Volume 9 no.1. May 1991

iale bulletin

International Association for Landscape Ecology

IALE-MEETINGS

IALE World Congress of Landscape Ecology 1991

Ottawa, Canada, Carleton University 21-25 JULY

PROGRAM (as of March 10, 1991)

Registration:

Sunday, July 21 13.00-17.30

Monday, July 22 to Wednesday, July 24 08:00-17.30

Thursday, July 25 08:00-13.00

Sunday, July 21

14:00
Workshops:
workshop leaders:

(3h) Landscape ecology courses and training programsB. Ingram (Canada)

Interactions of landscape andculture Z. Naveh (Israel)

Current development of landscape ecology in Asia I.S. Zonneveld (Netherlands)

LIST OF CONTENT:

NEXT NUMBER:

New Statutes for Iale?

Tadeusz Bartkowski: Working group on urban ecology - Past, achievements, future.

19:00

Keynote Address & Public Lecture/Opening Reception

The Landscape Ecology of Hydroelectric Impoundments/Andy Hamilton (tentative)

Rawson Academy of Aquatic Science & the International Joint Commission Ottawa, Canada

Monday, July 22, 1991

09:00

Plenary Lecture I: The Landscape Ecology of Rivers/Henri Décamps

Conseil national de recherche scientifique, Centre d'écologie des ressources renouvelables, Toulouse, France.

10:30Contributed Paper Sessions I-III

(1.5h)
Poster Session I

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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13:30

IALE Symposium I: Time and Space Dynamics of Realistic Metapopulations (3.5h)
organizer Paul Opdam (Netherlands)

Speakers: J.A. Wiens (USA), B. Enoksson (Sweden), D. Saunders (Australia), J.D. Brawn (USA), J. Verboon (Netherlands)

IALE Symposium II: Land System Processess in Regional Landscapes
organizer: Michael Moss (Canada)

Speakers: D.M. Sharpe (USA), V.Meentemeyer (USA), A.R. Hill(Canada), J.T.de Smidt (Netherlands), L.Ryszkowski (Poland)

17:00

CSLEM Annual General Meeting

US IALE Annual General Meeting

19:30

US IALE Banquet

20:00

Forum for Future Forests

organizer: John Middleton (Canada)

Tuesday, July 23, 1991

08:30

Colloquium I: Forest Management Policy and Forest Landscapes

(3.5h)
organizer: Thomas R. Crow (USA)

Speakers: V.H. Dale (USA), N.E. Mitchell (New Zealand), W.C. Zipperer (USA), K. Sjöberg (Sweden), A.H. Perera (Canada), D.A. Perry (USA), B.J.Danielson(USA), M.L. Rosenzweig (USA)

(1.5h)

Contributed Paper Session IV

10:30

Contributed Paper Session V (1.5h)

Poster Session II

13:30

IALE Symposium III: Regional Ecological Risk Assessment (3.5h)
organizer: Carolyn T. Hunsaker (USA)

Speakers: P.H. Duinker (Canada), C.H. Flather (USA), R.H. Pulliam (USA), C.T. Hunsaker (USA), H. Sverdrup (Sweden)

IALE Symposium IV: Buffer Ecosystems and Matter Recycling in AgriculturalEcosystems
organizer: Ulo Mander (Estonia)
Speakers: D.L. Correll (USA), A. Krug (Sweden), U. Mnder (Estonia), K.F.Schreiber (Germany), W. Bleuten (Netherlands)

17:00

IALE Business Meeting

20:00

IALE Mixer

Wednesday, July 24, 1991

08:30

Colloquium III: Incorporating Landscape Ecology into Conservation Plans (3.5h)
organizer: W. Bert Harms (Netherlands)
Speakers: P. Angelstam (Netherlands), R.G.H. Bunce (UK), R.R.T. Forman (USA), B.H. Green (UK), W.B. Harms (Netherlands), M. van Buuren (Netherlands)

Colloquium IV: Implications of Social

Perceptions for Landscape Integrity
organizers: James F. Thorne & Joan L. Nassauer, (USA)
Speakers: J.F. Thorne (USA), F. Burel (France), J. Patocka (Czechoslovakia), F. Luz (Germany), J.L. Nassauer (USA)
(1.5h)

Contributed Paper Session VI

10:30

Contributed Paper Session VII
(1.5h)
Poster Session III

13:30

IALE Symposium V: Land Abandonment in Rural Areas
organizer: Almo Farina (Italy)
Speakers: E. Del Amo (Mexico), J. Primdahl (Denmark), A.I. Anaya Lang(Mexico), I.S. Zonneveld (Netherlands), J.M. Hartman (USA), A. Farina (Italy)

IALE Symposium VI: Effects of Fragmentation in Boreal Landscapes
organizers: Lennart Hansson & Per Angelstam (Sweden)
Speakers: P.A. Esseen (Sweden), P. Angelstam (Sweden), R.A. Ims (Norway), D.A. Welsh (Canada), M. Hunter (USA)

17:00

IALE Social Evening

Thursday, July 25, 1991

09:00

Plenary Lecture II: Landscape Ecology as the Basis for Conservation Planning, Paul Opdam, Research Institute for Nature Management, Leersum, The Netherlands

