



bulletin

International Association for Landscape Ecology

CALL FOR WORLD CONGRESS DISTRIBUTED

Material for the IALE world congress in July has been distributed directly or through the regional contacts to all members of IALE. It comprises Registration Form, Grant Aid Application, Room reservation Form, Congress Program and Call for Contributed Papers. The Application for Grant Aid has to be send as soon as possible. The Dead-line for the other application forms is 20 February, which has to be observed for economic-organizational reasons. For safety's sake we enclose the total material in this Bulletin.

If you have any questions concerning the congress, then please contact our President, Dr. Gray Merriam, Department of Biology, Carleton University Ottawa, Canada K1S 5B6, FAX-(613)-788-4497, Phone-(613)-788-3859.

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Dead-line for IALE-Bulletin Vol. 9 no. 1: 15 March.

Dead-line for IALE-Bulletin Vol. 9 no. 2: 15 May.

IALE Vice President as president for INTECOL

In the October issue of INTECOL Newsletter it is seen that INTECOL has got a new president. The previous president of INTECOL Frank B. Golley (likewise a well known and central IALE-person) has been followed by Wolfgang Haber, Professor of Landscape Ecology, Lehrstuhl Landschaftsökologie, TU München, Germany (and also a IALE Vice-President).

CULTURAL ASPECTS OF LANDSCAPE

Proceedings of the IALE-Conference of the Section Cultural aspects of landscape, Baarn, Netherlands, 28-30 June 1989. Edited by H. Svobodova. ISBN 902201018X, has recently been published. The price is Dfl. 80.00 plus postage. The book can be ordered from European Book Service/PBD, Strijkviertel 63, 3454 PK De Meern, Netherlands.

The International Association for Landscape Ecology (IALE) exists to promote interdisciplinary scientific research and communication between scientists and planners

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The IALE BULLETIN is published 4 times yearly. News items, articles comments and suggestions are welcomed.

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THE VEGETATION SCIENTIST, ECOLOGY AND THE ENVIRONMENT is the title of the valedictory address given in Enschede, The Netherlands on Friday, 15 December 1989 by the former president of IALE, Professor of Vegetation Survey Isaak S. Zonneveld upon his retirement from The International Institute of Aerospace Survey and Earth Sciences (ITC).

Isaak Zonneveld has kindly accepted his valedictory address to be issued in IALE-Bulletin.

Mr chairman,

Mr. president and members of the Board of Governors of ITC and of the Agricultural University of Wageningen,

Representatives of other Netherlands' and foreign universities,

Representatives of The Netherlands' government,

Colleagues, students and staff members,

Family and friends and furthermore all of you who do ITC and me the honour of being present today.

Giving me the opportunity to address you in this kind of ambience every 10 years seems to have become an institution. The first time was at my acceptance of this chair of vegetation survey 21 years ago, when ITC was still in Delft. The subject then was the concept of integrating the study of land for development [16].

The second time was 10 years ago when I had the honour of delivering the anniversary address of the then 28-year old ITC. I spoke about the ecological information that is necessary for applying the four main

techniques to properly manage our world to reach a desired steady state [17].

In the meantime, some of you may have been exposed to my inaugural address in Wageningen in 1982, when I explained how vegetation survey is a singular way to knowledge, and not simply a means of application [18].

This time I speak on the occasion of ITC's 38th birthday and my own 65th birthday - an event that forces me to leave 16 days from now the chair that I occupied for the last 21 years; and finally because 40 years ago today I became engaged to my wife, who has since given me all her love and support.

The subject this time is the role of vegetation scientists, the type of people I have been responsible for forming and educating, and the state of the science of ecology today, and - further - the relationship of both to the environment, the place where we live, the world. The subject of my speech after the next 10 years has to be kept secret for the time being; I should preserve some tension among this audience.

The vegetation scientist is a kind of ecologist. Esteem for ecological scientists has changed considerably during the last decades. That change is even more dramatic for those ecologists who applied their science especially to conservation activities. In the 1950s, the ecologist who made a plea for the conservation of nature and warned of the pollution created by industry and agriculture was considered to be a harmless idealist, if not somewhat dotty. In those days, we lived under the

motto of William the Taciturn: "N'est besoin désespérer pour entreprendre, ni de réussir pour persévérer" (no need to hope to undertake, neither to succeed to sustain).

During the 1960s, attitudes toward this type of scientist gradually became more guarded; they came to be considered as dangerous adversaries of development. In the meantime, the name of their science in general, "ecology", became a commonly used (even misused) word by newspaper writers and politicians.

In the meantime, however, the ecologist gradually came to be considered as someone worth listening to, just as the economists in the last half century used to dominate in political spheres. For the first time in history, politicians started to take seriously - be it still mainly verbally - general long-term ecological considerations about the environment, and were even willing to start translating this awareness into tangible budgetary facts. The famous Christmas speech of our Queen Beatrix last year, which was endorsed by our prime minister, expressed concern for not only the direct needs of homo-sapiens, but also our duty to care for the whole of "creation".

