31 augustus 1976

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Wageningen

NOTE ON THE XVI-I.U.F.R.O. WORLD CONGRESS

(Oslo, Norway, June 20 - July 2, 1976)

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C O N T E N T S

1. INTRODUCTION

The I.U.F.R.O. (International Union of Forestry Research Organization) held his XVI World Congress in Oslo, Norway from June 20 to July 2, 1976. The first week was devoted to plenary sessions and divisional discussions, while the second week was filled with 18 excursions, all of a different type, to be participated by I.U.F.R.O.-members.

The I.U.F.R.O. contents of six divisions. The divisions have been subdivided into several subject-groups and project-groups, while in many cases these subject- and project-groups are again subdivided into one or some working parties. This of course means a tremendous organization with many people in charge of the different divisions, subject- and project-groups and workingparties. Table 1 shows these functions.

Table 1. Number of Functions within the Divisions of the I.U.F.R.O. (after I.U.F.R.O., 1975)

Div.	CO	CD	SL	SD	PL	PD	WL	WD	total	number of office holders
I	1	2	9	4	5	1	27	4	53	47
II	1	3	11	8	3	3	65	69	163	159
III	1	2	4	6	2	1	13	12	41	38
IV	1	2	6	6	6	4	22	16	63	56
V	1	1	4	4	1	1	22	6	40	35
VI	1	1	7	6	-	-	11	6	32	31
	6	11	41	34	17	10	160	113	392	366

CO = Divisional Coordinator

CD = Deputy Divisional Coordinator

SL = Subject Group Leader (Chairman)

SD = Deputy Subject Group Leader (Vice-Chairman, Co-Chairman)

PL = Project Group Leader (Chairman)

PD = Deputy Project Group Leader (Vice-Chairman, Co-Chairman)

WL = Working Party Leader (Chairman)

WD = Deputy Working Party Leader (Vice-Chairman, Co-Chairman)

In the table above, 392 functions are filled by 366 office holders, i.e. some office holders have more than one function (two or, sometimes up to three). Therefore the Union has at present 379 office holders, including the Executive Board.

In total 77 countries have membership with the I.U.F.R.O., as can be seen in the table below.

Table 2. I.U.F.R.O. in the World (after I.U.F.R.O., 1975)

	countries	member institutions	number of scientists
Europe	25	125	2,487
North America	2	51	2,228
Central and South America	11	17	202
Africa	18	28	265
Asia	18	54	1,278
Australia and New Zealand	2	17	400
	77	292	6,860

From the tables it can be calculated that 1 out of each 18 members has a function within the Union. The congress was attended with some 1200 participants. This means that about 1 out of each 3 persons had a function on the congress.

In total 6 divisions, 41 subjectgroups, 17 projectgroups and 160 working parties have been formed within the Union since the XV

World congress in Gainesville, Florida, U.S.A. in 1971 (see appendix 1). These groups have been used as a basis for the programme of the XVI World Congress in Oslo.

2. THEME AND PROGRAMME

As theme for the congress was chosen: Forestry in a World of Limited Resources. It was the purpose of the congress to deal with this theme on various occasions and from different viewpoints. This was especially true for the plenary sessions (see the programme) but it was also tried to invite people to give papers on the several aspects of Forestry within the framework of the theme.

The programme of the congress was divided into two main parts:
- sessions and meetings in the first week (June 21 through June 26)
- excursions in the second week (June 27 through July 2).

Each day in the morning a plenary session was held in the main congress Hall in which a key address was given. The different congress group meetings were held, starting after the opening session on Monday, June 21 and finishing on Friday June 25, in the different conference rooms.

The Key addresses were given by:
. Dr. Kenneth King: 'Forest resources of the world'.
. Dr. Norman Borlang: 'Mobilizing world land resources to meet the growing needs for food, fibre, forest products, wild life and recreation'.
. Prof. Marten Bendz: 'Multipurpose forestry in a world of limited resources'.
. Dr. Otto L. Forgaes: 'The forest products industry of tomorrow'.
. Dr. Thor Heyerdahl: 'Man and forest. A time perspective'.

Appendix 2 shows the overall programme while on appendix 3 the scope and content of each Congress Group is given.

In total 18 excursions were organized for the Congress members. Each division had several specific excursions lasting about 5 days. Appendix 4 shows the different topics of the excursions.

3. THE 6.01 - SUBJECTGROUP DISCUSSIONS

3.1. G e n e r a l

This subjectgroup is named: 'Forest Recreation and Landscape Management' and is subdivided into four workingparties:

. S 6.01-01 : documentation and terminology
. S 6.01-02 : landscape management and recreation environment
. S 6.01-03 : methodologies for research, planning, and determination of benefits of outdoor recreation
. S 6.01-04 : recreation and leisure behaviour, benefits, and outdoor education research.

During the congress-week 6 invited papers were discussed, while an additional 16 discussion papers were presented. Aside from this congressmeetings a businessmeeting was held in which among other things the names of the subjectgroup and workingparties were discussed. They have been changed as follows:

. Subjectgroup 6.01 : 'Forest Landscape, Recreation and Tourism Management'
. S 6.01-01 :'Documentation and Public-information'
. S 6.01-02 :'Landscape Management and Environment'
. S 6.01-03 :'Planning Methodologies'
. S 6.01-04 :'Social Studies'

The six invited papers were dealing with several aspects of recreation and forestry as for instance:

- the perception of landscapes by human beings (see ELSNER, 1976)
- the relation between human behaviour and recreation-management (see BROWN, DRIVER and STANKEY, 1976)
- the international aspects of recreation and leisure (see STOUT and KÖPP, 1976)
- the relation between forestry and landscape planning (see ZUNDEL, 1976)
- methods and results of recreation research, especially for forest areas (see HEYTZE, 1976)

- demand studies with regard to forest recreation (see par. 3.4).

In the next section a brief description will be given of the five above mentioned invited papers while thereafter the discussion paper will be dealt with.

3.2. Invited papers

3.2.1. The perception of landscapes

For this aspect ELSNER (1976) prepared a paper about: 'quantifying landscape dimensions for land-use planning'. In his paper he proposes that all landscape descriptors be classed into one of four dimensions: form, line, color, and texture. This four-dimensioned classification will assist in identifying variables and in interpreting research results. Further, it will provide a framework for testing the relative importance of one variable over the other. This framework may help those who are seeking to develop a complete theory underlying the understanding of human perception and evaluation of and preference for wildland landscapes. Sample research results are discussed for each of the four dimensions. Several alternative measures are discussed for each of these four dimensions. For example, form is discussed in terms of landform, vegetation pattern and waterform. And landform measures presented include: elevation, slope, ridgeline, relative and absolute relief, ruggedness, enclosure, and aspect. Similarly, alternative measures are discussed for vegetative pattern, waterform, and the line dimension. References to basic research on color and texture measures are included. The distinction is made between scene analysis methods and broader landscape planning methods. The results of hypothesis testing on scenes are expected to provide insight to the types of quantitative measures useful for larger landscapes. Most kinds of higher level quantitative landscape analysis can usually be thought of as complex operations based upon the four dimensions of form, line, color, and texture.

3.2.2. Human behaviour and recreation management

The paper of BROWN, DRIVER and STANKEY (1976): 'Human behavioral science and recreation management' is dealing with this aspect.

An understanding of recreational preferences and behavior can be useful in making recreation management decisions. Their paper examines the usefulness of preference and behavior information by focusing on three questions. How do preferences and behavioral information fit into recreation management decision processes? How well have researchers done in getting the necessary preference and behavioral information? What must now be done to make the contribution of behavioral science more meaningful and useful to recreation management? Most of the literature and examples utilized in their paper focus on wildland (forest and range land, and national parks) recreation in the U.S.A.

3.2.3. International aspects of recreation and leisure

In a paper: 'The international semantics of recreation and leisure 'STOUT and KÖPP (1976) are dealing with this aspect.

The communication of ideas and information among recreation and leisure professional groups is hampered by the lack of uniform meanings for the words and terms commonly used. Their paper briefly describes the current world situation in leisure and recreational definitional problems, including cultural and semantic differences among countries, and outlines some representative examples of projects which are helping to overcome communication problems. Future efforst should include greater attention to the improvement and expansion of existing glossaries and the incorporation of published recreation and leisure information into the computerized documentation services in related fields.

3.2.4. Forestry and landscape planning

In his paper: 'Verflechtungen zwischen forstlicher Fachplannung und Landschaftsplannung' ZUNDEL (1976) is dealing with the relationship between landscape planning in general and the planning of forests in particular.

A large part of forests and woodlands in many countries have to serve multi-purpose functions, e.g. timber production and simultaneously important protection and recreational functions. Based on modern forest legislation the forest authoroties have to ensure a well-established equilibrium between the interests of forest owners and the general public. Their instruments are the classical forest management (working) plans as well as forestry frame plans and/or detailed forestry plans as part of landscape plans covering all ownerships. Emphasis is given to adrive concerning changes in the total area of forests and woodlands and the setting-aside and management of preserves. Important data can be taken from the mapping of both present and future forest functions. Further more there are proposals for land reclamation and recultivation schemes, the choice of tree species and their regeneration even outside special reservers, the establishment of leisure and recreation facilities and the improvement of the forest structure. Realization of these plans will be possible only through direct grant schemes and other financial support, because strict measurements beyond normal silvicultural management otherwise leads to compensation of private forest owners.

3.2.5. Methods and results of forest recreation research

In a paper: 'Recreation research-results and technics' HEYTZE (1976) is especially dealing with methods which can be used regarding research on forest recreation as also with the results obtained.

In his paper some information is given about research-data and the use of technics (methods).One of these technics is the use of Likertscales to measure attitudes of people in recreation situations. This technic can be very useful if it is necessary to know how people motivy themselves in participations in certain recreation-patterns. Another one is the field experiment, a research in which is tested how people react on a special structured field with alternatives. By this method it is possible to study the effect of the way recreation facilities work in the field.

3.3. Discussion papers

During the congress meetings several discussion papers were presented. It will be tried to give short summaries of the most important ones.

GREIG (1976) presented a paper dealing with the demand-response to changes in characteristics of recreational sites. His method tries to forecast the short-term change in numbers of visitors at an area, following some change in the recreational quality there. The method suggests ways of defining a group of recreation areas that may be substitutes for the area of concern. It is claimed that recreationists choose to make trips to particular areas in the group, depending on the relative costs and quality characteristics of the areas, and on their own particular preferences for those characteristics. Both the characteristics as well as the distribution of preferences in the community, are described mathematically, so that a model of recreationists' choices is able to be constructed. When the model is calibrated, using observed data on costs, characteristics, and numbers of visits at the areas in the group, it can be used to forecast new choices following some change in the characteristics of any area in the group. The method is described with simple numerical examples.

