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Onzième Réunion Technique

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Rapports et Procès-verbaux

NEW DELHI, INDIA

25-28 November 1969

VOLUME V

Sixth Session : Landscape Planning Commission

CREATIVE CONSERVATION IN AN AGRARIAN ECONOMY



Published with the assistance of UNESCO

Union Internationale
pour la Conservation de la Nature
et de ses Ressources

International Union
for Conservation of Nature
and Natural Resources

Morges, Switzerland, 1971

The International Union for Conservation of Nature and Natural Resources (IUCN) was founded in 1948 and has its headquarters in Morges, Switzerland; it is an independent international body whose membership comprises states, irrespective of their political and social systems, government departments and private institutions as well as international organizations. It represents those who are concerned at man's modification of the natural environment through the rapidity of urban and industrial development and the excessive exploitation of the earth's natural resources, upon which rest the foundations of his survival. IUCN's main purpose is to promote or support action which will ensure the perpetuation of wild nature and natural resources on a world-wide basis, not only for their intrinsic cultural or scientific values but also for the long-term economic and social welfare of mankind.

This objective can be achieved through active conservation programmes for the wise use of natural resources in areas where the flora and fauna are of particular importance and where the landscape is especially beautiful or striking, or of historical, cultural or scientific significance. IUCN believes that its aims can be achieved most effectively by international effort in co-operation with other international agencies such as UNESCO and FAO.

The World Wildlife Fund (WWF) is an international charitable foundation for saving the world's wildlife and wild places. It was established in 1961 under Swiss law and has headquarters near those of the International Union for Conservation of Nature and Natural Resources (IUCN). Its aim is to support the conservation of nature in all its forms (landscape, soil, water, flora and fauna) by raising funds and allocating them to projects, by publicity and by education of the general public and young people in particular. For all these activities it takes scientific and technical advice from IUCN.

Although WWF may occasionally conduct its own field operations, it tries as much as possible to work through competent specialists or local organizations.

Among WWF projects financial support for IUCN and for the International Council for Bird Preservation (ICBP) have highest priority, in order to enable these bodies to build up the vital scientific and technical basis for world conservation and specific projects. Other projects cover a very wide range from education, ecological studies and surveys, to the establishment and management of areas as national parks and reserves and emergency programmes for the safeguarding of animal and plant species threatened with extinction.

WWF fund-raising and publicity activities are mainly carried out by National Appeals in a number of countries, and its international governing body is made up of prominent personalities in many fields.

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Volume V

Sixth Session: Landscape Planning Commission

Creative conservation in an agrarian economy



Edited by
Alfred H. Hoffmann

Published with the assistance of UNESCO

**International Union
for Conservation of Nature and Natural Resources
Morges, Switzerland, 1971.**



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Preface

The Ninth and Tenth Technical Meetings of IUCN held at Nairobi (1963) and Lucerne (1966), were concerned with identifying and assessing some of the more important ecological considerations affecting conservation of nature and natural resources in tropical and temperate regions, respectively. The Eleventh Technical Meeting, held at New Delhi on 25-28th November 1969, adopted a somewhat different approach. Although much of the material presented was appropriately drawn from experience of conservation problems and scientific research in southern Asia, the aim was to use this material, supplemented by a limited number of comparable studies from other parts of the world, to illustrate the activities and interests of each of the five Commissions on which IUCN relies for technical advice, the formulation of its policies and the promotion of its projects.

Thus, with the exception of the Commission on Legislation, whose specialized field of work does not lend itself to this kind of approach, each Commission undertook the organization and supervision of a Session of the Technical Meeting. In addition, reflecting the close community of interests between IUCN and the International Biological Programme, a full Session of the Meeting was devoted to IBP activities and this was also organized by the Commission on Ecology by virtue of its special liaison responsibilities.

The Papers and Proceedings of the Eleventh Technical Meeting are, therefore, being published in five parts. Volume I contains those pertaining to the Commission on Ecology, including the IBP Session material; Volume II has been prepared by the Survival Service Commission; Volume III by the International Commission on National Parks; Volume IV by the Commission on Education and Volume V by the Commission on Landscape Planning.

Two points concerning the arrangement of material in the five volumes call for comment. First, certain of the topics dealt with in Volume I, under the heading of wildlife utilization and management (e.g. 'the role of zoos') and also the problems concerned with the identification and conservation of undisturbed islands, are very much the concern of the Survival Service Commission and of its specialist groups. That they were nevertheless dealt with at the first two Sessions of the Technical Meeting, under the auspices of the Commission on Ecology, was mainly due to the large number of papers on endangered species presented for discussion at the Survival Service Commission's half-day Session which are to be found in Volume II. It is, however, also an indication of the interdependence of conservation of habitat and species survival, which closely links the work of the two Commissions.

Secondly, a novel feature of the Eleventh Technical Meeting was the presentation and discussion of the reports on what came to be known as the 'pre-Conference Study Tours'. These were in effect six short-term research projects, designed to provide an up to date assessment of a variety of conservation problems of current importance in the host country of India, but typifying problems which frequently come to IUCN's attention. The projects were made possible by the generous financial support of the Smithsonian Institution and were carried out during the week immediately preceding the General Assembly by small groups of experts, representing the appropriate Commissions, working in collaboration with their Indian counterparts, appointed by the Inspector-General of Forests, who were responsible for all the local arrangements. Two

of the studies were mainly concerned with endangered species, two with National Park development and management, and one each with problems of general ecological and landscape planning significance. The resulting reports were dealt with accordingly at various Sessions of the Technical Meeting, but for ease of reference and because, with the exception of the one for which the Landscape Planning Commission was chiefly responsible, all the studies were sited in existing National Parks or equivalent reserves, it has been deemed convenient to include all the reports and summaries of the discussion on them in Volume III of the Proceedings.

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11th TECHNICAL MEETING: SIXTH SESSION

General Introduction

The sixth session of the XIth Technical Meeting of the International Union for Conservation of Nature and Natural resources took place in New Delhi on Friday 28 November 1969, from 1430 to 1730 hours. It was organized by the Landscape Planning Commission, whose Chairman, Mr. R. J. Benthem, acted as Chairman of the meeting, and whose Executive Officer, Mr. Alfred Hoffmann, acted as Rapporteur.

The theme of the meeting was: Creative conservation in an agrarian economy, with the two sub-titles: 'Landscape planning for agricultural land use' and 'Integration of urban requirements into rural land use patterns'. No geographical limitation was included in the title.

One paper entitled 'Impact of urbanization and integrated landscape planning of urbo-rural complex', which was contributed by Mr. K. L. Datta and Mr. V. P. Dhamija, both from India, could not be presented during the session, but is included in this volume.

Morges, 21 July 1970

A.H.Hoffmann,
Executive Officer,
IUCN Commission on
Landscape Planning.

SECTION A: LANDSCAPE PLANNING FOR AGRICULTURAL LAND USE

Experiences in Planning and Reconstruction of Landscape in the Rural Districts of the Netherlands

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There is a long tradition in the creation and reconstruction of human environment in the Netherlands. The old saying that 'God made the world with the exception of Holland, which was made by the Dutch' still rings true, even in these days in which large new areas are being reclaimed in the Zuiderzee region and in the Delta area.

Nevertheless, the planning of land use has become a great problem in this small country with its heavy population pressure. On a total area of about 33,000 square kilometres, the population density has increased from 5 million inhabitants in 1900 to 12 million in 1968. It is estimated that by the year 2000 it will have increased further to at least 18 million. If we moreover take into account that since World War II the country changed rapidly from agriculture to industry—in 1850, 50% of the working population was engaged in agriculture, today, 9%, and in the year 2000, only 3%—, then it seems evident that big changes in the pattern of life are inevitable.

Urbanization is more and more putting its mark upon the face of the Dutch countryside, while the remaining rural areas are under the increasing pressure of an intensified use for agriculture, recreation and other purposes. In order to keep pace with the demand for dwelling accommodation, an area corresponding with the size of a town of 250,000 inhabitants has to be built up every year. Within the period 1950-1980, at least 30 of such towns have been and will have to be built.

This difficult situation induced the Netherlands' authorities to find ways and means for a controlled development of both the urban structures and the remaining countryside, in order to avoid as far as possible a deterioration of the Dutch landscape.

This has been attempted so far by a policy which is focussed on two ways of approach. These are:-

1. Measures in the framework of physical planning on national, regional and local level.
2. Measures connected with the planning and execution of public works which are interfering in the existing landscape pattern.

1. MEASURES IN THE FIELD OF PHYSICAL PLANNING

Until recent years the government policy with respect to the treatment of the countryside was chiefly concerned with measures for the protection of

valuable landscape features against developments which would make an impact on their existing appearance and quality. Fruitful results have been obtained i.e. in the conservation of forests, estates, and a great number of nature reserves and other areas of significant scientific value. This could be done by a system of legal and financial means.

Today, however, the conclusion has been reached that adequate care for the countryside as a whole should not be restricted to protective measures. The necessary and unavoidable developments and reconstructions in the rural areas need in addition a *creative* approach in the field of landscape planning, to ensure an adaptation of the rural environment to the present day way of life.

The main lines of policy in land use planning are embodied in a government statement of 1966: 'The second report on physical planning in the Netherlands'. This report, signed by eleven ministers, gives an outline of the system by which the necessary urbanization will have to take place in the remaining decades of this century. Instead of a strong concentration of the urban centres or an extreme spreading of residential regions all over the countryside, a solution has been chosen in a 'bundled deconcentration' of the necessary new urban pattern. It is foreseen that large green sections will play an important role in these new town systems.

The report further indicates that, in the remaining open space, large areas will get the status of park-land to meet the increasing demand for outdoor recreation. A rough survey of these parks will have to be worked out in the regional plans of the provincial authorities, and a more detailed delineation in the development plans of the local governments. These parklands will partly be located in areas which have already an attractive landscape pattern: forest-land, heath-country, lake-land and old agricultural zones with hedgerows, avenues, rivers, farm villages and other interesting features. But specially in the open western part of the country in the Conurbation of Holland these parks will have to be completely created.

A new ad hoc legislation is now in preparation to open up possibilities for an adequate procedure for the acquisition of land and the reconstruction of land use. Thereby a great number of legal and financial problems will have to be investigated before the first trees and shrubs can be planted.

Nevertheless, rapid progress has been made in recent years with the preparation of several park projects near Amsterdam, Rotterdam and Haarlem.

Finally, the report indicates that large tracts of land will retain their present use for agricultural purposes. The conditions for their preservation against unwanted urban developments will be worked out in the regulations of the local development plans.

2. MEASURES CONNECTED WITH PUBLIC WORKS

In the course of years, a collaboration has been established between the Landscape Planning Department of the State Forest Service and several authorities engaged in the planning and execution of all kinds of public works which interfere with the existing landscape pattern.

(a) Land consolidation

Of particular importance in this respect is the collaboration with the Government Service on Land and Water Use in the preparation of schemes for consoli-

dation of holdings. In the framework of the Land Consolidation Act, a total area of 135,000 acres of agricultural land is annually being reconstructed. Thereby not only the network of roads and watercourses has to be reorganized and improved, but also the landscape pattern has to be adjusted and reshaped.

In this Act, the *landscape plan* is a condition for the financial and technical support of the government for these regional reconstructions. The plan comprises protective and creative measures. Valuable existing landscape features will have to be spared.

On the other hand, large numbers of new trees and shrubs will have to be planted for the restoration or improvement of the rural scene. Often hundred of acres of land are being transformed into shelter-belts, farmyard-plantations, forest zones, recreation facilities and other non-agricultural purposes.

The land-users of the regions decide upon these consolidation projects (including the landscape plan) by voting. More than 100,000 trees and one or two million shrubs are being planted yearly in the framework of these regional agricultural reconstruction plans.

(b) Road building

A long established collaboration between the Landscape Planning Department and the highway authorities of the Ministry of Transport is resulting in careful treatment of the rapidly expanding network of highways with respect to the surrounding countryside. From the very beginning of each highway project the landscape architects are in the position to make their contribution regarding the amenity aspects of the work.

The desirability of acquiring more land for planting purposes, details concerning the alinement of the roads, profiles for planting medians and verges, adjustment of special structures such as bridges, viaducts, picnic areas and others to the adjacent surroundings are all presented in detailed planting schemes and landscape plans.

Moreover, every year, maintenance plans are drawn up to advise the highway engineers in the management of the 'natural' equipment of the roads.

For most of the provincial highway systems a similar method of collaboration has been practised for several decades.

(c) Land reclamation

A specific aspect of land use planning and creation of landscape is to be found in the great land reclamations in the former Zuiderzee and in the Delta region in the south-western part of the Netherlands.

In the polders of the Zuiderzee, a new area of about 550,000 acres will finally be created, before the end of this century. The first polders were nearly completely dedicated to agriculture, with only 8% of the total area allocated for forest-land or recreational purposes.

Nowadays, however, these non-agricultural kinds of land use will reach to 20% or more. Urbanization, recreation and the demand for new natural areas, forests and beaches, are putting their mark upon the plans for land use in these new areas.

In the Delta region there is also the need for freshwater basins and for better accessibility to the isolated archipelago which influence the planning of those great undertakings, primarily started for better protection of the land against the sea.

For all these great land reclamations, teams of specialists are working together to cover all the different technical aspects. The landscape planners are making their contribution already from the earliest stages, as it is understood that the creation of a multivariated environment is essential for future living conditions in this densely populated country.

(d) Forestry

Within the scope of recreational development, the use of forests has been critically observed in recent years. This induced the State Forest Administration to frame a new policy which has resulted in the reconstruction of the existing forest management plans.

Today the landscape architects of the Landscape Planning Department are drawing up new plans for all the state forests, whereby unattractive chess-board like road-systems will be replaced by different kinds of roads and trails which are more adjusted to recreational use. Moreover, a system of open spaces and more facilities for camping and picnicking will be developed, and the the establishment of visitor centres has been started.

(e) Other landscape improvements

Finally, it should be mentioned that for several years past the Minister of Agriculture has encouraged the improvement of landscape in the rural areas by subsidizing different kinds of plans submitted by local governments, institutions and individuals. These plans, drawn up by private landscape architects, are being reviewed by the State Forest Service, and supported with grants ranging from 35% to 65% of the estimated costs.

Quite a number of country lanes, farmyards and minor recreation projects are being planned within the framework of this governmental aid, for which about 1½ million guilders are available yearly.

SUMMARY

Land use has become a great problem owing to heavy population pressure. Urbanization has increasingly become the hallmark of the Dutch countryside. This situation has forced the authorities to develop methods for controlling urbanization. Their policy includes two aspects:-

1. Measures in the field of physical planning

Until recently the government policy was directed chiefly to the protection of valuable landscape features. Today, however, an adequate stewardship of the country as a whole has developed following the government statement of 1966 on land use planning. This report advocates 'bundled deconcentration' of urban areas, the remaining open space being allotted parkland status to meet outdoor recreation requirements. Already attractive areas will primarily be used to this end. Extensive tracts of land will remain for agricultural purposes.

2. Measures connected with public works

Collaboration has been established between the Landscape Planning Department (State Forest Service) and several authorities engaged in planning and execution of all kinds of public works which interfere with the existing landscape pattern.

(a) *Land consolidation*: The Land Consolidation Act stipulates that the Landscape Plan shall be a condition for financial and technical support by the government. The Plan provides protective and creative measures.

(b) *Road building*: Long-established collaboration between the Landscape Planning Department and the highway authorities ensures careful treatment of highways in relation to adjoining countryside. Every year maintenance plans are drawn up to assist highway engineers.

(c) *Land reclamation*: the area reclaimed in the former Zuiderzee will ultimately total about 550, 000 acres. Initially polders were almost completely agricultural. Now 20% of the acres are used for forestry and recreation. The Delta plan originally started for protection against the sea now also provides for freshwater basins.

(d) *Forestry*: forests are increasingly used for recreation, necessitating the review of existing forest management plans. More recreational facilities, more attractive road systems and visitor centres will be developed.

(e) *Other landscape improvements*: The Minister of Agriculture has encouraged the improvement of landscape in agricultural areas. Plans are supported by grants ranging from 35% to 65% of costs.

RÉSUMÉ

Sous l'effet des fortes pressions de population, le problème de l'utilisation des terres a pris une acuité particulière aux Pays-Bas. La campagne néerlandaise est caractérisée par une urbanisation sans cesse croissante.

Devant cette situation, le gouvernement s'est vu contraint d'adopter des mesures en vue de contrôler l'urbanisation. Sa politique comporte deux aspects:

1. Les mesures d'aménagement physique du paysage

Jusqu'à récemment, la politique du gouvernement visait essentiellement à protéger des éléments particulièrement intéressants du paysage. Mais actuellement, à la suite de la déclaration de 1966 du gouvernement sur la planification de l'utilisation des terres, il s'est créé une politique de gestion rationnelle de l'ensemble du pays. Ce rapport préconise une décentralisation groupée des zones urbaines, les espaces verts restants recevant le statut de parcs affectés aux loisirs de plein air. Les sites présentant déjà une valeur esthétique serviront essentiellement de zones de récréation tandis que quelques grandes parcelles de terre arable conserveront leur vocation agricole.

2. Les mesures touchant aux travaux publics

Au cours des années, il s'est établi une certaine collaboration entre le Département de l'Aménagement du Paysage (Service des Forêts Domaniales) et divers services s'occupant de la planification et de l'exécution de travaux publics de toutes sortes qui touchent au paysage.

(a) *Remembrement des terres*: Le décret sur le remembrement des terres stipule que l'établissement d'un plan directeur du paysage est la condition indispensable à toute assistance technique et financière du gouvernement. Le Plan propose des mesures de protection et de développement du milieu naturel.

(b) *Construction des routes:* Une collaboration de longue date entre le Département de l'Aménagement du Paysage et les Services des Routes a permis la création d'un réseau routier ne déparant pas le paysage environnant. Chaque année, on établit des plans d'entretien du réseau qui apportent une aide efficace aux ingénieurs des Routes.

(c) *Assèchement des terres:* A la fin de ce siècle, la surface totale de terres récupérées dans l'ancien Zuiderzee couvrira approximativement 275'000 hectares. A l'origine, les polders étaient à vocation presque exclusivement agricole. De nos jours, 20% de la surface actuelle sont assignés aux forêts et aux zones de détente. La région du Delta qui servait à l'origine de protection contre la mer verra aussi la création de bassins d'eau douce.

(d) *Les forêts:* Les forêts servent de plus en plus de zones de détente. Ceci a incité l'Administration des Forêts Domainiales à rénover les plans d'aménagement des forêts. Il a été décidé de créer plus de centres et d'aménagements touristiques et un réseau de routes plus varié.

(e) *Autres améliorations:* Le Ministère de l'Agriculture a encouragé l'amélioration et l'embellissement du paysage rural. Ces plans d'aménagement recevront des subventions couvrant de 35% à 65% des frais.

Section A.

Landscape Planning for Agricultural Land Use in an Historical Country of Central Europe

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Central Europe, where Czechoslovakia is situated, comprises an area of 127, 870 sq.km., and has 14. 5 million inhabitants; it has been inhabited for some 250, 000 years. The land is known to have been cultivated by agricultural tribes, which settled as early as the fifth century B.C. The territory was first inhabited by Slav tribes in the fifth century A.D. Historical documents concerning this settlement are found more frequently from the seventh to the ninth centuries A.D., the period of the so-called Great Moravian Empire.

The earliest records of plans to gain new agricultural land by draining bogs and clearing scrub date back to the tenth and eleventh centuries, the period when Man advanced from the fertile valleys alongside water courses to less accessible hilly country under forest. More extensive and better conceived landscape arrangements to serve agricultural aims are known from the fourteenth and fifteenth centuries A.D. At that time, swamps and peat moors were drained, and ponds and canals constructed. In the sixteenth century, the area occupied by ponds in the territory of Bohemia and Moravia was some 220, 000 hectares. These ponds were used for pisciculture. Some of them have continued to exist since, especially in the regions of South Bohemia and South Moravia.

The so-called 'Land-Registers', compiled as late as the latter part of the eighteenth and the beginning of the nineteenth centuries, may be considered as quite significant measures of landscape planning, although their aim was to register land owned by landlords and their subjects for revenue purposes. In 1857, the first land consolidation was made on a voluntary basis for the village of Záhlinice, Moravia. The parcelling of land into lots, and in turn their consolidation, may in general be considered one of the most important alterations from the point of view of agricultural landscape planning.