But, ladies and gentlemen, I am still just in the beginning of my speech, so there is no reason yet for you to have fallen asleep. Did you notice how many meanings I have given in the meantime for the keywords of my subject today: "ecology" and "environment"? And do you realize that the term "vegetation science" has almost disappeared (silently) from the research and education programmes of most of our Dutch universities, just as

awareness of the importance of environmental thinking - which has its most firm and fundamental roots in vegetation science - is becoming a common good?

ECOLOGY

So let us start with our subject, "ecology". Here in the academic sphere, this is nothing else but a science - as you know, the science of the relationships between living beings and their environments and on various scales. The term ecology can also be used for the type and present state of a tangible ecosystem, an area of land or landscape and its resources. For the average, newspaperman, ecology is the state of the greenness of the Earth, the general state of the environment in relation to dirt and pollution, but also the basic philosophy of a clean environment for man, the panacea to improve the world. In that context, the term may then degenerate to become the opposite of economics, which becomes the source of all evil because of its shortsightedness. This is in fact a misinterpretation of ecologism versus economism, which are ideologies, not sciences [12]. Economics is the name of a related science (in subject and name) which is also used for the state of the object, in this case "the state of transformation of natural resources into useful goods and the distribution of the resulting wealth (or lack of wealth) over the area".

The controversy between economics and ecology created by this dangerous popular language is unreal, however. Any science can be misused. Ecology is certainly not an exception. Agronomy and the medical sciences are

mainly applied ecology. A considerable part of the present so-called "environmental crisis" can be attributed to a one-sided or shortsighted (in space and time) application of agronomic and medical (ie, ecological) knowledge. The knowledge that life, including agricultural plants, needs a certain amount of water has led to irrigation and drainage practices that, in addition to tremendously increasing production, have also led to environmental destruction. Ecological research has resulted in the development of an infernal arsenal of pesticides that threaten the diversity of plants and animals. Vegetation study and other land ecological research are the basis for effective reclamation, which is often the distortion of the last remnants of virgin nature into cultivated land, with maximum production but minimum species diversity. One-sided medical (ie, ecological) activity in extending the lifetime of individuals, especially in preventing natural infant mortality (however necessary and noble it may be) but without at the same time equally effective action to reduce the birth rate, is one - not the only one - but nevertheless a major factor hampering the eradication of the dramatic injustice, the unequal distribution of wealth and welfare in the world. No, wrongly applied ecology is just as disastrous as wrongly applied, shortsighted economics, which is, I must admit, indeed a common way of applying economic science. Economics, however, should be the opposite of what it had become for the environment, especially during the era of the "waste-economy". The Dutch equivalent of economics ("zuinig", saving, if not frugal) expresses clearly the real subject of economic science: the study of the mechanism of the distribution of scarce goods (in the United States, where the waste-economy was invented, it is called the study of

the distribution of wealth). So defined, and if we include the human society in the world ecosystem [11], economics can be considered as a part of ecology in the widest sense. Indeed the names are appropriate: ecology represents the general knowledge (logos) of the household of our home (oikos); economics deals with counting (nomos) the benefits and deficiencies, but then also in a long-term environmental context and not only in a simple gross national product or comparable stone-age criterion.

You may have noticed how we apply this at ITC by combining a valedictory lecture with an anniversary address, saving masses of air pollution for the environment, half of your travel costs, quite a number of bottles of sherry for ITC and at the time honouring the speaker by giving him this special anniversary audience.

No, more than a fault of economic theory, it is the greediness of the individual man that causes shortsightedness. That greediness is not an invention of modern man. Since the dawn of humanity, man has tried to grasp as much of the environment as he could. In the past, he could not be as destructive as nowadays only because of a lack of technology, although his achievements with fire in creating savannas and deserts should not be underestimated. The stories of the noble wild man and the "ecological" primitives are mainly a product of romantics, although there might then occasionally have been - just as today - also some wise men among the irresponsible crowds.

The last, but certainly not the least of the 10 commandments of Moses is more realistic about human

greediness: "Thou shalt not covet ..." [1a]. In fact, it is one of main components of the desired ecological steady state about which I spoke 10 years ago. It is now often formulated, still with considerable covertness (greediness), in the term "sustained development" - a dangerous term if it is meant in the materialistic sense and in the belief that continued unlimited growth is really possible.

I will resist the temptation to start a moralistic sermon about the necessary control of egoism in economic behaviour. One thing, however, should be kept in mind. In addition to biological/ecological laws, we also need cultural ones to counteract excessive greediness. I will come back to that later.

ENVIRONMENT

Let us first devote some time to that fashionable concept "environment". Environment and milieu are in scientific language almost synonymous with habitat, or niche - the exclusive ecosystem of the organism at issue.