10:30

Contributed Paper Session VIII
(1.5h)
Contributed Paper Session IX

13:30

Colloquium V: Landscape Ecology of Acid
(3.5h)
Precipitation in Canada
organizer: Robert Hélie (Canada)
Speakers: R. Hélie (Canada), M. Sioh (Canada), T.A. Clair (Canada), P.A. Arp (Canada), P. Blancher (Canada)

Colloquium VI: Ecological Basis for Management Regions at Meso Scales
organizer: Orie Loucks (USA)
Speakers: O.L. Loucks (USA), M. Grandtner (Canada), D. Albert (USA), D.H.-S. Chang (China), G. Smalley (USA), J.Baudry (France), G. Francis (Canada)

17:00

Adjournment

After the Congress 6 Trips will be arranged:

1. Moosonee, boreal,
879 $
26 July-1 August

Forest landscapes of Ontario

2. Obabika, canoe,
750 $
27 July-2 August

Pine ecosystems and Obabika Lake

3. Niagara, landuse,
250 $
25-29 July

Niagara escarpment landscapes

4. le Haut-Saint-Laurent,
75 $ 26 July

A long-settles rural landscape

5. Gatineau forests,
10 $ 26 July

Unmanaged deciduos forests

6. Gogama, southern & boreal forests,
42 $ 26-30 July

Research stations and wilderness

WORKSHOPS

THE IALE-WORKING GROUP ON ECOLOGICAL INFRASTRUCTURE - A REPORT

Ecological infrastructure was born as a concept in the early eighties in the realm of discussions on the application of the MacArthur & Wilson dynamic equilibrium concept for oceanic islands to mainland fragmented habitat. Its place of birth was a governmental organization for landscape planning. Its meaning in ecological terms is probably not very clear, but refers to the spatial characteristics of the distribution of habitat fragments over the landscape which are relevant to the long-term survival of fragmented populations in more or less isolated, but suitable patches of habitat. A sketch of the field the working group wants to cover was given in the IALE-bulletin Vol. 3 no. 1 (August 1985) The main key-words are fragmentation of landscapes, size and isolation of habitat patches, corridors and barriers in the landscape affecting dispersal, metapopulations, metapopulation dynamics, significance of dispersal in spatially structured populations, landscape planning. Please note that studies on the individual level, on the population level as well as on the community level are relevant, that population genetical aspects are important as well, and that we need both empirical and modelling approaches and fundamental as well as applied studies.

The working group was initiated in Roskilde in 1984, and firsthad a meeting in Münster 1987. The composition of the group isvariable. This report comes after a few years of inactivity, but I still feel that a IALE-working group can act as a platform toinform each other about current research and to exchange and discuss ideas. In this issue of the IALE-bulletin you will find both of them.A letter was sent to 35 addresses where I thought people were active in research within the field of the working group. As a result, you will find 12 reports on current research which give some idea of what is going on, but which are by no means complete.

A second part of this report contains a discussion paper on strategies in landscape planning by five persons who attended the working group meeting in Münster. It was completed two years ago, but is still waiting for an opportunity to be published.

In July 1991, the next IALE world congress will be held in Ottawa, Canada. There will be a symposium on metapopulation dynamics in fragmented landscapes (in various parts of the world), and the working group will have the opportunity to meet once or twice. I received a few suggestions for

topics to discuss, but I have not yet made up my mind on the organizationof a workshop.

The secretary,

Dr. Paul Opdam

Head Department of Landscape Ecology

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SUMMARIES OF CURRENT RESEARCH PROGRAMMES AND PROJECTS ON ECOLOGICAL INFRASTRUCTURE AND RELATED TOPICS

Lennart Hansson (et alientes). Dept. of Wildlife Ecology, Swedish

University of Agricultural Sciences, P.O. Box 7002, S-750 07

Uppsala - Sweden.

REMNANT HABITAT IN PRODUCTION LANDSCAPES

This is a research programme directed and funded by the Swedish Environmental Protection Agency. Fragmentation of taiga forests as well as landscape changes affecting deciduous forests and traditional agricultural environments are examined with regard to the effects on community composition and integrity, population persistence and genetic diversity. Vascular plants, mosses, lichens, molluscs, insects (Coleoptera, Hymenotera, Lepidoptera), amphibians, birds and mammals are study objects. The analyses are performed by regional and local surveys, field experiments and mathematical modelling. Metapopulation structures and dynamics are considered in a very wide sense and matrix effects are emphasized. The results are used in conservation, including management of nature reserves and separate species.

Period: 1989-1994. Number of man-years involved in 1990: 14.

Berit Martinsson. Department of Zoology, Uppsala University, Box

561, S-751 22 Uppsala and Grimsö Wildlife Research Station, S-770

31 Ridderhyttan, Sweden.

EFFECTS OF FOREST FRAGMENTATION ON THE POPULATION DYNAMICS OF THE-BLACK GROUSE

I am studying how an organism with a narrow habitat niche, the black grouse, is affected by forest fragmentation. The study area, Grimsö Wildlife Research Station, is situated in south-central Sweden, in the boreal forest totally dominated by modern forestry. These are distributed in the landscape as patches and due to their size, quality and isolation some patches are sources and others are sinks (Pulliam 1988) for this species.Censuses conducted during a 15 year period in large and small habitat fragments show that numbers in large fragments vary little in density between years

but those in small fragments fluctuate greatly. The small patches are probably dependent on the immigration of birds from the larger fragments. The aim of this study is to:

- document the dynamics, in time and space, of the occurrence of black grouse cocks in a landscape (130 km2) with a dynamic mosaic of forest stands of different size and age

- compare abundance, composition of the population, and the production of black grouse in patches of different size and age

- to study colonization- and extinction processes in patches.