During the earliest times of common land ownership, the land under agricultural use formed continuous organic units, limited by natural boundaries, such as running and stagnant waters, forests and hillsides. The land lying nearer a settlement was farmed as fields and meadows, while the more distant plots were utilized as pasture land and woodland. Agricultural land, gradually expanded in area through human activities—felling of forests and draining of bog lands—, was graded into its original state along irregular boundaries. True private ownership at those times included only dwelling-houses, yards and gardens. Disintegration of larger families into smaller family units and down to separate homesteads was the stimulus for the first and the most intensive land division. In subsequent years, it was only the land under the ownership of the landlords and the Church which remained unaltered and retained its integral character, because large areas offered more expedient conditions for farming. A great deal of parcelling also occurred because of legal measures, through sales and

purchases; further alterations have taken place during the past century, having been caused by different engineering constructions, such as highways, railways, river training, and also in connection with the progress of settlement, with the advancement of industries, and the like.

In the first years following World War II, the 7.4 million hectares of agricultural land of Czechoslovakia incorporated some 33 million plots, their ownership being divided into 1.4 million farming enterprises. The average number of plots per farm was 23, in individual cases as much as 150, and even 800 plots were no exception; on the other hand, the average size of a plot did not exceed 0.23 hectare.

Socialization of the country here started in 1948, going hand in hand with the setting up of the Unified Agricultural Co-operatives and State Farms which, at present, are farming about 92% of the entire agricultural land of the territory. In this connection, pertinent legislation ensued: the Law on the Economic and Engineering Land Arrangements contained provisions for the consolidation of land. These land arrangements are aiming at the due utilization of the economic farming area and at the management of the existing soil fund along progressive lines, especially its organization and operation, taking into account its full utilization for agricultural purposes and incorporating conservancy and improvement aspects.

Such arrangements of agricultural land are planned for the entire territory of Czechoslovakia, and the size of individual field areas (plots) is fixed so as to meet best the requirements of particular topography, specialization of production, economical application of machinery, means of transportation, and anti-erosion measures. Consequently, there are variations in the size of individual fields, ranging from several hectares to several tens of hectares. Permanent rotation of crops have been introduced and are practised, i.e. regular sequences of crops or of groups of crops.

A great deal of attention has been given in Czechoslovakia to different measures of landscape planning to be applied in the utilization of agricultural land. Agricultural land developed to a high level is being taken over not only by densely populated built up areas but also by industrial development. These, together with transportation systems and new housing estates, occupy and frequently also damage with ever increasing intensity more and more fertile land. Over the past thirty years, 550,000 hectares of agricultural land have been lost in this way. It goes without saying that fertile soil should not only be preserved, but also duly economically utilized. The new land required should be reclaimed by draining waterlogged soil, by recultivation of devastated areas, by irrigation of arid areas and the like.

Experience gained over a long period, both abroad and in Czechoslovakia, has indicated that all-round information on soil properties is a prerequisite for planning. The realization of effective measures should lead to fuller use and to further improvement of the soil. As a result, a special research programme was started in 1961, called 'Complex Survey of Czechoslovak Soils', consisting of studies of the morphological, biological, chemical and physical properties of soils.

In addition, during 1956-1960, the so-called 'Delimitation of the Soil Fund' was carried out on the whole territory of Czechoslovakia, being a part of the 'General Plan for Furtherance of Agriculture, Forestry and Water Economy'. This is a programme aimed at the utilization, protection and shaping of the natural environment of the future. The purpose of the delimitation of the soil fund was to make proposals for the most expedient way from the point of view

of prospective large-scale organization for agricultural and silvicultural production, while simultaneously securing soil and landscape protection and taking into account the interests of water conservation and regional planning. These specific interests, concerning the water regime of a landscape and the use of water by the major branches of our national economy, have been compiled and incorporated in the 'National Water Conservancy Plan for Czechoslovakia', covering thirty-five partial watersheds. The requirements by the inhabitants for job opportunities, housing, culture and recreation were noted and their interests have been incorporated in the so-called 'Regional Plans for Areas, Housing Estates and Constructions'.

Another significant document, completed in 1960, showed the distribution and specialization of agricultural production under existing natural conditions—an 'Atlas for Regional Distribution of Agricultural Production'. Its maps were made on the basis of the biological requirements of individual crops for a given environment. Special maps show the soil conditions and climates, using the form of a synthesis of isotherms, isohyets, and phenological data.

To serve the aims of long-term planning and the co-ordination of different actions related to national economy and bearing upon agricultural landscape, special 'Programmes and Prospective Plans of Amelioration' have been compiled for the period until 1980. Mainly the following items are considered therein: soil drainage, irrigation, soil improvement, construction of ponds and small water storage reservoirs, river regulation, plantation of vegetation for lining river banks, reclamation, and precautions to protect soil against water and wind erosion.

The 'Project of the Republic', now under progress, is to serve the needs of fixed assets planning. It contains descriptions and assessments of all major landscape elements to be considered in selecting convenient localities (regions) for the activity in question. The biological questions relating to a civilized landscape, and its due utilization and protection, will be the object of a 'Biological Plan for the Landscape', now being prepared.

Landscape planning applicable to agricultural land, as conceived by us in the Brno University of Agriculture on the basis of scientific expectations, determines the trend of agricultural activities so that, within a definite, orographically delimited region, the production capacity of its soils will be at the maximum level. A balanced development of all biotic and abiotic factors is considered simultaneously.

SUMMARY

Czechoslovakia has a surface area of 127,870 sq. km. and 14.5 million inhabitants. The first records of planned vesting of land in agriculture go back to the tenth century.

The 'Land-Registers' at the end of the eighteenth century, established for the registration of privately owned land for revenue purposes, were a most significant indication of the existence of landscape planning. In 1857, land consolidation was first undertaken in Záhlinice, Moravia. This parcelling of land and, in turn, its consolidation, was one of the most important advances in agricultural landscape planning. After World War II, Czechoslovakia's 7.4 million hectares of agricultural land incorporated 33 million plots, divided into 1.4 million farming enterprises. In 1948, the Unified Agricultural Cooperatives and State Farms were set up, together with the Laws on the Economic and Engineering Land

Arrangements, aimed at the consolidation and adequate utilization of economic farming areas, as well as at conservancy and improvement aspects. Individual fields are sized to suit topography, production, machinery, etc. Regular rotation of crops is practised.

Over the past thirty years, 550, 000 hectares have been lost through urbanization. There are various research programmes and plans in progress in Czechoslovakia, such as the Complex Survey of Czechoslovak Soils; Delimitation of the Soil Funds; General Plan for Furtherance of Agriculture, Forestry and Water Economy; National Water Conservancy Plan for Czechoslovakia; Regional Plans for Areas, Housing Estates and Constructions; Atlas for Regional Distribution of Agricultural Production.

The 'Project of the Republic' contains descriptions and assessments of major landscape elements to serve the needs of fixed assets planning.

RÉSUMÉ

La Tchécoslovaquie a une superficie totale de 127' 870 km² et une population de 14, 5 millions d'habitants. Les premiers documents mentionnant un aménagement dirigé des terres agricoles remontent au X^e siècle.

Les 'Registres des Terres' établis à la fin du XVIII^e siècle pour déterminer les revenus des terres privées constituent une preuve très nette de l'existence d'un plan d'aménagement des terres à cette époque. En 1857, pour la première fois, un remembrement des terres a été entrepris à Záhlnice en Moravie. Le morcellement des terres, puis leur remembrement, représentent un des grands progrès de l'aménagement des zones rurales. A la fin de la second guerre mondiale, les 7, 4 millions d'hectares de terres agricoles étaient divisés en 33 millions de parcelles réparties entre 1, 4 millions d'exploitations agricoles. L'année 1946 vit l'instauration des Coopératives Agricoles Unifiées et des Fermes d'Etat. Celles-ci, appuyées par la Loi sur l'Organisation Economique et Technique des Terres, visait au remembrement et à l'utilisation appropriée des zones rurales d'intérêt économique ainsi qu'à la conservation et l'amélioration du paysage. Chaque parcelle agricole est aménagée en fonction de la topographie, de la production, de l'utilisation des machines, etc. On pratique des rotations culturales régulières.

Au cours des trente dernières années, 550'000 hectares ont été acquis à l'urbanisation. Actuellement, divers programmes et plans d'études sont en cours: Revue des Sols de Tchécoslovaquie; Délimitation du Fond Foncier; Plan Général pour la Promotion de l'Agriculture, de la Sylviculture et des Eaux; Plan National de Conservation des Eaux en Tchécoslovaquie; Plans Régionaux concernant les Terrains Immobiliers et les Constructions; Atlas de Répartition Régionale de la Production Agricole.

Le 'Projet de la République' qui est en cours de développement contient la description et l'évaluation des principaux éléments dont il faudra tenir compte dans la planification immobilière.

Section A.

Situation of Landscape Planning for Agricultural Land Use in Australia

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INTRODUCTION

The countryside and the landscape values it comprises are part of the environment and in this environment man is the dominant factor. Even in a continent as large as Australia with its few million people, the next few decades will see enormous changes in land use patterns. These changing (for the better) land use patterns will come from the demands of our ever increasing urban population. We have taken command of a continent and there are now comparatively few areas left for development. The most spectacular future development will come from better land use practices in existing settled areas. Technology and science have enabled man to modify nature to his use and no area now is inviolate.

Clearly the individual needs some freedom of choice but it must be consistent with the demands of others. The basis of such complex planning needs research, and appraisal of land resources, a definition of land use and even a classification of landscape. Many disciplines will need to be involved.

The enormous pressures for total land use are real and assessable. The earth's productive soils are limited, there are few areas of agricultural potential not now being conquered and redesigned by man for his use. The resources of greatest value—the rivers, the mountain water catchments, the productive forests and the fertile agricultural lands—are also those with the greatest recreational values. These areas not only produce the food, fats, fibres and forests, and waters for our living, but they also should provide spiritual comfort and recreation.

It is now accepted that forests, water catchments, the soils and the air that we breathe shall have sustained productivity for man's physical benefit. So must landscape planning for agricultural land use be planned for man's spiritual and aesthetic* benefit. In Australia at the moment there are no proposals or recommendations which would stimulate Government or local action in regard to the enhancement of the quality of Australia's environment† aesthetically.

There is need for an assessment of the accelerating pace of change to the earth's surface, to bring the leading planners, agriculturalists and conserva-

* Aesthetic standards are intangible and not suited to legal interpretation because they vary with the individual, with the cultural group concerned, with the locality and with the period. However, in the case of environmental design involving architecture, landscape architecture and engineering aesthetic principles can be established.

† A Council for Environmental Education has been appointed by the Standing Committee of the Countryside 1970 (United Kingdom).

tionists and the responsible Government authorities together to design and incorporate landscape planning as a major factor in agricultural land use.

For the purpose of this paper I have devoted proportionately more time to the recreational values of landscape planning because it is a more recent and a more critical concept of land use. This then becomes a paramount theme although it is necessary to assume certain premises:

That the 'urban requirements in a rural land use pattern' need positive integration in the 'landscape planning programmes for agricultural land use'.

that recreation is now a basic and economic form of land use,

that planning recreation into the land use programme requires a scientific and technological approach by the governments and those benefiting from recreation,

that good land use is synonymous with sustained optimum production which in turn is consistent with total land use and with conservation,

that good land use is generally good landscape,

that total land use envisages a designed plan for recreational use as well as for economic land use within the conservation ideals,

that the aesthetic values in the landscape are tangible, are economic and are assets of the whole community and should be preserved by education, adequate controls, and possibly and probably appropriate compensation, and

that landscape planning for agricultural land use needs to be treated as a broadening of the term conservation.

PHYSICAL SURVEY

Australia's three million square miles have a great diversity of soil, climate, topography and land utilization. As a land mass it is very old and degraded. There are no inland mountain barriers—though there are isolated small inland ranges rising to 5000 feet. Australia's High Country parallels the Eastern Coastline, rising to just over 7000 feet. Even these comparatively high areas are largely uplifted penneplains. The escarpments from the Kosciusko Plateau (6-7000 feet) and some other areas drop steeply thousands of feet to the rounded hills and plains below.

There are no permanent snowfields, though the winter snow-clad area in the South East covers about 800 square miles. Half of Australia has a rainfall of less than 10 inches per annum, one quarter from 10-20 inches. The balance—a substantial 750,000 square miles—is the agricultural and forested area and the tropical north.

The only substantial river system drains about one-third of the south-east part of the continent (one seventh of the continent). It is by far the most variable and has by far the smallest average annual flow (10 million acre feet per annum) of any other major river system in the world. Underground water resources are not great nor are they of good quality. Water is without doubt the limiting natural resource.

Our water conservation and development programmes are soundly based and most major dams for domestic, town, farm and irrigation purposes have been constructed. No dams have been deliberately constructed for maintenance of stream flow and pollution already is serious in many streams.

Australia's flora and fauna are unique, largely because of the very considerable period of geological time Australia has been separated from other land masses. Our animals are mainly marsupials, the trees, shrubs and grasses are peculiarly Australian and even species of birds belong to endemic families (41%). Most soils are extremely mature and many are peculiarly deficient in trace elements.

Scientifically Australia has great value because, until the first European settler in 1788, its aboriginal population was small. They were nomadic people who neither cultivated crops nor herded domestic animals. They were a gentle people who understood nature and lived with nature, and except for the occasional fire their violation of nature was slight. On the other hand the European impact in the 180 years of dominance has been considerable with dramatic and considerable environmental change.

Despite Australia's aridity—it is the driest continent in the world—man's impact is found over almost the whole continent. There are still substantial areas of natural bush and forest in the form of Crown Lands but unfortunately too few areas (1.1%) are permanently dedicated as National Parks (See Table 1).

LAND USE PROBLEMS

In Europe over a long period man has learned to live with his environment, he knows its weather, soils and problems; he has evolved a land use pattern which ensures a high continuing productivity. There, the largely man-made landscapes of farm and village, pastures, moor and woodland blend in the natural scene—a beautiful, charming landscape and it is indeed good land use. However, this modern mechanized age has created problems for the European farmer.

In Australia land has been considered a commodity to exploit. There has been little concern over the spoliation and pollution of natural resources, and, except for Town and Country Planning and Erosion Control legislation there are few controls over destructive elements through land use. Town and Country Planning legislation so far has been concerned almost entirely with town planning. The preservation or restoration of landscape values in land use programmes have seldom come into the context of planning. Soil conservation legislation does much for resource preservation in most States although there is still much to do and there are far too many raw and ugly land use patterns continuing.

Too many Australian farmers and pastoralists (one who grazes stock on broad acres) are not working with nature and do not understand it as do farmers in Europe and Asia. Their approach to land use is usually thoughtless and exploitive.

Scientific and technical knowledge to increase productivity or to improve land use is available to both farmers and pastoralists but too few have availed themselves of this information. There is no information available from Government sources specifically to improve landscape values.

FEDERAL LAND USE PLANNING

Federal land use planning is confined to the Federal Territories—Northern Territory and the Island Territories of Papua and New Guinea. The six States in the Commonwealth have differing State laws concerning land use.

An approach to agricultural land use planning which has steadily been gaining ground over the last twenty-five years in Northern Australia is the American one of first classifying land on the basis of its known or inferred capability for safe sustained use, and then planning its economic use within limits imposed by the capability assessment. When planning is attempted on this basis, the first process might be described as a terrain landscape and natural resource analysis for the purpose of agricultural land use planning. If planning decisions made in the second stage are applied to the ground, these will result in changes to the scenic landscape which are a direct flow on from the land capability assessments.

In Northern Australia so little development has been done that we are only now entering the phase of discovering what our scenic landscapes will become once pastoral and agricultural activities have been developed to, or *restricted to*, the limitations imposed on safe land use by terrain landscape and the natural agricultural resources. The development of agriculture in Northern Australia is economically so marginal that scenic landscape has not yet received any attention as a problem in its own right.

Landscape planning has not been omitted from the scheme for the development of suburban communities across the Australian Capital Territory. Walter Burley Griffin's concept for Canberra envisaged an urban community blended into the existing landscape with wooded hills and some forms of rural land use separating the various urban development areas. The National Capital Development Commission is endeavouring to preserve this concept in their current development planning. It is conscious of the need for planned development of rural lands in areas adjacent to the national capital and the conservation aspects which are a necessary corollary. In the Northern Territory the Administration has had opportunities to study large-scale agricultural development at Humpty Doo and at Tipperary. Both forms of development have created scenic landscapes distinctively different from virgin conditions.

In many parts of Northern Australia the problems are more those of reclamation than of development. Western Australian* and Northern Territory conservation teams have been active for some years on the restoration of the Fitzroy River, Ord River, and Victoria River catchments, all of which have been severely damaged by the combinations of heavy stocking and drought. These regional scale conservation measures represent a form of landscape planning.

Some of the most interesting studies connecting terrain landscapes with land capability assessments are those of the Commonwealth Scientific and Industrial Research Organization Division of Land Research which has been active in Papua and New Guinea as well as in Australia.

PROBLEM OF EROSION OF NATURAL RESOURCES

The early European settlers' experience of land use in Australia came from their experience of a more gentle climate and of kinder soils. Agricultural experience in Europe was of little value in the harsher climate and poorer soils in Australia and for almost 150 years of the 180 years since European settlement land use was exploitive.

* The Department of Agriculture of W. A., Bulletin 3599, The Ord River Catchment Regeneration Project.

TABLE 1 STATISTICAL SUMMARY OF AUSTRALIAN PARK AND RESERVE SYSTEMS
(Information for 30th June, 1967, except where stated)

State or Territory	Type of Park or Reserve	Number	Area (acres)	Percentage of State or Territory (area of State or Territory, square miles)	Per Capita-acres (1966 population, millions)	Expenditure—Year ending 30th June, 1967
Queensland	National Parks	77	2,267,812	0.5	1.4	National Parks and Scenic Areas = \$288,000 Fauna Conservation = no information
	Scenic Areas	172	38,576	(667,000)	(1.7)	
	Sanctuaries controlled directly by Department of Primary Industries	3	31,080			
		252	2,337,468			
New South Wales (at October 1st 1967)	National Parks	12	1,959,400	1.1	0.5	Major Parks and Reserves = \$972,258 Fauna Conservation and Flora Reserves = no information
	State Parks	1	23,442	(309,433)	(4.2)	
	Historic Sites	6	2,009			
	Nature Reserves	52	141,680			
	Flora Reserves (Forestry Act)	8	9,095			
	85	2,135,626				
Victoria	National Parks	20	370,656	0.9	0.2	National Parks = \$440,979 Game Management and Wildlife Sections of Fisheries and Wildlife Department = \$206,781*
	Wildlife Reserves	25	121,640	(87,844)	(3.2)	
		45	492,296			
Tasmania	Scenic and Historic Reserves	78	608,926	3.7	1.9	Scenery Preservation = \$137,326 Fauna Conservation = \$45,000
	Sanctuaries on Crown land under sole control of Animals and Birds Protection Board	35	102,724	(23,383)	(0.4)	
		113	711,650			
South Australia	National Parks	33	555,958	0.3	0.7	National Parks = \$295,328 Fisheries and Fauna Conservation = \$133,936 National Pleasure Resorts = \$98,001* Flinders Chase = \$13,181
	Fauna Reserves, Prohibited Areas, and 1 Game Reserve	42	19,813	(380,070)	(1.1)	
	National Pleasure Resorts	21	23,316			
	Flinders Chase	1	135,745			
		97	734,832			
Western Australia (at 1st July, 1968)	Reserves vested in National Parks Board of Western Australia	33	821,220	about 0.5	about 3.6	By National Parks Board of Western Australia = \$246,100 Fauna Conservation 1967/68 (estimated) = \$104,000
	Parks and Reserves vested in local authorities, boards of management, societies, etc.	145	about 75,000	(975,920)	(0.8)	
	Fauna Sanctuaries vested in W.A. Wild Life Authority	95	2,008,588			
	Class 'A' Reserves administered by Department of Lands and Surveys	105	about 137,000			
		380	about 3,041,808			
Northern Territory	Reserves controlled by Northern Territory Reserves Board	27	532,053	3.7	311	By Northern Territory Reserves Board = \$211,570 By Animal Industry and Agricultural Branch on Fauna Conservation = \$251,060
	Sanctuaries	5	11,100,780	(520,280)	(.04)	
		32	11,632,833			
Australian Capital Territory	Tidbinbilla Fauna and Flora Reserve	1	11,500	2.0	0.1	Tidbinbilla Reserve = \$193,475 On other Fauna Conservation = \$10,000*
				(939)	(0.1)	
Total		1,005	21,098,013	1.1	1.8	\$3,647,005
				(2,967,909)	(11.5)	

* Does not include cost of certain shared services, such as proportion of cost of general administration, and proportion of salaries of certain officers engaged only part-time on this work.