In my anniversary speech of 10 years ago, you may remember that I presented in the terminology of Chris van Leeuwen [17] the four techniques that help us survive in this world: "civil technique" to give us shelter and protection against the climatic and other hardships and inhospitality of the environment. Second, there is the "culture technique" to cultivate crops for food and fibre. Agronomic sciences, including a lot of ecology, help us here. Third, there is the "milieu technique" (environmental technique) according to van Leeuwen,

to cure and mend what went wrong by applying the first two techniques incorrectly, causing depletion, pollution, erosion and what-not. Chemistry, physics and ecology are supporting sciences here under the name "milieukunde" in Dutch, which may be translated as "environmental science" or, better, "environmental technology" [2].

Finally, there is the "nature technique", the activity of nature conservation that aims at restoring, maintaining and protecting pure natural elements for ethical reasons, including the whole gradual transitional field from ethics to long-term, more utilitarian purposes. Here environment (milieu) is clearly restricted to the "environment of man" as far as it deals with deficiencies caused by erroneous applications of civil and agrarian techniques, and with cleaning dirty water and air.

Udo de Haas stated that "milieukunde" may also include the more integrated influence of the surroundings, including the influence of biological, but not social, aspects on man [14]. In that context, environment and the environmental sciences are, in addition to care for clean water and air and the like, also a basis for the protection of nature (nature conservancy) at least as far as the utilitarian meaning for man is concerned. The boundary between utilitarian and ethical, that is between basic natural (biological) needs and the needs of man as a cultural being, is certainly not sharp, and depends on the type and level of culture he belongs to. The higher that level, the more ethical nature conservancy will be included. "Milieu technique" and "nature technique" then consequently merge.

In a certain context, the study of hazards and the consequences of certain natural disasters, "acts of God", are also included in environmental management [5]. Here it concerns processes not caused by man, but ones which he has accepted the risks of being exposed to, such as living near volcanoes, or in seismically unstable areas, or along - even below - seas that occasionally sweep over the land. The wideness of the concept is demonstrated by the way environmental departments are distributed in governmental and non-governmental structures. Environmental care is sometimes combined with nature conservancy, sometimes with health and regional planning; nature protection often with forestry and sometimes even agriculture.

Experience teaches us that antagonistic subjects should not be handled within one policy-making organization. This hampers the natural and democratic process of creating a sound balance, as occurred during the previous government in The Netherlands where nature conservation was removed from the Ministry of Culture to the Ministry of Agriculture. (Our minister of agriculture has recently renamed his department the Ministry of Agriculture and Nature Conservancy. I hope this may help.)

It is clear that in most countries with growing populations (and which developing country has not ?) nature protection and agriculture are strongly antagonistic. Forestry and nature protection also often clash. A notorious example is the infestation of the Mediterranean world, and also large parts of the tropics, with eucalyptus plantations. Outside its natural area, this group of tree species usually has a disastrous

influence on the plant and animal life if planted in forest form, not to mention the aesthetic aspects for the landscape and soil erosion that may continue underneath. Still, large amounts of money, issued for restoration of environmental damage, are nowadays invested by forest departments in plantations of this noxious plant for the sake of some short-term economic returns in the shape of poles, timber and firewood, fully disregarding the environmental damage they do.

Other money and effort labelled for environmental causes can also be disastrous for nature. An actual example of the sometimes contradictory interpretation of the word "environmental" is what I experienced during a recent fact-finding mission for technical development cooperation in the environmental sphere in India a few months ago.

"Reclamation of wasteland" was considered to be a target that could be sponsored with expertise and money from the "environmental budget". "Reclamation" as such is already an ominous word in this respect. In the Dutch language, this term is usually translated as "ontginnen", which means "destruction of the virgin state in order to cultivate it". Such activities are still quite normal in developing countries, but Dutch environmentalists will never allow the use of environmental funds for the destruction of virgin areas in this stage of the world's history. If it is unavoidable, then such undertakings should be classified as agricultural.

Wasteland can, according to the dictionary and discussions in many places in the field in India, be

defined just as the now obsolete Dutch term "woeste grond" (neither built on nor cultivated land). That term was abandoned a quarter century ago by the (for conservationists) famous Queen's speech in which the government announced that from then on, wasteland would no longer be reclaimed ("geen woeste grond meer ontginnen"). That abandonment was necessary in The Netherlands because the wastelands in our country were defined as any type of non-agricultural land including highly valuable natural areas.

And so it is in India, natural alkaline grassland, including wetlands in semi-arid floodplains usually in use as degraded communal grazing land, are generally considered as wastelands, as are the artificially created extensions of these lands that result from wasting irrigation water. Heavily eroded soils are considered as wastelands, as well as the saline, half to fully natural -be it somewhat devastated - tidal areas along the sea coast.

It is clear that this concept differs according to the cultural position of the user. Thus the judgement of a Dutch environmentalist may differ from that of an Indian farmer - and from that of the Dutch minister of finance.

Our advice was that, for example, regeneration of (semi)natural alkaline grazing land through "social forestry" - using local native species with multiple value as fodder, shelter and fuel - could be considered an environmental improvement. Reclamation through new irrigation or drainage schemes to obtain intensive agricultural land, however, would *not* be an improve-

ment. Upgrading a mangrove forest so that it can function optimally again as fish nursery, wildlife habitat and/or village fuel supply can be considered an environmentally positive action. Costs for the embankment for a new rice polder, if necessary, should not be paid from environmental funds but from other sources.