Period: 1988-1992. Number of man-years involved in 1990: 1.5.

Henrik Andrén, Grimsö Wildlife Research Station, S-770 31,Riddarhyttan, Sweden.

EFFECTS OF STAND SIZE AND ISOLATION IN MANAGED BOREAL FOREST ON RED SQUIRREL AND TITS

The aim of this project is to study how organisms with different dispersal abilities (non-flying vs. flying) but with similar area requirement (10-20 hectares) are affected by forest fragmentation (stand size and isolation between stands). Stand size varies between 0.5 ha and 500 ha of coniferous forest and maximum isolation between stands is around 600 m. The study is performed in south-central Sweden, around Grimsö wildlife research station, in a forest landscape that is intensively managed for pulp and timber production. Species that I study are red squirrel and tits (crested tit, willow tit and coal tit). The effects will be studied both at a population level (present-absent data and density indices) and at an individual level (radio-marked squirrels and colour-banded tits). At an individual level I will focus on habitat utilization. The use of corridors is of special interest. Finally, I will study the effect of different proportions of old forest in the landscape on the spatial distribution of species. At high proportions all stands are connected to one another, while isolated stands will occur below a certain proportion. There is probably a threshold where the habitats in the landscape break down to become isolated from one another that influences the spatial distribution of the studied species. This will be studied by inventories in landscapes with different proportions of old forest, by simulations and by following an area where forestry has become more intensive over the years.

Period: 1989-1992 (?) Number of man-years involved in 1990: 1.5.

Peder Agger, National Forest and Nature Agency, Slotsmarken 13,

2970
Hoersholm, Denmark

HABITAT NETWORKS IN AGRICULTURAL AREAS AND STRATEGIES FOR NATURE-MANAGEMENT

Developments in the patterns of small uncultivated habitats ("smallbiotopes") in agricultural landscapes are studied and the results are sought implemented by integration in overall strategies for nature management inDenmark. Patterns of small biotopes are currently

being monitored in 30 selected landscapes as a part of the national farsighted nature monitoring programme on which I am concentrating in these years.

Period: Each 5th year from 1981

Man-years involved in 1991: 3:

Paul Selman & Nigel Doar,

Environmental Conservation and Development Unit,

Department of Environmental

Science, University of Stirling, Stirling, FK9 4LA, Scotland

LANDSCAPE ECOLOGY AS A BASIS FOR STRUCTURED FARM WOODLAND PLANTING

This project investigates the applicability of principles derived from Continental European and North American literature to the planning of new wooded landscapes in the U.K. Theoretical aspects of landscape ecology are considered in conjunction with the practicalities of woodland planting and socio-economic factors in an area of Central Scotland. Computerised G.I.S.-based plans based on measures of hedgerow & wood network connectivity and circuitry are being produced for two study areas. Problems associated with such planning are being highlighted and requirements for future research are being identified.

Period: 1989-1990

Number of man-years involved in 1990: 2.

Jon Marshall

Institute of Arable Crops Research

Long Ashton Research Station

Bristol

B518 9AF

U.K.

PLANT AND INSECT DISPERSAL WITHIN AND BETWEEN SEMI-NATURAL AND CULTIVATED HABITATS (FARMLAND ECOLOGY PROGRAMME)

The roles of semi-natural habitat in arable agriculture, as sources of weeds, pests and disease, for species conservation and their potential contribution to integrated pest management are being examined. Studies are made of the movement of plant and insect species, especially from hedgerows, into and within cereal crops. Population dynamics of particular plant and insect species, notably carabids, spiders and aphid parasites. Seed movement studies are aimed at population and spatial dynamics models. The role of dispersal in maintaining individualpopulations and species diversity is being examined in experimentally created mosaics of semi-natural vegetation in a matrix of cereals (and vice versa). Major factors are patch size, dispersal distance and distance from established habitat.

Period: 1986-1994. Man-years in 1990:6.

Michael Kozakiewicz and Alekay Lukowski.

Department of Zoology and Ecology Faculty of Biology

Warsaw University

Ul. Krakowskie Przedmiescie 26/28,
00-927 Warsaw, Poland

The project concerns the effects of habitat fragmentation and anthropogenic pollution on populations (metapopulations) of selected species of invertebrates, birds and mammals as well as on interspecific interactions. Two regions different in level of pollution, intensity of agriculture and industry management, and the type of habitat mosaic (especially fragmentation) are selected for studies. The most important areas of investigationare:

/1/ problems of ecological function of edges of habitat fragments,

/2/ problems of ecological consequences of different types of spatial activity of species in relation to habitat fragmentation and pollution.

Both empirical and modelling studiesare employed. The results can be used in spatial planning and practice of landscape protection.

Period: 1991-1994. Number of men involved: 17.