SHECHTER (1976) compares the use of home and site surveys in recreation research. In his paper the pros and cons of home interviews versus on-site surveys are briefly reviewed. The complementary relationship between them is illustrated by the findings of an extensive study on the demand for outdoor recreation at Mt. Carmel National Park, the largest national park in Israel. It is further shown that the need for expensive home interviews can be greatly reduced when the less-expensive, site surveys are properly constructed and implemented.

In another paper LUCAS and SHECHTER (1976) are dealing with a travel simulation model as an aid to management planning. A simulation model for dispersed recreation areas has been developed that provides a means for experimenting with modifications of use or area conditions to determine effects on use patterns and encounters between visitor

groups. The model, the results of a test of it, and potential future applications are discussed.

HOFFMAN (1976) tries to come up with relative values of outdoor recreational areas. In his study visitors were asked how much they would be willing to pay to use activity areas, such as Campground or Swimming Beach, within Willow River State Park, Wisconsin. A random sample of visitors provided a measure of the relative value of each activity area. Generally, the more developed areas, such as the Campground, were considered the more valuable areas. The values were then compared against costs (value/cost) and an efficiency index was developed. This was done for both annual maintenance-operation costs and total annual costs (maintenance-operation costs plus 1/20 of development costs at 5 percent interest). The results show that the most efficient areas are the least developed ones and the least efficient ones are the most costly to provide. Either the agency has over estimated the value visitors receive from the more expensive zones or visitors don't appreciate the cost of providing them.

MECHLER and KLEIN (1976) have studied wildlife-related recreation. The intent of their paper is to help planners and administrators better understand wildlife-related recreation expenditures. The authors consider total spending generated by participants in a particular region and also some potential benefits that might accrue to the local economy by increasing and/or enhancing wildlife-related recreation opportunities based on consumer-related preferences. An analysis of what people are seeking in terms of types of wildlife-recreation and the satisfactions gained can lead to planned wildlife development that will have a positive monetary impact at a local level. In this way it can serve as the initial input into a decision-making process on the impact wildlife-related recreation can have on the economy of a given locale.

RUDRA (1976) pays attention to the mathematical programming of phenomena studied for planning. According to him in some forest management problems multiple goals can be linked through a single performance-function criterion. A variety of such problems have been solved by traditional mathematical programming techniques such as

linear programming. There is, however, another class of problems where such a unified single dimension criterion is not readily available. Increased concern in environment quality has brought into focus the importance of extra-market benefits. Surrogate measures are often not adequate enough in assessing the totality of such intangible values that result from any activity. Infeasibility of solution is another difficulty encountered in the conventional structuring of multiple conflicting goals through linear programming. The goal programming approach is therefore advocated in ascertaining the trade-off in achieving specific goals. A case study is presented. There is also a need for the recognition of the fact that many real life parameters are stochastic. A brief introduction is given to chance-constrained programming, and an indication is given for a plausible measure of system reliability.

He concludes that by its very structure, the goal programming method removes infeasibility and obviates the necessity for a single dimensional criterion in the objective function. Goal programming therefore deserves more attention in the management planning of resources for multiple goals, particularly when no single measure can comprehensively evaluate all the facets of conventional materialistic as well as intangible values that result from any management alternative. There is also a definite case for applications of stochastic programming, since most parameters in real life are probabilistic. Standard sensitivity analysis with LP can provide only partial answers. The probabilities of achieving specific goals can be incorporated in CCP formulations and some measure of system reliability can be assured.

AMMER (1976) has studied the wanted amount of forest areas in a certain region (landscape areas) from several viewpoints. In order to present to forest managers and landscape planners ecological, economic, and aesthetic decisionmaking aids, investigations were carried out with the support of the Deutsche Forschungsgemeinschaft of Baden-Würtemberg, the Ministry for Nutrition, Agricultural Economics, and the Environment, three provincial, and two municipal government organizations, in order to determine minimal, optimal,

and maximum densities of representative forest land. From these investigations, important planning directives would be derived which would:

- Intensify the recreational and tourist function in rural areas taking into consideration socio-ecological points of views, without causing damage to the attractiveness of the restive landscape, and
- to achieve a balance between the quality of life and environmental protection on one side and permit the planning for the least amount of possible forested areas (even in populated sections) on the other.

IMANAGA, M, (1976) studied the recreational function of the forest, comparing his studies with those done in Germany. The purpose of his study was to find out the method to appraise the social especially the recreational function of the forest. To develope this study is the needs of the times, but this study is scarcely found in Japan. In Germany, on the contrary, prof. Prodan at Freiburg University already started this study at the early 1960's. He obtained some equations and showed the value in DM per year and per ha. In Germany, the location of the forests and those of the human habitation exist in a complicated way. In Japan, however the location and meaning of the forests are out of human habitation both in physical and mental means. Therefore, the relation between the forest and a human being differs to a large degree in these two countries. Nevertheless the Frodein-method can be used for the Japan-situation.

The author selected a recreational forest at Nibetsu in the suburb of Akita City. The distance from the center of the city is about 25 km. It takes about one hour by auto. The area of the recreational forest is 2825 ha. The forest is constructed with the old Akita Sugi-one of the most famous Japanese cedar, and hard woods. In this area a forest museum and other facilities for recreational purposes are found. At this forest, the investigation was done to observe the actual condition of the utilization as the recreational function. The opinions of 199 visitors to this forest were asked by the method of questionnaire. From these investigations

several results were obtained.

JAATINEN (1967) presented a discussion paper on a long-term research programme, being prepared at the Finnisch Research Institute. The objective of the programme is to define and subdivide the field of multiple use research to be done at the Institute and so improve both the research planning and the coördination of the work in this field between the different research departments of the Institute.

HAAKENSTAD (1976) presented a paper on recreation research and the public forest policy in Norway. During recent years a certain conflict of interests has become apparent between recreational demands and timber production in forest areas adjacent to Norwegian cities. The presented paper deals with research in multiple forest-use, multiple-use planning, and the current revising of legal regulations in order to develop a more balanced multiple usage of the forest. The major problems are related to the utilization of the Oslomarka forest area, which covers approximately 150 000 ha. surrounding the capital. Day-trip counts have made it clear that up to 75 000 - 100 000 visitors may use this forest area in a single day. Enquiry forms and interviews reveal that the major dissatisfactions from the recreational standpoint are with the practice of wide clearcuttings and with the development of the forest road network. Systematic behavioural observations have clarified the forest usage of the visitors. The studies have shown that relevant data on recreational practices should be collected by a combination of methods. The conflicting interests have led to the development of multiple-use plans and proposed legal revisions.

3.4. Improvement of demand studies as tool for planning outdoor recreation

Using this title an invited paper was presented at the congress. The paper itself is given below.

3.4.1. Prelude

No one will deny the ever-growing need for outdoor recreation. The problems we are facing are not only how great this demand will become but what turn it may take. As BIJKERK (1975) emphasized this

demand problem also concerns forest areas since: 'economic and social changes in the western world increase the need for multiple land use', leading to the fact that 'recreation in forested areas therefore is an important issue as well from the point of forestry policy as of forestry planning'. The same author points out that 'as a result of changing economic and social circumstances -the demand created by the happy few now being created by all social groups, the addition of day and weekend recreation to that in vacations, the greater mobility of recreationists and the awakening of the urban population to the fact that the abundance in natural resources is dwindling - forests are becoming an increasingly important feature in outdoor recreation'.

Planning of forests for recreation or planning recreation into forest areas means solving the sequence of problems concerning the type, location, capacity and lay-out of outdoor recreational facilities. Facilities in this context mean all kinds of provisions: playgrounds, beaches, waters, large recreational areas, special projects, etc. It has often been emphasized that a close relationship exists between the components type, allocation, capacity and lay-out in recreation planning(1)

Demand studies are a central issue in these problems. According to BIJKERK (1975), for an 'adequate planning of the important phenomenon of recreation, good statistics on participation rate, distribution over types and distance, frequency and time of occurrence are vital'.

Demand studies are needed : in the first place to determine type and amount of (additional) facilities. However since many of these demand studies use models which take into account the distribution-effect of recreationists over the area by means of distance functions, they also form a basis for the allocation problems as well as for the capacity of projects. Lay-out means type, size and mutual location of different elements in projects or areas. It determines the attractivity of the total facility and in doing so, also has an influence on the

(1)see for instance: LIER, H.N. VAN, J.G. BAKKER and H. BERGMAN, 1971

demand. Demand studies are therefore vital for planning of outdoor recreation.

3.4.2. How did it all start?

Older studies on outdoor recreation can be divided into two types. The first in which (a sample of) a certain population is interviewed at home about their outdoor recreational behaviour, has been performed in several countries in the last twenty years. Information is gathered on the one hand about 'background' variables (income, family size, age, sex, profession) and on the other number of trips, type of projects, distance travelled, activities performed.[2] The data are often, but not always, used for studies of the influence of background variables upon behaviour.

The second type of research can be called project research. People visiting certain (types of) outdoor recreational projects are interviewed as to their origin, the distance travelled, the activities performed on the project, the expenditures and some background (socio-economic) variables. From these data, what are known as use-models are often constructed, of which the general form is:

$$V_i = f(P_i, D_i, x_1 \ldots x_n) \qquad (1)$$

(2) See for instance the O.R.R.R.C.-studies (1962) for the U.S.A. and the studies of R.N.P. (1960) and C.B.S. (1966) in The Netherlands. Similar studies have been made in other countries.

or the visit to a certain project from a certain origin depends on the population (P_i), the distance (D_i) and (some) socio-economic variables ($x_1 \ldots . x_n$).[3]

One of the greatest disadvantages of this type of model is the fact that alternative (competing)projects and areas are not explicitly taken into account (however using visit-numbers means that the influence of competing projects is implicitly accounted for). This lack in the modelling means that:

a. it is very hard to transplant a calibrated use-model to other areas, because the supply - situation (types and distribution of facilities) in most cases is usually quite different, while it may also be that the 'demand' differs.
b. the influence of a facility that will soon be created or the improvement of existing ones cannot be calculated explicitly.

Aside from this, most models cannot be transplated in time, since changes in behaviour with time are seldom taken into account. This, however, is very often true for other models too and therefore will be omitted in this paper.

It must have been for these reasons that new model-types were developed in the past ten years. It all started with the gravity-model approach of VAN DOREN (1967) in which the alternatives are taken into account in the following way:

(3)Some examples: MEREWITZ (1966) constructed the following model for a lake in the U.S.A.

$$V_u = e^{(2,4976 - 1,894\ S_u - 0,0045\ S_u^{-3} + 0,0025\ P_u)}.P_u.D_u^{\ 0,7978}$$

in which population (P_u), distance (S_u) and population density ($P_u.D_u$) are taken into account. VAN LIER (1969/70) constructed models for inland beaches in The Netherlands:

$$V = \frac{P}{200} \cdot e^{(-0,08D+2,5)} + \frac{0,05\ P}{100}$$

in which P = population and D = distance

$$V_{ij} = C\frac{P_i A_j D_{ij}^{-b}}{\sum_{j=1}^{J} A_j D_{ij}^{-b}} \qquad (2)$$

where the population (P_i), the attraction idex (A_j), the distance between origin and project (D_{ij}) as also the combined influence of attraction and distance of the competing projects ($\sum_{j=1}^{J} A_j D_{ij}^{-b}$), are used as major elements in the demand for outdoor recreation sites.