Environmental impact assessments were considered positive in this context. They can be used to judge whether the execution of a new irrigation or other land reclamation project will diminish or possibly even improve natural values. The same holds for installation of userfriendly decentralized databanks and geographic information systems to bring the knowledge for improvement actions to the grassroots, including local non-governmental agencies.

The details of this experience may give you some impression of the complexity of this field, but also how care for agriculture, nature conservancy and the environment are closely entangled. At ITC we are used to dealing with this complex of agricultural, conservation and environmental aspects. The study of the amount and quality of water, degradation of vegetation and soil, deforestation, desertification, with or without satellite and airborne remote sensing, has a long tradition at ITC. It is already incorporated in at least four of the chairs into main departments of this institute.

It is especially true of our so-called "land ecology group", the truly multidisciplinary team I had the great pleasure to guide around our essentially

interdepartmental course "rural and land ecology survey". The term "land ecology" (which also includes water) is synonymous with landscape ecology, the emerging "transdisciplinary" science [11] that is represented by the International Association for Landscape Ecology (IALE), with about 2000 members in Europe and North America and growing numbers in the "developing" world. The seat of the first president of that association was at ITC - even in the land ecology group. Landscape ecology, as a science, studies the Earth's surface as tangible ecosystems at landscape scale. It is a fundamental basis for environmental technology [2] when operating in a spatial manner.

Environmental management includes - more specifically than, for example, agriculture and range management - a legal element. Laws have to be designed that forbid doing evil things to nature and that require carrying out positive measures. This aspect should be firmly incorporated in every consulting and education project. In the last meeting of the course board of our rural and land ecology courses, we decided to start next year with a specialization "module" to teach the new generations of students the techniques and methods of environmental impact assessment. The preparations are in full swing now.

We also rather recently accepted a consulting project to design so-called "ecological (or environmental) profiles" - global descriptions of certain areas of interest for development cooperation. The development potentials and vulnerabilities of countries are being described in a general ecological

(environmental) context.

It is a good tradition that departing professors, who have anyhow been sitting much too long on their chairs [9], have no voice in their own succession or the future structure of their departments. The decision was already made that I would be succeeded by at least one vegetation scientist and one agronomist, which is already 20 percent realized. Discussions are going on as to whether an environmental kind of professor would also be needed. It is clear from the discussions so far that care for the environment is not the monopoly of one of the five existing scientific fields in our department, nor can it replace one of these fields; all are needed for the firm academic base of this institute. Environmental activities advertised under that name should be an integrated affair.

We could think about a chair of "milieu science" in addition to the vegetation science chair and the 20 percent agronomy chair that already exists. The course board of the rural and land ecology survey courses (the extended "land ecology group"), with its interdepartmental and multidisciplinary character, that I had the privilege to chair so many years, would not be the worst place to become a stronghold to continue and extend the environmental activities of ITC. Not all aspects (for example the legal ones) have to be represented in ITC itself; coordination of the characteristic environmental issues is necessary, not only within ITC but also with the other universities in The Netherlands and abroad. One thing should be clear, however: the undiluted chair of vegetation science (and its applications) should be sustained.

The responsible professor of vegetation survey at ITC should be, now and in the future, a vegetation scientist and not simply a well-intentioned milieu-activist-scientist from another biological or even chemical discipline. Neither should it be a very able agronomist who would have to delegate vegetation science to some youngsters who know that if they specialize in this field they will never become a professor.

The discipline should not be punished in this way for the tolerance, the open mindedness, the eagerness for cooperation, application and integration which are characteristic of scientists in this field. There should be at least a few places in The Netherlands where it will remain possible to study real vegetation science and its research techniques under the guidance of a qualified professor with a clear mandate for doing research in this science field. And listen well: aerial photos and other remote sensing means, manipulation of sophisticated electronic systems for statistical treatment and geographic information handling, non-destructive sampling, sequential recording - all belong to the essential research techniques of this very singular science of vegetation [18].

VEGETATION SCIENCE

Dear audience, let me tell you something about this beautiful and highly valuable science. Phytosociology, phytocoenology (let us call it here simply "vegetation science") studies - in all its aspects - that three-dimensional body of plants covering the Earth like a patchy green blanket: the vegetation.

As in any science, vegetation science has a series of basic subdivisions asking and trying to answer the questions: what, where, when, why and how. The question "where" plays a most conspicuous role in ITC, but certainly not the only one. We are contributing to the methods and techniques to answer that question [8]. Seven years ago [18] I described vegetation survey methodology as a "singular, a unique - for vegetation science, innate - way to science", not merely a method to transfer knowledge of the highly important practical applications, such as telling the burgomaster where he can find the various types of land use in his community, or telling the Japanese firm where it may find the last remnants of tropical rainforest to be exploited or conserved, or the national park manager about the vegetation pattern and its quality for the wildlife species he has to care for.