Jan Szyszko

Department of Zoology, Agricultural University of Warsaw

02-528
Warsaw

Rakowiecka str. 26/30

Poland

DYNAMICS OF POPULATION SIZE AND DEVELOPMENT OF THE BIOCENOSIS

In accordance with the theory of "spreading of risk" (Den Boer 1968), which predicts that heterogeneously composed populations, in which subpopulations fluctuate asynchronously in numbers, have a better chance of surviving environmental changes thanhomogeneously composed populations (where subpopulations fluctuate in parallel), it is suggested that in some lower states of development of the biocenosis the populations of the samespecies are more heterogeneously structured than in more highly developed ones. Because of that they might be more resistant to destruction than populations of the same species included in a more highly developed biocenosis (Szyszko 1983, 1986). This would imply that for some species the development of the biocenosis would be accompanied by a development from initially heterogeneously composed populations with an overall good chance of survival and relatively small overall changes in abundance towards homogeneously composed populations with wider fluctuations in number and a higher risk of dying out.

Paul Opdam

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3956
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ECOLOGICAL PROCESSES IN FRAGMENTED LANDSCAPE

Metapopulations of plants, mammals, birds, amphibians, ants and carabids are studied in a largely agricultural landscape with scattered fragments of woods, heathland and marshes, ranging in size between 0.1 and 500 ha. Empirical and modelling studies are integrated, covering both landscape and regional scales. Most projects are aimed at spatial analysis of species distributions in relation to spatial configuration of habitat patches. Others are focused on negative effects of disturbances in the edges of fragments, on dispersal movements through the landscape and at validation of metapopulation dynamics predicted by simulation models. The results are used in spatial planning.

Period: 1986-1993. Number of man-years involved in 1990: 10.

Francoise Burel

Laboratoire d'evolution des Systèmes naturels et modifiés

Université de Rennes

1. Campus de Beaulieu

35042
Rennes Cédex

France

LANDSCAPE STRUCTURE AND SPECIES DISTRIBUTION PATTERNS

Plants, carabids and small mammals are studied in landscapes characterized by networks. Network elements are either hedgerows or dykes, road sides, in an intensive agricultural area. Landscape structure is analysed using a multiscale approach. Time is also taken into consideration considering that there is no equilibrium in fast changing landscapes. Dispersion is studied for carabids by capture-recapture experiments and landscape simulations.

Marc-André Villard

Dept. of Biology

Carleton University

Ottawa

Ontario

Canada K1S 5B6

SPATIO-TEMPORAL DYNAMICS OF FOREST BIRDS IN AGRICULTURAL LANDSCAPES

This project aims to identify the critical aspects of woodland configuration related to the persistence of forest birds in farmland. Patterns at the species assemblage level were examined for an array of forest patches widely interspersed in the study region. This allowed us to identify four target species, all neotropical migrants, which have intermediate requirements. Spatio-temporal variation in the distribution of these species is analyzed at the landscape scale (here, 100 km2), while temporal variability in the occupancy of individual patches is also examined in the context of metapopulation and source-sink models.

Period: 1987-1991 Number of person-years involved in 1990: 1.5.

Gray Merriam. Dept. of Biology,

Carleton University, Ottawa,

Ontario, Canada K1S 5B6.

Gray Merriam and colleagues in his laboratory are doing the following research which includes aspects of landscape infrastructure in Ontario farmland.

1. Interactive use by the mouse, Peromyscus leucopus, of wooded fragments and anthropogenic infrastructure elements such as wooded fencerows, and the anthropogenic matrix of crop fields
(John Wegner and G.M.).

2. Use of wooded fragments and fencerows by a hibernating, burrowing Sciurid, Tamias striatus, which does not use the matrix of crop fields but does use infrastructure throughout the entire landscape (Kringen Henein and G.M.).

3. Comparable models for the two species in the same landscape will be paramaeterized from 1. and 2. to predict relative metapopulation success as dictated by the difference in behavioural response to anthropogenic modification of the landscape structure.

4. Comparison of edge of wooded fragments with wooded fencerows in terms of plant species, vegetation structure and responses of plant species form forest interior, edge, and field planted, as phytometers, in transects across both types of edges (Ron Fritz and G.M.)

5. Test of the hypothesis that patterns of genetic change in P.leucopus do not show edges of genetic populations, as seen in mitochondrial DNA, except where gene flow is interrupted by very large barriers such as the St. Lawrence River (Etsuko Tsuchya andG.M.)

6. Measurement of genetic variation in sugar maple (Acer) in patch populations, isolated for 150 years in farmland, compared to unfragmented forests by electrophoretic comparison of leafproteins (Andrew Young and G.M.).

STRATEGIES IN LANDSCAPE PLANNING - A DISCUSSION PAPER

P. Agger, H.J. Mader, M.McDonnell, A. van Selm, D. Verkaar.

During the meeting of the IALE working group on Ecological Infrastructure on 22 July 1987, Münster (FRG) four discussion groups have been formed. In this contribution the discussion group II ("General theory") reports on the results of its discussions.

Aims

All members of discussion group II are inhabitants of western, generally densely populated countries with a well-developed agricultural system with high yields and with extensive urbanization and industrialization. This situation has definitely influenced the views of the group and thus the approaches presented here might be confined to this part of the world only. In other parts of the world other models may be more appropriate. The main objective of the strategies presented is to preserve nature, whatever it may be (species, populations, communities,

landscapes), notwithstanding the heavy pressure of human activities of various kinds. So far, it has seldom been described which nature should be preserved, although there are a few examples where the aims are clearly defined.