New South Wales is the biggest primary producing State in Australia. An erosion survey* of that State 25 years ago indicated that:

38. 3% of the land in the Eastern and Central divisions (which embraces nearly all the cultivated lands, supports 90% of the livestock and provides most of the water catchments and forested areas) was affected to some appreciable extent by soil erosion;

1, 187, 000 acres comprising some of the originally most productive land have been completely or permanently lost to the agricultural potential;

5. 5 million acres are suffering from moderate erosion.

These figures would be similar in other States.

RECREATION IN THE COUNTRYSIDE

There has been vast improvement in economic use of land in the last thirty years, due to the agricultural educational programmes and to specialist activities initiated by Soil Conservation Services or by conservationists or Conservation Societies. Thirty years ago conservation was not appreciated or understood. Now it is.

Landscape planning for agricultural land use is a widening of the conservation concept of thirty years ago. There are new demands on the countryside for both active and passive recreation. The desires and political pressures for landscape planning of agricultural land use must become a dynamic force in the planning of the countryside. These new demands on the rural community are abundantly demonstrated by the pressure on National Parks and other outdoor recreational facilities. The recreational pressures will extend into the planning of agricultural land use patterns. Conservationists thirty years ago saw the soil as a diminishing resource; now, the lovers of the countryside, the landscape architects and the planners similarly see the recreational values in landscapes† as a diminishing resource. Thirty years ago there was no soil conservation legislation; now there is an equal need for legislation in regard to the aesthetic values in landscape.

The pressures by the increasing urban masses for a countryside with amenity‡ must expand as their leisure periods increase and they have greater mobility. The seemingly uncontrollable pollution of the atmosphere and the accelerating noise of the large cities will continue to drive man in increasing numbers to the tranquillity of the countryside. Most of the streams and lakes and even the ocean beaches are not without pollution problems and the nearer the large centres of population the worse all forms of pollution become.

* From a report by N.S.W. Soil Conservation Service 1942.

† 'Undeveloped landscape does exist but in planning for future increased leisure activity there must be an awareness of the proportionately increasing use pressures upon the natural landscape'. The IFLA 11th Congress in Montreal, June 16,-20 1968. The theme 'Planning for Leisure.'

‡ *Amenity* is a new word in planning and its broad interpretation is attractive, pleasant and stimulating living and working conditions. An amenity is more than a needed or essential service. Clause II of the New Countryside Commission 3. 8. 68 obliges every Government Department and public authority to have due regard for amenity.

At this stage in Australia's development we can accept the fact that soil and water conservation is active and positive, even if there are still vast areas of badly used farm and pastoral land. This aspect of conservation is economic and to an increasing extent is being controlled by legislation.

PLANNING FOR LEISURE

Recreation to most people in most if not all countries in the world connotes an environment of natural landscape. With the advent of the motor car the recreational emphasis is now passive—a drive in the country and somewhere pleasant to have lunch. This can be spoilt by ribbon development—housing, farmlets*, garages, sidewalk stalls, motels, snack bars and so on.

In Australia, sporting activities of every kind are catered for by large, powerful organizations and there is not a shortage of sporting facilities but if there should be, the area of land required is relatively small.

The countryside can and must be developed fully under its land use capabilities to produce economic crops or fibres needed in a civilized community. The land itself must be kept in a state of permanent productivity—it cannot be a diminishing resource.

All land whether designated for farming, pastoral, horticultural and forestry or other production or for national parks or recreational areas, is receiving ever increasing use pressures. Misguided or unchecked over-use and exploitation can lead, through dilution of quality, inevitably to destruction.

This need not be. The recreational values in landscape for passive recreation must be designed into every land use programme.

A modern road or bridge, a powerline, a dam or diversion ditch, a factory, a town or an urban area can be designed into the landscape and if properly planned need not destroy the landscape values.

Increasingly, emphasis should be given to aesthetic and environmental qualities of the countryside in all resource planning and development programming.

Open air recreation is now becoming one of the most urgent needs of man. We are not satisfied now with our open air recreation facilities. Now is the time to design and plan *the total use of land*.

LANDSCAPE PLANNING

Landscape planning is still a new discipline. Whether the landform is urban, rural or wild, each requires a wise and practical management policy, each one differing from the other. Ideally man dominates nature in the urban environment, he should work with and share with nature in the rural environment and in wild landscape he must be subservient to nature.

The classification of landscape having regard to its several uses will require the development of new techniques of interdisciplinary research. Such classification will need to consider the ability of each particular environment to sustain its economic production and to absorb the intrusions of urban population seeking recreation in the countryside.

* Under existing planning regulations it is not easy to relate subdivision of economic farm units to purely rural industry.

This new conservation approach, that is landscape planning for agricultural land use, needs thoughtful, conscious, organized and continuing land use planning to ensure the creative preservation and restoration of the quality as well as the usefulness of the landscape.

In the vast continent of Australia with its low population density recreational demands for open space even now are considerable. Our national parks, forest park wildlife reserves, parkland, foreshore and other reserves are already overcrowded.

This trend must continue and evidence overwhelms us with the cold and frightening facts that our recreational resources are insufficient. What is going to happen when Australia's population doubles in the next few decades, and our leisure periods and mobility increases?

Clearing of the countryside for farming or grazing in the days of the axe and firestick was fortunately not as devastating as the fuming iron monsters of today. Today the big tree is a challenge to the bulldozer driver and his monster—it was respected by the man with the axe. So, before the era of the bulldozer large individual trees were left, clumps of trees on hilltops and in gullies, along creeks and rivers and on the road verges were left. This was attractive, good land use. The clumps of trees were left usually on poorer land or difficult sites and provided amenity, wildlife was assisted, farm animals had shelter from sun, wind and rain, and there was timber for posts, yards and firewood.

The immense powers that man has acquired over nature have not been equalled by the equivalent growth of wisdom in the use of these powers.

FORESTS AND WOODLANDS

In six per cent (120,000,000 acres) of the land area of Australia trees are the predominant vegetation. This does not include the scattered tree growth on savannah woodland. The 120,000,000 acres include large areas of mallee (a dwarf multiple-stemmed eucalypt) and other low quality, inaccessible or uneconomic timber. Only 15,000,000 acres, largely eucalypt hardwood, is prime commercial forest, of which 3.5 million acres is rain forest.

Current annual plantings of exotic softwoods (mostly *Pinus radiata*) are 15,000 acres by the various Forest Services and 5,000 acres by private enterprises*.

Softwood plantings occur in areas of high rainfall, good soils and with reasonable access, and in fact the 20,000 acres of softwood plantings annually are generally competitive with agriculture. The need for softwoods in Australia as in most countries is increasing. It is likely therefore that the 20,000 acres per annum could increase considerably in the foreseeable future and that even in a country as large as Australia there could be long-term ecological and land use implications.

The 15,000,000 acres of dedicated commercial forests have added values for recreation and wildlife, whereas the pine plantations in Australia have little

* Australia's Forests Today and Tomorrow. Forestry and Timber Bureau publication, Canberra, 1962.

wildlife value. Many of the forested areas also protect valued water catchments particularly along the eastern coast of Australia and provide the best National Parks.

Most of our hardwood forests have been cut over and heavily burnt by wild fires. These fires have not only affected timber production but also have impaired water relationships. Stream flow and intake beds for underground waters have been affected and deposits of silt have filled rivers. Consequently fish and wildlife habitat have been destroyed or at least harmed.

If the quality of the agricultural scene is to be preserved then the quality of the forest too must be enhanced. Forests can provide optimum per acre timber and amenity. Amenity is not incompatible with timber production. Recreational and wildlife values will need to be designed into forestry practices. Water productivity must also be considered. There could be some slight reduction in timber production under this multiple approach but the added values to the State would be fair compensation.

BUSHFIRES

Fires have been part of the ecology over most of Australia. Many seeds need the extreme of heat by fire before germination. Without doubt the greatest problem of Australian forestry is forest wild fire control. Controlled fuel reduction fires in the cool moist periods of the year which reduce litter from the forest floor is a new approach which is being watched closely by both the forester and the conservationist. At this stage of knowledge and research it appears to be the best method of fire inhibition.

Australia shares with America the fearful distinction of being the most fire plagued region in the world. Victoria and California are the States in each country which suffer most.

In the southern States—comprising some of Australia's most productive land, recurring bush fires can cover and do cover thousands of square miles in a few hours under extreme conditions. These fires cause tremendous property and stock losses, and at times considerable loss of life.

Few farms and few small rural towns have been planned to prevent fires although the South Australian Bushfire Research Committee has shown this is possible.

Building type and construction, town and farm layout, location, water supply, orchards, woodlots, shelter belts, and even field layout can be planned to decrease fire danger. Such planning would repel or ease fire's devastating effect. Management by grazing stock is another important fire control measure.

Collated fire preventive measures must become a major part of land use planning. Day to day weather forecasting and long-range weather forecasting are becoming more accurate and this trend should continue. Work is being done in research laboratories to measure flammability* of plant material and shrubs, and the use of non-flammable trees and shrubs and grasses must assist in containing and controlling fires.

* Variation in the flammability of the leaves of some Australian forest species, N.K. King, R.I. Vines, CSIRO Publication. July 1969.

SHELTER BELTS AND FARM WOODLOTS

The winters in Australia, even in the most southerly States, are mild and animals do not need to be shedded. However, they do need some protection from sun, wind and driving rain. Shelter belts and mixed farm woodlots of native and/or of exotic trees and shrubs along a creek, surrounding a dam or in some area unsuited to agriculture, for instance a steep slope or rocky outcrop, have an ameliorating effect on farm climate and provide amenity for man and beast.

The over-clearing of farm lands has led to a deterioration of bird life in numbers and varieties. Insect-eating birds have economic as well as aesthetic values in farm and forest and a design plan is needed to encourage such wild life.

FENCING

Fencing in Australia is highly efficient. Close meshed netting fences are used for boundary fences to keep out rabbits or wild dogs (dingoes) and of course to keep stock in. Sub-divisional fencing is normally of plain wires, barb wire or prefabricated large mesh fencing. A trend is toward electric fencing as fixed fencing rather than the popular moveable electric fence. More sympathetic consideration of topography needs to be encouraged.

NATIONAL PARKS AND OTHER RESERVES FOR RECREATION

Australia's National Parks (see Table 1) are still too few. Furthermore, many areas having outstanding values have not been dedicated as either National Parks or as any other form of reserve. On the other hand, not only National Parks but also many of the various reserves which have been dedicated for some special purpose are not being managed to best advantage because funds available are inadequate.

There are still unique environments, wildlife forms and plant communities, not represented in permanent reserves of any kind. In most States, the wilderness (wild landscape) aspect of National Parks has received little attention. It is only in a wilderness environment that the unique flora of Australia can be studied scientifically. There are few wild rivers left in Australia and most are unlikely to survive.

Scientists and naturalists in Australia and indeed all over the world are anxious to see that viable ecological units representative of the full range of geological and anthropological interests as well as flora and fauna are represented in permanently dedicated reserves.

Australia's National Park boundaries have been fixed or are being fixed by political expediency, not by ecological standards or requirements. A National Park or part of it may be a viable ecological unit now but consideration has not been given to the increasing impact of man. Man's conservation activities in this field must be reconciled with land use management and probable future pressures. Weather, soil, vegetation, fauna and man create an interacting complex which requires day to day management and long-term research to ensure the continuance of ecological values.

In the land use mosaic there is need to expand the conservation unit whatever its form, into the surrounding countryside. This could be in the form of a

multiple-resources park or even of the U.K. concept of National Parks where agriculture, industry and urban environments all merge in a land use pattern which is highly productive and has tremendous tourist attraction.

Too often National Parks in Australia are boxed—or metaphorically fenced in. They are not part of the general landscape; they exist largely as islands surrounded by areas of development.

ROAD RESERVES

Australian road reserves are wider than in other countries because of lack of public transport in early settlement days and the need to drive stock by road over long distances. Some stock routes are five chains* wide with camping or watering areas ten or twenty chains wide located fairly regularly.

Many of these reserves still exist and now that all stock are moved either by road or rail transport these reserves are no longer used for their original purpose. They should now be redeveloped for the changing circumstances for use by the motoring public as rest and recreation areas.

Some roads today in Australia contain the only remnants of local flora because nearby farmlands had been cleared completely. The continuing problem is that services such as electricity, telephone, drains, gas and fuel and of course the road pavement all use the road reserve. In recent years roadside verges have been burnt as firebreaks by the appropriate authority. This destroys the perennial vegetation, shrubs and trees, and the road verge become much more a fire hazard because of replacement of the perennial vegetation by exotic grasses which dry completely in the summer. There are some trends which are of interest and value to landscape and land use. The roadmaking authorities in some States acquire farmland parallel to and outside the present road reserve and are constructing dual highways using one side of the road reserve as a median strip. The electricity supply authorities also tend to use the adjacent bared (of trees) farmlands and telephone authorities are putting more and more lines underground. If we can evolve more effective measures than burning along roads as fire breaks and a more positive management programme, there would be hope for the preservation of some flora on road verges and in some instances a restoration of the flora.

The highways today are the viewing platforms of tomorrow's tourist industry. The frame of this observation platform through which we look at the countryside is the road verge. Surely a design plan for this frame is little enough to seek. In the whole of Australia with its million miles of roads there is not one landscape architect fully employed by the road authorities.

The gentle rounded hills which comprise large areas of open farm land in Australia are particularly suited to construction of driveways with planned vistas as the road sweeps around hillsides. Many roads are being reconstructed now but with little if any thought to the scenery or to the design of the road to make use of scenic values. A straight road built up in the valleys and passing through a cutting in the hills is not good design and often is not as efficient or cheap as one with sweeping curves.

Outdoor advertising is not permitted on country areas in most States yet the Railway and other Government Authorities do permit hoardings on Crown Land. Necessary road signs are now being standardized and simplified.

* One chain = 66 feet or 20.116 metres.

Roadside verges are seldom mowed or otherwise groomed in Australia. Roads and highways should be given room for future expansion and in some areas trees for commercial harvest could prove an interim source of revenue as in Europe.

Trees contribute to the absorption of noise, exhaust smells, carbon monoxide and smoke, screen unsightly structures, offer a measurable degree of protection from sun, heat, wind, rain and run-off, and of course provide amenity.

FARM BUILDINGS

The station homesteads and associated sheds and yards of the squatting era of hugh properties had an Australian flavour. They were well sited, landscaped and usually built of local stone or hand sawn timber. Many still stand, some being classified highly by National Trusts.

Closer settlement started early this century and has accelerated more recently. Building standards are poor, little thought has been given to siting, location or even a design plan for the essential sheds and associated yards. Buildings and yards are often on the road alignment and houses are situated as if on a suburban allotment. This is more appalling if the house is of urban design with all the needless fussiness.

Town and regional planning could and should control location of houses buildings and yards, and ribbon development by service industries to the motoring public. In classified areas materials and design plans should be subject to approval by the planning authority.

WATERING PLACES AND FACILITIES

Australia is the driest continent in the world, with few perennial streams, so the provision of water for domestic and stock use and for irrigation has been a special activity by Governments, by farmers and by pastoralists.

Wells and bores provide some water and in places where there are good clay soils and run-off, dams are sunk and other very substantial areas are served by irrigation channels. As most farmers in Australia carry stock, each field must have its water and the countryside is dotted with dams, windmills, tanks and troughing. Of course there are many springs, creeks and rivers in the high rainfall areas and in the arid zone water remains in large water holes when rivers run dry.

In few instances have the dams or other watering places been shut off to stock and planted with trees and shrubs for amenity or bird life. A great deal of satisfaction can come from beautifying watering areas by tree planting. Stock in Australia have full access to too many creeks and rivers, with great destruction of creek banks and the associated trees and shrubs. Quite apart from the loss of aesthetic values it is not good husbandry in high rainfall areas to allow stock to water directly from dams and rivers.

Most streams and associated foreshores belong to the Crown and are leased to the adjacent landholder on a rental basis. The landowner has certain rights but must control vermin and noxious weeds and almost inevitably it is found easier to remove most of the shrubs and many of the trees to control vermin and noxious weeds. These river foreshores vary from one half to three chains in width. The hiker and fisherman in Australia have not been fully considered

as yet and undoubtedly there will be pressures for public access to rivers and streams in Australia now leased or in some instances owned by private persons. There will need to be better controls over destruction of trees and shrubs on perennial stream banks and other foreshore reserves. At the moment there is legislation to control removal of vegetation on Crown Lands but the legislation is not used.

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SUMMARY

It was not long ago—in the days of the horse and buggy—that the rural scene seemed stable. Envisaged changes could be anticipated, changes were slow and tedious and because of this physical changes were looked at more closely. Today we live in a technological age, of massed power, with the bulldozer as the symbol of that power. Changing land use patterns are rapid, drastic and complete.

We can assume that there will be more and more support or subsidies for primary industry in some form or another. Such supports occur in most, if not all, other primary producing countries; this too must be the trend in

Australia. If rural industry is to be supported by subsidy or some other method then let that assistance be a rational one covering total land use and not just the industry concerned.

The pressing problem of the moment is to plan for the recreational requirements of the future, to anticipate needs, assess priorities, promote the necessary public relations so that the necessary legislation is accepted. Then will come the need to provide the needed skills in several disciplines to ensure that the planning policy is carried out.

Farm diversification as was practised a few decades ago either does not now exist or has been modified by the pressure for specialization. Farm units are becoming bigger as well as more specialized. Uneconomic units are being absorbed by nearby more efficient and more specialized units. Specialization can have its impact on landscape. A crop of wheat does not need shade trees or shelter belts and in fact both could impair efficiency.

If rural industry is to be supported by subsidies from the taxpayer, and those people who are not largely domiciled in huge city environs want a pleasant landscape—one with amenity—, then now is the time to plan a programme which assists both rural industry and amenity requirements.

The problem of environmental deterioration in Australis is similar to that in many other countries. We have the same problems of urban sprawl, industrial infiltration of rural areas, of pollution and ribbon development, of shoddy design and poor location of roads. We have overground transmission lines and telephone lines. There are most certainly too many sub-standard farm buildings. Here in Australia as in similar newly developing countries there is a most urgent need for research and examination of trends and for projecting these trends not into the 1970's and 80's but into the 21st century. We can and must benefit from the obvious mistakes and experiences in the older developed countries.

RÉSUMÉ

Il y a peu de temps encore—à l'époque de la voiture à cheval — le paysage rural paraissait stable. Il était possible de prévoir les changements. Ceux-ci étaient considérés avec une attention plus grande.

Aujourd'hui, nous vivons à l'ère des techniques, des puissances concentrées symbolisées par le bulldozer. Les modes d'utilisation du sol changent rapidement, de façon subite et radicale.

Nous pouvons supposer que de plus en plus, aides et subventions, sous une forme ou une autre, seront destinées à l'industrie primaire. Dans la plupart, si ce n'est la totalité, des autres pays à production primaire, il en est ainsi, et il en adviendra de même en Australie.

S'il est prévu que l'industrie rurale reçoive une aide sous forme de subventions ou autres, que cette aide soit rationnelle et porte sur l'utilisation des terres dans son ensemble et non pas uniquement sur l'industrie concernée.

Actuellement, le plus urgent est de prévoir quels seront dans l'avenir les besoins récréatifs, de déterminer les priorités, de créer dans l'opinion publique un climat favorable à l'acceptation de la législation nécessaire. Ensuite, il faudra trouver des gens compétents dans différentes disciplines pour assurer l'exécution de la politique d'aménagement.