One of the most important challenges in vegetation survey is to put the question "when", the study of wanted or feared changes. Here especially is a task for real vegetation scientists to develop, handle and apply the rapidly developing new technologies.

The questions "why and how" it works concern the real ecology in the narrow sense. They are being put and answered for academic satisfaction, but no less also for the daily practice of a herdsman, a landscape planner, as well as applications for nothing less than safeguarding the future of the world, the number one environmental issue.

In this field of fundamental and applied vegetation ecology (also called syn-ecology), the integrative

character of vegetation science is clearly exposed. That aspect of integration-mindedness is its great strength and, as we will see, has also made it vulnerable as an independent science.

During the last 40 years, I have dealt more than enough with vegetation as a source of food, fiber, fodder, shelter, a stabilizer of soil and slopes, and an integrated indicator of all other environmental factors. Instead I want now to discuss some aspects of my beloved science as such and about those who "do" it - the vegetation scientists. The very good ones of these guys have some bad habits. They are usually too modest and, moreover, prefer to be in the green blanket itself, rather than lobbying in the bureaucratic corridors. Thus during the budgetary tug-of-war festivals, they get the shortest end.

Further, there are some strange and persistent misunderstandings and prejudices about our science. The most charming one is the belief that phytosociology is just a nice "hobby" for nature lovers. Indeed, I noted down this qualification from the mouth of a professor of plant ecology when I was preparing my doctoral thesis. Yes indeed, I cannot help it that vegetation and the study of it are not only useful but also beautiful. In many books on vegetation science, you can find lyrical descriptions about how beautiful the green cover can be.

The first real phytocoenological publication was *Das Pflanzenleben der Donauländer*, written by the first of my predecessors, Professor Kerner Ritter von Marilaun,

half way through the last century at the University of Vienna. It is written in beautiful poetic German [6]. It reads like a novel. But why would affection for a subject and aesthetics in the presentation adversely effect scientific quality ?

On the contrary, real scientific activity requires such total commitment of the individual that it can be optimal only if the person is fully dedicated by affection to his subject. Just mere obligation is not enough to endure all the "blood, sweat and tears" involved. How could vegetation scientists endure the killing greenhouse stickiness of the rainforest, or the torture by the flies and mosquitos in the Taiga, the infernal heat and drought of the desert, the rheumatism-initiating moist chilliness of the temperate marshlands or the disappointment and frustrations of observing so much desolate destruction of nature if he had no affection for his subject ?

Another real misunderstanding is the belief that vegetation science should be restricted to answering the question "what", which would include just description and classification. Indeed, there have been enthusiastic botanists-phytosociologists interested in taxonomy who described the vegetation properly, with due attention to the floristic composition; after having reached the stages of designing classification units, however, they lost their energy, and published square meters of paper full of tables and nicely named vegetation units, without doing further study with those building blocks.

The means for promoting vegetation science is, first of all, for the phytosociologist to become more active in

the scientific policy circuit, however boring this may be. Further, the vegetation scientist should realize that he cannot look after all the details of the research himself. Just as a field soil scientist delegates some work to the laboratory, so the vegetation scientist should delegate to the plant taxonomists and the herbarium institutes. But then, of course, those institutions should be prepared and equipped to give real service. In reality, this type of cooperation is a question of both mentality and most of all money.

In this time of privatization and no-nonsense policy in The Netherlands, we find private ecological bureaus, consulted by the government, trying to carry out vegetation surveys in their eagerness to get jobs, often with much too small budgets. A consequence is the risk that the surveyor-scientists tend to deliver below standard work unless the dedicated workers are willing to put in extra unpaid private time and effort.

Here the affection of the vegetation scientists for their subject plays a role. At the same time, however, the government executes a kind of "overcropping" of individual workers. Underestimation of the importance of the work, occasionally some lack of quality norms at the side of the commissioners, in combination with the laws of supply and demand, play a role here.

One of the necessary remedies here is to improve the education at the universities. To get better training, the Dutch universities should be given more opportunities to do free, real fundamental as well as applied vegetation scientific research, un-retouched by

non-vegetation scientists (in Dutch "betutteld"). This would continue the line that started about half a century ago, when Adriani Sissing, Diemont, Dinant de Vries, Meyer Drees, Westhoff and (in the background) in their own way also Meltzer and de Leeuw, paved the way for vegetation science in The Netherlands, with influence far beyond our borders.

This university education is needed for the sustained supply of manpower necessary for the applications in environmental and nature conservancy management in The Netherlands and also by consultants abroad. It is also an indispensable source for creating awareness by a broader group of students than only vegetation scientists of the complexity and holistic character of the landscape, where biotic and abiotic forces meet. It is an ideal means of scientifically training the student in the spatial aspects of nature, a crucial subject for cultural and political leaders of our over-populated world.