The situation in agricultural areas: constraints

To describe the background for the need to develop strategies of nature conservation in western countries, the Danish situation is given as an example: The context is a situation where several years of increasing environmental problems in the agricultural sector call for solutions. At the same time a decrease in production can be foreseen because of several years of overproduction in the Common Market. These problems are similar in many other countries but are especially acute in Western Europe. In Denmark, for example, the situation is further characterized by:

a) Serious water pollution problems, resulting from the heavy use of nitrogen as fertilizer, have already spoilt a significant part of the groundwater resources (on which the water supply in Denmark is almost 100 % dependent).

It has also caused problems with eutrophication of fresh water, and even the sea, with heavy oxygen deficit in the bottom water and fish death in extended areas.

b) Agriculture is in intense structural change. The number of farms has gone down by more than 50 % since 1950, and the average farm size is now 30 hectares. In the same period specialization has increased. The former dominant mixed farming with pigs, cattle and crops on the same farm disappeared rapidly (today less than 1/4). The decrease in the number of farms having cattle (and consequently pasture land) is particularly important in the present context.

c) The fairly intensive agricultural use of the landscape leaves hardly any remnants of former natural areas and habitat islands (hedgerows, ditches, marlpits, spinneys). In Denmark they make up only 2-4 % of the area in the agricultural landscape (which totally covers 2/3 of the national area). These habitat islands are disappearing rapidly at yearly rates of 1-4 %. This is partly due to amalgamation of fields and farms. Current ownership of discontinuous farmland increases the need for land consolidation. Denmark (as one of the only European countries) has not needed land reallotment for almost 200 years due to a farsighted and deep reallotment around year 1800 that has since kept the fields undivided and close to the farm buildings.

A government report has suggested that 15 % of the total agricultural area might be taken out of present production within the coming 20 years in order to decrease overproduction. Subsequently the government has decided to spend 1,200 million U.S. $ (350 pr. capita) in an attempt to decrease by 50 % the nitrogen leaking into the sea within the next 5 years. Landscape ecologists were asked to come up with ideas and suggestions (within 6 months from June 86) on how this development could be planned and managed.

Some of the conceptual models presented here were suggested toimprove the

conditions for wildlife and hence recreation in the countryside. At the same time they will result in a de-intensification of the agricultural use and application of the total amount of chemicals and therefore in a more ecologically sound agricultural use and application of chemicals.

The theory of landscape ecology and the development of conservation strategies
The science of landscape ecology has developed primarily from an applied viewpoint concerned with the intelligent use of the land, as opposed to one which was purely academic. The emerging theory of landscape ecology is based on years of study and practicalexperience especially in Europe, and is continuing to develop.The components which make up the theory (e.g. concepts, laws, models, etc.) are continually being refined, altered and at times completely rejected. Unlike other more well-developed scientific-theories, such as the theory of evolution, the emerging theory of landscape ecology contains no clearly defined universal laws and few widely tested empirical models. None the less, because of its strong practical foundations landscape ecology can continue tosignificantly contribute to solving problems on the landscape scale such as the situation in Denmark which was described above. One of the major concepts in landscape ecology is:

Landscapes are composed of repeating patterns of structurally and functionally distinct areas (e.g. ecotopes) that vary in composition, size, shape and arrangement. Based on this concept, numerous studies have indicated the-following relationships:

1. The size, shape and arrangement of areas composing a landscape are important to the function and persistence of each individual area and/or the landscape as a whole.

2. Connections between similar areas (e.g. noncultivated land)increase the interactions between them. Using these theoretical underpinnings, landscape ecologists concerned with nature conservation have found that size ofecotopes is an important structural aspect which affects species dynamics (Houte de Lange 1984). Similarly, other studies have indicated that maintaining connections between similar ecotopes is critical for maintaining viable populations of some animals in fragmented landscapes (Merriam 1984, Henderson et. al. 1985).

Landscape ecologists armed with a good theory and apparently clear relationships, such as those presented above, still have to deal with the real world which does not always fit the "theoretical landscape". Thus, in order to address the current landscape problems facing countries like Denmark, Germany and The Netherlands, we have developed two different approaches toward land management for nature conservation. The first (group a) we will refer to as the Minimum Dynamic Area Models. These take a practical viewpoint and emphasize the importance of saving an existing habitat of an appropriate size and character which is suitable for maintenance of biological diversity by isolating it from surrounding farmland. A premise of this view is that the area available for nature reserve elements is large enough to provide well-functioning populations and/or communities, or

serve as minimum dynamic areas as defined by Pickett and Thompson (1978). The models deducted from this approach also emphasize the importance of boundaries or buffer zones around natural elements to dampen negative effects on surrounding areas, and the importance of a gradual decrease of human impact in the landscape (models of group a).

The second approach, Network Models, is based on the premise that for a number of more or less well-defined species or communities the minimum area available in existing landscapes is too small to meet their requirements. Then, corridors between natural elements may provide an exchange and therefore larger biotopes (models of group b).

All models presented can be applied to the landscape-level, but most of them are also applicable to larger scales. They are not exclusive models but can be used interchangeably or together depending on the landscape in question and the nature conservation goals.

The author of the model description is indicated between brackets.

Models of group a

1. The "status quo-model" (Agger & Brandt, DK)

Description:

The objective of the "status quo-model" is to provide a better protection for the habitats that still exist. This is accomplished a) by placing a moratorium on further removal of habitat islands and b) by establishing buffer-zones along and around those habitats which already exist.