3.4.3. Shortcomings

Not only have the shortcomings of use models been critisized but, in recent years, so also have those of gravity models. Following NIEDERCORN and BECHDOLT (1969) by making a distinction between an origin factor, a destination factor and a linkage factor as essential parts of the modelling, the following shortcomings can be given:

a. The impossibility of clearly separating and extracting these three factors. This problem has been exphasized many times and by many authors. Both statitically and conceptually it is impossible to separate the influence of origin, destination and linkage on visit rates (or numbers) to outdoor recreational facilities.(1) S t a t i s t i c a l l y it is impossible because the values given to, say, the attraction indices of projects or areas and distance parameters (as part of a specific distance function) depend to a certain degree on the statistical analyses procedure followed. (covariance techniques, regression analyses). Here, also the criterion used as a measure for the goodness of fit also plays an important role.(2) C o n c e p t u a l l y the separation is difficult because it assumes that the influence of the origin, in this case the push-factor, in no way relate to the support situation, while for the same reason the attraction-index is assumed to be unrelated to the decision people make whether they will have their outing or not. In other words: it is assumed that the decision-making process of an individual as to whether he will make a trip, yes or no, runs as follows:

first: the person decides that he definitely wants to go out no matter what he can do outdoors

secondly: he makes an inventory of projects and travel distances and then chooses which one he will visit, knowing the properties of the different projects (attractivity) as also the barriers (distance, travel-time, or costs) to be overcome.

There are reasons to believe that the decision-making process runs more or less like this, but the two aspects are often interwoven: many persons decide to make a trip because they know a very nice place to perform a certain activity. Nevertheless the distinction in origin-, destination- and linkagefactors is useful, because it enables one to approach the process systematically. One has, however, to keep in mind that this distinction is a mean, not a purpose in itself.

b. The meaning of each of these three factors has up to now not been investigated thoroughly. What are the background variables in the push-factor, how is a linkage perceived by the recreationists and what properties of the projects determine the attractivity. Very recently studies regarding these aspects have been starting to appear, as we shall see in the next section.

3.4.4. Recent developments

a. R e g a r d i n g t h e r e s e a r c h i t s e l f. As has been said a movement towards deepening the background knowledge of the 'driving' forces and the meaning of the different factors is needed. CESARIO (1975) recently proposed a new method of analyzing outdoor recreation trip data (for instance regarding visits to forest areas or projects which are situated in and closely related to these areas). He follows a two-stage approach. In the first stage a covariance technique is used to extract systematically origin factors (called emissiveness) and destination factors (called attractiviness). In the second stage the influence of different factors for both the emissiveness and the attractiviness is analyzed. Different techniques can be used for this purpose, for instance

multivariate analyses. For the emissiveness, selected characteristics of population centres can be used. In the same way, the attractiviness can be analyzed by using project characteristics.

In the approaches of analyzing trip distribution regarding outdoor recreation KLAASSEN (1974) distinguishes between projects or areas which are origin-exclusive and those which are destination-exclusive. When a large part of the recreationists of a certain project say 70% originate from one population centre, the project has origin-exclusivity. When the majority of all recreationists from a certain population centre travels to one destination, then that project has destination-exclusivity. Studies regarding the problem of planning a large number of small areas as opposed to a small number of large areas are starting. KLAASSEN (1974) found that the first planning-system (a large number of rather small areas) might be advantageous.

According to BIJKERK (1975) the same effect seems to occur in town planning, where 'polynucleation seems to be the leading principle'.

It is obvious that future research on the demand for outdoor recreational facilities should also focuss on these aspects.

b. R e g a r d i n g d e m a n d - m o d e l l i n g. Many attempts have been made to improve the structure of both use-models and gravity-type models. Regarding use-models VAN LIER (1973) constructed the following one for inland beach recreation in the Netherlands:

$$V = \left[\alpha(P-E)+\beta B\right] e^{-jD_r} (A_{c1}+A_{c2})^{-1} \qquad (3)$$

in which the population (P), the vacationists elsewhere (E), the vacationists in the area (B), the distance (D_r), the alternatives inside (A_{c1}) and outside (A_{c2}) the origin, both weighted as to their recreation type and distance are taking into account.(4)

For the use of wilderness areas, models were constructed by McKILLOP (1975) of the following type:

$$Y_{it} = b_o+b_1X_{1it}+b_2X_{2it}+\ldots. b_jX_{jit}+\ldots. b_{it} \qquad (4)$$

in which the use level (Y_{it}) for an area in a certain year is described by several variables (X_{it}). It was found that for Forest Service areas

such variables as percentage of area over 7000 feet in elevation, road construction in adjacent National Forests, travel time, precipitation, population within a certain distance, size of wilderness area, number of lakes and number of entry points are important.

Regarding gravity-type models many attempts are being made for improvements and implementation. FREUND and WILSON (1974) give an example of an implementation by estimating a gravity-model to explain recreational travel and participation. In concentrating on the implementation method and the nature of results it was found that a major task was to make physically observed measurements serve as proxies for parameters specified by the gravity-model. Aside from this it was shown that another task was the choosing of a reasonable set of meaningful predictor variables.

According to WOLFE (1972) a disadvantage of the gravity-model is the tendency to overestimate the number of short recreational trips and to underestimate the number of the long ones. He therefore constructed an inertia-model:

$$V_{ij} = K\frac{P_i^p C_j^c}{D_{ij}^d} \cdot D_{ij}^{\left[\frac{\log D_{ij}/m}{n}\right]} \qquad (5)$$

in which the same variables (population P, capacity C and distance D) are used but the distance function itself (or the description of the reaction of recreationists on distance) is transformed. Whether this

(4)The formula can be rewritten as follows:

$$V = \frac{\alpha(P-E)+\beta B\, e^{-jD_r}}{(A_{c1}+A_{c2})} = \frac{\alpha(P-E)+\beta B)\, e^{-jDr}}{\frac{1}{5}\left(\sum_{n=1}^{5} g_n c_n + \sum_{k=1}^{K} g_k r_k c_k + \sum_{m=1}^{M} g_k r_k c_k\right)}$$

where g=competitional effect of a certain project on other projects, c=capacity of that project and r=reduction coefficient depending on distance. This shows that properties of population centres and alternative projects are explicitly also taken into account. The model simulates trips originated in a gravitational field.

type is more adequate to simulate reality is still to be proved for different forms of outdoor recreation. It would be worthwhile to try it out for forest areas.

Taking all things together it will be clear that the modelling itself is something to be followed critically. Other simulation procedures for outdoor recreation demand may come operational, perhaps in the near future.

c. Regarding the origin factor. An important aspect of demand-modelling for outdoor recreation is the achievement of obtaining knowledge on the reasons people have for seeking recreation in the outdoors. But although many ideas have been formulated, little research has been done and almost no results have been produced.

Up to now research in this field has been restricted to analyses of the influence of socio-economic variables upon demand (measured mostly as number of trips), although other approaches have also been followed. LA PAGE and RAGAIN (1974) for instance found that a large change in camping (51 percent of former campers were either camping less or had dropped out the camping market) was related to a change in the style of camping itself, as also to changes in the family cycle, although the latter gave no consistent pattern. These findings point to the problem of the substitutability which has been defined by HENDEE and BURGE (1974) as: 'the interchangeability of recreation activities in satisfying participants motives, needs, wishes and desires'. It is quite obvious that research, especially on this aspect of the demand, is needed.

How various socio-economic factors have their influence upon outdoor recreation participation is shown by different researchers. Recently McEVOY III (1974) investigated by means of an experiment, the influence of the distribution of the working time. He found that 'substantial increases in the consumption of outdoor recreation will result if the four-day workweek is adopted by a significant segment of the workforce'. The future distribution of leisure time will be very important in planning outdoor recreation. According to BIJKERK (1975) we must know whether 'we are moving towards less working hours

per day, less working days per week, less working weeks per year or less working years in a life-time'.

The approach adopted by CESARIO (1975) allows the demand-party of the trip-distribution to be analyzed more thoroughly. In his research only population and income were taken into account, but it is necessary and it should be possible to enlarge the efforts in this direction. In The Netherlands this was done by LINTSEN (1975). He constructed a special demand function, in which the distribution effect was not included, however:

$$\alpha_i = \beta_o + \sum_{n=1}^{12} \beta_n . hhcat_m^{(n)} + \sum_{n=13}^{n=16} \beta_n . won_m^{(n-12)} + \beta_{17} . mob_m + \beta_{18} U_m \qquad (6)$$

In his formulation it was shown that the demand (α_i) depends on household-categories (hhcat) which were based on income and family cycle as also on the type of house (won), the possession of a car (mob) and the level of urbanisation (U) of the origin.

Although it can be concluded that several studies of the analyses of the origin factor have started, more thorough studies are needed.

d. R e g a r d i n g t h e l i n k a g e f a c t o r. The problem of the reaction of people to distance (or on factors derived from distance, such as travel-time or -costs) has been tackled by many investigators. As already mentioned WOLFE (1972) initiated a new approach by using a different reaction-to-distance-function based on the so-called inertia of starting up and on the inertia of movement. The starting up inertia is caused by the fact that: 'a great many people may not wish to make a trip of any length, however short', while the inertia of movement is caused by the fact that: 'among the minority of people who indulge in lengthy trips, a still smaller minority finds travel itself so stimulating that the farther they go, the farther they want to go'.

This has led BEAMAN (1974) to analyze the reaction to distance as a function of distance. Based on the analysis of five gravity-functions it was found that there are cases in which:

- each new mile to be travelled offers more resistance than the last,
- each new mile to be travelled offers less resistance than the last,
- each new mile to be travelled has a constant resistance.

This shows that the reaction to distance is hard to understand, especially because it is also related to the distribution of outdoor recreation facilities itself. This last aspect has been stressed by O'ROURKE (1974) who says it is: 'a function of the structure of opportunities available to the recreationists'.

From the foregoing it can be concluded that this part of the demand has to be investigated thoroughly. One has, however, to keep in mind that it will be very complicated since:

- the availability and distribution of opportunities plays an important role: is the road to be considered as a factor on its own or is it a part of the site;
- the fact that in many cases the travel itself can be enjoyable. This probably causes the inertia of movement found by WOLFE (1972).

e. Regarding the destination factor. The leading problem in analyzing the destination is whether it can be analyzed objectively (i.e. based on hard facts such as acreage of parking areas, playing fields, etc.) or whether it has to be analyzed also subjectively (i.e. using perception of the area by the recreationists).

In the approach of CESARIO (1975) only objective variables were used: number of acres, number of camping units, length of beach, etc.