Most of all, there is the application of landscape ecology, the "trans-disciplinary emerging science" I mentioned as the basic discipline of our land ecology group and environmental management. Indeed here is also a weak point for the independence of vegetation science. In fact, the study of the relationship between vegetation and the other environmental factors is "vegetation-centred land ecology". Classical phytosociology is indeed one of the most important sources, if not the main cradle, of modern landscape ecology, after having been enriched by animal population science and geography in general. It would, however, be as wrong to dismantle soil science and hydro-

logy because they make important contributions inside the integrating discipline of landscape ecology as it would be to consider vegetation science and landscape ecology as synonymous. I have said it already many times: integration is essential, but integration is not to mix, or whip or whisk (in Dutch "klutsen"). It is to build structures of recognizable building blocks that together form a new whole. Landscape ecology is such a trans-disciplinary [8] integrating discipline - not a substitute for the ones it integrates.

The new electronic technologies create, in the meantime, fantastic opportunities for the further development of vegetation science. I still clearly remember how Dinant de Vries, not before the early 1960s, had to carry out his first (renowned) statistical treatment of vegetation data for classification, assisted by a little army of office girls equipped with hand-turned mechanical calculators, and how I followed his example using the first Zebra computer. That computer occupied an entire room, and it cost me a fortune (from my meagre budget) to do calculations that can be done now by the simplest pocket chip. Compare that with the user-friendliness of the present computer facilities, where even an average starting student can do the same in a few afternoons.

The present possibilities of all kinds of remote sensing, especially combined with sequential recording and non-destructive quantitative sampling, have opened a wide perspective for vegetation studies that by far have not been fully exploited. The technology and methodology of electronic geographic information systems, these fantastic electronic colour boxes, are opening tremen-

dously more possibilities to handle spatial material than could be achieved in the old days with real colour pencils on cracking and tearing maps with still-fading colours. Similar developments have made it possible for herbaria to make their data much more efficiently retrievable and available to users, not the least of which are phytosociologists.

One remark should still be made. There is a great misunderstanding about using remote sensing for vegetation and other land ecological surveys, and it is partly our own fault. Do we not expose most of our visitors almost immediately to our glamorous image processing laboratory, where the pseudo-magics of computer-generated psychedelic pictures are used to impress our guests? Do they not get the impression that most of the survey work nowadays is done with only these nice toys? Some of our young temporary staff members, applying for jobs elsewhere, have even been told by outsiders that it is good for them to turn back to the reality of life after all this ivory-tower technology.

Our students know better. After a few months, they realize that most land ecological study has to take place in the field, that vegetation study means to really get dirty hands and wet feet, to be exposed to all hardships of the climate, the terrain, the social and economic problems of the people living on the land that is studied - but also to appreciate the beauty and adventure of it. Remote sensing (including the unsurpassable aerial photograph), and any other modern means, is just one of the many handy tools

which it would be unwise and inefficient not to use. It is foolish to think that it could replace any aspect of direct field contact, but assessment of form and shape of the patches and systematic analyses of the patterns at any scale is highly facilitated by it. What results is an enormous savings of time and energy and the opening of new analytic possibilities not known before.

But enough, ladies and gentlemen, about my science. I may take it that I will be succeeded by at least one of my disciples as an undiluted professor in vegetation science (with of course an open eye for all the trans-disciplinary integration lines I have mentioned before), and I trust also that it will be done in narrow cooperation with the other universities in The Netherlands with whom we have already made plans for joint courses and research.

THE WORLD

Ladies and gentlemen, all that ecological work we were talking about is just a modest contribution to the fate of the world and mankind. Let us see, from the pure ecological-biological point of view, what the position of mankind is. Well, that position is magnificent. No organism, plant nor animal, has reached such a high level of development, occupying the fringes of the Earth, exerting its influence everywhere, wiping our competition from its adversaries. And still its extension is going on unlimited: "Sustained development". Of course on the fringes of its optimal habitat, there is suffering caused by sub-optimal environmental conditions, but that is, from the bio-scientific-ecological

point of view, normal - just as some creatures pollute their own habitats. Never does the full population live optimally. Look at other also very prosperous groups, such as rodents and insects. Compare them with the dreadful position of our nearest relatives among the organisms, who had their blooming period earlier, such as the Chimpanzees, or, a little bit further, the elephants, the whales. These poorest of the poor, not even able to vote for themselves, are on the point of extinction because their optimal environments do not exist any more, because they are occupied or being disturbed by that most successful mammal ... us.

This line of reasoning proves that the cries for ecologists to improve the world are not sufficient. Man is not just one of the other animals. During the history of the world, in a rather late stage, homo sapiens became a fully new type of creature with a much stronger emotional life, a much higher intelligence, but especially with something totally new: the ability to live in the fourth dimension - to remember the past and look toward the future and contemplate the sense of its existence. To quote Teilhard du Chardin [11]: "man during the universal rise of complexity/consciousness, has passed a new threshold: reflection. He does not any more belong only to the biosphere, but also to the noosphere."

This means that man has to obey cultural laws in addition to biologic/ecologic ones. These laws are not programmed by instinct; like certain biological laws, they have to be learned. Cultural and ecological laws are nevertheless difficult to unravel. Take the laws of charity and solidarity that a good observer also can

detect in many aspects of animal life. In the ideologies, philosophies and especially the dogmas and practices of all religions, we see the reflection of the aim to bring homo sapiens farther than the state of just a successful animal. After the propaganda I have provided for my own science, I would like to give you an example of how we need other disciplines, and even also prophets, to maintain our world.

