own criteria and knowledge systems, and why are they hesitant to adopt recommendations derived from externally defined systems of land evaluation?

Several ITC MSc studies confirm this discrepancy. In the new FAO methodology, land evaluation and land use planning should be able to answer questions such as:

How can these resources be tapped by the users?



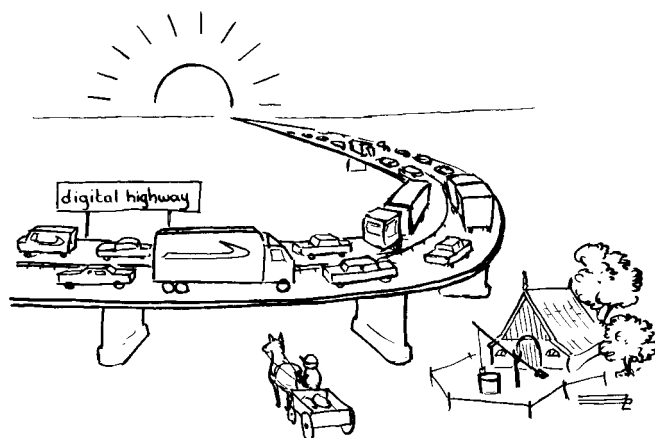
What constraints, including socio-economic and political ones, have to to be removed?

Again these are questions requiring the building of bridges between different disciplines and between different stakeholders. Mrs A Kutter of FAO will indicate how such questions can be answered, using an example from Sierra Leone.

Dr S Bie, director of ISNAR and formerly director of the FAO research division, addresses the question of how all the geo-information that is becoming increasingly available in digital form at global, regional and national levels is going to benefit individual farmers or landholders in developing countries.

He considers GIS technology to be part of the digital superhighways, which never cross villages. Therefore, not only bridges but also feeder roads will be required to cover—as Bie says—the "last mile to the farm!" Unfortunately, the last miles of most journeys are usually the most arduous ones.

How to cover the last mile to the farm?



This seems a fitting question in the sequence of problems addressed so far.

During our fifth session, "Geo-information infrastructure for sustainable land management", we attempt to create a perspective on how the information superhighway system should be developed to become an effective, efficient and equitable service to all stakeholders.

Several countries and organizations are setting up their own integrated digital (geo-)information networks, often with a top-down approach, although with varying degrees of sympathy for decentralization and customization for different types of information user. The question that arises is:

How can we overcome the institutional and administrative problems such as standardization, legislation and quality control, which are creating bottlenecks in the working of information technology?

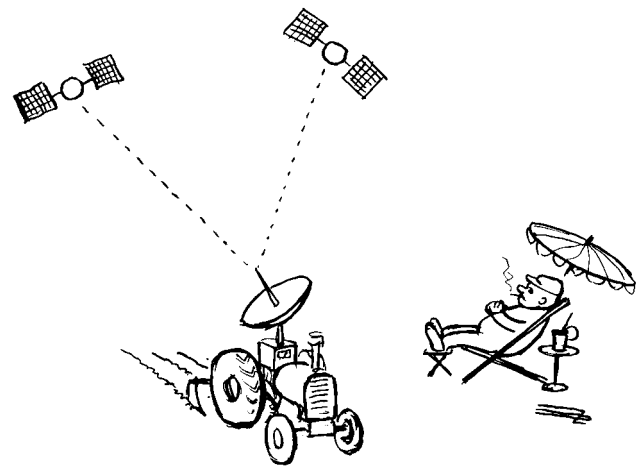
Professor R Groot will share with us his vision on geo-information infrastructure and management and its effect on the role and future products of national mapping organizations.

Dr A Ramalho-Filho, director of the Brazilian Soil Research Service, will illustrate this by presenting the initiative of the National Agricultural Research Organization EMBRAPA and his Institute in setting up the National Soil Information Service for sustainable land management. It is exciting to witness how in his organization soil scientists, agronomists and computer/information specialists are cooperating with social scientists and local farmer groups to design geo-information systems that will indeed carry the information along the last mile to the farm. A question that comes to my mind is:

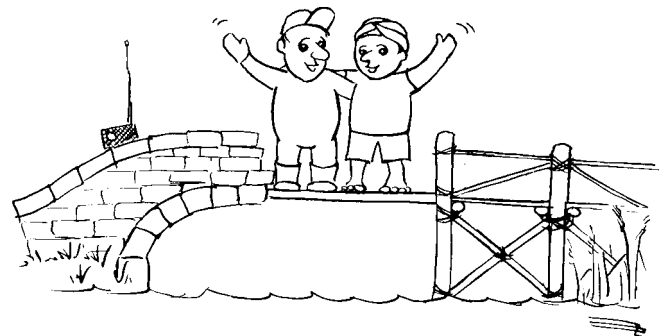
How can local people be provided with the knowledge required to collect by themselves some of the detailed field information that is so often lacking, in order to support local management and mobilize the local manpower and knowledge available, and thus free expensive specialist time for data analysis and modelling?

Finally, as you could expect at this congress, we will be looking at the perspective of promising remote sensing techniques for the innovative mapping of dynamic land use processes and the monitoring of both slow and rapid changes in land use and land cover in order to keep our geo-information up to date; this will be presented by Professor A Skidmore. The obvious question is:

How can such technology be matched, at an affordable price, with the needs of different categories of land user—from capital-intensive precision farming to irrigation schemes, forestry concessions and low capital input farming in the developing countries?



Ladies and gentlemen, we have briefly glanced through the agenda—or menu if you prefer—for the next three days. I have not yet referred to the many oral and poster presentations, which will impress you with their innovative and creative ideas. I hope that our collective effort will have some influence on the way the land resources of our countries will be managed in the future, each of us contributing in his or her own way, because, as I recently heard it formulated in Brazil: on spaceship Earth there are no passengers, only crew members.



ACKNOWLEDGMENT

To Dick van der Zee for drawing the cartoons for this presentation.

REFERENCE

- 1 Winsemius, P. 1995. Sustainable development: sustaining the pace, sustaining the planet. Presentation, Clingendael series of The Netherlands-Canada Distinguished Lectures, The Hague.

ACKNOWLEDGMENTS

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