An inventory of camping-sites in The Netherlands by IJKELENSTAM (1974) showed that the preferences of campers with regard to the location of the sites are closely related to forests and the seacoast (fig. 1). The attractivity (or the attractiviness) in its essence is more subjective, however.

In the study of LINTSEN (1975) regarding 'the analysis of visits to outdoor recreation sites in the vicinity of a large town in The Netherlands (Eindhoven)', it was shown that the attractivity found as a result of the calibration of gravity-models per socio-economic group shows large differences (table 3).

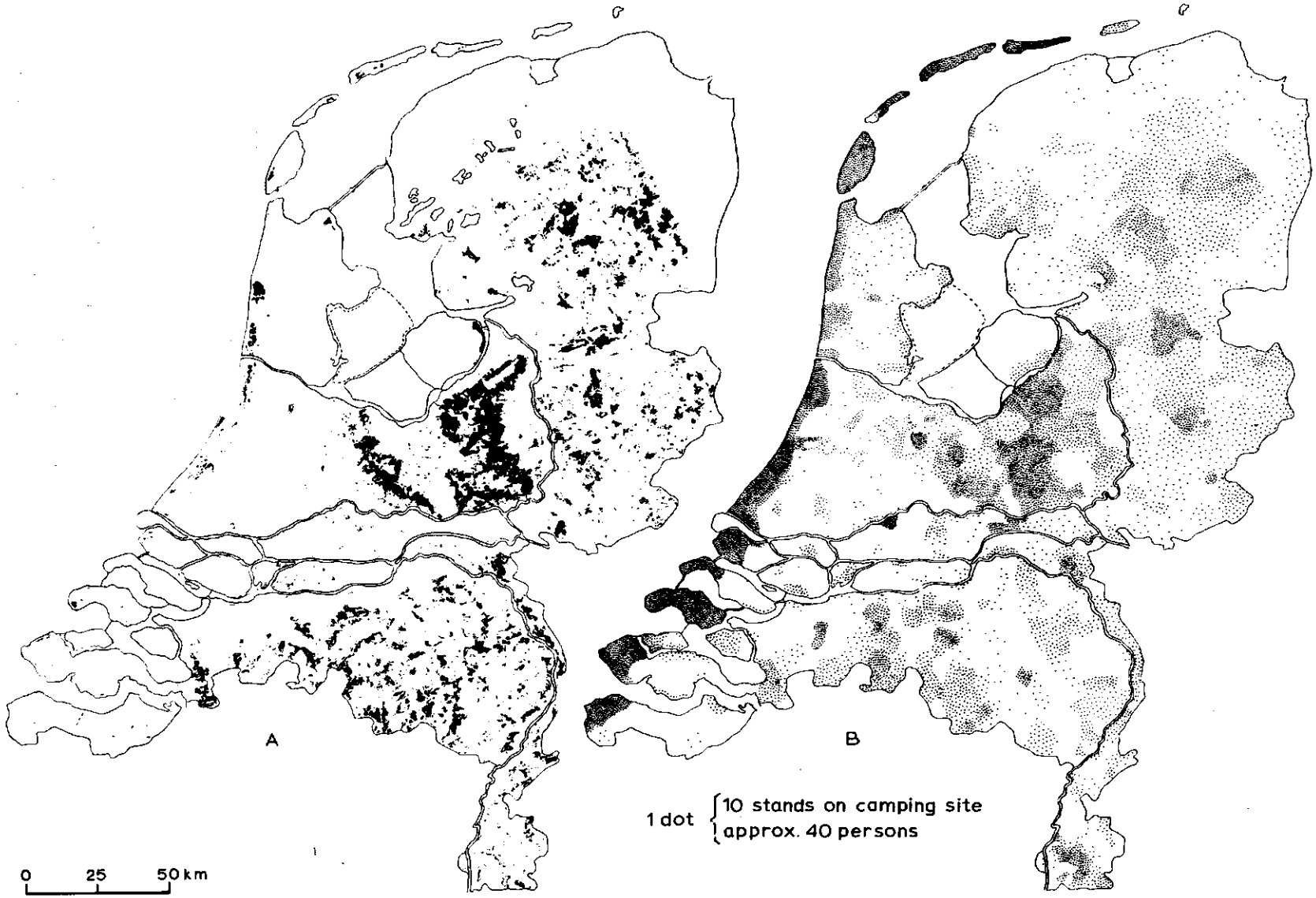

Fig. 1. Location of forests (a, after CBS, 1971) and camping sites (b, after IJKELENSTAM, 1974) in The Netherlands

Table 3. The attractivity-indices of 12 recreation areas for 12 household categories (hhcat) depending on income and familycycle (after LINTSEN, 1975)

area	hhcat											
	1	2	3	4	5	6	7	8	9	10	11	12
1	.070	.110	.053	.069	.074	.036	.049	.112	.067	.064	.098	.047
2	.026	.060	.028	.033	.042	.069	.049	.067	.041	.027	.049	.055
3	.005	.010	.010	.007	.003	.005	.005	.008	.006	.014	.009	.008
4	.043	.040	.048	.028	.034	.042	.060	.055	.047	.031	.052	.046
5	.092	.053	.117	.104	.152	.111	.083	.107	.160	.124	.195	.202
6	.038	.013	.028	.032	.026	.017	.040	.041	.019	.008	.038	.012
7	.253	.237	.115	.234	.172	.211	.251	.127	.181	.204	.181	.187
8	.192	.131	.184	.160	.188	.178	.179	.279	.213	.136	.262	.132
9	.090	.095	.152	.083	.130	.123	.070	.050	.096	.106	.036	.117
10	.138	.097	.097	.179	.073	.096	.092	.102	.057	.102	.017	.035
11	.045	.087	.082	.030	.085	.071	.067	.029	.062	.105	.034	.135
12	.008	.068	.087	.040	.021	.040	.057	.023	.051	.079	.029	.025

The table shows two effects:

a. the ranking of the areas (first, second, etc.) differs from household category to household category;
b. the variancy of the attractivity-indices per area among the household categories is large.

From this it can be concluded that the attractivity of sites depends not only on the site-properties but also on the differentiation in demand.

This shows that studies regarding the perception of especially wilderness and forestry areas should be encouraged in the near future. Yet the first steps on this difficult path have already been made.

TUAN (1974) has made a study of environmental perception, attitudes and values, while PETERSON (1974) studied the perception of wilderness in particular. Especially regarding alternative uses, it was found that

among the different groups some activities were approved of (e.g. paddle, canoing and fishing) and others were disapproved of. Differences were found in the perception by recreationists and managers. CARLS (1974) found in a recent study that the perception of certain landscapes is negatively correlated with the 'area of people and the area of high development', while a positive correlation was found for 'area of stream, of waterfall and of lake'.

The research on the destination factor has up to now been done in two ways:

- studying the properties (hard facts) of the area and relating these to the attractiviness;
- studying the perception by recreationists of the area with or without the properties of the area.

There is no doubt that an approach including perception and hard facts will be needed and will be well worthwhile in the near future. Here the recently published report of the CADORR (1975) should be mentioned. In that report the planning and social and economic policy of outdoor recreation was considered as also were methods for demand analysis. Special topics were the demand for alternative types, the demand for site-specific outdoor recreation resources, a socio-psychological definition of recreation demand and the estimation and use of models.

3.4.5. Some final remarks

It has been attempted to give an insight into the type of demand studies which are or can be important for (the planning of) outdoor recreation in forest areas.

The following general conclusions on the demand for outdoor recreation in forests can be drawn:

- Demand studies are a vital part of planning outdoor recreation facilities in general. This also includes the type of facilities and projects which are predominantly situated in forest areas or which are formed by (the special layout of) the forest itself.

- Research on the substitutability of the demand should be encouraged. Insight into this matter opens the possibility for planners to adjust the plans in a better way to the (natural) suitability of forest areas for outdoor recreation.
- Although demand studies based on model-approaches have been performed in several ways and improvements have been made in recent years, nevertheless the type of model to simulate trip distribution particularly to forest areas should be object of further studies.
- A separation of origin, linkage and destination factors in demand-models is often made. A start has been made on the study of the way in which these factors should be distinguished and on their analysis. More research is needed. This applies especially for forest areas. Since not enough is known about the factors (variables) determining their attractiviness. Perception research should be mentioned in this regard.
- For the analysis of the origin-factor, studies regarding background variables should be performed. The reaction of recreationists on distance to forest areas is a special problem since nothing is known about the perception of travel distance as related to the proposed visit to forest areas. More and detailed studies on this part of the demand-modelling are needed.

Finally some more planning-induced remarks regarding forestry and recreation as drawn up by BIJKERK (1975) can be given:

- a more systematic approach, according the sequence allocation - - capacity - layout, to determine the requirements of new recreation facilities in forests, will improve the effectiviness of the plans, and also reduce the difficulties of acquiring funds for outdoor recreation.
- a classification of forests according to recreational potential will prove to be of great benefit in planning an increased recreational use. Research on the possibilities of making such classifications should be encouraged.
- data on recreational activities should be included in the census, as such data are becoming indispensable for adequate planning.

3.4.6. Summary of the presented paper

The demand for outdoor recreation, especially in the context of forest areas, is evident. Future changes in this demand regarding amount and direction, are to be studied when planning of facilities is involved. Solving the sequence of problems concerning the determination of type, location, capacity and layout of outdoor recreational facilities is vital.

A description is given of use models which were first developed to describe the demand for specific sites, as also the disadvantages of these models especially regarding the impossibility of transplanting them to other areas. The following type of model, the gravity type, was constructed to overcome this disadvantage by explicitly including alternatives (competing sites or areas) in the model. The shortcomings of this last type of models are two-fold:

- the impossibility of clearly separating and extracting the three basic factors in the model: origin, destination and linkage. Both statistically as well as conceptually the separation of the influence of the three factors on trip distribution is difficult;
- the meaning of each of the three factors has not been investigated thoroughly. Insight into the background variables of the push (origin) and pull (destination) as also into the distance (linkage) perception is lagging.

In more recent developments proposals and studies have been made to overcome these disadvantages. New analyses regarding trip distribution as also the background of origin and destination have been made or are on their way. Some examples are given.

In addition some final remarks have been made. Demand studies will be needed in the future. The problem of the substitutability of the demand should be given more attention in coming research. This also applies to the analyses of trip distribution to the separation in origin-, linkage- and destination factors and to the analysis of these groups of factors in more detail.