Implementation:

So far this model has been the most popular. Near consensus exists in the Danish Parliament that paragraph 43 of the Danish nature conservation act, which protects some types of habitat islands of a certain size, needs to be broadened to include more types and expanded to include smaller habitats. The paragraph states that any changes in these habitats need approval from the regional authority. Rejections are very common. No compensation is paid to the owner. Ponds, brooks, bogs, salt marshes and heaths are already included. Permanent grassland will certainly also be included. Also the size limits are under debate. Those in force until now are: Ponds: 500 sq. m. Brooks: 1.5 m bottom width. Bogs: 5000 sq.m. Salt marshes: 3 hectares. Heaths: 5 hectares. Those suggested are for Ponds 250 sq. m. and for all other types 2,500 sq. m.

Buffer zones have also been debated in the parliament. Six metre broad fertilizer- and pesticide free zones along paragraph-43-brooks are suggested by the government. But the opposition in the parliament wants to make these free also of mechanized soil cultivation, and it wants to have buffer zones also around and along other types of habitats than brooks and rivers.
Fairly similar to this model is:

2. The "segregation model" (Mader, FRG)

Description:

A certain amount of a landscape (10-20 % ??) will be set aside for nature

conservation use. Production on the remaining parts of the landscape will be as intense as always or even more intense, thus the dominant functions of the areas will be strictly separated.

Implementation:

There have been no implementations of this model so far, but the ordinary land use in most parts of Central Europe resembles this system - except for the percentage of land offered for nature protection use (in West Germany: 1.2 %).

The next model emphasizes the impact of isolation of nature reserves due to the surrounding heavily used crop land.

3. The "boundary-model" (Agger & Brandt, DK)

Description:

The "boundary-model" is more an idea than a model. It is aimed primarily at maintenance of a minimal level of connectivity between natural areas within the agricultural areas, by protecting and establishing uncultivated strips in all boundaries between municipalities, parishes and farms.

Implementation:

Generally habitats in these boundaries exist already, i.e. nearly 100 % in the boundaries around municipalities and parishes and ca. 90 % in the boundaries around farms. In this way the "boundary model" is just another issue of the "status quo-model". In the more intensively cultivated regions, however, a tendency toward removal of uncultivated habitats even in the boundaries is observed. The high coverage of boundaries with habitats that already exist should make it relatively easy to be accepted by the farmers and the Parliament. Further establishment of habitats in the boundaries not yet covered only requires that the farmer stops cultivating the 0.5 m strip closest to the neighbour. The "boundary-model" has however still not been discussed seriously in Denmark.

A model that stresses the importance of the accessibility of the agricultural landscape for outdoor recreation is:

4. The "road-structure-model" (Agger & Brandt, DK)

Description:

"The road-structure-model" (or idea) aims at improving the recreational use of the agricultural landscape by preferably abandoning agricultural fields close to the road (rather than more remote fields).

This model was developed in order to make the countryside more accessible to visitors. The change in agricultural production has led to an increasing inaccessibility of the countryside. Many field roads have been removed as the production on the farm became more specialized. In addition, other small habitats have disappeared and with them visitor access. Also the pattern of crops has changed from accessible pasture land to inaccessible fields with cereal crops. The road system also has historical value. Especially the secondary roads which indicate where people have lived and travelled through the centuries. These routes are closely related to the character of the geomorphological nature of the land-

scape.

A further argument for this model is that an extension of the road side verges may compensate for the vast disappearance of uncultivated grassland that has been one of the most important changes in the Danish landscapes in our century.

Models of group b

1. The "habitat linking-system" (Mader, FRG)

Description:

Habitat linking system is called in German-speaking countries: "Biotop-verbundsystem".

It is a combination of 3 features, which should be implemented together, namely

* overall reduction in land use
* protection of large areas for nature conservation
* installation of a network of corridors or other small landscape elements

Reduction in land use will primarily affect the use of pesticides and heavy machinery in agriculture and forest management. Large areas for nature conservation mean areas from 10 sq. km. and upwards. The network of corridors has to be designed according to the landscape character, its history and the obvious deficiencies in connectivity.

It is by no means restricted to a network of hedgerows.

Implementation:

Habitat linking systems are implemented in West Germany at several locations as pilot studies or experiments, but in most cases either on a too small scale (f.b. Krautheim in Baden-Württemberg) or incomplete (f.e. Burgwald in Hessen). Even on a community-level so-called "Biotop-verbundsysteme" have beeninstalled.

2. The "corridor-model" (Agger & Brandt, DK)

Description:

The "corridor-model" aims primarily at improvement of biological dispersion among the forests, bogs and extensively-used areas outside the agricultural areas as such. This model suggests that the planner at any scale (region or landscape) looks out the most characteristic (2-15) habitats and answers the questions of where dispersal among them possibly may exist and s/he evaluates whether these connections seem to satisfy the requirements or whether they need to be improved. These considerations can then be used as guidance for future planning and management.

In principle this procedure should be repeated for each of the five main types of habitats: tree covered dry areas, tree covered wetlands, herb covered dry areas, herb covered wetlands and aquatic habitats.

Implementation:

Thus far the application of this model has already been taken up at the regional level in several counties, but is still mostly at the planning stage, and only a few have as yet been imple-

mented.

Only the aquatic corridors where the dispersal problems for migrating fishes already have been recognized for hundreds of years are now being taken up systematically. The buffering zones mentioned in relation to the "status quo-model" will further improve the dispersion of these stream corridors.