The real world problem of human society is the quality of life of all individuals. A main cause of the misery is the poverty of a large part of mankind. Sociologists and economists, and through them politicians, quarrel about the causes of poverty, including the role of modern technology and industrialization, the guided economy principles of socialism, or just capitalism. There is no common opinion [7, 15, 9, 10]. The greediness of man, outside as well as inside the developing countries, certainly plays a major role here, however. Measures taken through development cooperation in joint efforts between developed and developing countries have so far had less effect than we would like, while in the meantime one striking feature is continuing in ever-increasing, devastating power: the population boom. As a simple, but culturally minded ecologist, I want to briefly call your attention to this phenomenon that, in relation to the other factors, really bothers me. At the same time, it gives me the opportunity to show how biological/ecological thinking, not alone but in combination with other disciplines, may contribute to a solution. In its simplest form, the world's misery problem can be expressed in the following equation:

$$M = \frac{N \times A}{C \times S}$$

where

- M = misery
- N = number of people
- A = destructive activity of humans (biologically and culturally)
- C = environmental capacity (ie, production function; information function; regulation function; the carrying function of the environment in the general sense)
- S = size of the living area (for the world as a whole this is a constant).

Our task as ecologists in the wide sense (agronomists, foresters, environmentalists, conservationists, hydrologists, soil scientists), concerns mainly the C and S factors. Factor A also has our attention, especially in the environmental sphere (in the narrow sense). Cultural people as we are, we try to raise the awareness of the people about their own destructive activities, as I am doing at this moment.

To reduce the misery, we are asked to contribute to the increase of C, mainly by increasing production. Consequently, the denominator of the formula will become larger. We are, however, constantly counteracted by a dramatic increase (more than doubling each quarter century) of the factor N, which is continuously enlarging the numerator.

Truly fabulous achievements in food production are

overtaken and outstripped by this never-before-experienced human birth surplus. The lowering of A, a process of legislation and education, can never keep pace with this dramatic phenomenon.

From the purely biological point of view, there is no problem. The "disease will burn itself out", says the proverb (which in Dutch is "De wal keert het schip" - the quay holds the ship). Too many people at a certain place and time will cause all kinds of misery, eventually starvation, and the equilibrium will be restored. Man, however, is too good for that; moreover, before man collapses, most of the quality of the rest of creation will also be crushed between the ship and the quay, as we now see in the example of the chimpanzees, the elephants and all the other clients of the World Wildlife Fund and Greenpeace.

The direct cause of the outrageous human explosion is improved health (so medical ecology), and one remedy is medical assistance in finding ways to prevent unwanted births or, depending on the local morals and culture, medical and ethical ways of abortion, the equilibrium factor on which Europe and Japan built their prosperity during the last century. How hypocritical it is that certain groups in these countries now withhold development funds from developing countries that want to do the same legal abortion.

A crucial point here is that the old theory - that birth reduction would automatically follow increasing prosperity, so that it would be sufficient just to stimulate some economic trigger mechanism - does not hold in the developing world of today. There, contrary to the

northern countries, the demographic boom started long before economic improvement began. Any increased economic growth tends to be counteracted by the surplus of people, preventing attainment of the level at which economic wealth could start to stimulate birth control, as it did on the northern hemisphere. There, indeed, it went the other way around. The victory over infant mortality and the general medical achievements in extending life expectancy were a result of the economic growth that in turn stimulated the medical sciences. So there was not the dramatic contest between economic level and demographic numbers.

If it were a question of food alone, then - although ecologically-theoretically possible - it is still doubtful whether practically, politically and administratively it will not be too heavy a task for mankind to feed three times as many people [10, 15].

It is, however, the quality of life of mankind and the whole of creation (or better, the Earth's ecosystem) that is at issue. I cannot imagine how with two or three times more "sustained developing world citizens" even with, according to the Bible, partly "willing spirits, but with weak flesh" [1 b] - a reasonable quality of life can be guaranteed. Imagine: (at least) three times more pollution, three times more poachers, the pressure of three times more visitors on the already too much exposed nature reserves.

Because the negative correlation between increasing prosperity and decreasing birth rate does not hold in all stages of development, stimulating economic growth

alone *without very active birth control activities* is like accelerating an airplane to reach the critical speed for take-off, and then crashing at the end of the runway when the critical value has not been reached because of a too-heavy load. At the very least, it is like trying to fill a bottomless vessel.

As everyone knows, birth control has, in addition to a medical/technical side, especially a general cultural aspect. Making people aware of the long-term responsibility of every individual is a main means. Others include women's emancipation, as such, and shifting the short-term responsibility for dependent old people from their own children to the society as a whole.

The right of every woman to deliver two children should become one of the main human rights within the next half century. Physicians and theologians, those pioneers of reflection, have a crucial task here and should become aware that they bear responsibility not only for the individual but also for society and the Earth's ecosystem as a whole.