3.4.7. Verbesserung der Frageuntersuchungen für die Planung von Freilufterholung (Zusammenfassung)

Die Frage nach Freilufterholung, besonders in Waldgebiete, ist klar. Zukünftige Aenderungen dieser Fragen mit Bezug auf Zahl und Richtung, müssen untersucht werden wenn es sich um die Planung von Anlagen händelt. Die Lösung einer Reihe Probleme mit Bezug auf Feststellung von Art, Stelle, Kapazität und Einrichtung von Freiluft - erholungsanlagen ist notwendig. Eine Beschreibung ist gegeben worden von 'Gebrachsmodelle' die zuerst entwickelt worden sind um die Fragen für bestimmte Stellen zu beschreiben, gleich wie die Nachteile dieser Modelle. Besonders bezüglich die Unmöglichkeit diese für andere Gegenden zu benützen. Um diese Nachteile zu überwinden ist das nächste Modell, das 'Schwerpunktmodell' entwickelt worden. In diesem Modelle werden Alternatieven wie konkurrierende Stellen oder Gegenden planmässig eingebaut. Die Nachteile dieses Modelles sind zweifaltig:

- die Unmöglichkeit drei Grundlagen dieses Modelles, nämlich Ursprung, Bestimmung und Verbindung, deutlich zu separieren und zu extrahieren. Die Separation der Einfluss dieser drei Grundlagen auf Fahrtverteilung ist statistisch sowohl wie konzeptisch schwer durchzuführen
- die Bedeutung jener drei Grundlagen ist nicht eingehend geprüft worden. Einsicht in den Hintergrundvariabelen von'Push' (Ursprung) und 'Pull' (Bestimmung) sowohl wie in der Abstandperzeption (Verbindung) fehlen.

Im Rahmen neuere Entwicklungen sind Vorschlage gemacht worden und Untersuchungen durchgeführt worden um diese Nachteile zu überwinden. Neue Analysen mit Bezug auf Fahrtverteilungen ebenso wie auf Hintergründe der Ursprung und Bestimmung sind fertig oder werden gemacht. Einige Beispielen sind gegeben worden.

Hinzu sind einige Schlussbemerkungen gemacht worden. Frageuntersuchungen sollen in der Zukunft durchgeführt werden. Das Problem der Substitutionsfähigkeit der Frage müssten bei noch kommende Untersuchungen mehr benachdrückt werden. Dies gilt auch für die Analysen der Fahrtverteilungen, die Separation in Ursprung, Verbindung und Bestimmungsfäktoren und die mehr detaillierten Analysen dieser Faktoren.

3.4.8. L'amelioration des études de la demande comme moyen de planification de la récréation en plein air (Resumé)

La récréation en plein air, plus particulièrement sous forêt, est très recherchée. Des modifications fûtures de la demande, quant à la quantité et l'orientation, devront être étudiées quand il s'agit du planning des facilités. La solution des problèmes relatifs à la détermination proprement dite à la location, à la capacité et à l'amenagement des projets en plein air est d'une importance majeure.

Une description des 'modèles d'utilisation' qui avaient été développés initialement aux fins de décrire la demande pour des sites precises, a été donnée aussi que des desavantages de ces modèles en ce qui concerne l'impossibilité de les utiliser pour d'autres regions.

Un deuxième modèle, 'du type gravité', était construit pour surmonter ces desavantages par l'inclusion explicite d'alternatives (d'autres sites ou regions) dans le modèle. Les limites de ce deuxième type sont:

- L'impossibilité de séparer clairement les trois facteurs de base: origine et destination du voyageur et accessibilité du site. A là fois sur le plan de conception et de statistique la destillation de l'influence de chacun de ces trois facteurs sur l'utilisation des facilités est difficile.
- La signification de chacun des facteurs n'a pas été recherchée profondément et notre comprehension reste insuffisante.

Lors des développements plus recents des propositions ont été formulées et des études ont été entamés pour faire face ces deux limites. Des analyses nouveaux relatifs à la distribution des voyages ainsi qu'à la destination et à l'orgine des voyageurs ont été faits ou sont en voie de realisation. Quelques examples ont été donnés.

A la fin il a été remarqué que des études de la demande seront necessaire dans l'avenir et que le problème d'une substitution possible de cette demande devra recevoir plus d'attention. Ceci est valable aussi bien pour les analyses de distribution de voyages, pour la separation des trois facteurs origine, accessibilité et

destination que pour l'analyse de ces groupes de facteurs de façon plus détaillée.

4. GENERAL SUMMARY

From June 20 to July 2, 1976 the XVI I.U.F.R.O. World Congress was held at Oslo. The theme of this congress was: 'Forestry in a World of Limited Resources'.

The first week of the Congress (the discussions were held in this week) was attended, especially in subjectgroup 6.01: Forest Recreation and Landscape Management. An invited paper was presented in this subjectgroup entitled: 'Improvement of demand studies as tool for planning outdoor recreation'(see section 3.4. of this note).

Discussions were held on several other aspects of outdoor recreation in Forests in particular as well as more general items regarding the meaning of forest areas (landscaping; perception; wildlife; ecology etc.).

New approaches regarding the determination of benefits of forests areas (such as recreational, social, ecological) have been given and discussed in several invited and discussion papers. Brief summaries of these papers are given in this note.

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Appendix 1.

THE DIVISIONS AND RESEARCH GROUP AND THEIR LEADERS OF THE I.U.F.R.O.
(after I.U.F.R.O. 1975)

Division 1 - Forest Environment and Silviculture

Co-ordinator - D. Mlinsek, Yugoslavia
Deputies - L. Leyton, UK; C. P. van Goor, Netherlands

S1.01-00 Ecosystems (H. MAYER, Austria)
- 01 Virgin forests (H. MAYER, Austria)
- 02 Silvicultural problems in mountain regions (P. PIUSSI, Italy)

S1.02-00 Site (E. STONE, USA; F. RICHARD, Switzerland)
- 01 Fertilization (K. E.REHFUESS, Federal Republic of Germany; W. L. PRITCHETT, USA)
- 02 Soil moisture regime and aeration of soils (N. LINNARTZ, USA)
- 03 International methods for chemical analysis (C. P. van GOOR, Netherlands)
- 04 Reclamation of degraded soils (A. DAVIS, USA)
- 05 Influence of clearcutting on site (V. G.CHERTOVSKY, USSR)
- 06 Site classification (D. BURGER, Canada; K. KREUTZER, BRD)
- 07 Quantitative studies of site factors (S. GESSEL, USA)

S1.03-00 Environmental influences (J. D. HEWLETT, USA)
- 01 Atmospheric environment (A. BAUMGARTNER, Federal Republic of Germany)
- 02 Forest hydrology (J. D. HEWLETT, USA)

S1.04-00 Torrents, snow and avalanches (G. KRONFELLNER-KRAUS, Austria)
- 01 Torrent erosion and control (G. KRONFELLNER-KRAUS, Austria)
- 02 Snow and avalanches (H.-R. in der GAND, Switzerland)

S1.05-00 Stand establishment, treatment and amelioration (M. van MIEGROET, Belgium)
- 01 Afforestation of peatland and extremely wet soil (L. HEIKURAINEN, Finland)
- 02 Afforestation problems in arid and sub-arid regions (J. MARION, France)
- 03 Treatment of young stands (H. OSWALD, France)
- 04 Characterization of plant material (H. SCHMIDT-VOGT, Federal Republic of Germany)
- 05 Thinning experiments (P. ABETZ, Federal Republic of Germany)
- 06 Multiple-use silviculture (F. B. CLARK, USA)
- 07 Use of herbicides (A. BONNEMANN, Federal Republic of Germany, Christiane VOLGER, Federal Republic of Germany)
- 08 Natural stand regeneration (S. PURCELEAN, Romania)
- 09 Improvement and conversion of degraded and coppice stands (A. RIEDACKER, France; A. ZAKI, Morocco)

S1.06-00 Biological productivity (A. GALOUX, Belgium)

S1.07-00 Tropical silviculture (H. LAMPRECHT, Federal Republic of Germany; J. L. J. GROULEZ, France)
- 01 Asia (E. F. BRÜNIG, Federal Republic of Germany)
- 02 South America (H. LAMPRECHT, Federal Republic of Germany)
- 03 Africa (A. PIETERS, Zaire)

S1.08-00 Wildlife habitat management (T. RIPLEY, USA; R. C. STEELE, UK)
- 01 Effects of forest management practices on wildlife (R. C. STEELE, UK)
- 02 Identification and classification of wildlife habitats (J. KIKKAWA, Australia)

S1.09-00 Forest and fire research (A. G. McARTHUR, Australia; J. S. BARROWS, USA)

P1.01-00 Soil preparation and mechanization (with Division 3) (P. J. RENNIE, Canada)

P1.02-00 Land classification (with Division 4), (P. DUFFY, Canada)

P1.03-00 Afforestation methods (with Division 3) (L. OLDENKAMP, Netherlands)

P1.04-00 Nursery problems (with Division 3) (C. Glerum, Canada; A. von SCHÖNBORN, Federal Republic of Germany)

P1.05-00 Arboriculture and urban silviculture (with Divisions 2, 3, 4, and 6) (J. W. Andresen, Canada)

Division 2 - Forest Plants and Forest Protection

Co-ordinator - R. Z. Callaham, USA
Deputies - E. Donaubauer, Austria; H. Gerhold, USA; M. Hagman, Finland

S2.01-00 Physiology (D. A. ROOK, New Zealand)
- 01 Water relations and mineral nutrition (G. AUSSENAC, Frankreich; E. G. ESPARCIA, Spain)
- 02 Photoresponses and metabolism (W. FERRELL, USA)
- 03 Physiological ecology (P.G. JARVIS, UK)
- 04 Growth processes (M. GIERTYCH, Poland; P. DENNE, UK)
- 05 Reproductive processes (S. L.KRUGMAN, USA; G.SWEET, New Zealand; R. N. KONAR, India)
- 06 Seed problems (M. SIMAK, Sweden; K.-B. YIM, Republic of Korea; S. ASAKAWA, Japan; F. SIMANCIK, CSSR)
- 07 Mycorrhizae (P. MIKOLA, Finland; E. HACSKAYLO, USA)
- 08 World directory of tree physiology workers (G. BROWN, USA)

S2.02-00 Species, provenances, and gene resources (M. HAGMAN, Finland; L. SZÖNYI, Hungary; V. JERMAKOV, USSR)
- 01 Dendrology (B. T. STYLES, UK; L. D. PRYOR, Australia)
- 02 Conservation of gene resources (L. ROCHE, U.K.; E. A. OLA-ADAMS, Nigeria)
- 03 Species monography (S. KEDHARNATH, India; M. VIDAKOVIC, Yugoslavia; D. FUNK, USA)
- 04 Procurement of seeds (H. BARNER, Denmark; R. H. KEMP, UK)
- 05 Douglas fir provenances (H. HATTEMER, Federal Republic of Germany; P. GATHY, Belgium)
- 06 Contorta pine provenances (R. LINES, UK)
- 07 Japanese larch provenances (R. SCHOBER, Federal Republic of Germany; H. SCHÖNBACH, German Democratic Republic; J. SINDELAR, CSSR; S. ASADA, Japan)
- 08 Tropical species provenances (H. KEIDING, Denmark; P. J. Wood, UK; W. Barrett, Argentina; S.P.K. BRITWUM, Ghana)
- 09 Eucalypt provenances (J. LACAZE, France; J. TURNBULL, Australia; L. M. HODGES, South Africa; M. FERREIRA, Brazil)
- 10 Poplar provenances (R. KOSTER, Netherlands; J. JOKELA, USA; S. P. IVANNIKOV, USSR; S.Y. SHIM, Republic of Korea)
- 11 Norway spruce provenances (J. DIETRICHSON, Norway; P. KRUTZSCH, Sweden)
- 12 Sitka spruce provenances (J. O'DRISCOLL, Ireland; H. ROBAK, Norway)
- 13 Mediterranean conifer provenances (R. MORANDINI, Italy; M. ARBEZ, France)
- 14 *Abies* provenances (A. M. FLETCHER, UK)