Advantages and disadvantages of the models presented

Models of group a

Advantages

- easy to plan and to understand for the people
- chances for rather fast implementation
- fit fairly well into existing agricultural goals and do not contradict the "Law of growth" ("a well-functioning agricultural economy needs a continuous increase in productivity")
- do not need much additional knowledge in general

Disadvantages

- enhance landscape fragmentation
- hamper exchange between landscape elements
- small natural elements are very vulnerable to getting lost
- programs devoted to natural regulation and biological control have to be given up

Models of group b

- take fragmentation and "insularisation" of landscape elements into account
- may be more vulnerable to intensive agricultural management if the corridors border farmland (influence of fertilizers, water regime, etc. applied in agricultural areas may affect the corridors).

Disadvantages

- the network of man-made infrastructure will not easily be integrated in general, especially in densely populated areas
- there is a great lack of information on the minimum area requirements and the minimum degree of exchange

Testable predictions

So far, most of the models can still be considered just as ideas open for debate. The possibility of applying these models in practical situations depends on the political support that they will receive. This support may be partly determined by the answers to questions of how important corridors, boundaries and subdueing of human influences are in relation to nature conservation, and last but not least for which species, populations, communities as well as landscapes are considered.
To answer these questions the best that can be done is to compare the two basic approaches, which give support to the models, in real landscapes. The answers obtained may be dependent on the degree of utilization of the landscape and the occurrence of species, communities and/or ecosystems. They may be either particularly vulnerable to disturbance from activities in the surrounding area (i.e. species etc. that

benefit from isolation in particular) or strongly affected by habitat fragmentation and benefit from having corridors with various landscape elements in (direct) connection to, say agricultural activities. From this point of view there are a number of challenges for landscape ecologists and landscape planners to test the approaches presented.

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WORKING GROUP ON THE ECOLOGY OF THE RHINE CATCHMENT AREA

Rob H.G. Jongman

The working group of the Rhine catchment area coincided with the foundation of the LEARN, the Large European Alluvial River Network. During the seminar in Münster it has been agreed to let the LEARN take initiatives in coordinating European research and exchange of knowledge. Unfortunately during the last years the LEARN seems to have passed away without being announced. This severely hampered the activities of the IALE working group on the Rhine catchment area.

Although progress in research can be reported from individual scientists, there is still no or nearly no coherent program of research and exchange. The history of the LEARN was one cause, but there are also few landscape ecologists working on each river separately; the rivers join these scientists and their countries, but only over long distances. For the Rhine there have been several symposia on nature conservation, hydrology and ecology and nature development. However, the participation of IALE members was too small to make them IALE workshops.

I propose the general assembly of the IALE to adjourn the two working group of Rhine and Danube and to establish one or two working groups on the ecology of alluvial rivers (of the tempeorate zone and the tropics for instance) and in this way prevent that working groups for each river in the world will be founded. This could be more succesful than the separate working groups for every river. The IALE working groups must be centered around general ideas on landscape ecology and river ecology is one of them. They must not work on regional topics. Other organizations are capable to do so. I will be pleased to see such a working group founded.

NEWS FROM THE IALE-REGIONS

Japan

The first meeting in the Japanese branch of IALE was held on April 3 in Nara in connexion with the 38th meeting of Japan's Ecological Society.

Columbia

Intending to start a IALE-Columbia Chapter a contact person to Columbia has been appointed: Andres Etter, Ap. Aereo 93729, Bogotá, Columbia. Andres Etter comes from the National Geograhic Institute of Columbia, now moving to the Javeriana University to run a newly created Center for Ecological information and research.

Scandinavia

The Nordic Society for Landscape Ecology (Nordic IALE) has arranged a seminar on Developmental tendencies of rural areas in a landscape ecological perspective at the Danish Agricultural University in March. A publication based on the seminar has been planned for an August-issue of Ugeskrift for Jordbrug.

UNITED KINGDOM

Formation of a Iale regional group in the U.K.

Over the years several informal meetings have been hold in the U.K. and various representatives have attended the international conferences. However, a small amount of people have been involved, and it is first recently that sufficient interest has been generated to justify the formation of a regional group. Such an interest is in part due to an increase in the international profile of Iale, but also due to an appreciationof the scientific problems paced by the fragmentation of populations and patterns in agricultural landscape.

A small ad hoc committee of colleagues from the Institute of Terrestrial Ecology, The Conservary Council and Nottingham University, has met and discussed the future. It was agreed to have an initial meeting introducing landscape ecological problems and then to hold a session to form a group. The meeting will be held on the 23. november 1991 at University College, London. It is hoped that an open meeting will be held in the autumn of 92, that will lead to a publication presenting the principle landscape ecological research in the U.K..

Robert Bunce

NEWS FROM LANDSCAPE ECOLOGY

Volume 6 of the IALE-related journal Landscape Ecology will be increased in size by about 100 pages and will thus cost 65 US $ for IALE-members (normally 55 US $). This is however very favorable compared to the normal subscription price for non-members: 228 US $. Upcoming papers in Landscape Ecology will include:

Lotta Andersson and Åke Sivertun
- A GIS Supported method for detecting the hydrological mosaic and the role of man as a hydrologic factor.