All these activities, the purely materialistic ones as well as the purely ethical, cost money. The World Bank estimates that, to get the average birth rate in the developing countries down to 3.3 by the year 2000, US\$ 5.6 billion will be needed per annum. This is three times more than what is spent at this moment. An important NGO in this field, the International Planned Parenthood Federation, spends some US\$ 70 to 80 million yearly for this purpose [4]. The developing countries now contribute about US\$ 1.5 billion. The international assistance from the rich world is

about US\$ 0.5 billion. To reach the target, some US\$ 3.5 billion extra is required. In my opinion, this is in no way in balance with the very much higher amounts that are used for all other activities to stimulate sustained development. It must be possible to increase the contribution of the richer countries to those developing ones that want to accept it, even without much reduction of other necessary development money. Actively reducing the factor N in the numerator of my equation may well be more effective than many well-intentioned but marginal efforts to increase the C factor in the denominator.

Part of this activity is the task of what I like to call the prophets. In any period of cultural change, we need people who are able to stir the minds of the sleeping or petrified political, cultural and religious leaders, and also of the common man and woman in the forest and the street who stick to almost pure biological principles from an era when the Earth was "virgin and void" and still had to be filled with life and men, or from periods when armies were made of human flesh and mainly numbers counted.

Was it not missionaries - theologically trained prophets, pioneers of reflection - who brought a new culture to the now developing countries, introducing at the same time some of the western technical achievements, especially health improving techniques? Have they not, although with clear consciences, therefore nevertheless aided and abetted the demographic processes that now are threatening the whole of creation, including man? Is it unjust to ask the churches, the mosques and other

religious and cultural organizations for a new generation of missionaries, this time especially from the developing countries themselves, morally and financially supported by the rich countries, to include in their sermons also a plea for stability ?

Ladies and gentlemen, at the end of my career as an ecologist, I expose you to this example to show clearly that the physical bio-ecological sciences and techniques alone cannot solve the environmental crises. We need the whole ability of man, as a reflective cultural being, in all its aspects. There are clear signs, however, that the human race is coming to awareness of the fragility of our spaceship Earth. I must therefore admit that I have not yet lost hope that it may be possible to turn the fate of the developing countries in time and that the sustained development of which some people there dream may gradually lead to a more happy steady state for man and his fellow creatures of this still beautiful world.

I thank you.

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LAND ABANDONMENT AND ITS ROLE IN CONSERVATION:

INTECOL seminar held and sponsored by the Instituto Agronomico Mediterraneo de Zaragoza (Spain), December 1989.

The meeting was designed to summarize the current information available on land abandonment in Western Europe. The two main goals were to assess current knowledge on the ecological consequences of land abandonment and to examine the possibilities for interaction with socio-economists. A socio-economic seminar was held in parallel, and joint discussions were held to identify mutual interests.

In the ecological meeting, two main types of papers were presented.

1) *Land abandonment in the context of the rural landscape*, these papers cover a range of examples of abandonment in Spain, France and Britain. In mountain areas, in the south, large areas have been abandoned because of socio-economic factors, whereas in the north, only small fragments have been left.

2) *Land abandonment as a process affecting biological organisms*, the process of abandonment is of interest to many ecologists as it involves both principles and ecological concepts. The papers draw examples from a variety of situations in Europe and demonstrate the challenge for ecological interpretation. A range of different biota are

covered, from plants to invertebrates and birds.

The conclusions reached, were mainly concerned with the ecological principles involved. These stimulated suggestions for future research to test the hypotheses proposed. In particular the spatial and temporal scales of study are considered critical, as the effects of abandonment differ at the field and landscape level. For example a field in a landscape can be abandoned whilst intensification takes place elsewhere. Similarly, the ecological succession following abandonment can, in a short term lead to a reduction in biodiversity, but, in the long term, eventually lead to an increase at the regional level. Other principles, such as the change in landscape grain size and the loss of environmental control were also discussed. Finally, the central role of socio-economic factors in the initiation and duration of abandonment was recognized, as was the urgent necessity of cooperation between ecologists and socio-economists.

The papers and the discussion will be published in a special issue of *OPTIONS MEDITERRANEENNES*, available from IAMZ, Apartado 202, 50080 Zaragoza, Spain.

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- Contact: Administrative Secretary, BOU, c/o British Museum (National History), Tring, Herts HP23 8AP, UK
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20-24 May 1991
- First European Symposium on Terrestrial Ecosystems: Forest and Woodlands
- Contact: P Mathy, Commission of the European Communities Directorate-General for Science, Research and Development, 200 rue de la Loi, 1049 Brussels, Belgium
- Ottawa, Canada
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- World Congress of Landscape Ecology
- Contact: H G Merriam, IALE Congress, Dept of Biology, Carleton University, Ottawa, Ontario, Canada K1S 5B6
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- Wildlife 2001: Populations
- Contact: Dale McCullough or Reg Barrett, Dept of Forestry and Resource Management, 145 Mulford Hall, University of California, Berkeley, CA 94720, USA
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