S2.03-00 Breeding (A. BROWN, Australia; C. EHRENBERG, Sweden)
- 01 Breeding tropical species (D. G. NIKLES, Australia; J. BURLEY, UK; G. A. O. OJO, Nigeria)
- 02 Breeding white pines (H. KRIEBEL, USA; Emma de VECCHI-PELLATI, Italy; H. SAHO, Japan)
- 03 Seed orchards (R. FAULKNER, UK; S.-O. HONG, Republic of Korea; R. KELLISON, USA)
- 04 World directory of geneticists and tree breeders (H. NIENSTÄDT, USA)
- 05 Breeding Scots pine (S. BIALOBOK, Poland; K. KANAK, CSSR)
- 06 Breeding nut species (V. BENEA, Romania; M. JOVANOVIC, Yugoslavia; D. FUNK, USA)
- 07 Breeding poplars (V. STEENACKERS, Belgium; E. AVANZO, Italy; L. ZSUFA, Canada; N. V. STAROVA, USSR)
- 08 Breeding for improved wood properties (H. van BUIJTENEN, USA; W. F. SMITH, Australia)
- 09 Breeding Monterey pine (M. H. BANNISTER, New Zealand)

S2.04-00 Genetics (R. TODA, Japan; G. NAMKOONG, USA)
- 01 Population and ecological genetics (V. KOSKI, Finland; C.E. FRANKLIN, USA)
- 02 Breeding theory (A. NANSON, Belgium; C. J. A. SHELBOURNE, New Zealand; M. ARBEZ, Frankreich)
- 03 Progeny testing (E. ANDERSSON, Sweden; J. F. KRAUS, USA; H. JOHNSSON, Sveden; B. JOHNSTON, UK)

04 Cytogenetics (L. C. SYLOR, USA; T. N. KHOSHOO, India; J. HUNZIKER, Argentina)
05 Biochemical genetics (P. T. FERET, USA; H.-J. MUHS, Federal Republic of Germany)

S2.05-00 Genetic resistance to insects and diseases (B. SOEEGAARD, Denmark; H. M. HEYBROEK, Netherlands)
01 Resistance of pines to blister rust (R. T. BINGHAM, USA)
02 Resistance of elms to diseases and insects (H. HEYBROEK, Netherlands)
03 Resistance of poplars to diseases (M. RIDE, France)
04 Resistance of poplars to insects (G. M. ARRU, Italy)
05 Resistance of pines to *Melampsora pinitorqua* (F. MORIONDO, Italy; T. KURKELA, Finland)
06 Resistance of pines to *Peridermium pini* (J. S. MURRAY, UK)

S2.06-00 Pathology (B. K. BAKSHI, India; C. S. HODGES, USA)
01 *Fomes annosus* (A. YDE-ANDERSEN, Denmark; G. WALLIS, Canada)
02 Canker diseases - *Scleroderris* (J. GREMMEN, Netherlands; C. DORWORTH, Canada)
03 Biological control (J. RISHBETH, UK; D. H. MARX, USA)
04 Needle diseases (C. MILLAR, UK; G. PETERSON, USA)
05 Mistletoes (F. HAWKSWORTH, USA; F. PLAGNAT, France)
06 Dutch elm disease problems (D. H. BURDEKIN, UK; J. B. THOMAS, Canada)
07 Phytophthora and related diseases (F. D. PODGER, Australia; D. H. MARX, USA)
08 World directory of forest pathologists and entomologists (R. ANDERSON, USA; H. O. BATZER, USA)
09 Mycoplasma diseases of forest trees (S. P. RAY-CHAUDHURI, Indien)
10 Rusts of five-needled pines (Y.-J. LA, Korea)
11 Diseases of eucalyptus (M. S. REIS, Bazil)

S2.07-00 Entomology (R. STARK, USA)
01 Cone and seed insects (A. BAKKE, Norway; A. F. HEDLIN, Canada)
02 Integrated control of *Hypsipyla* species (R. I. GARA, USA; P. GRIJPMA, Costa Rica)
03 Integrated control of *Hylobius* species (H. H. EIDMANN, Sweden; J. NORD, USA)
04 dissolved
05 Integrated control of *Dendroctonus* species (W. Cole, USA; J. P. VITE, USA)
06 Population dynamics of forest insects (G. VARLEY, UK; W. BALTENSWEILER, Switzerland)

S2.08-00 Damage by vertebrates (G. CROUCH, USA; R. DZIECIOLOWSKI, Poland)

S2.09-00 Air pollution (T. KELLER, Switzerland; P. R. MILLER, USA)
01 Protective measures (J. MATERNA, CSSR; H. RANFT, German Democratic Republic)
02 Diagnosis (A. C. COSTONIS, USA; H. ROBAK, Norway)
03 Air quality criteria and risks (W. KNABE, Federal Republic of Germany)
04 Physiological effects (H. G. DÄSSLER, German Democratic Republic; G. HALBWACHS, Austria)
05 Ecological Problems of Air Pollution (L. DOCHINGER, USA)

S2.10-00 International regulations on plant materials (R. BRANDT, USA)
01 Phytosanity regulations and quarantines (D. PHILLIPS, UK)
02 Certifying genetic worth of forest reproductive materials (J. C. BARBER, USA: R. KOSTER, Netherlands)

S2.11-00 Pesticides (Temporary leader, R. L. Lyon, USA)

P2.01-00 Interaction between site factors and destructive agents (with Division 1) (K. SHEA, USA)

P2.02-00 Production of high-yielding trees (with Divisions 1, 3, 4, and 5) (A. van LAAR, South Africa; H. do AMARAL MELLO, Brazil; J. H. CAYFORD, Canada)

P2.03-00 Impacts of destructive agents (W. E. WATERS, USA; D. SCHVESTER, France)

Division 3 - Forest Operations and Techniques

Co-ordinator - B. Ager, Sweden
Deputies - K. Putkisto, Finland; C. R. Silversides, Canada

S3.01-00 Harvesting and transport (K. PUTKISTO, Finland; T. C. BJERKELUND, Canada; S. YAMAWAKI, Japan)
- 01 Harvesting machines and methods under non-mountainous conditions (C. E. MALMBERG, Sweden; B. Y. RICHARDSON, USA)
- 02 Harvesting machines and methods in mountainous regions (H. LYSONS, USA; V. STAUD, CSSR)
- 03 Harvesting in tropical forests (C. LEPITRE, France; A. WOTHERSPOON, Chile)
- 04 Long-distance transport of wood products (K. WIBSTAD, Norway; nominee from USSR)
- 05 Forest roads (G. PANKOTAI, Hungary; W. G. PATERSON, Canada)

S3.02-00 Operational methods in the establishment and treatment of stands (M. BOL, Netherlands; J. SASAKI, Japan; nominee from USSR)
- 01 Stand establishment (R.GRINNELL, Canada; S. E. APPELROTH, Finland)
- 02 Stand treatment (C. E. McGEE, USA; S. HAGNER, Sweden)

S3.03-00 Ergonomics (G. KAMINSKY, Federal Republic of Germany; J. H. van LOON, Netherlands; T. VIK, Norway)
- 01 Physical and mental work load and occupational hygiene (J. H. van LOON, Netherlands; J. WENCL, Austria)
- 02 Work psychology and sociology (K. LANGE-ANDERSEN, Norway; B. GARDELL, Sweden)
- 03 Ergonomic checklists (B. STREHLKE, Federal Republic of Germany; D. van HATTEM, Netherlands)
- 04 Vibrations (S.-A. AXELSSON, Sweden; J.-E. HANSSON, Sweden)

S3.04-00 Operational planning and control; work study (D. E. KOTEN, USA; A. WHAYMAN, UK)
- 01 Planning and control (S. ANDERSSON, Sweden; H. H. HÖFLE, Switzerland)
- 02 Work study; payment; labour productivity (S. HÄBERLE, Federal Republic of Germany; H. I. WINER, Canada)

P3.01-00 Harvesting and wood utilization (with Division 5) (P. HAKKILA, Finland; J. ERICKSON, USA)

P3.02-00 Accessibility of forest resources (with Division 4) (K. PUTKISTO, Finland)

Division 4 - Planning, Economics, Growth and Yield, Management and Policy

Co-ordinator - G. Speidel, Federal Republic of Germany
Deputies - F. Jörgensen, Norway; G. R. Gregory, USA

S4.01-00 Mensuration, growth and yield (J. FRIES, Sweden; J. POLLANSCHÜTZ, Austria; T. G. HONER, Canada)
- 01 Mensuration of forest biomass (H. E. YOUNG, USA; H. MADGWICK, USA; P. HAKKILA, Finland)
- 02 Estimation of increment (J. POLLANSCHÜTZ, Austria; D. BRUCE, USA)
- 03 Design of experiments (J. FRIES, Sweden; H. L. WRIGHT, UK)
- 04 Growth models for tree and stand simulation (T. G. HONER, Canada; N. Decourt, France)
- 05 Instruments (D. BRUCE, USA; B. EKLUND, Sweden; B. HELLRIGL, Italy)

S4.02-00 Forest resource inventory (T. CUNIA, USA; K. KUUSELA, Finland)
- 01 Resource data in tropical countries (A. J. NASH, USA)
- 02 Resource data in temperate countries (K. KUUSELA, Finland)
- 03 Forest inventory on successive occasions (P. SCHMID, Switzerland; W. E. FRAYER, USA)
- 04 Application of electronic data processing to forest inventory (W. SCHÖPFER, Federal Republic of Germany; J. E. BARNARD, USA)

S4.03-00 Managerial economics (P. WARDLE, Italy)
01 Planning systems (G. von MALMBORG, Sweden)
02 Decision theory (G. F. SCHREUDER, USA; A. LUNDGREN, USA)

S4.04-00 Forest management and planning (R. MAGIN, Federal Republic of Germany; I. ERASLAN, Turkey)
01 Inventory of stands (P. MARTINOT-LAGARDE, France)
02 Stands, site types, and management targets (T. GREGUS, CSSR)
03 Management methods with respect to the function of forests (R. MAGIN, Federal Republic of Germany)