La polyvalence des fermes, telle qu'elle existait il y a quelques dizaines d'années, n'existe plus ou bien s'est modifiée sous la pression de la spécialisation. Les exploitations agricoles s'aggrandissent et se spécialisent. Celles qui ne sont pas rentables sont absorbées par des exploitations plus efficaces et plus spécialisées. Cette spécialisation a aussi une action sur l'aspect du pays. Ainsi un champ de blé n'a pas besoin de l'ombre des arbres ni de la protection des brise-vents; en fait ces deux éléments lui seraient plutôt défavorables.

Si l'industrie rurale doit être aidée par des subventions fournies par le contribuable et si ce dernier, qui vit actuellement le plus souvent dans d'immenses banlieues urbaines, souhaite avoir un environnement attrayant, il est grand temps de prévoir un programme d'aide destiné à la fois au développement de cette industrie et à l'embellissement du territoire.

Le problème de la détérioration du milieu naturel en Australie est le même que dans beaucoup d'autres pays. Nous avons les mêmes problèmes d'étalement des villes, d'infiltration industrielle dans les zones rurales, de pollution, de constructions alignées sans fin le long des routes et de mauvaise implantation de routes. Le pays est sillonné de poteaux et de fils télégraphiques. Il n'y a que trop de fermes mal construites et laides. Ici, comme dans d'autres pays neufs, il est urgent d'effectuer des recherches et des études sur l'orientation que prend le pays et de prévoir cette évolution non pour les années 70 ou 80, mais pour le XXI^e siècle. Nous pouvons et devons bénéficier des expériences et des erreurs des pays dont la civilisation est plus ancienne.

Section A.

Agriculture and Landscape in Relation to the Common Market (EEC)

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The change in agricultural structure in Europe has recently become very marked, resulting without doubt in extensive transformations of the landscape. The overproduction of some agricultural commodities in various European countries has caused the EEC to become increasingly involved in agricultural questions. On 18 December 1968, the Community issued a memorandum, under the title of the 'Mansholt-Plan', with the aim of decisively altering land use patterns in relation to the size of agricultural holdings. By giving up the smallholdings and consolidating the medium-size ones, five million hectares will be taken out of agricultural production in the EEC countries, i.e. Belgium, German Federal Republic, France, Italy, Luxemburg, the Netherlands. Four million hectares of this land will be put under forest.

From the technical aspect, the following comment may be made concerning the situation. The areas mainly involved are those marginal in value to agricultural production, i. e. semi-mountainous areas. According to the memorandum proposals, four-fifths of these areas are to become forest and are to serve recreational purposes, with the establishment of green belts and week-ending areas further afield. This will be of importance in the vicinity of urban conglomerations and industrial areas.

Let us look at this problem in a little more detail. Obviously, no two forests are alike: their significance varies according to their utility, conservation and recreation functions. Furthermore, their geographical position, their botanical composition and type of exploitation play decisive roles. It is therefore indispensable that great attention be paid to these considerations during the afforestation programme envisaged in the memorandum. A detailed exposition would be out of place here; this would be more appropriate for a forestry department. However, we should certainly examine and define the overall landscaping problems.

Of interest will be the following table which shows the expected increase in forest within the EEC area (see page 36).

As a result of the expansion of forest land by four million hectares mentioned above, the percentage of such land in the EEC is expected to increase by 3.4% from 22.9% to 26.3% of the total area of the six countries concerned. Considering present population levels and their expected rise in the following decades, this increase in forestry does not appear to be of excessive concern. The essential is where and in what form this increase is to take place. Without doubt, afforestation is to be welcomed in Italy and southern France, where uncontrolled cutting of the forests has occurred for centuries and has caused heavy deterioration of the landscape. In the Netherlands also, which have the smallest forest area of the Common Market countries, an increase can only be

MAIN LAND USE

Country	Total Area '000 hectares	of which			Change		New Forests plus 4000 ha	New
		Agricultural Land	%	Forests	%	Agricultural Land less 5000 ha		
German Federal Republic	24, 754	13,871	56.0	7,184	29.0			
Belgium	3,051	1,666	54.6	601	19.7			
France	54, 703	34, 001	62.2	12,366	22.6			
Italy	30,122	20,405	67.7	6,099	20.2			
Luxemburg	259	133	51.4	86	33.2			
Netherlands	3, 615	2,245	62.1	292	8.1			
EEC area	116,504	72,321	62.1	26, 628	22.9	67,321	57.8	26.3

Source: National Yearbook of the German Federal Republic, 1969, p. 48.

advantageous to the landscape (see table). In this context it is important to remember that most of the areas now under agriculture in the Common Market territories were at one time overgrown with forest, which was cut down for various reasons, through population pressure in the first instance. A limited and sensible programme for the re-establishment of forests and, for that matter, of moors and similar landscape patterns in order to create new biotopes is undoubtedly also feasible.

Locally, the question of afforestation is of varied significance and will therefore have to be examined carefully. In the German Federal Republic, it is not immediately possible to apply the above mentioned percentage figures representatively. What is expressed as a seemingly low percentage and therefore looks perfectly acceptable can in fact mean a loss of 80 to 100% of the agricultural area in some places. These extreme cases mostly occur in landscapes which are the most sought after for recreation; and afforestation, even with deciduous trees, can be a real problem. According to the evidence we have had up to now, these areas are entirely planted with spruce (*Picea excelsa*) whose biological disadvantages in a landscape are well-known. In these regions particularly, agriculture with its present and future potential becomes of great value. In the semi-mountainous areas these difficulties demand very careful consideration with respect to recreation areas, settlements and Man. Primarily, this is a land use zoning task in which the landscape as a whole must be considered. This will be expressed in the landscape master plan, which constantly gains in importance but which as yet has an insufficient legal basis.

On the other hand, the retrogression of agriculturally exploited areas from the present 62.1% to 57.8% does not mean the landscape is in danger if it retains biological and ecological stability and has a harmonious appearance. Under no circumstances should the remaining agricultural areas be excessively exploited by further consolidation and by intensive land use. The guarantee of optimal and permanent soil fertility through the application of a well thought out plan must be the goal.

These criteria can only be fulfilled by enunciating a clear principle to cover all eventualities in the form of a landscape plan, which is founded on the natural conditions dominant in the landscape in question, and which takes into consideration the various claims made not only by the landscape itself but by growing urbanization and increased mobility.

SUMMARY

In Europe the agricultural structure is changing fast and the inevitable consequence is the change of the landscape. The over-production of food in some European countries has induced the European Economic Community (EEC) to work intensively on agricultural problems. In December 1968, the EEC published a memorandum prepared by its vice-president, called the 'Mansholt Plan'. By giving up the small plots and joining those of medium size, five million hectares will be taken out of agricultural production in the six countries of the EEC: Belgium, France, West Germany, Italy, Luxembourg and the Netherlands. Of those five million hectares, four million will be afforested. It is thought that the greatest part will be used for recreation, the majority of which is only of marginal value to agriculture. According to the evidence we have up to now, it must be expected that the main/or only species for afforestation, at least in Germany, will be spruce (*Picea excelsa*), whose biological disadvantages in the landscape are well known.

Looking at the statistic table given in the paper, it can be seen that the percentage of forests in the six countries will be increased by 3.4% from 22.9% to 26.3%. This increase does not appear to be very significant, but it is important where and how the afforestation will be carried out. From the European point of view, the increase of forests in Italy and the south of France, both at present with a small percentage of land under forest, also in the Netherlands, where there is the smallest percentage of all, is to be welcomed. Most of the areas concerned were wooded in former times, and it seems that limited and reasonable reafforestation will be feasible. Locally, however, the question of afforestation is of very varying significance and has to be examined very carefully. For example, it is not possible to apply the above-mentioned percentage figure immediately in West Germany. What seems to be a low percentage, and therefore looks acceptable, can in fact mean a loss of 80 to 100% of agricultural land and a total loss of open landscape, especially in the valleys. The extreme cases lie mostly in areas of the greatest value for recreation, where afforestation can become a real problem. There is no doubt that agriculture in its present form and future potential is of great value to these areas. In semi-mountainous areas, these difficulties demand special consideration due to the effects on recreation, villages and men. Primarily, this is a land use task in which the landscape must be considered and respected as a unit. This can be expressed in the landscape master plan based on the ecological, biological and economic conditions. On the other hand, the retrogression of agricultural land from 62.1% to 57.8% in the six countries of the EEC does not endanger the landscape if the natural stability is secured and the countryside remains harmonious. Under no circumstances should the remaining agricultural areas be cleared of more trees and shrubs by intensifying land use. In order to guarantee an optimal and permanent fertility of the soil in agricultural areas, the aim must be to keep the remaining shelter belts, hedges and trees.

RÉSUMÉ

En Europe, la structure de l'agriculture change très rapidement et entraîne inévitablement la transformation du paysage. La surproduction alimentaire dans certains pays d'Europe a incité la Marché Commun (CEE) à étudier à fonds les problèmes agricoles. En décembre 1968, la CEE a publié un mémoire préparé par son vice-président, sous le titre de 'Plan Mansholt'. En supprimant les petites parcelles, et en rassemblant celles de grandeur moyenne, 5 millions d'hectares seront enlevés à l'agriculture dans les six pays de la CEE: Belgique, France, République Fédérale Allemande, Italie, Luxembourg et Pays-Bas. Sur ces 5 million d'hectares, 4 millions seront afforestés. La plus grande partie de ces terres, n'ayant qu'une valeur marginale pour l'agriculture, sera réservée aux loisirs. Selon les indications obtenues à ce jour, nous devons nous attendre à ce que la principale, ou même la seule essence utilisée pour l'afforestation, du moins en Allemagne, sera le sapin (*Picea excelsa*), dont nous connaissons les désavantages biologiques dans le paysage.

En examinant les statistiques du rapport, on constate que le pourcentage des forêts dans les six pays sera augmenté de 3,4%, c'est-à-dire qu'il passera de 22,9% à 26,3%. Cette augmentation ne paraît pas très significative, mais il est important de voir où et comment cette afforestation sera réalisée. Du point de vue européen, on peut accueillir avec satisfaction une augmentation des forêts en Italie et dans le sud de la France qui, actuellement, n'ont qu'un

faible pourcentage de forêts, ainsi que dans les Pays-Bas, dont le pourcentage est le plus faible de la CEE. J'ajouterais en outre que dans le temps passé la plupart de ces régions étaient boisées, et il semble qu'une réafforestation raisonnable et limitée sera possible. Localement cependant, la question de l'afforestation a une signification très variable et doit être considérée très soigneusement. Il n'est pas possible par exemple d'appliquer le pourcentage mentionné ci-dessus à l'Allemagne Fédérale. Ce qui paraît être un pourcentage bas, et semble acceptable, peut en fait signifier une perte de 80 à 100% des terres agricoles, c'est-à-dire la perte totale du paysage ouvert, spécialement dans les vallées. Les cas extrêmes sont situés la plupart du temps dans des zones à grande valeur récréative où l'afforestation peut devenir un véritable problème. Il ne fait aucun doute que le potentiel présent et futur de l'agriculture est d'une grande valeur pour ces régions. Dans les régions semi-montagneuses, ces difficultés demandent à être examinées très soigneusement sous le rapport des zones de récréation, du village et de l'homme. Il s'agit avant tout de considérer et de respecter le paysage en tant qu'unité dans le cadre de l'utilisation des terres. Ceci peut être traduit dans le plan directeur fondé sur les conditions écologiques, biologiques et économiques. Par contre, la régression des terres agricoles de 62, 1% à 57, 8% dans les six pays de la CEE ne menace pas le paysage si la stabilité naturelle est assurée et que le paysage reste harmonieux. On ne devrait en aucun cas supprimer les arbres et les arbustes restants sur les zones agricoles pour intensifier l'utilisation de ces terres. Pour garantir une fertilité optimale et permanente du sol dans les régions agricoles, il faut y conserver les brise-vent, les haies et les arbres restants.

Section A.

Landscape Planning in India

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The Indian landscape has two characteristics. One is its diversity, and the other is its scale. There are, within its boundaries, almost all the main types of landscape, including the Palaearctic regions of the Himalayas, the tropical dry deciduous of the Gangetic plain, the tropical thorn forest type of the Indus plain, the semi-evergreen and wet evergreen regions of South India and the swamps of the Sunderbans.

In spite of this diversity, there are certain kinds of topography and landscape which can be recognized as typically Indian. The climate, too, over the major part of the subcontinent is conducive to quick and luxurious growth. Every monsoon the undergrowth becomes an impenetrable tangle; and a decade is long enough for a seed to become a goodly tree.

This prodigality of nature has bred certain attitudes in the Indian people. The first is a belief that the sources of all natural material are inexhaustible. In other words, that there is never *really* any need to make an effort to produce necessary things like wood, grass, fodder, browse, dung, thatch or fuel. All these things can be picked up, as it were, at the doorstep. The second attitude is the refusal to recreate or shape the environment; for the environment is always too strong and dominating to be manipulated.

Since the beginning of World War II, the ratio of available natural material to the needs of the people has been changing rapidly, while the last ten years have produced an escalation in shortages. The greatest shortage is, of course, in all the different kinds of wood. Indeed, it can be said that a tree famine stalks the land. There is puzzlement and hurt among the rural population that something which is so clearly their birthright should have become difficult to procure. At the same time, there is a total inability to connect cause and effect; or to understand that the growing numbers of stray cattle which trample down all seedlings, in addition to the uncontrolled population growth, have created a condition where, except in forests, natural regeneration has almost ceased to take place. Because of its vastly multiplying numbers, the cattle community, which was once the mainstay of the human community and lived with it in a state of happy symbiosis, has now become a competitor and a rival. At the moment all signs are that the stray cattle are winning over the humans.

Fuel is, perhaps, the main reason for the destruction of trees. The need for fuel drives people not only to hack off branches but to kill whole trees either by scraping off the bark and leaving them to die, or by setting fire to them. The amount of firewood needed in the country can be computed if it is remembered that about nine-tenths of the population do their cooking over wood, and that every single cremation—all Hindus are cremated—requires something like eight or nine maunds* of wood.

* a 'maund' varies from 25-82 lbs (11-37 kilograms) in various parts of India, according to usage and locality.

Apart from the practical need for wood, forest has always been the natural cover in India. Wherever a large number of trees are destroyed, the effect on the climate is immediate and palpable; conversely, it has been possible to increase the average rainfall in many areas by judicious planting schemes. Even if grass could be induced to grow in a climate where eight months of the year are totally rainless, it is doubtful whether grass alone could prevent denudation; only big trees can stop large scale soil erosion from the torrential rain and strong winds which are the usual feature of the climate. The depletion in trees and forests is so disastrous for the country as a whole, that it might well be cheaper in the long run to subsidize an alternative fuel.

All thinking about landscape planning in India, then, must be in terms of heavy and continuous replanting. There are, roughly, three groups of public lands whose planting and maintenance should be a matter of anxious thought. The first group consists of roadsides, canal banks, and generally any open lands in and around towns and villages. The second group includes forests, both protective and productive; while in the third group I include all public parks, national parks, sanctuaries, etc.

Anyone who has even the most indirect knowledge of India must know the importance of shade in this country. In ancient times our kings considered it an act of piety, which cancelled out many sins, to plant shade trees along the roads; and this should surely be the attitude of a modern administration as well. At this time, when efficient road transport is the key to economic development, every effort must be made to add to the comfort of all road users, whether they travel by motor truck or bullock cart. It takes several days to drive from one city to another in India, and well planted roads would much reduce the fatigue, and consequently increase the safety, of the drivers.

In any species of tree chosen for roadside planting, two characteristics are of paramount importance. The first is that the tree must give a deep shade throughout the year; and the second is that it must be hardy and long-lived, for planting and protecting a sapling is a heavy capital expense and cannot be incurred frequently. On both these counts, it seems to me that the traditional (but now neglected) roadside trees, the peepal (*Ficus religiosa*), the banyan (*Ficus bengalensis*), the tamarind (*Tamarindus indica*) and the neem (*Azadirachta indica*) are unrivalled. The first two grow to enormous size, they give a dense shade over a wide space throughout the year, and they live so long that they may be considered almost indestructible. The peepal still carries an aura of sanctity in many parts of India, a great advantage, since it gives it a little protection against woodcutters. The tamarind and neem are also large densely leaved trees with a very brief leafless period. They have the added advantage of giving useful produce. The fruit of the tamarind is in daily use in nearly every Indian kitchen; while neem leaves are medicinal, capable of many miraculous faith cures, and its twigs are used as tooth-brushes.

Many of these fine old trees had to be cut down when old roads were widened. It is always difficult to visualize the future spread of a tree at the time of planting; but obviously these trees should be planted far back from the road, in order to minimize the need to lop overhead branches, which is disfiguring and wasteful. Ideally there should be a double row of trees on at least one side of the road, making an extra rough track for cattle, bullock carts, and pedestrians. At the moment the replanting of road trees is on nothing like the required scale; and too often the species chosen are unsuitable on the grounds I have mentioned.

Exotic flowering trees are, it seems, only allowable on urban roads which are a different case from grand trunk roads, since shade is somewhat less

important in urban areas, and space more precious. Nevertheless, the saving and maintaining of young trees even in large cities requires so much labour and expense, that here, too, longevity must now be counted important. Few of the showiest flowering trees, unfortunately, have a life span beyond 25-30 years. The rain tree (*Samanea saman*) whose flowers are less eye-catching than some of the others is comparatively longer lived. It has no leafless period, and is particularly suitable for city roads as it is tall, dense, and has few low-growing branches.

A tree which is always associated with Indian village life in my mind is the babool (*Acacia arabica*). It has every virtue that a village tree ought to have. The wood is hard and durable, suitable for building rough village houses and furniture, bullock carts, well curbs, and above all for fuel; while its twigs make fine tooth-brushes. Because of its long sharp thorns, it makes an excellent fence against cattle, and even against wild animals, although, strangely, these same vicious thorns do not seem to deter birds from perching and nesting in it. The babool is normally associated with dry semi-desert country; but it will grow along the sea coast, in the mud on the edges of ponds, even in standing water. A farmer is severely handicapped unless he has his own stock of babool trees on which he can draw for use in his house and fields. So far there was little need to plant the babool systematically. It was expected to, and did, appear by itself. But among the new shortages is a shortage, or perhaps insufficiency, of the babool in many places and a methodical replanting on the waste spaces around villages would be of great benefit to local farmers.

Another hard-wood which is resistant to cattle and therefore has a fair chance of reaching maturity is the karanj (*Pongamia glabra*). It does not have the versatility of the babool, but it is shady. Those trees which have already been mentioned as suitable for the roadside are also, of course, suitable for planting in and about villages and towns. The village banyan is traditionally its town hall—it is the social centre and political headquarters of the village. Innumerable other indigenous trees which grow without any special care, produce either edible fruits—like the jambhool (*Eugenia jambolana*), bèr (*Zizyphus jujuba*), drumstick (*Moringa oleifera*), mango (*Mangifera indica*)—or other useful produce—like the arita (*Sapindus laurifolius*) and shikakai, which are used in place of soap.

The protective forests which should be representative of the plant communities of the locality and which should, ideally, be left without human interference, need not be discussed here. The productive forests, on the other hand, are mainly man-made and man-managed. The dominant tree here is usually teak (*Tectona grandis*), for its valuable timber gives it a special status. Except in the north, where it is replaced by its close relative the sal (*Shorea robusta*), it is an indigenous tree over most of the country and has an integral place in the local ecology. There is, however, a new enthusiasm in the Forest Department for planting eucalyptus, because of the quick returns from its pulp, and this may have many unforeseen consequences. Eucalyptus is an exotic which does not offer food or browse to either beast or bird; it does not tolerate any undergrowth and it has been suspected that it reduces the quantity of subsoil water, because of its high rate of evaporation. These are serious charges against a tree which is being planted on a large scale throughout India, often, it is whispered, even thrusting a wedge into the heart of traditional forest land.

There is room for an important policy decision here. If the economic advantages of the eucalyptus make it necessary to put large tracts under it, the land used for the purpose should not be that which is already under good forest. We are already short of forests. Only 20% of the total land is now under forest,

whereas according to the National Forest Policy at least 30% of the total land surface should be forested.