K.J. Canters, C.P. den Herder, A.A. der Veer, P.N.M. Veelenturf and R.W. de Waal
- Landscape-ecological Mapping of the Netherlands.

W.J. Mitsch, J.R. Taylor, and Kimberley Benson
- Estimating Primary Productivity of Forested Wetland Communities in Different Hydrologic Landscapes.

Sharon Hoover and Albert Parker
- Special Components of Biotic Diversity in Landscapes in Georgia.

Paul Opdam
- Metapopulation Theory and Habitat Fragmentation: a Review of Holarctic Breeding Bird Studies.

R. Goossens, T. Ongena, E.D. Haluin, and G. Larnoe
- Satellite Image Interpretaiton (SPOT) for the Survey of the ecological infrastructure in a small scaled landscape (Kempenland, Belgium).

Correspondence concerning editorial matters should be directed to the editor-in-chief, Dr. Frank B. Colley, Institute of Ecology, university of Georgia, Athens GA 30602, USA.

Subscription by SPB Academic Publishing bv,
P.O.Box 97747,
NL-2509 GC The Hague, The Netherlands.

IALE-PROCEEDINGS STILL AVAILABLE

Proceedings from the 1st and 2nd international IALE-seminars are still

available:

Proceedings of the first international seminar on Methodology in Landscape Ecological Research and Planning. Vol. I-V. Edited by J. Brandt and P.Agger. Each volume costs DDK 40.- , all five cost DDK 140.- , (app. 22 US $) and can be ordered from

GEO-RUC, House 19.2,
Roskilde University Centre,
P.Box 260,
DK-4000 Roskilde,
Denmark. Fax +45 46 75 74 01.

Proceedings from the 2nd International Seminar of IALE on connectivity in Landscape Ecology. Edited by K.-F. Schreiber. Cost DM 30 (app. 18 US$), and can be ordered from:
Institut für Geographie der Westfälischen Wilhelms-universität,
Schriftentausch,
Robert-Koch-Strasse 26,
D-W-4400 Münster,
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Fax +49 251 83 20 90.

RENEWAL OF IALE MEMBERSHIP

Certainly you have renewed your dues for 1991.
But has your colleague also done so?
Please pay to your regional secretariat or (if no such exists) direct to:
IALE treasurer,
Dr. Mark McDonnell,
Institute of Ecosystem Studies,
Cary Arboretum,
Box AB,
Millbrook,
New York 12545,
USA.

In the last case, the fee will be 5 US $. (Institutional membership 30 US $). IALE membership is for a calendar year, 1 January - 31 December.

SEND US YOUR NEWS

If you have information about upcoming meetings, or activities of interest to IALE members, please let us know. This will permit us to improve our coverage of IALE regional activities. Send your news to
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House 19.2,
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E-mail@RUC.DK.

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REGIONAL INFORMATION

DAIRY

Espoo, Finland 3-6 June, 1991	Global Monitoring for Earth Management. International Geoscience and Remote Sensing Symposium (IGARSS'91) Contact: Prof. Martti Hallikainen, Helsinki University of Technology, Lab. of Space Technology. Otakaari 5 A, 02150 Espoo, Finland.
Ottawa, Canada 21-25 July 1991	World Congress of Landscape Ecology. Contact: H.G. Merrian, IALE Congress, Department of Biology, Carleton University, Ottawa, Ontario, Canads K1S 5B6
Oakland, Ca, USA 29-31 July 1991	Wildlife 2001: Populations Contact: Dale McCullough or Reg Barrett, Department of Forestry and Resource Management, 145 Mulford Hall, University of California, Berkely, CA 94720, USA
Uusküla, Estonia 19-25 August 1991	Human impact on enviroment Contact: Ph.d. Tiiu Koff, Institute of Ecology and Marine Research, Estonian Academy of Sciences, Paldiski 1, 200 001 Tallinn, Estonia. Phone: 70142-453318, Fax: 70142-453748
Zürich, Switzerland 28-30 August 1991	Second Symposium on Large Spatial Databasis. Contact: Dr. Hinterberger, Institut für Wissenschaftliches Rechnen, ETH-Zentrum, CH-8092 Zürich,Switzerland
Amsterdam, Netherlands 1-7 Sept. 1991	24th IUBS General Assembly 7 Associated Symposia. the Contact: IUBS Secretariat, 51 Boulevard de Montmorency, 750 16 Paris, France.
Lancaster, UK 11-13 Sept. 1991	The Future of Vegetaiton Sceince: The Uses of Phytozoo logy. Contact: British Ecological Society, Burlington House, Picadelly, London W1V OLQ, UK
Dudince, Czechoslovakia 14-19 Oct. 1991	IXth International Symposium on Problems of Landscape Ecological Research. Contact: Institute of Landscape Ecology, Slovak Academy of Sciences, P.O.B. 23/B, 949 01 Nitra, Czechoslovakia
Delhi, India 6-9 Dec., 1991	Monitoring Geosystems: Perspectives for the 21st Century, IGU Seminar Contact. Dr. R.B. Singh, Department of Geography, University of Delhi, Delhi-110007, India
Marseille, France 7-11 Sept., 1992	6th European Ecological Congress. Organiser by European Ecological Federation and Sociét'France d'Ecologie. Contact: Dr. D. Bellan Santini, Centre d' Oceanologie, Station Marine d'Ednoume, rue Batterie des Lions,13007 Marseille, France. Fax: 33 91 04 16 35

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