S4.05-00 Economics at national and international level (G. R.GREGORY, USA; N.HERMANSEN, Denmark)
01 Evaluation of the contribution of forestry to economic development (A. J. GRAYSON, UK; I. HOLLAND, USA)
02 Forecasting of roundwood supply (R. SAETHER, Norway; H. MOISEEFF, USSR)
03 National income accounting (L. HEIKINHEIMO, Finland)

S4.06-00 Forest policy (P. RIIHINEN, Finland; A. J. GRAYSON, UK)
01 Effectiveness of policy measures as applied to small woodlands (R. PLOCHMANN, Federal Republic of Germany; K. HAHTOLA, Finland)
02 Effectiveness of policy measures inencouraging investments in forestry in developing countries (H.-J. von MAYDELL, Federal Republic of Germany; H. GREGERSEN, USA)
03 Forest taxation (W. KROTH, Federal Republic of Germany; E. T. WILLIAMS, USA)

P4.01-00 Economic, technological and environmental aspects of wood substitution (with Division 5) (D. HAIR, USA; J. F. SAEMAN, USA)

P4.02-00 Economics and harvesting of thinnings (with Divisions 1 and 3) (H. KRAMER, Federal Republic of Germany; C. M. KERRUISH, Australia)
01 Thinning and mechanization (C. M. KERRUISH, Australia)
02 Economics of spacing and thinning (G. J. HAMILTON, UK, H. OSWALD, France)

P4.03-00 Economics of recreation (with Divisions 1 and 6) (J. M. HUGHES, USA)

P4.04-00 Economics of afforestation and reforestation (with Divisions 1 and 3) (leader vacant; V. KELTIGANGAS, Finland)

P4.05-00 Concepts in inventory, management, planning and economics of forestry (G. von MALMBORG, Sweden)

P4.06-00 Forestry and himan environment (with Divisions 1,2,3, and 6) (H. KENNEWEG, Federal Republic of Germany)

Division 5 - Forest Products

Co-ordinator - H. O. Fleischer, USA
Deputy - B. Thunell, Sweden

S5.01-00 Wood quality (W. E. HILLIS, Australia; P. J. LARSON, USA)
01 Normal wood formation (P. R. LARSON, USA; V. NECESANY, CSSR)
02 Significant variations in normal wood formation (G. K. ELLIOT, UK; A. FAHN, Israel)
03 Secondary wood changes (J. BAUCH, Federal Republic of Germany; T. HIGUCHI, Japan)
04 Effects on properties of genetic factors, environment, and forest practices (J. M. HARRIS, New Zealand)
05 Desired properties for end use (E. H. BULGRIN, USA)
06 Bark properties and utilization (E. L. ELLIS, New Zealand; R. W. KENNEDY, Canada)
07 Quality of plantation-grown woods (W. E. HILLIS, Australia; G. SCARAMUZZI, Italy)

S5.02-00 Wood engineering (J. G. SUNLEY,UK; D. E. KENNEDY, Canada)
01 Mechanical properties (D. E. KENNEDY, Canada)
02 Structural utilization (J. G. SUNLEY, UK)
S5.03-00 Wood protection (M. FOUGEROUSSE, France; J. W. W. MORGAN, UK)
01 Protection of solid wood (M. FOUGEROUSSE, France)
02 Protection of particleboard (K. GRIFFIOEN, Netherlands)
03 Protection of wood in storage (P. NYLINDER, Sweden)

04 Performance of wood in fire (J. COLLARDET, France)
05 Biodetermination of wood (J. LEVY, UK)

S5.04-00 Wood processing (R. A. HANN, USA; C. H. BANKS, South Africa)
01 dissolved
02 dissolved
03 dissolved
04 Slicing and veneer cutting (J. F. LUTZ, USA)
05 Panel products (J. F. S. Carruthers, UK)
06 Drying (J. A. KININMONTH, New Zealand; A. SCHNEIDER, Federal Republic of Germany)
07 Wood glueing (R. H. GILLESPIE, USA)
08 Milling and machining (G. PALITZSCH, Federal Republic of Germany)
09 Pulp and paper (J. E. STONE, Canada)

P5.01-00 Properties and utilization of tropical woods (D. NOACK, Federal Republic of Germany)
01 Characteristics and properties to be evaluated (G. GIORDANO, Italy)
03 Systems of information exchange (J. M. YAVORSKI, USA)
04 Collection and assembling of sources of information (J. D. BRAZIER, UK)

Division 6 - General Subjects

Co-ordinator - J. Parde, France
Deputy - G. Holmes, UK

S6.01-00 Recreation and landscape management (D. Lloyd, USA; L. BIJKERK, Netherlands)
01 Documentation and terminology (N. STOUT, USA; H. KÖPP, Federal Republic of Germany)
02 Landscape management and recreation environments (R. ZUNDEL, Federal Republic of Germany; B. LITTON, USA)
03 Methodologies for research, planning, and determination of benefits of outdoor recreation (G. H. ELSNER, USA; A. A. H. C. van ONZENOORT, Netherlands)
04 Recreation and leisure behaviour, benefits, and outdoor education research (M. H. ORROM, UK; P. Brown, USA)

S6.02-00 Statistical methods, mathematics, and computers (J. JEFFERS, UK; W. G. WARREN, Canada)

S6.03-00 Information systems and terminology (S. SCHRADER, Federal Republic of Germany, T. B. YERKE, USA)
01 Multilingual forestry thesaurus (P. G. BEAK, UK)
02 English language version of the multilingual forestry terminology (R. K. WINTERS, USA)
03 Technical information systems related to forestry (S. SCHRADER, Federal Republic of Germany; Mary O'HARA, USA)
04 Information retrieval (F. E. DICKINSON, USA; C. H. BANKS, South Africa)

S6.04-00 Education and training of research workers (vacant)
01 Education for research in forest genetics and tree breeding (P. FERET, USA)
02 Research in silvicultural education (S. DAFIS, Greece)

S6.05-00 Remote sensing (G. HILDEBRANDT, Federal Republic of Germany; C. R. HELLER, USA)

S6.06-00 Management of research (D. L. Bosman, South Africa; J. H. OHMAN, USA)

S6.07-00 History (A. HAUSER, Switzerland)
01 The influence of forests on economic and social evolution (vacant)
02 History of forestry sciences (vacant)

XVI IUFRO WORLD CONGRESS, OSLO JUNE 20-26, 1976

HOUR	MONDAY 21	TUESDAY 22	WEDNESDAY 23	THURSDAY 24	FRIDAY 25	SATURDAY 26
09:00 ↓ 10:00		FORESTRY IN A WORLD OF LIMITED RESOURCES				
		KEY ADDRESS I *Dr. Kenneth King* Congress Hall A	KEY ADDRESS II *Dr. Norman Borlaug* Congress Hall A	KEY ADDRESS III *Dr. Mårten Benda* Congress Hall A	KEY ADDRESS IV *Dr. O.L. Forgacs* Congress Hall A	KEY ADDRESS V *Dr. Thor Heyerdahl* Congress Hall A
10:00 ↓ 13:00	OPENING SESSION Congress Hall A	DIVISION 2 Congress Hall A DIVISION 3 Congress Hall B and/or CONGRESS GROUPS Conference Rooms	DIVISION 1 Congress Hall A DIVISION 4 Congress Hall B and/or CONGRESS GROUPS Conference Rooms	DIVISION 5 Congress Hall A and/or CONGRESS GROUPS Conference Rooms	INTERNATIONAL COUNCIL Congress Hall A and/or CONGRESS GROUPS Conference Rooms	11:00 CLOSING SESSION Congress Hall A
15:00 ↓ 18:00	DIVISION 1 Congress Hall A DIVISION 4 Congress Hall B and/or CONGRESS GROUPS Conference Rooms	DIVISION 5 Congress Hall A DIVISION 6 Congress Hall B and/or CONGRESS GROUPS Conference Rooms	DIVISION 2 Congress Hall A and/or CONGRESS GROUPS Conference Rooms	INTERNATIONAL COUNCIL Congress Hall A and/or CONGRESS GROUPS Conference Rooms	Special IUFRO/FAO meeting Speakers: *Prof. M. Bol* *Prof. P. Braathe* *Prof. H. Leibundgut* *Prof. U. Sundberg* Congress Hall A	
			17:00 MIDSUMMER EVE			

Specification of Conference Rooms will be given in due time before the Congress.

Appendix 2. Overall programme of the XVI-IUFRO World Congress in Oslo, 1976

Appendix 3.

SCOPE AND CONTENT OF THE SEVERAL CONGRESS GROUPS OF THE XVI - I.U.F.R.O. WORLD CONGRESS IN OSLO, 1976

Division I - **Forest Environment and Silviculture**

Congress Group 1 *Ecosystems.*

Silvicultural treatment of Ecosystems.

Virgin forests in the boreal forest area.

Silvicultural problems in the Alpine Forests of Central Europe.

Silvicultural problems in the mountains of Norway.

The influence of recreation functions on the forest and silviculture.

Congress Group 2 *Site.*

Fate of applied nutrients in forest ecosystems.

Use of fertilizers for nonwood production objectives.

Forest nutrition problems in the tropics and subtropics.

Fertilization studies as a basic technique.

Forest eco-regions, a concept in forest site classification.

Comparison of methods of site classification.

Factors which determine productivity for western hemlock.

The productivity of forest land. A multi resource simulation approach.

Effects of clear cutting and broadcast burning on nutrient budgets, stream water and productivity in Western Canada.

Quantitative studies of site factors.

Problems related to analysis of forest soil fertility.

Congress Group 3 *Environmental influences. Torrent, snow and avalanches. Forest fire research.*

An estimation of bed load transport from European torrents.

Newer research results on torrent erosion and torrent control in Japan.

Erosion processes and control methods in North America.

Newer results on snow and avalanches research and newer tendencies on avalanche control methods.

Congress Group 4 *Stand establishment, treatment and amelioration.*

Urban forestry, its assignments and its program.

The multiple use aspects of silviculture systems related to Eucalyptus forests of southeastern Australia.

Silviculture and air quality.

Drainage of peatland as a means for forest amelioration.

Treatment of forests and hunting-practices.

New trends in the development of afforestation methods.

The effect of standard silvicultural systems of all major uses and forest types.

Silvicultural assignments in industrial areas.

Forest destruction and reconstruction in the mediterranean and their influence on the environment. /Example Yugoslavia/

Possibilities of conversion of forest stands.

Silviculture and landscape planning.

Etude des possibilités de modifier la morphogénèse juvénile des systèmes racinaires de quelques essences; applications pratiques.

Multiple use in southern Appalachian hardwoods - a case history.

Congress Group 5 *Tropical Silviculture.*

Structure and functions in natural and man-made forests on the humid tropics.

Methods and results of the biomass-determination in a rain-forest - ecosystem in the Andes of Venezuela.

Environmental constraints on the possibility of natural regeneration after logging in tropical moist forest.

Structure of a Mountain cloud forest in the Andes of West Venezuela.