The exotics seem, at present, to be everywhere preferred to our native flora. The native species in the Borivli National Park, near Bombay, comprise many *Erythrina indica*, *Erythropsis colorata*, *Bombax malabaricum*, and *Butea frondosa*, all splendidly flowering natives. They are unfortunately being replaced by exotic flowering trees; and the same is true of many areas which ought to look as if God planted them, not man. Replanting on any scale should be influenced by the pattern of the local flora.

Just before his death, Shankar Brahme, who was one of our most gifted landscape architects, analysed the reasons why our efforts to 'improve' our national parks are so unsuccessful. We cannot desist, he says, from 'introducing urban architecture, urban plants and urban aesthetics into national park areas. Among the deficiencies that all the schemes of Mararashtra State suffer from is that the development is limited only to introducing frankly urban motifs like avenue planting of ornamental trees, lawn making, garden vegetation, eclectic and the so-called modernistic architecture in defiance of ecological principles'. Mr Brahme has put his finger on the crux of our weakness. The main job in a national park should be to protect the area from tree and animal poaching; and occasionally, in unusual or desperate situations, to replant small areas with species which are already dominant there. To allow poaching and then to replant with exotics, is to turn a beautiful natural forest into a mongrel wasteland.

The really great national parks should be left as little disturbed as possible, the effort being, as I have already said, to encourage natural regeneration. They must not be vulgarized by the introduction of flamboyant flowering exotics. The place for such species is within city limits, where their function is mainly decorative.

The connotation of landscape planning includes the planning of roads, dams and other engineering feats; but it seems to me that in India at the present moment there need be no great hurry to achieve these things. Modern technology can always be trusted to arrive in India, even if it is a quarter of a century late. Admittedly more roads and better roads in some of the national parks would mean greater visitor use. But we have yet to learn to build, and afterwards to use, roads with the minimum disturbance to the environment. The noise and bustle of the contractors' gangs, and later the noises of car horns, transitors and plain shouting, the undisciplined behaviour of visitors, is likely to drive away the very animals for whom these sanctuaries are preserved. The immediate need in all national parks now is for blanket, and effective, protection for flora and fauna. We also need time to educate our public. The less 'development' there is, for the present, the better the chances will be of really first rate national parks and sanctuaries in the future.

SUMMARY

Owing to a climate which, over the major part of the Indian subcontinent, is conducive to quick and luxurious growth, the beliefs have arisen that resources in India are inexhaustible and that the environment is too dominating to be manipulated. The last ten years have seen an escalation in shortages, especially in trees. Much of this tree famine is caused by the growing numbers of stray cattle, and the destruction of trees for fuel. This effects the climate and results in erosion. Landscape planning in India should give priority to afforestation.

There are three groups of public lands where planting and maintenance should receive high consideration: first, roadsides, canal banks and open lands in and around towns and villages; secondly, forests; and thirdly, public and national parks, sanctuaries, etc.

Shade is of paramount importance. The planting of shade trees along roads was in ancient times considered an act of piety and since efficient road transport is the key to economic development, this attitude should be adopted by the present-day authorities. The present rate of replanting roadside trees is too slow and unsuitable species are often chosen. The author here suggests various kinds of trees which could be used, because of their ability to provide deep shade, their hardiness and their longevity.

A tree typical of Indian villages is *Acacia arabica*. It is suitable for fuel, for building and furniture, and its twigs make fine tooth-brushes. Because of its sharp thorns, it can also be used for fencing. It is extremely adaptable to ground conditions and could therefore be planted wherever wastelands occur. There are several other tree species mentioned which are suitable for planting in villages and towns.

The author then goes on to consider productive forests. These are mainly man-made and man-managed, and the dominant trees are native. There is currently, however, an enthusiasm for planting eucalyptus for its quick returns; unfortunately, if planted on a large scale, such exotics can have many unforeseen consequences in the long run. They should not replace good indigenous forest, since India is already one third short of the 30% target of total land under forest.

The introduction of urban architecture, urban plants and urban aesthetics into national park areas, disregarding ecological principles, make the efforts to improve national parks unsuccessful according to the late Shankar Brahme, an Indian landscape architect. The immediate need in the national parks is to maintain the integrity of their flora and fauna as well as to make the public aware of its responsibilities.

RÉSUMÉ

Dans la majeure partie du subcontinent indien, le climat favorise le développement d'une végétation dynamique et luxuriante. Ceci a engendré la conviction que les ressources de l'Inde sont inépuisables et que le milieu naturel est trop vigoureux pour être domestiqué. Au cours des dix dernières années, on a observé une augmentation importante des carences, surtout en ce qui concerne le bois. Une grande part de ces carences en bois et en arbres sont dues au bétail, qui en nombres toujours croissants erre par le pays, ainsi qu'à l'abattage des arbres pour en obtenir du bois de chauffage. Ceci affecte le climat et entraîne l'érosion du sol. L'aménagement du paysage, en Inde, devrait donc s'occuper en priorité du reboisement. On distingue trois types de terres communes où la plantation et la protection des arbres sont particulièrement importantes: 1° les bascôtés des routes, les berges des canaux et les terrains découverts dans les villes, les villages, et leurs alentours, 2° les forêts, 3° les parcs publics et nationaux, les réserves, etc.

L'ombre est un facteur de toute première importance. Autrefois, c'était un acte de piété que de planter des arbres pour donner de l'ombre aux routes. De nos jours, cette conception devrait être reprise par les autorités, car les

transports routiers sont à la base du développement économique. Actuellement, le rythme de la plantation d'arbres le long des routes est beaucoup trop lent et des espèces impropres sont fréquemment utilisées. L'auteur suggère ici un certain nombre d'arbres qui, par l'ombre qu'ils donnent, leur résistance et leur grande longévité, pourraient convenir à cet usage.

L'*Acacia arabica* est l'un des arbres typiques des villages indiens. Il sert de combustible, de matériau de construction; on l'utilise pour en faire des meubles, et ses brindilles fournissent d'excellentes brosses à dents. Ses épines acérées en font un très bon bois de clôture. Cette espèce a une grande faculté d'adaptation aux conditions du sol et pourrait donc être plantée dans les terres en friche. Diverses autres espèces d'arbres, qui pourraient être utilisées dans les villes et les villages, sont également citées.

L'auteur aborde ensuite la question des forêts de rapport. Elles ont pour la plupart été créées par l'homme et sont exploitées par lui. Les essences dominantes sont des essences indigènes. Toutefois, le Département des Forêts s'intéresse actuellement beaucoup à l'eucalyptus, car c'est une essence à rapport rapide. Malheureusement, ces essences exotiques peuvent avoir à la longue des effets indésirables si elles sont plantées sur de grandes superficies. Elles ne devraient jamais remplacer la forêt indigène, car la surface boisée en Inde n'est que de 20% alors que le plan prévoit une surface afforestée totale de 30%.

D'après un célèbre architecte paysagiste indien, le regretté Shankar Brahma, l'introduction d'une architecture urbaine, d'une végétation et d'une esthétique urbaines dans les parcs nationaux sans tenir compte des principes écologiques, voue à l'échec les tentatives d'amélioration de ces parcs. Le premier objectif à fixer doit donc être de protéger dans les parcs nationaux l'intégrité de la flore et de la faune et d'éveiller la conscience du public à ses responsabilités.

Section A.

Landscape Planning and Agriculture

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There are possibly greater opportunities for applying modern techniques in agriculture to the tropical and sub-tropical parts of the world than to the temperate parts, because in the latter, the climate has been more favourable to agricultural patterns with a high level of production for a long time and which require much consideration before any farmer would face the task of change. In many tropical and sub-tropical regions, agricultural production is still well below that elsewhere, and there is a better chance of decisive action for change under the pressure of the interchange of ideas and methods of civilizations in the world of today. Thus, I would argue that agriculture which operates within the principles of landscape planning could be introduced to a most impressive extent in these regions. But the case must be argued for the wisdom of this particular form of rural development.

The fact that landscape planning means in brief the arrangement of all uses of the landscape in a way that leads to a total integrated landscape, and also, and equally important, that the arrangement accords with the broad ecological basis of the landscape, should command the support of many agriculturists. Regrettably, those who follow short-term methods of quick production at the expense of long-term landscape health are unlikely to give this support. There are numerous examples from both the present and the past where agricultural development under landscape planning principles has taken place. It is true that in most of the examples a named landscape plan was not prepared, just as there are innumerable examples of cities well worth residing in which were not built to a clear cut town plan.

My own particular experience qualifies me best to cite the agricultural revolution in Britain of the 17th and 18th centuries as one example. Before that era, agriculture in Britain was on the 'open field' system which, although having the merit of diversity in the use of the soil, did not provide for shelter or incorporate trees and shrubs as part of a pest control policy through the varied species of wildlife attracted to them. It was also inefficient in relation to a modern society wherein a vast population in cities is fed by a small population in the countryside.

During the 17th and 18th centuries, a very large part of the agricultural and potentially agricultural lands of Britain were replanned under what is known as the Enclosure System. Large fields enclosed by hedge-rows, and usually devoted to one crop or to grazing, replaced the narrow cultivated strips. Also, the planting of trees as shelter belts or in the hedgerows for timber to be used on the farm, made the rural landscape rich and balanced in the sense that few, if any, pests were able to dominate the situation. There were also large acres of parkland (grasslands with intermittent groups of trees) which, although having a strong amenity and recreational purpose, were used for grazing—and more importantly added further variety to the landscape. It should be pointed

out that the climate of Britain whilst producing forest cover when human interference is not present, is also very favourable to grassland. This brief description is completed by the small woodlands (referred to as copses and spinneys) planted mainly for the purpose of providing a suitable environment for game birds.

Thus, the British landscape of the Enclosure System provided adequately for efficient agriculture, and at the same time constituted a pleasant environment in which to live, and one which is worth a great deal of money as a tourist attraction today. Moreover, the pattern of rectangular fields has proved to be flexible as the demand for different crops and the techniques of agriculture change. Insufficient credit, however, is given to the landowners, their agents and advisers, and their landscape designers of the parklands, who planned the revolutionary change, usually in map form; this was indeed landscape planning for a new landscape and one which accorded well with ecological principles of diversity and balance between uses. The new landscape unfortunately meant that some small farmers went out of business, as it was essentially a change that could only be accomplished by large holdings of land. If the change had taken place today, it is likely that some form of co-operative or State ownership would be required before such large areas could be redeveloped.

Holland is one country that, in the 20th century, is able to carry out an equivalent agricultural revolution without the facilities granted by very large holdings of land. Holland, also, plans the landscape change in accordance with landscape planning principles, the Landscape Department of the State Forest Service being the agency most deeply involved.

Another aspect of the idea of an integrated and balanced landscape is the fostering of a two-way link between town and country. Hitherto, the towns' main interest in the countryside was as a provider of food. Now, it seems inevitable that the townsfolk will visit the countryside more frequently for recreation—they can hardly be stopped from using the roads—and ways of providing for them will no doubt have to be discovered. In a landscape which is more or less self-maintaining because of its balanced ecology, the users, whether man as a farmer or holidaymaker, or the animals and insects, provide most of the work of maintenance. For example, most upland areas in Britain have been kept as rough grasslands by the grazing of animals. If the animals were removed, but a method of control ensured that a similar wear and tear occurred as a result of the holidaymaker, the latter really becomes an essential part of the ecology.

In the complex world, it is essential to plan with pre-knowledge the extent of visitor participation which the countryside may receive without being materially affected by it. Even more important is the kind of planning which can inject, as it were, townsfolk into the countryside in such a manner that they are a necessary part of the functioning of the landscape. Planning of this kind must understand ecological principles. At the present time, it is the densely populated small countries of Europe which are most likely to suffer, if the demand that exists within them by towns-folk for a use of the countryside is not steered in some way onto a non-damaging course. In the thinly populated large countries, perhaps areas immediately around towns may be affected, but they are small when set against the total area. The national parks and game reserves have their own powers for safeguarding the landscape, and it will be a calamity if these powers are not used to the full.

Nevertheless, large countries are unlikely to remain immune for ever, and now is the time to plan ahead for this eventuality.

The question may well be asked why the planning of rural landscape should not be left to the agriculturist. In the first place, landscape planning worth its salt is unlikely to operate without full consultation with the agriculturist and other rural land users, like the forester, the water supply engineer, and the hydroelectric engineer. In the second place, each of these four, together with other users, is likely to consider that he himself should do the planning, and he is likely to mean the location as well as the details of land use. Already, complex arguments occur over this kind of 'planning' in many countries. Apart from its basic impartiality an objective of landscape planning is to produce and maintain the highest state of landscape health and the greatest total benefit. It must be accepted that the 'greatest total benefit' may mean that any one land use may fall below the maximum production achieved under its own self-interested form of planning.

It is a fact of history that many social and technical advances came out of tragedy or disaster. To quote Holland again as an example of the practice of landscape planning, her experience of inundation by the sea may well underly her desire to achieve the greatest total benefit. In the USA the Tennessee Valley arose from the need to establish new employment after the financial disaster of the early nineteen thirties. Must this always be the case before a country is ready to accept a plan based upon landscape ecology?

The fear that any form of planning is an interference with the individual is one of the hazards that has to be overcome by the protagonists of landscape planning, and another is that the planning will be done by persons who do not understand the problems of the individual's particular occupation. In answer to these charges, there is first the educational system of the landscape planner, and quoting the examples of Holland and Britain, he can graduate through following his landscape studies over a long period in an agricultural university or, after graduating in agriculture, forestry or some other rural land use, he is equipped to enter with other suitably qualified persons a concentrated period of landscape study. Both systems will naturally limit entry to those who are likely to have the qualities required by a landscape planner, and merely to graduate as a forester, for example, is not enough. Thus, there is every chance that a landscape planning team will have a proportion of persons already well grounded in the various land use activities. Secondly, landscape planning in my view will be a teamwork operation, especially where large areas are concerned, and one would expect agricultural engineers, soil scientists, hydrologists and many others to be involved in the team, as well as the qualified landscape planner who is equipped to pool the many ideas and solutions, and translate them into a pattern of landscape development.

The more difficult obstacle to landscape planning is that of the individual landowner or tenant, who will need convincing that he will be better off if he changes his habitat or his methods of land use in accordance with a landscape plan. The task of overcoming this kind of obstacle lies more with the politician than the landscape planner, but a method of guarantees, deposited and safeguarded before the change has to take place, might be effective and would certainly be just. It is, however, a mistake to consider that landscape planning necessarily means everybody will be evicted from their land and resettled elsewhere. On the contrary, there can be many areas where a landscape plan is needed which is phased far into the future, but can be achieved little by little as land changes hands or the economic situation forces a landowner to consider other methods.

In countries where the tempo of change has been comparatively slow, but where the new age of rapid communication will surely bring swift changes

very soon, landscape planning will need to consider the individual as a participant in achieving ecological balance—more than in countries where considerable changes have already occurred to the rural landscape. Even with mechanical aids, it takes time for rural land users to adjust to the new social structure that inevitably accompanies mechanization, just as they will find the new techniques difficult to acquire. On top of these two problems, lies the likelihood that unforeseen matters like certain pests and diseases will rapidly multiply after the control had been unwittingly withdrawn. With landscape planning and its concept of care for the whole landscape, there is a better chance that these problems may be overcome.

One of the objectives of landscape planning is the provision of favourable habitats in which appropriate land uses can operate. This objective should not be confused with a decision to allocate so many acres of land in a particular location to a land use, because the creation of a definable habitat or the improvement of an existing habitat is determined as the primary decision which in turn leads on to the secondary land use decision. The fact that the latter decision is secondary can be misconstrued as relegating the land use to a secondary position, when in fact it should be able to operate under better conditions than those resulting from the land use approach.

The essential difference between a great deal of rural development which has taken and is taking place, and landscape planning, is that the latter proposes maintenance as well as modifying operations for the whole landscape, accepting it as an ecological system with the characteristics of life. With rural development which does not operate within this concept there is no guarantee that it will necessarily fit into this concept of the landscape.

SUMMARY

Agriculture operating within the principles of landscape planning could be introduced to an impressive extent in tropical and sub-tropical regions. Decisive action for change has greater opportunities in these regions as the agricultural production is still well below that elsewhere.

Landscape planning is the arrangement of all uses of the landscape on an ecological basis to form an integrated landscape. There are numerous examples where agricultural development under landscape planning principles has taken place.

The author shows the example of Great Britain in the agricultural revolution in the 17th and 18th centuries, where a large part of the agricultural lands was replanned under the 'Enclosure System'. He also mentions the radical changes in the Netherlands in our days.

The two-way link between town and country is another aspect of the concept of an integrated and balanced landscape. Hitherto the town's main interest in the countryside was as a provider of food. Now the countryside is more frequently visited for recreation.

The landscape is more or less self-maintaining through a balanced ecology; the users provide most of the maintenance. If a method of control ensures that a similar balance results from the holidaymaker, he becomes an essential part of the ecology.

Planning of this kind must take into account ecological principles. Densely populated small countries are most likely to suffer these days if the use of the

countryside by townsfolk is not steered to a non-damaging course. Nevertheless, large countries are unlikely to remain ever immune: now is the time to plan.

Landscape planning should operate through full consultation with the agriculturist, the forester, the water supply engineers and other rural land users. The objective of landscape planning is to produce and maintain the highest state of landscape health and the greatest total benefit.

The fear that any form of planning interferes with the individual and that the planner is not familiar with the problems of the individual's particular occupation has to be overcome. The author explains that landscape planning education is extensive and plans are conceived through teamwork, and that these fears are therefore unfounded. A more difficult obstacle to landscape planning is the individual landowner who will have to be convinced of the advantages. This, however, can be overcome in many cases through a landscape plan which is phased far into the future.

In countries where changes have been comparatively slow but where, through rapid communication, swift changes will occur soon, landscape planning will have to consider the individual as a participant in achieving ecological balance.

The essential difference between a great deal of rural development and landscape planning is that the latter proposes maintenance as well as modifying operations for the whole area, accepting it as an ecological system with the characteristics of life.

RÉSUMÉ

Une agriculture qui se développerait dans le cadre d'un plan d'aménagement du paysage pourrait être instaurée sur une très vaste échelle dans les régions tropicales et subtropicales et aurait de meilleures chances de réussite dans ces pays, car la production agricole y est encore peu évoluée et bien inférieure à celle d'autres pays.

L'aménagement du paysage consiste à organiser toutes les utilisations possibles d'un territoire sur une base écologique dans le but de constituer un espace intégré. Il existe de nombreux exemples de développement agricole réalisé dans le cadre d'un plan d'aménagement.

L'auteur cite l'exemple de la Grande Bretagne au cours de la révolution agricole des XVII^e et XVIII^e siècles, où une grande partie des terres agricoles fut restructurée sur la base de l' 'Enclosure System'. Il mentionne également les transformations radicales qui ont eu lieu au XX^e siècle en Hollande.

L'interdépendance entre villes et campagnes constitue un autre aspect du concept d'espace intégré et équilibré. Jusqu'ici les campagnes étaient essentiellement considérées par les villes comme des sources d'alimentation. Maintenant, la campagne devient toujours plus un lieu de détente et de loisirs.

L'espace rural s'entretient plus ou moins par lui-même grâce à son système écologique équilibré; ce sont les utilisateurs de cet espace qui en assurent essentiellement le maintien. S'il était possible que le vacancier ou le touriste parvienne à susciter le même équilibre écologique, il deviendrait alors une composante essentielle de l'écosystème.

Des projets d'aménagement de ce genre doivent tenir compte des principes écologiques. De petits pays qui ont une forte densité de population sont

destinés à détériorer leurs espaces ruraux si l'utilisation de la campagne par les citadins n'est pas orientée dans un sens qui ne lui soit pas préjudiciable. Les grands pays ne sont pas non plus à l'abri de ce phénomène, et il semble que le moment soit venu de tirer des plans pour l'avenir.

Les projets d'aménagement des espaces ruraux doivent être élaborés dans le cadre d'une étroite collaboration entre agriculteurs, forestiers, ingénieurs hydrauliques et autres utilisateurs des zones rurales. Le but d'un aménagement de l'espace rural est d'instaurer et d'entretenir un état optimum de cet espace pour les plus grand bénéfice de tous.

Il faudra vaincre différents préjugés, entre autres la crainte que toute forme d'aménagement de l'espace porte atteinte à la liberté individuelle et que le planificateur ne connaît pas les problèmes particuliers à chacun. L'auteur indique alors que l'enseignement en matière d'aménagement du paysage est fait de façon très sérieuse et approfondie, qu' en outre les projets d'aménagement sont toujours conçus dans le cadre d'un travail d'équipe et que par conséquent ces craintes sont dénuées de tout fondement.

Le propriétaire foncier individuel représente un obstacle plus coriace sur le plan de l'aménagement de l'espace rural, car il faut parvenir à le convaincre des avantages de cet aménagement. Mais cette difficulté peut également être surmontée dans de nombreux cas, si l'on établit un plan directeur qui se réalise à longue échéance et par étapes successives.

Dans des pays où les changements ont été relativement lents jusqu'ici, mais où, grâce au développement des communications, des transformations rapides interviendront sous peu, les projets d'aménagement des espaces ruraux devront tenir compte de l'individu en tant que composante d'un écosystème équilibré.

La différence essentielle entre une certaine forme très fréquente de développement rural et l'aménagement de l'espace rural tient dans le fait que ce dernier propose non seulement une action visant à transformer mais aussi à entretenir l'ensemble de l'espace rural, en le considérant comme un système écologique.

Section A

A Detail Plan for the Reclamation of Coal Mining and Industrial Waste to Agricultural Use

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INTRODUCTION

Reclamation may be described as the return of land from an unproductive, infertile or devastated state to a fertile and pleasing landscape for agricultural, silvicultural or other purposes.

From an early time in the industrial revolution the coal industry has left scars on the landscape in the United Kingdom and on the continent of Europe. The deep mines are responsible for colliery spoil mounds, where it is not possible to back stow the spoil underground.

To give some idea of the extent of the problem in England and Wales, the Ministry of Housing & Local Government consider that there are 36, 400 ha of derelict land of which 21, 600 ha are in need of reclamation. Another example of how mining operations despoil the landscape is shown by the figures given by the Bureau of Mines in the USA (1965), which indicate 1, 296, 000 ha are involved.

Advances in coal mining equipment mean that large areas of land can be laid waste unless adequate safeguards are taken. However, in opencast working, it is possible to replace an infertile original surface with a more fertile one.

The coal deposits of India are found in a number of areas, the main fields being Bengal and Bihar, Madhya Pradesh, Vindhya Pradesh, Singareni, Orissa and Assam. The origins of the industry date back to the latter part of the 19th century, the superior qualities of coal being concentrated in Bihar and West Bengal. Of the estimated 50, 800 million tons of reserves of all qualities available in the country, only some 2, 845 million tons are of the coking variety. The bulk of India's coal output is consumed by the iron and steel industry, thermal power stations and railways.

Reserves of lignite have been located at South Arcot near Madras, the deposits are estimated at 2, 032 million tons (Ministry of Production, 1954).

Important opencast workings are to be found in the Bokavo Coalfield whose total area is 618, 000 ha, the east Bokavo field being 24, 605 ha, and the west field 22, 015 ha. The Karkali seam of the Barakar measures in east Bokavo has a thickness of 37 m (Dutt, 1963).

Growth of production has risen steadily. For example in 1934 the production was 20 million tons and the industry employed 200, 000 people: in 1957, the consumption was 30 million tons and had increased to 46 million tons by 1960. But, even though production has since moved up considerably (the Inspector of Mines (1965) puts the production for the years 1962-64 in excess of 61

million tons), the rate of rise in coal utilization was much higher than output. Present indications are that demand for coal is about 80-90 million tons. Predictions for 1970-71 may be assumed at 165 million tons (Chopra, 1965).

The rapidly expanding domestic demand and internal coal shortages are likely to put a brake on exports. By the end of the Third Plan, coal will become an extremely small item on India's export list.

These figures indicate that problems may well be encountered in the reclamation of landscape despoiled through coal mining in all its operations. The experience gained in reclamation works in the UK, could be of value in tackling the problems in India, by providing guidelines.

I. INVESTIGATION PRIOR TO LANDSCAPE RECLAMATION

(1) Heap investigation

The main reasons for heap investigation are: fire risk, suitability of material to carry development, and likely cost of the scheme. Method and cost of investigation are also very important.

(a) *Fire risk (see Vyle & Downing, 1966)*

There is little knowledge on the subject of fire risk in heaps. It is, however, gradually being realized that firing of heaps is a reclamation hazard.

Fire is most likely to occur where the coal content of the heap is in excess of 20% by weight, but all heaps have a fire risk potential. Basically the risk depends on the percentage of volatile material. Highly volatile coal is likely to catch fire since tars and resins are distilled at lower temperatures. Heating is caused by the oxidation of the pyritic material in particular, which fires the carbon content of the coal. There is no fire so long as the heat is dissipated by a circulation of air currents, by radiation or by conduction through the surrounding mass. If the heat is not dissipated, a local rise in temperature occurs, which causes accelerated oxidation, increase in heat and so on, resulting in spontaneous combustion.

Rather than fire starting at the centre of the heap, it is thought more probable that it starts near the surface where the supply of air is greatest but where heat is not sufficiently dissipated. The fire then works into the heap.

Hazards which may be experienced in reclaiming pit heaps:—

On industrial and housing areas, there is considerable risk since it is easy to start a fire without thinking, e.g. bonfires in gardens, burning rubbish, waste paint, etc., heat from boilers, and even large buildings can raise the temperature of the surrounding material.

Fire may give rise to an increase in the void ratio which in turn reduces the bearing capacity.

Death of trees and vegetation may result. Flames and smell may constitute a nuisance in urban areas.

(b) *Suitability of material to carry development*

The coal content and bearing capabilities must be assessed as these items will affect radically the design and after use of the scheme.

(c) *Cost of the scheme*

The salvage of material may reduce the cost of the scheme and may allow for a higher standard of reclamation.

Red shale. Removal of this material reduces the capacity of the material to be regraded. The contractor must be made to leave the site in a reasonable condition.

Coal. The heap must have 10-15% coal by weight depending on the ease of separation, to make it commercially worthwhile exploiting. The effect of this coal on the bulk of the heap is more dramatic since the ratio of weight to volume is about 1 : 2 and hence a heap containing 10% by weight of coal will have its volume reduced by 20% on removal of the coal. Even though discard is left, this can be regraded and with greater regrading of the heap a far better standard of reclamation will result. However, such a method is likely to extend the time for restoration.

(d) *Method of heap investigation*

Tests to determine coal content:

Floats and sinks test at 1.6SG% of coal by weight.
Ignition temperature of material.

Engineering tests:

Tests of material which are in the nature of soils or fillers should be undertaken under BS 1377/61.

Hazard surveys:

These should be undertaken on old industrial sites prior to any design or use proposals.

Landscape survey and analysis:

A landscape survey should be undertaken and the results analysed so that proposals take note of existing environmental conditions and allow for the creation of a related, possibly improved, new environment.

Points to be considered are:—

Relations of the land from inside and outside the site.

A record of site features—land form, planting and buildings, which may be utilized to give interest and character to the site.

Definition of areas of distinctive landscape character.

The drainage pattern of the area.

Existing plantations, where and what.

Good views into and out of the site.

Ugly views into and out of the site.

Wind exposure.

Compatibility of materials to sustain plant life.

Topsoil and subsoil areas.

Highly toxic areas.

Services.

II. AN EXAMPLE OF LANDSCAPE RECLAMATION AT RODDYMOOR, CROOK, CO. DURHAM

The policy, design solution and implementation comprising topsoil and subsoil strip, grading of coal industry waste, seeding and planting are briefly described.

(1) Policy

The proposed use, and the reasons why the scheme was thought to contribute to the development of industry in the area were two items of the policy which must meet the requirements laid down for the formal application for approval of grant under the Industrial Development Act 1966, Section 20, rehabilitation of derelict sites in development areas.

The main heap dominated the town of Crook and was particularly conspicuous from the A689 and A690 roads on the approaches to the town from Durham and from the A68. The entire site was also well seen from the B6299 road which served as an alternative route to the town from the A68 and is well used by tourists travelling from Durham via Tow Law to Weardale.

Two significant statements relating to the White Paper 'The North East' (comd 2206) are 'A region can attract and hold the professional, technical and other skilled people on whom industrial development increasingly depends, only if its general environment and society can bear comparison with living conditions in other parts of the country'; and 'A steady drive to remove eyesores is an important element in the effort to make the region more attractive and prosperous'. It was against the background of these statements that the scheme was undertaken and helped to contribute to the development of industry in the area.

(2) Design solution

Landform. Due note has been taken of the existing surrounding landform and valley systems and watercourses: the main west-east watercourse has two tributaries, one running from north-west to south-east and the second from north to south-east; there is a second main watercourse which runs from north to south; the main catchment of them is 526 ha. The aim was to emphasize the west-east valley system leaving a feature sometimes found in the area, a one-sided wooded valley.

Land-use. Agriculture, and woodland for erosion protection and shelter purposes, were the two end uses envisaged.

Where possible the agricultural slopes have been orientated towards the south.

Tree planting was dependent on the degree of slope and need for shelter.

(3) Implementation

(a) Earthmoving

Topsoil and subsoil. The Ministry of Agriculture was consulted in view of the 18 ha of agricultural land involved. The full depth of the topsoil was stripped and stacked and approximately 30 cm of subsoil stripped and stacked separately.

Regrading coal industry wastes. The regrading of the waste was designed to ensure that the haul for spreading was kept as short as possible and that the greatest amount of shale, commensurate with the creation of viable slopes for agricultural management, was left untouched within the area of the different wastes.

Materials on site included hot red shale, black shale, grey shale, slurry, coke breeze and cinders.

Generally the regrading of the waste was undertaken by a Cat 657 rubber-tyred machine of 33 m³ capacity.

(b) Difficulties encountered with materials on site

Difficulties were encountered with the hot red shale and slurry:

Red shale. Temperatures of up to 475° C were recorded in the material and bulldozers were used to move the hot material which cooled rapidly on the surface. The rubber-tyred machines could then be used again.

Slurry. Because of its physical and chemical properties it was thought safest to dig out the material. On several occasions the heavy machines were bogged down. In order to handle the material a haulway of red shale was used to provide a suitable access onto the slurry. About 2'6" (76 cm) of red shale were brought onto the slurry areas.

(c) Drainage

The north-south watercourse was cleaned out and the banks graded off where possible. The west-east watercourse was dug out to dimensions capable of carrying the flood flow from the newly graded land and adjacent land being open-casted.

On the flatter areas agricultural drains have been installed.

Cut off ditches have been incorporated at the top of the north batter, at the foot of the heap and around the slurry area.

Concrete flumes have been used down the steeper and longer slopes.

(d) Seeding

Prior to cultivations, ripping at 91 cm centres 61 cm deep was specified to break up the surface compacted by the heavy machines.

Seeding of the soiled areas was undertaken by conventional methods, using a Cockle Park mixture at 34 kg/ha.

Shale and other areas scheduled for agricultural use were sown with the same mixture applied at double the rate and by using a Lancashire County Council type of mixture at 68 kg/ha. Two methods of sowing have been used: conventionally broadcast and hydromatic seeding with no mulch.

The steep northern slope was hydromulched (mulched with wood cellulose) with a mixture containing cocksfoot, browntop, red fescue S. 59, Chewings fescue, and fine leaved fescue applied at 85 kg, 113 kg and 170 kg/ha.

A number of grass/legume mixtures was also being tried under less severe conditions at lower seeding rates.

(e) Planting

Mainly deciduous species have been planted, particularly alders, birch, willow, poplars, rowan and two pines, Scots and Corsican. Shrub and rootstock plants have also been tried on a small scale.

III. SUGGESTED OUTLINE PROCEDURES IN THE PREPARATION OF LANDSCAPE PLANS FOR AREAS AFFECTED BY COAL INDUSTRY WASTES

The reclamation of landscape made derelict by industrial activities of a former age is an important aspect of raising the general quality of the environment.

(1) **M. F. Downing (1967) suggests aspects of the problem could be categorized under the main headings:—**

- (a) Prevention of additional dereliction by the control of industry.
- (b) Eradication of existing dereliction by economic use of derelict sites where this is possible.
- (c) Reclamation where no economic return is possible, paid for by public funds.

(2) **C. J. Vyle (1967) indicated that a possible sequence for landscape reclamation of colliery waste shales on a regional basis might run as follows:—**

- (a) Assess the heap for potential fire hazard and mineral content with a view to salvage of minerals.

Black shale. If say 15% coal of suitable quality the heap should be worked. If under 10% the heap should be reclaimed without salvage.

Red shale. If good quality red shale—work into road programme if possible. If poor quality—heap should be reclaimed to appropriate use.

Brick shale. Use.

- (b) Assess the ability of material to carry development at a later date. If the coal content is just below critical economic level it would be unwise to use the reclaimed landscape for housing or industry.
- (c) Assess the potential fertility of material as a soil. Red shale appears to be superior to black and will not require additional liming.

The effect of phosphate/potash fertiliser on red shales appears to be superior to that on black.

Thus if possible leave red shale as the final reclamation surface.

- (d) Work sites for minerals and/or reclaim sites to appropriate uses in accordance with a landscape plan based on engineering assessment of (a) and (b) and soils assessment of (c), and upon an adequate landscape survey.
- (e) Select species and mixtures appropriate to the 'soil'.
- (f) Prescribe adequate establishment and maintenance conditions.

In a landscape planning approach there is also a need to co-ordinate regional plans with landscape plans, thereby ensuring that reclaimed polluted or derelict landscapes are assimilated into the broader landscape and returned to an appropriate use. The adoption of a systems approach to park planning and the integration of derelict or polluted landscapes into the open space network should also be considered.

IV. POSSIBLE GUIDELINES IN FUKTHERING THE CONCEPTS OF LANDSCAPE PLANNING INCLUDING LANDSCAPE RECLAMATION

- (1) Landscape reclamation should be regarded as a basic resource.
- (2) The establishment of a Landscape Planning Agency on the lines of the Landscape Planning Department of the Dutch State Forest Service, should be considered.
- (3) The establishment of an Institute for Landscape Planning, Nature Conservation and Vegetation Research. This could incorporate a regional plant materials centre with a tree and shrub bank for indigenous species, which could be used in park planting generally; planting within the visual corridor of main roads and rural roads, and the banks of rivers; the margins of forests; and the restoration of landscapes despoiled by mining operations.
- (4) The establishment of an Institute to investigate the re-use of waste materials.
- (5) The drawing up of landscape plans as a prerequisite of any financial and technical aid from Government sources. This concept not only has relevance for colliery waste areas and other despoiled landscapes, but could also be extended to incorporate schemes for urban renewal, new towns, industrial and road development and recreational areas.
- (6) The co-ordination of regional plans with landscape plans, thereby ensuring reclaimed, polluted or derelict landscapes are assimilated into the broader landscape and returned to an appropriate use.
- (7) A campaign to educate the public should be undertaken with particular regard to the conservation of nature and landscape. The aim would be to enlighten them as to the dangers arising from the deterioration of the natural resources on which they live and the disfigurement of the environment, and to make them aware of the importance for them of the success of a policy designed to protect the countryside, to establish and maintain open spaces, and to set up and administer efficiently national parks and natural parks.
- (8) To adopt a systems approach to park planning and to integrate derelict or polluted landscapes into the open space network where this is appropriate.

It is interesting to note that Tindall (1967) suggested that, as large areas in the world are exploited for their mineral wealth and then left derelict, the cost of landscape restoration should be recognized as a fair charge on mineral developers. The IUCN Technical Meeting might well discuss this point and items IV (1)-(8) above and prepare a resolution relating to landscape planning in general and the reclamation of landscapes made derelict by mineral extraction.

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SUMMARY

Reclamation is the return of unproductive devastated land to a fertile and pleasing landscape for multiple uses. In Britain derelict land is estimated at 36, 400 ha and in the United States at 1, 296, 000 ha. Technical advances in coal mining equipment can lay vast additional areas to waste in a short time unless proper safeguards are taken

The author lists the main coal fields in India: their reserves are estimated at 50, 800 million tons, of which only 2, 845 million tons are of the coking variety; most of the annual output is consumed by the steel industry, power stations, railways and export; although production has steadily risen, rapidly expanding domestic demands are likely to stop exports in the near future. As coal production for the years 1970-71 is estimated at 165 million tons, there may well be need for reclamation in certain areas.

In order to provide guidelines for such reclamation, some experiences in the United Kingdom of various aspects of reclamation are described.

The investigation of spoil heaps will be concerned with—

- (a) Fire risk, which depends on the coal content of the heap as well as the percentage of volatile materials. A rise in temperature is caused by oxidation of the pyritic material if the heat is not sufficiently dissipated through ventilation; fires sometimes arise through carelessness, especially if waste heaps are near industrial or housing areas. An increase in void ratio, reduction in bearing capacity of the material, destruction of vegetation and a rise in air pollution through fumes are among the hazards arising from the firing of heaps.

(b) The bearing capacity of the material, which has to be assessed in order to plan development.

(c) The cost of reclamation, which will be dependent on the coal contents of the heap. If these contents are above 10-15% in weight, a salvage operation can be advantageous.

After these investigations, a landscape survey should be undertaken and the results analysed so that layout proposals can take note of the existing environmental conditions and allow for the creation of a related new landscape.

As an example, the policy, design solution and implementation, including top and subsoil stripping, grading of the coal industry waste, and seeding and planting, in a particular reclamation project in the U.K. are described.

A suggested operational sequence for landscape reclamation of colliery waste shales on a regional basis and, in conclusion, some guidelines for furthering the general concepts of landscape planning, including in particular the reclamation of derelict areas, are presented.

RÉSUMÉ

La remise en valeur des déblais houillers consiste à transformer une surface improductive et désolée en une région fertile et riante à usages multiples. On estime qu'il y a environ 36.400 hectares de terres dégradées par l'exploitation de la houille en Grande Bretagne, et 1.296.000 hectares aux USA. A cette somme impressionnante de terres dévastées viennent s'ajouter le résultat des progrès techniques dans le domaine de l'équipement minier qui sont cause que de grandes surfaces peuvent être dégradées en peu de temps si des mesures appropriées ne sont pas prises pour les sauvegarder.

L'auteur donne une liste des principaux bassins houillers de l'Inde, dont les réserves sont évaluées globalement à 50.800 millions de tonnes avec seulement 2.845 millions de tonnes de charbon cokéifiable. Le gros de la production annuelle est absorbé par la sidérurgie, les usines motrices, les chemins de fer et l'exportation. Au cours des dernières années, on a observé une progression régulière de la production, et il paraît vraisemblable que l'augmentation rapide de la consommation domestique fera cesser les exportation dans un proche avenir. La production houillère prévue pour 1970-71 est estimée à 165.000 millions de tonnes, ce qui laisse supposer qu'il faudra entreprendre des opérations de récupération des déblais dans certaines régions.

L'expérience acquise dans le domaine de la remise en valeur des terrils au Royaume Uni pourrait servir de base à des opérations de ce genre en Inde.

Etude des terrils

(a) Risques d'incendie. Le risque d'incendie dépend de la teneur en charbon du terril ainsi que du pourcentage de matières volatiles. L'oxydation de la fraction pyritique provoque une forte élévation de la température si l'aération est insuffisante. Les incendies naissent parfois d'une simple négligence, surtout si les tas de déblais sont situés près de zones industrielles ou résidentiellles. Le feu peut causer une augmentation du taux de cavités, en réduisant ainsi le pouvoir porteur du matériau, la destruction de la végétation et un accroissement de la pollution de l'air par les fumées.

(b) Pour pouvoir établir un projet de remise en valeur, il faut avant tout déterminer le pouvoir porteur du matériau.

(c) Le prix d'un projet de ce genre dépend de la teneur en charbon des terrils. Si cette teneur est supérieure à 10-15% de poids de charbon, une opération de récupération peut s'avérer avantageuse.

Après cette étude des déblais houillers, il conviendrait d'effectuer une étude du paysage afin que les projets d'aménagement puissent tenir compte de tous les facteurs présents et permettent la création d'un site nouveau intégré.

L'auteur décrit alors les aspects politiques, géo-économiques et pratiques (décapement des couches supérieures et sousjacentes du sol, nivellement des déblais houillers, semis et plantation de végétaux) d'un projet de remise en valeur du paysage minier en Grande Bretagne.