Etude de l'influence du milieu sur la germination et la croissance dans le jeune âge d'Entandrophicagma cylindricum Sprague.

Silvicultural practice and timber properties in plantation forestry in India.

Congress Group 6 *Wildlife habitat management.*

Identification and classification of wildlife habitats.

A comparison of North American and Scandinavian moose habitat.

Wildlife habitat development in the tropics of Africa.

Effects of forest management practices on wildlife.

Congress Group 7 *Soil preparation and mechanization. Land classification. Afforestation methods.*

Title of Invited Papers:

Findings within the project: land classification.

Congress Group 8 *Nursery problems. Characterization of plant material.*

Arising problems and tasks in forest nurseries.

Division II - **Forest Plants and Forest Protection**

Congress Group 1 *Physiology.*

Tissue culture and vegetative propagation.

Planting stock and establishment.

Tree root - soil interface and mycorrhizae.

Tree root - soil interface and root system.

Tree crown - atmosphere interface.

Wood production and quality.

Physiological control of differentiation of xylem elements.

Congress Group 2 *Species, provenances and gene resources. Physiology. International regulations on plant materials.*

Early results of the IUFRO Pinus contorta provenance experiments in Canada.

Interaction between site and provenance in survival and early growth of Pinus contorta in Sweden.

Provenance trials with the IUFRO Pinus contorta collection at low latitudes.

Progress report on the IUFRO Pinus contorta provenance experiments.

Terminology and definitions for certification schemes for forest reproduction materials.

Incompabilities among certification schemes for forest reproductive materials.

European and American experiences with Populus deltaides.

Statues of provenance research on Norway Spruce.

Research problems in management of seed orchards.

Congress Group 3 *Breeding.*

Status and trends in breeding of nut species.

Breeding Haploxylon pines for subalpine regions.

Breeding Haploxylon pines for timber production in rust free regions.

Congress Group 4 *Genetics.*

Physiological genetics of forest tree, species.

Silvicultural manipulation to prevent and restrict damage by Scleroderris.

Major problems facing quantitative genetics - a summary from the meeting at Bordeaux.

Congress Group 5 *Genetic resistance to insects and diseases. Pathology.*

Feasibility of biological control with Ascocoryne sarcoides against Fomes annosus using preinoculation techniques.

New developments in the white pine blister rusts of Japan.

New developments in the white pine blister rusts of Korea.

Congress Group 6 *Entomology.*

Control of seed and cone insects with behavioral and toxic chemicals.

Population dynamics of cone insects.

Insect population dynamics.

Forest stand dynamics.

Ecosystem interactions.

Evaluation of impact in the forest ecosystem.

Population dynamics of Argyresthia on silver fir and its interaction with stand composition.

A simple bark beetle population model and implications for pest management.

Population dynamics of Dendroctonus.

Importance of population structure to population dynamics.

D. Micans, populations and integrated control in the Kura River watershed.

D. Monticolae, climatic barriers and in on integrated control in Canada.

D. Monticolae, integrated control through management strategies in the USA.

D. brevicomis, integrated control potential using biotic factors.

New strategies for controlling pales weevil in pine plantations of the southern USA.

Cone and seed insect problems in seed orchards in Europe.

Statial theory of insect population dynamics.

Congress Group 7 *Damage by vertebrates. Production of high-yielding trees. Physiological ecology.*

Management problems in man-made forests of short rotation in South America.

Importance of tree improvement programs for wood production on man-made forests of short rotations.

Current research toward intensive management of forest trees in USA.

Congress Group 8 *Voluntary Papers.*

Kenngrössen für Immissionseinwirkungen.

Geeignete physiologische und biochemische Indikatoren zur Feststellung von Kenngrössen.

Division III - **Forest Operations and Techniques**

Divisional meeting

Man in the production system - the worker.

Man in the production system - the administrator.

Man in the production system - the researcher.

Congress Group 1 *Harvesting and transport.*

Tropical logging, problems and need of research,

problems in technical logging

proposal for IUFRO activities in the field of tropical logging.

Planning mountain logging operations

regional reports from Northern Europe, Central Europe, Eastern Europe, North American West Coast and Japan.

Long distance transport of chips.

Congress Group 2 *Stand establishment.*

Probably 6 Invited Papers, still open.

Congress Group 3 *Ergonomics.*

Work conditions, subjective work experience and psychosomatic health. An explorative study of two groups of sawmill workers.

Monotony and mental overload: stress factors in the sawmill.

Vibrations in forestry machines.

Belastung und Beanspruchung des Schlepperfahrers durch mechanische Schwingungen.

Effects of vibration of forest tractors and processors on the driver. (Physiological points of view).

Ergonomical check lists in forestry .

Lärmbelastung bei der Holzernte im Gebirge.

Congress Group 4 *Planning, work study.*

Prediction of time consumption in logging.

Planning systems.

Information systems.

Development, introduction and use of planning systems.

Congress Group 5 *Harvesting and wood utilization. Accessibility of forest resources.*

Logging and utilization problems in the harvesting of raw material for pulp industry.

Logging and utilization problems in the harvesting of raw material for saw and veneer industry.

Division 4 - **Planning, Economics, Growth and Yield, Management and Policy**

Congress Group 1 *Mensuration, growth and yield. Forest resource inventory.*

Practices and trends in the inventory of temperate forests.

Present practices and future trends in forest inventory designs in the tropical countries.

Sampling designs for continuity in forest inventory.

Sampling methods useful to forest inventory when using data from remote sensors.

Mensuration of forest biomass.

Actual problems in the field of increment research.

Design of experiments.

Data requirements for tree and stand simulators.

Congress Group 2 *Economics of recreation. Forestry and human environment.*

Stress characteristics of human environments relevant to forestry.

Economic procedures used in outdoor recreation throughout the world.

Forestry practices to modify human environment stress.

Outdoor recreation as a sector for economic development.

Congress Group 3 *Managerial economics. Forest management and planning. Concepts in inventory, management, planning and economics in forestry.*

Principles of the forest information system.

Modern management planning in forestry.

Feststellung der optimalen Elemente und der Nutzungsgrösse in Plenterwäldern auf typologischer Grundlage für die Ziele der Forsteinrichtung.

Überführungsverfahren anormaler Betriebsklassen der Buchenwäldern in Bosnien.

Hiebssatzoptimierung von Fichtenbetriebsklassen.

Der Variationskoeffizient zur Bestimmung des optimalen Stichprobenumfanges in Eukalyptusbeständen.

Congress Group 4 *Economics at national and international level. Economic, technological and environmental aspects of wood substitution.*

Interactive variables affecting wood substitution.

Wood substitution for non-renewable resources in industry-technical and ecological considerations.

A review of forecasts and projections on supply of roundwood in Europe compared to actual quantities supplied.

Congress Group 5 *Economics and harvesting of thinnings. Economics of afforestation and reforestation.*

Developments in harvesting technology and their application to early thinning operations.

Different thinning systems and their influence on growth value of the stands.

The influence of different thinning systems on damage to soil and trees.

Congress Group 6 *Forest policy.*

Effectiviness of forest policy measures as applied to small woodlands: conceptual and methodological background.

Forest policy and farm - forest owners objectives and decision criteria.

Investment policy as a pre-condition for development of forestry and forest industries.

Taxation as means of forest policy.

Site value taxation and forest policy.

Division V - Forest Products

Divisional meetings

Wood property requirements for end-use.

Future demands and cost of supply.

End-use requirements for building purposes.

End-use requirements for wood joinery, veneer, etc.

End-use requirements for glulam and reconstitution into boards.

End-use requirements for preservation.

End-use requirements for specific paper properties.

Methods of assessing properties.

Effect of forest practices on quality of the harvested crop.

Processing to meet end-use requirements.

Congress Group 1 *Wood quality.*

Bark properties and utilization.

Differentiation of xylem elements and tissues.

Breeding and growing trees for end-use.

Variations in the quality of wood from fast-grown trees.

Congress Group 2 *Wood engineering.*

Fracture mechanics, shear, and load duration.

Modulus of elasticity and rigidity.

Effectiveness of stress grading.

Non-destructive testing.

Structural use of particleboard and fiberboard.

Congress Group 3 *Wood protection.*

Treatment of wood for ground contact.

Recent developments in wood impregnation.

Protection of wood in storage.

Congress Group 4 *Wood processing.*

Utilization of residues for energy, food and chemicals.

Occurrences and processing of forest and mill residues for board manufacture.

Energy costs and requirements in wood processing operations.

Congress Group 5 *Properties and utilization of tropical wood.*

Survey of current world-wide status and needs in tropical woods research.

Division VI - General Subjects

Divisional meeting

System analysis and forestry research.

Rapport sur l'organisation des recherches forestieres.

Congress Group 1 *Recreation and landscape management.*

Quantifying landscape dimensions for land-use planning.

Progress in measuring demand for recreation.

Contributions of behavioral science to recreation management.

The international semantics of recreation and leisure.

Integrating landscape management into total forest management.

Forest recreation as a component of tourism.

Congress Group 2 *Statistical methods, mathematics and computers. Information systems.*

Statistical advances in forest inventory.

Mathematical problems in forest products research.

Non-normal multivariate distribution theory.

Congress Group 3 *Education History.*

Evolution of the management of French forests between the middle ages and the nineteenth century.

Von der primitiven zur modernen Waldnutzung in den Appalachians.

Die europäische Bauernshaft und der Wald im 19. Jahrhundert - ein Ueberblick.

Le développement de la technologie du gemmage dans le sud de la Yougoslavie (Macédoine).

Congress Group 4 *Remote sensing.*

Remote sensors for airborne and spaceborne imagery.

Automatic thematic mapping using remote sensing data.

Techniques and applications for computer aided analysis of multispectral scanner data.

Remote sensing in the tropics with special reference to sattelite imagery.

Possibilities and problems of RADAR-image interpretation for vegetation and forest types, with particular reference to the humid tropics.

Inventory and monitoring of forest diseases and damages by remote sensing - considerations about promising ways to do it.

Die spektralen Reflexionseigenschaften der Vegetation.

Congress Group 5 *Organization of research.*

Appendix 4.

TOPICS OF EXCURSIONS OF THE XVI - I.U.F.R.O. WORLD CONGRESS, OSLO, 1976

I.1. Forest fertilization. Treatment and growth of young stands
I.2. Stand establishment. Amelioration.
I.3. Applied silviculture
I.4. Afforestation in West Norway

II.1. Forest genetics
II.2. Forest entoniology
II.3. Forest pathology

III.1. Forest operations and long distance transport in mountainous regions. Industrial utilization
III.2. Harvesting, transport and ergonomics

IV.1. Land classification and mapping
IV.2. Yield and planning - social and economic problems in Forestry

V.1. Timber, pulp and paper
V.2. Sawmilling and integrated industries
V.3. Wood quality and industrial utilization

VI.1. Forestry and recreation
VI.2. Forest education and training, forest history

VII.1. Forestry in West Norway
VII.2. Forestry in North Norway