Il décrit un processus possible de récupération des déblais houillers argileux sur une base régionale et conclut en indiquant les points fondamentaux dont il faut tenir compte pour développer le concept d'aménagement des sites et en particulier de la remise en valeur du paysage.

SECTION A: LANDSCAPE PLANNING IN AGRICULTURAL LAND USE

POINTS MADE IN DISCUSSION

Why has the Dutch Government changed its policy and is now reserving 20% of the reclaimed land of the polders for forestry, while they reserved only 7.5% a few years ago? It also appears that the emphasis on moisture control by manipulation of drainage in the polders has been withdrawn in the current plans (D. K. Ganguli, India).

There is a great need for non-agricultural lands for urban purposes and recreation. Today we advocate multi-varied land use rather than single-purpose land use (Chairman, R. J. Benthem, Netherlands).

Why do people understand the phrase 'conservation of environment' but not 'conservation of nature'? The reason is that nature is thought to be something untouched, which we will not be able to retain. The addition of the words 'and natural resources' to the word 'nature' is not enough and there would be advantages if IUCN were renamed the International Union for Conservation of the Natural Environment (R. Kalliola, Finland).

It is a good policy to change when society changes and to look if the phrases one uses are still appropriate (Chairman, R.J. Benthem, Netherlands).

In the new polders of the Netherlands, in those of the former Zuiderzee as well as in the Delta area, hundreds of reclaimed hectares are (2%) and will be (5%) allocated as nature reserves. These will be primarily shallow waters, marshland and wetlands, which are important for wildfowl and waders; some areas will also be developed as woodland to provide habitat for other animal species (M. F. Mörzer Bruyns, Netherlands).

There is to be a national conference in New Zealand, in May 1970, on the physical environment. One of the matters which are causing us much concern relates to visual amenity. Where the state owns the land or the amenity, something can be done. But what can be done where the land is privately owned? Is there any legislation in Australia covering this problem? (R. J. Maclachlan, New Zealand).

There is legislation in all of the states in regard to town and country planning. Most has been concentrated on towns. There is now a tendency for more regional planning (D. W. Goode, Australia).

What is the general landscape planning approach on wilderness in Australia? In a previous session, Dr. McClure stated that the wilderness concept should not be advocated except for the U.S.A. (D. H. Henning, U.S.A.).

Our approach at the moment is a negative one. We have to give people access, but in a number of large National Parks which we now have in Australia, access is only given to certain limited sections, which are opened up by 'scrub-bashing'. We have still got very fine wilderness areas, which we hope to keep, but, at this stage, they are not planned. We have quite a lot of trouble from fires and in one of the wilderness areas fire-fighting stations on the tops of the hills have now been established (D.W.Goode, Australia).

What is being done in Australia to control the excessive planting of exotic trees like pines, which spoil the natural fauna? (S. S. Buit, India).

Pines are growing very well in Australia because there are no natural parasites to attack them, but if our own native forests could be managed properly, we would get much more out of them. We have ecological deserts which are created by pines from America, while you have them here in India created by our eucalyptus (D.W. Goode, Australia).

We should plant trees of the right species at the right places. If you travel on the Great Trunk Road from Delhi to Chandigar, you will find miles of eucalyptus trees along the road which are depriving the traveller of enjoyment in the landscape. When we speak of landscape we relate it generally to vegetation, but there are also other values, and we should have a proper evaluation of the landscape (J.J.Dutta, India).

Would it not be a proper thing to divert some of the vacant agricultural lands within the EEC countries to pasture land? (D. K. Ganguli, India).

This would not be very advisable, as Western Europe is overproducing cattle (E. Barnard, Germany).

Under a forest conversion project, 1, 000 hectares of forest in the Republic of China are cut down every year and replaced with exotic species, and this in addition to the regular logging of productive forest. This happens often up to the edge of roads and in recreation areas. To bring this kind of thing under proper control, it would be an advantage if ecologists and landscape planners had a hand in such projects at the planning stage before they start (Hunter Han-Ting Eu, Taiwan).

When the reafforestations take place, will it also be along the roads? This would increase the wildlife kill (H. E. McClure, Thailand and U.S.A.).

It will be mainly in mountainous areas and perhaps along roads which have to be fenced, such as certain sections of the autobahns (E. Barnard, Germany).

We will be able to plant more trees, if we produce more food, of which we have not enough in India, and have less children (P. B. L. Srivastava, India).

At the present time we are paying much attention to measuring organic production in natural ecosystems. Mrs. Futehally's paper emphasises social and cultural values of some natural systems, and we should be measuring these values as well as the organic production. We tend to overlook the importance of the social and cultural aspects in our concern for quantitative scientific measurements (J. B. Cragg, Canada).

The problem of reclamation exists particularly on the outskirts of the cities where earth is taken for making bricks. The natural ground is excavated to a depth of 5-8 feet. Areas spoiled like this should be taken over by the authorities and developed for recreation. Another point concerns quarries. They should be preserved or modified to create interesting landscape features (K. K. Gupta, India).

I agree that, through flooding, quarries can be made into bird sanctuaries or used for fishing and boating. Also, industrial spoil heaps can often make interesting features with only a little reshaping. One has to look at the problem first from a creative point of view. Whatever is being done, it must include a plan for reclamation (Sylvia Crowe, U.K.).

Unfortunately, we have in most states in India a compartmental system of administration, with lots of different departments concerned with conservation, i.e. Agriculture, Fisheries, Forests and Tourism. We should instead have a comprehensive national conservation institute (D. K. Dey, India).

Landscape planning is mainly done by urban planners and rarely reflects the views of the rural population. Steps should be taken to make sure that these views are included (G. O. Kurup, India).

It is essential that the planner understands the country and is in close contact with its people. We must overcome purely urban thinking (Sylvia Crowe, U.K.).

SECTION B: INTEGRATION OF URBAN REQUIREMENTS INTO RURAL LAND USE PATTERNS

A Landscape Project for the Town and Surroundings of Mogadiscio, Somalia

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INTRODUCTION

In 1962, at the request of the German Federal Ministry for Food, Agriculture, and Forestry, the author was asked to advise the Government of Somalia on the arrangement of tree nurseries, to prepare a report, a landscape plan for the capital Mogadiscio, and a report on details of testing areas available. Here I want to propose what I consider to be the best solution to the problem of integration of urban development and its surrounding agricultural area.

BASIC NATURAL FEATURES

When flying over the Northern District of Somalia, one is astonished to see the green cover extending over this mountainous area despite the deep erosion valleys of this semi-arid region. One has the same impression when flying over the Southern District to Mogadiscio. Apart from the typical coastal formations, with extensive dunes, and the high mountains of the Northern District, with their mist forests, dry bush savanna predominates, in which *Commiphora*, *Acacia*, *Boswellia*, and *Euphorbia* are the typical species, although there is also some dry tree savanna, where *Dobera* replaces *Boswellia* but the other dominant species are identical. Gallery forest occurs along the banks of the rivers Uebi Scebeli and Giuba, which are almost always full of water: here, the main tree species are Dom Palm, *Hyphaene benadirensis*, Sycamore *Ficus sycomor* and *Acacia stenocarpa*. South-west of the river Giuba there is the wet tree savanna with *Terminalia*, *Acacia adanson*, *Garcinia* and similar trees, while along the coast of the Indian Ocean there are mangroves.

SOME FACTS CONCERNING THE CAPITAL, MOGADISCIO

The town has most probably reached a number of approximately 100, 000 inhabitants after uncontrolled settlement in the outskirts by many semi-nomads, small farmers, and casual labourers. The built-up area of the town stretches for about 10 km along the coast of the Indian Ocean, in a south-west to north-east direction. Its maximum width is about 3 km. A flat sandy beach of 1.5 km in length is situated north-east of the town; the remainder of the surrounding coastline is mainly bluff or low cliff of coral-line lime. Inland stretch extensive hills and peaks, also consisting of coral-line lime and often covered by sand and, in places, enormous dunes.

Very little ground-water is available for plants. The average rainfall amounts to 500-600 mm, mostly falling during the rainy season, from March to July. This is the period of seeding and harvest. When the heavy rains begin, the savanna turns a fresh green within a few days. The wind is predominantly south to south-west. The period from July to August can be called the 'half-dry' season: during this period minor amounts of rain often occur. From September to November, there is further heavier rainfall; this is the period of the second seeding and harvest. The period from December to March is considered to be the driest: with the wind mostly from north and north-east, the grass and bush of the savanna then becomes pale and dry.

ESTABLISHMENT OF TREE NURSERIES

As the above brief survey of the area indicates, considerable difficulties handicap the production of plants in the Mogadiscio area. Nevertheless, the systematic mass production of suitable trees must be attempted. Large-scale afforestation together with general fostering of the few surviving stands of trees, which can no longer be called forests, is a question of life or death for Somalia. The territory in both the northern and southern regions has been dangerously over-exploited: the estimated livestock population is 6 million sheep and goats, 2 million cattle, and 2.5 million camels, whereas the total human population is not quite 2.5 million. Erosion damage caused by pasturing these animals is considerable in places. New forests have to be established and made secure. Being the largest settlement area of Somalia, Mogadiscio offers good opportunities for systematic afforestation.

DUNE STABILIZATION

A difficult problem is the securing and fixing of dunes. In the Mogadiscio area, there are some dunes close to the coast, especially one large dune, 2 km long and several hundred metres wide, to the north of the town. These dunes must be stabilized biologically and according to engineering principles. The large dune mentioned shifts to and fro and up and down in distinctive large ripples, according to whether the monsoon is blowing from the north-east or from the south-west. It is essential that appropriate stabilization measures should be undertaken, using a combination of dead and living material. I have in mind (see Fig. 1) a diagonal lattice of *Acacia* brushwood, according to the degree of slope in squares varying in size from 5 by 5 metres to 2 by 2 metres. These should be interplanted with the bindweed *Ipomoea macalusoii* which is growing on the beach; in addition, cuttings of *Tamarix nilotica*, and *Casuarina equisetifolia*, *Parkinsonia digitata*, *Conocarpus lancifolius*, *Suaeda monoica*, *Eucalyptus camaldulensis*, *Eucalyptus gomphocephala*, should be sown or planted and perhaps also, *Cardia somalensis*, *Cordyla africana* and *Aristolochia* spp. The most favourable time for this is the weeks before the rainy season begins, i.e. February or March. The steps taken for biologically stabilizing the shifting dunes could serve as a model for treating other dunes.

THE LANDSCAPE PROJECT FOR MOGADISCIO

On the re-afforestation of over-exploited areas and the education of the population to respect the trees depends the future of this young country. The nomads living in Somalia are used to leading a free life in the bush. Restric-

Fig. 1 PROPOSAL FOR THE STABILIZATION OF THE GREAT SHIFTING DUNE AT MOGADISCIO, SOMALIA
SCHEME

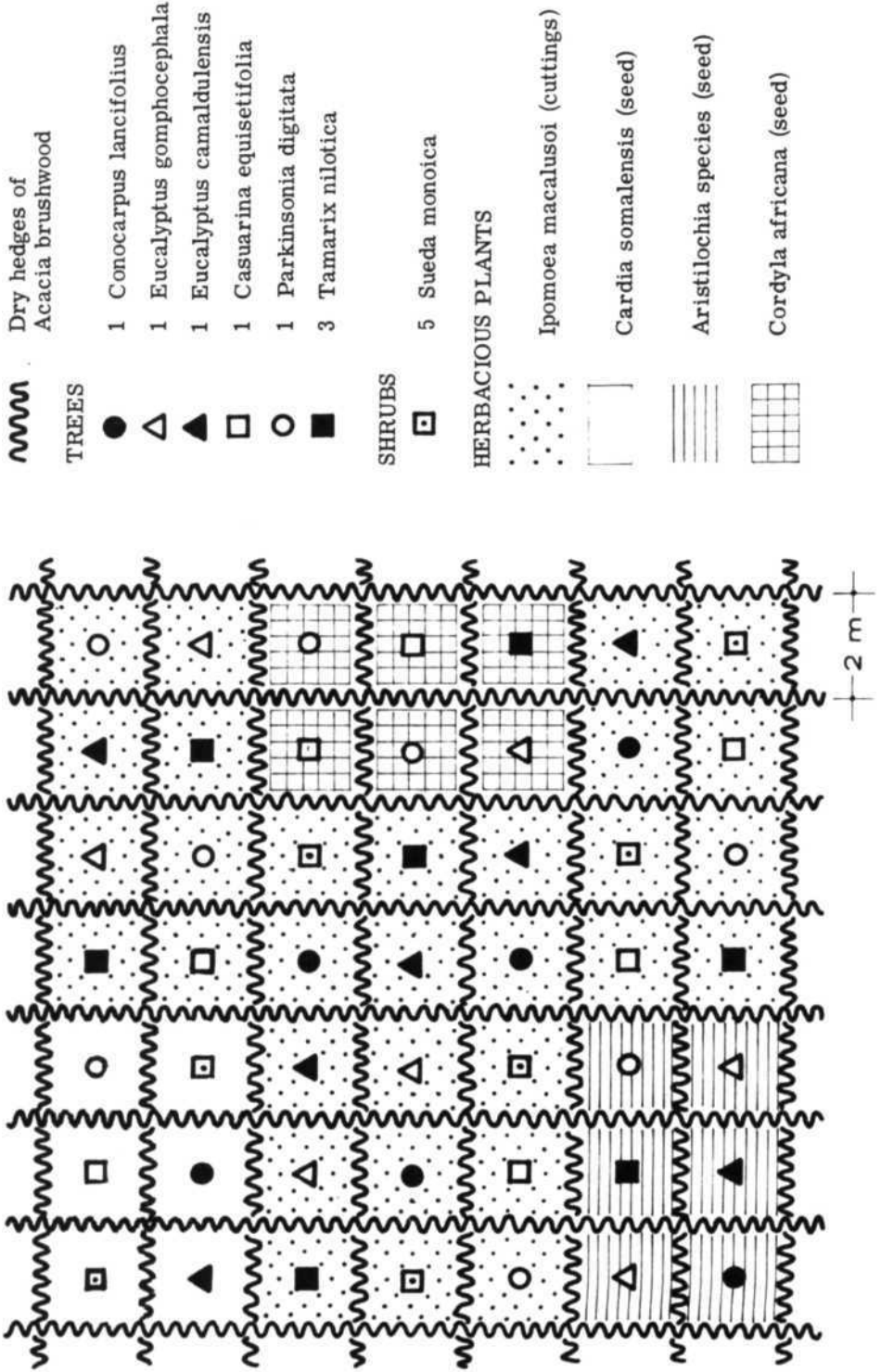
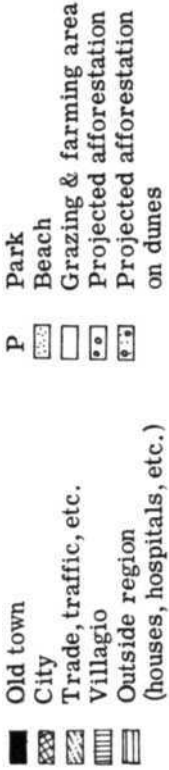


Fig. 2 MOGADISCIO-LANDSCAPE PLAN OF THE AREA

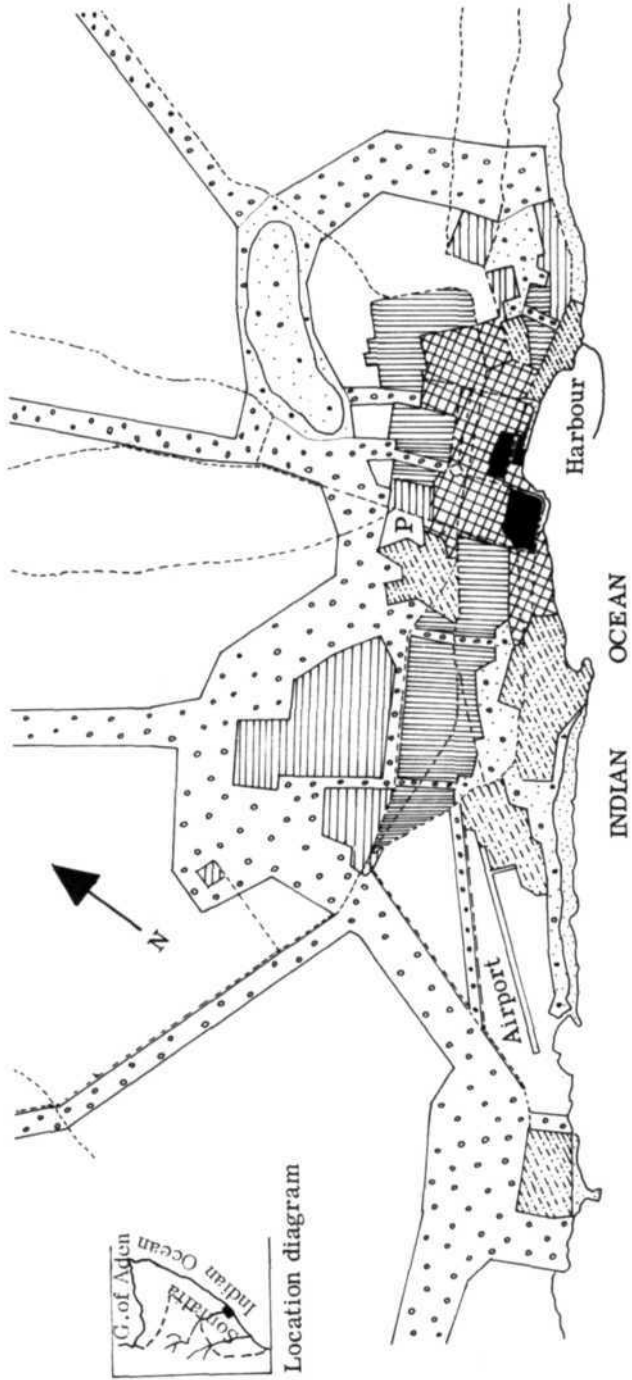
This scheme has the following aims:-

1. To make possible an effective soil conservation
2. To improve climate
3. To give indications for town planning
4. To make known the advantages of afforestation, in such a way as to win popular support.

The proposed measures are necessary prerequisites of an economic agriculture and horticulture.



Scale : 1 : 10 000 approx.



tions on the use of grassland in certain protected areas seem to them a limitation of their personal freedom. The government does its best to explain matters, but people have to be told again and again that by destroying the biological potential of the territory they are killing the goose that lays the golden egg. The desert-like former forest areas and the immense erosion over large areas provide menacing danger-signals.

The landscape plan for Mogadiscio (see Fig. 2) submitted with my report, is primarily intended to provide a solid basis for establishing new forests. At least to a certain extent, it also serves the purpose of providing answers to some of the fundamental town planning problems of the town. At the old core of this former residential town of the Sultan of Zanzibar, there is a section in which the buildings are not standing closely together, but are interspersed with trees and bushes: around this central area are the native quarters or 'villagios', which in due course will have to be cleared and re-organized. It is beyond and encircling this 'villagio' belt that a woodland zone, some 400 to 600 metres in width, is planned.

From this zone narrow strips of trees would stretch right into the centre of the town. In addition, in an easterly to northern direction, four belts of woodland, approximately 200 metres wide, would reach out far into the savanna. They are intended to create desirable relief in the savanna. Within the northern part of the woodland zone there is also the shifting dune, to which reference has been made. How this is to be fixed by planting it up with pioneer plants, according to engineering principles, has already been described.

In those sections of the Mogadiscio woodland zone where saplings have to be planted on dune sand, *Conocarpus*, various *Acacia* species and *Eucalyptus* will be mainly used. *Casuarina* together with *Tamarix* will play an important part in border areas, while the big bushy *Parkinsonia* is especially suitable and will be used with other plants to form dense thickets. I have in mind a plant combination on a 1.5 x 1.5m lay-out, whereby the main species of trees and shrubs occur again and again according to a certain pattern. For the calculation of the quantities of plants needed, the following estimate will certainly be helpful:-

- (a) main Mogadiscio woodland zone with connected spurs into the centre of the town: area approx. 830 hectares; number of plants needed: 4.15 million.
- (b) woodland belts projecting from the zone into the surrounding savanna: area approx. 215 hectares; number of plants needed; 1.075 million.

This means a total of approximately 5 million plants. Taking into consideration that a number of bushes already exist in the two areas, so that some intermediate planting is advisable, 20% may be deducted from the total. This leaves some 4 million young plants to be raised in the first large-scale tree nursery, which it is proposed to establish at Agfoi, a little town in the vicinity of Mogadiscio.

It is hardly necessary to mention that such large-scale afforestation will considerably change the climate. The hot monsoon winds blowing according to the season either from the continent or the sea, will come up against a barrier; moreover it is to be expected that inside the woods the temperature will be somewhat lower than outside and thus provide a supply of cooler air to the lower parts of the town. Most probably difficulties will arise, when the proposed afforestation is initiated, with the farmers and semi-nomads of the area. I am not sure to what extent personal land property in the outskirts of Mogadiscio is recognized, but there is likely to be strong opposition

from those claiming 'dry-farming' rights in areas surrounded by hedges. However, the responsible members of the Government consider the new forest areas are a national responsibility. It is taken for granted that, with the setting up of trade and industries, there will be an increasing general understanding of the need for reclamation of the countryside by building efficient roads and creating intensively irrigated arable land, so that other forms of long-term planning will be more appreciated.

Although it is recognized that the landscape plan discussed in this paper cannot be carried out at once, a general indication has been given of what the realization of such a plan will involve and this should help the town planning authorities to do their best for the welfare of the population. Meanwhile it is recommended that the Somali Government should carry out the plan as soon as possible and so create a basis for the future systematic creation of green cover in the whole country. The Mogadiscio example is especially suitable because, under the eyes of the responsible Government and with support and supervision by the Mayor, success can be achieved and become a model for similar projects.

SUMMARY

The area around Mogadiscio, capital of Somalia, consists mainly of dry bush savanna, dry tree savanna and gallery forest along the banks of the rivers Uebi Scebeli and Giuba, with some wet tree savanna south-west of the Giuba.

Mogadiscio has 100,000 inhabitants and covers about 30 sq.km. The coastline is mainly cliffy, apart from 1.5 km of flat sandy beach. Inland the country is rather mountainous. The average annual rainfall is between 500 and 600 mm. Summer winds are southerly and winter winds northerly in direction.

Large-scale afforestation and the preservation of a few remaining stands of trees are essential, as well as measures to control overgrazing in order to block progressive erosion.

The author discusses biological methods of dune stabilization, according to engineering principles, using a combination of dead and living material. He recommends that *Acacia* brushwood in lattice formation should be interplanted with the *Ipomoea macalusoii*, a bindweed, together with several species of trees.

The essential factors are afforestation and education of the public. The landscape plan should provide a solid basis for the creation of new forests. The basic features of the plan would be a 400-600 metres wide green belt around the outskirts of the town, from which narrow strips of woodland would extend into the very centre of the city; in addition, four 200 metres wide belts of woodland would extend from the green belt into the surrounding savanna. A scheme has been devised which envisages the establishment of about 4 million plants in a first large-scale tree nursery near the small town of Agfoi not far from Mogadiscio.

RÉSUMÉ

Bases naturelles

La région située autour de Mogadiscio, capitale de la Somalie, est constituée en majeure partie par une savane buissonneuse sèche, une savane-parc sèche

et des forêts-galeries le long des rivières Uebi Scebeli et Giuba. Au sud-ouest de la rivière Giuba, on trouve une savane-parc humide.

Quelques informations sur Mogadiscio

Mogadiscio a 100'000 habitants et s'étend sur 30 km². La côte est escarpée, à l'exception d'une plage sablonneuse d'1, 5 km de long. L'intérieur du pays est montagneux. La pluviosité annuelle moyenne s'élève à 500-600 mm. En été, les vents soufflent du sud et en hiver, du nord.

Mesures pour l'organisation de pépinières d'arbres

Il est indispensable de pratiquer le reboisement sur une très grande échelle et de préserver quelques peuplements d'arbres restants ainsi que de prendre des mesures contre le pâturage excessif afin d'arrêter l'érosion.

Fixation des dunes

L'auteur décrit des méthodes biologiques destinées à stabiliser les dunes en utilisant une combinaison de matériaux vivants et inertes. Il recommande de planter une liane, *Ipomoea macalusoï*, et diverses espèces d'arbres entre des entrelacs de branchis d'acacia.

Projet d'aménagement de la région de Mogadiscio

L'afforestation des régions sur-exploitées et l'éducation de la population sont deux facteurs essentiels. Le plan d'aménagement devrait constituer un point de départ solide pour la création de nouvelles forêts. Voici les grandes lignes de ce projet. Une zone verte de 400-600 m de large entourant les faubourgs de la ville et d'où partent d'étroites bandes de terres boisées se prolongeant jusqu'au cœur-même de la ville. Quatre bandes de 200 m de large partent de cette zone verte et s'enfoncent dans la savane. On a établi un projet de plantation qui prévoit l'emploi d'environ 4 millions de plants. Cela constituera le point de départ de la première pépinière à grande échelle à Afgoï, une petite ville des environs.

Section B

Design Approach for the Integration of Urban Requirements in Rural Land Use Patterns

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In this paper it is proposed to review some of the conditions which would seem to be necessary so that the processes of planning and design may operate to produce healthy, enriched, agrarian landscapes.

In the majority of countries, agrarian territories provide valuable resources which the world will need in the foreseeable future. These territories will continue to yield an abundance of raw materials and of spiritual wealth (and a dwindling supply of independent people) for as long as their natural systems are allowed to function properly.

At the present time in both the East and West, however, new patterns of urban land use are pressing into the countryside in a manner that seems to jeopardize the functioning of the agrarian ecosystems. Their value as resources in the future is threatened by decisions for change, which are being made now by people who are not members of the agrarian communities and whose immediate objectives are different.

The traditional agrarian landscapes have one outstanding quality in particular: that is, or was, the quality of unity: a single authority—the agrarian—was responsible for husbandry in the broadest sense; the responsibility of the agrarian peoples for the landscape was founded on a common purpose—the conservation of the resources which provided them with a living. But the countrymen's authority over the countryside is being taken over by a diversity of authorities, with fragmented and specialized interests, and the unity that the traditional landscapes had is not manifest in the collective works of the new authorities.

Where urban pressures on the countryside are intense, many governments have recognized the need for some form of monitoring, to weed out inappropriate uses and to co-ordinate changes, so that conflicts in the agrarian landscape can be avoided and new developments can work together to enhance rather than to diminish the value of these landscapes. Various forms of monitoring are being tried, but it is becoming clear that the social movements of the twentieth century are something new in history, and that we are only at the beginning of an understanding of their impact and of how to provide for them. As we make new landscape patterns, we have at the same time to distinguish the disciplines by which the whole may be made harmonious.

It is useful to examine beautiful, traditional agrarian landscapes and to identify some factors which the communities have in common in their relationships to the landscape, because these attitudes may be relevant in the planning and design of a contemporary countryside.

It has been pointed out that the agrarian communities were single-minded in their purpose of conservation and that these people, individually and collec-

tively, were fully responsible for the health of their environment. Consequently, each member exercised restraint in estimating present and future needs, and in balancing these needs against the capacity of their resources. Socially, country people who struggled continually with the power of natural forces, developed a cohesive community structure, effectively organized for action. At the same time, each member of the community developed as an independent individual, respected by the other members according to his worth. And lastly, these people from long and close observation of their environment accumulated stores of local, ecological knowledge and wisdom, which were shared by all; with this knowledge, they developed and refined suitable practices for working their lands and for building in the landscape.

It seems that the unity of the traditional agrarian landscapes was the product of human communities and natural communities functioning harmoniously in one system; and that countrymen were able to develop such an ecosystem *by working from within it*. To summarize: the best rural landscapes were developed by men working together, single-mindedly and responsibly for conservative objectives, with full local, ecological knowledge (even though empirical), using intelligent landscape practices based on that knowledge.

Now that the penetration of the agrarian areas by urban people, urban authorities and urban practices has established a new geographic scale of activity, the region, the nation, the continent, are the areas of common interest, for which the people who live in them must be responsible. Within the present regional and national scale, it seems that the effectiveness with which the public's responsibility for the environment is carried out can be measured by the extent to which the critical qualities, such as unity of purpose and of authority, emerge.

It has always been one of the difficulties impeding the work of IUCN that few governments have demonstrated their understanding that the conservation of man and of his vital resources must now be the first national objective in each country; and this despite the warnings and recommendations of the UN, UNESCO and ourselves. Few governments are structured to pursue this goal. There is still a tendency for conservation to be a departmentalized subject in the corridors of government, and, also, in the curricula of universities. However, to implement departmental policies, forms of planning (which vary from country to country) are developing, to husband and give order to the systems of environmental energies. Systems of power and of transport; the investment of public capital; the development of natural resources; the deployment of populations; the uses of land; are planned and as far as possible co-ordinated. But it is clear to professional planners in the field that planning can only be successful if it can operate from the brain centres of authority in region and nation.

Finally, in the management of the nation's 'estate', planning programs have to be implemented by the design and construction of structures in the landscape, as additions to the structure of the landscape itself. As the design process is one of the fundamental elements in the development of landscape, it is worth examining this process in some detail.

To design is to devise the most satisfactory scheme for structure which will enable a set purpose to be achieved. The development of the design may be substantially under the direction of an individual designer, or of a team whose collective design skills and experience are those needed for the project. The participation of the client with the team is essential, as he supplies the controlling authority. (The client may be one person, or a representative group.

In fact, in every case, behind the client stand the public, who will experience the design and who can contribute by their understanding of design matters, and by making their wishes known). In proceeding with the design, it is often necessary to consult professional and scientific advisers, who join the team in its discussions when they are needed.

The design method consists of reviewing all possible schemes, and all combinations of possibilities, and of choosing the most satisfactory solution. To begin with, the information is studied, and then each member of the team presents to the others the possibilities that occur to him.

The alternatives which are available on almost every element of the design provide the team with its opportunities. There are choices, for example, because there is more than one way of putting together a structure that will meet the purpose; because there is more than one material which will serve; because plants have a tolerance range, and people are flexible in their responses; because a solution with qualities beyond those of basic utility is usually required, so that there is a margin in the budget, and so on. However, no choice is completely satisfactory; there are advantages and disadvantages to be weighed; each choice involves some compromise. The trigger effects of each alternative have to be foreseen and, as far as possible, also considered.

At this stage of seeking a scheme, the possibilities are not dealt with progressively, as in an identification key, but are all held in the mind together, as in a pool. As the possibilities accumulate, some combination may suggest a completely new approach to one of the team, and this gives the other members, both consultants and designers, reason to reconsider their own range of possibilities from a new angle, which in turn may open up still further possibilities.

As the team becomes more familiar with the problem, and learns to work together, many schemes are sketched, tested against the conditions to be met, and discarded. Some schemes may seem to meet all the conditions, but none is completely satisfactory to all the members. Finally, when the problem has been studied for long enough, one scheme emerges, which meets all the requirements, which allows all the contributory elements to knit smoothly together, and which pleases everyone. When a team is seriously trying to find the right answer to a problem, it usually happens that all are convinced when they have found it. This is the moment of excitement in design, when a solution which looks convincing, proves to be the right solution.

The quality of design in the landscape depends on several factors; first, on the soundness of the stated purpose or program—that is, on good planning. Second, the full range of relevant information, systematically recorded and conveniently available, is essential for both planning and design processes. For example, geographical and ecological information, backed by existing land use records, is needed at regional centres, so that a nation's policies on the conservation of its soils, water and air systems can be translated into specific programs. Information is required on the agrarian ecosystems as sub-climacteric states; how much more activity can they absorb, place by place, and of what kinds, so that there may be safe progress to a richer state. In the social sciences, questions have to be answered such as, 'How many people can move into this place, or that place, without feeling overcrowded; and in what patterns?' Members of IUCN are only too well aware of the need for more research to be done speedily and for the means to achieve this.

On the other hand, much useful information could be quickly available if arrangements for it to be received and recorded were made. Co-ordination

centres would be required, locally, regionally, and also nationally, where information could be filed and found, and through which specialists could be contacted. Apart from scientific records, direct local knowledge could be important—knowledge which might be the result, perhaps, of years of observation, or the experience of one dramatic event or disaster. The responses of people to design in the landscape are also valuable for future guidance.

Other factors which affect the design are, of course, the skill, experience, integrity and imagination of the designers; and also the vision, breadth of experience and imaginative enterprise of the clients. It is essential that clients should be able to choose competent designers and then be willing to respect and support their judgment.

The choices which have to be made throughout the design process range through subjects which form a band from physical matters to psychological responses; and because the physical matters can be stated mathematically, they carry an authority which tends, time after time, to overwhelm judgments, which may be based on years of careful observation of the responses of people to things and places, but which cannot be supported, yet, as scientific fact.

Mature design thought balances facts against judgments, giving appropriate weight to all elements. A mature society respects and supports the judgments of its experienced designers. This matter of judgment is perhaps the key to the quality of good design, which we are going to have to learn to achieve.

It follows that the public, who experience and commission design, need to be well informed about it. It would seem that the programs recommended by the 1967 Conference, sponsored by UNESCO for the International Biophysical Year, whereby all sectors of the public would be given some knowledge of ecology, should be supplemented by general briefing on the qualities of design.

In conclusion, there is no mysticism about design. The criteria in examining a design are questions such as: Is it honest? Is it adequate for its purpose? Are the means which have been used practical? Is it pleasing as an experience, and does it harmonize with its surroundings? Does it add to the visual satisfaction that the landscape affords?

SUMMARY

In most countries agrarian territories provide valuable resources. However, patterns of urban land use are beginning to jeopardize the functioning of the agrarian ecosystems and the unity of agricultural landscapes, due to decisions taken by people whose objectives are different to those of the farmer. The latter has been the only authority up to now responsible for husbandry in the broadest sense.

Many governments have recognized the need for some form of monitoring, but social movements in the twentieth century are something new in history and we are only just beginning to understand their impact.

The author examines the structure of agrarian landscapes, their unity, balance and relationships with communities, with reference to contemporary planning and design. It seems that the unity of the traditional agrarian landscapes was the product of human communities and natural communities functioning harmoniously in one system.

Penetration of agrarian areas by urban development has established a new geographic scale of activity: regions, nations and continents have become areas of common interest. But few governments have the appropriate structure or for that matter have fully realized that conservation of vital resources must be a primary national objective and that planning from the brain centre of authority is the only key to success. Planning programmes must be complementary to the design of landscape structures and the author goes on to examine the 'design process' in some detail. The process involves close team-work and the studied consideration of combinations of possibilities until one scheme will emerge which proves to suit all requirements.

Quality of landscape design depends on good planning; consideration of all the available information, for which co-ordination centres at all levels are required where information could be filed and rapidly found; it depends also upon the calibre of the designers as well as the farsightedness of the clients. Mature design thought balances facts against judgment, which is respected by a mature society. It follows that the public should be given some knowledge of ecology and a general briefing on design quality.

RÉSUMÉ

Dans la majorité des pays, les territoires agraires constituent des ressources de grande valeur. Cependant, les modes d'urbanisation des terres commencent à menacer fortement le fonctionnement des écosystèmes agraires et l'unité des paysages agricoles, du fait que les décisions sont prises par des gens dont les objectifs diffèrent de ceux des agriculteurs. Jusqu'ici, ces derniers étaient seuls responsables de l'aménagement du paysage rural.

De nombreux gouvernements ont reconnu la nécessité d'exercer un contrôle sous une forme quelconque dans ce domaine; mais les bouleversements sociaux du XX^e siècle, sans précédents dans notre histoire, sont un phénomène encore trop nouveau pour que nous en saisissons la pleine portée.

L'auteur analyse la structure des paysages agraires, leur harmonie, leur équilibre et leurs rapports avec les communautés qui y vivent, vues sous l'angle de l'aménagement. Il semble que l'unité des paysages agraires traditionnels résulte d'une association harmonieuse entre les communautés humaines et naturelles.

La progression de l'urbanisation dans les zones agraires a donné aux activités une nouvelle dimension géographique: régions, nations et continents deviennent des zones d'intérêt universel. Mais rares sont les gouvernements qui disposent des structures nécessaires ou même qui sont pleinement conscients du fait qu'une des tâches primordiales d'une nation consiste à protéger et à conserver ses ressources vitales et que la seule façon d'y parvenir est de penser l'aménagement au niveau des autorités gouvernementales. Les programmes d'aménagement des espaces ruraux doivent venir compléter les projets de structuration du territoire. L'auteur aborde ensuite le processus 'd'élaboration du projet directeur'. Ce processus exige un travail d'équipe étroitement coordonné et l'analyse de tous les groupes de combinaisons possibles, jusqu'à l'élaboration d'un schéma qui satisfasse à toutes les exigences.

La qualité du projet d'aménagement d'un paysage dépend des moyens mis en oeuvre pour son élaboration: prise en considération de toute information disponible; il faudrait créer à cet effet des centres de coordinations à tous les niveaux où l'information pourrait être fichée et retrouvée rapidement;

expérience professionnelle et capacités des planificateurs; prévoyance et perspicacité du client. Une conception réfléchie du schéma d'aménagement établit l'équilibre entre les faits et les jugements qu'une société adulte respectera s'ils sont portés par des planificateurs expérimentés. On peut en conclure que le public doit recevoir des notions d'écologie et apprendre à juger de la qualité d'un projet.

Section B

The Need for Landscape Conservation along the Greek Coastline

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1. THE DAMAGING EFFECTS OF COASTAL ROADS

The coasts of Greece, extending over 15,000 kilometres with a great variety of form and character, are one of the country's main natural resources. They are generally highly attractive, hospitable, bathed in sunlight and open to a wonderful sea, which remains bright and friendly for a great part of the year. Many of these coasts are isolated semi-natural landscapes offering ample experience of an unspoilt environment. These are landscapes of particular cultural and economic importance.

Tourism and recreation in Greece, which have developed spectacularly over the past twenty odd years, are closely related to the enjoyment of coastal areas and the sea. Perhaps no other tourist attraction, such as archaeological sites, picturesque settlements or mountains, is as popular as the coast.

Coastal recreation is concentrated mainly in beaches and resort areas which are easily accessible by automobile or by regular boat service. These coastal areas, however, are not the only ones of recreational value, for wild and relatively inaccessible coasts are also highly important in this respect. The tourist and recreational value of any coast should not be assessed by conventional entrepreneurial standards alone. Professor J. H. Merryman regards much of the shoreland of Greece as 'barren rock and cliff with a kind of wild, craggy beauty but negligible use value'.¹ In this way, however, he overlooks the possibility of using such coasts for new kinds of recreation facilities.² Even more so, he overlooks the intangible yet great value of wild coasts both as a refuge and as an ideal setting for developed coastal areas. It is after all the extensive presence of unspoilt nature that makes the Greek coastline as a whole a valuable recreational resource.

During the last fifteen years, government agencies have been building and improving an impressive network of coastal roads in an effort to further the growth of tourism as well as road transport. In fact, parts of this network were built primarily to extend tourism to isolated coastal areas. Like any other road in the Greek countryside, coastal roads are usually designed according to the obsolete, one-sided engineering approach, not as parts of broader development plans. Landscape planning and conservation needs related to road design are very rarely met, and then only partially and intuitively. None of these roads is known to have been built according to a comprehensive development plan dealing with every aspect of the problem, including landscape. Furthermore, the development control exercised along roads in the countryside is usually inadequate. In most cases the existing planning legislation encourages unorganized building along both sides of the road. Besides, control over the coast is normally limited to a very narrow

zone, extending from the shoreline to the high-water mark, and therefore has no real influence over coastal development.

As a result, some parts of the coastal road network have fitted well into the landscape more or less accidentally, while others have damaged fine coasts. In addition, a chain of reactions has quite often set in; a wave of essentially uncontrolled development threatening the aesthetic, cultural and economic value of the coastal areas involved. This is becoming increasingly apparent near certain urban centres where rural coasts are steadily being transformed into suburban-looking areas for second homes and related vacation facilities.

The erosion of coastal landscapes by contemporary human intrusion, brought about primarily by the motorcar, is an international phenomenon noticeable even in countries where physical planning is highly advanced.³ Greece, however, can hardly afford to continue along this path, since her coasts are one of her main natural assets.

2. A CASE OF COASTAL LANDSCAPE EROSION

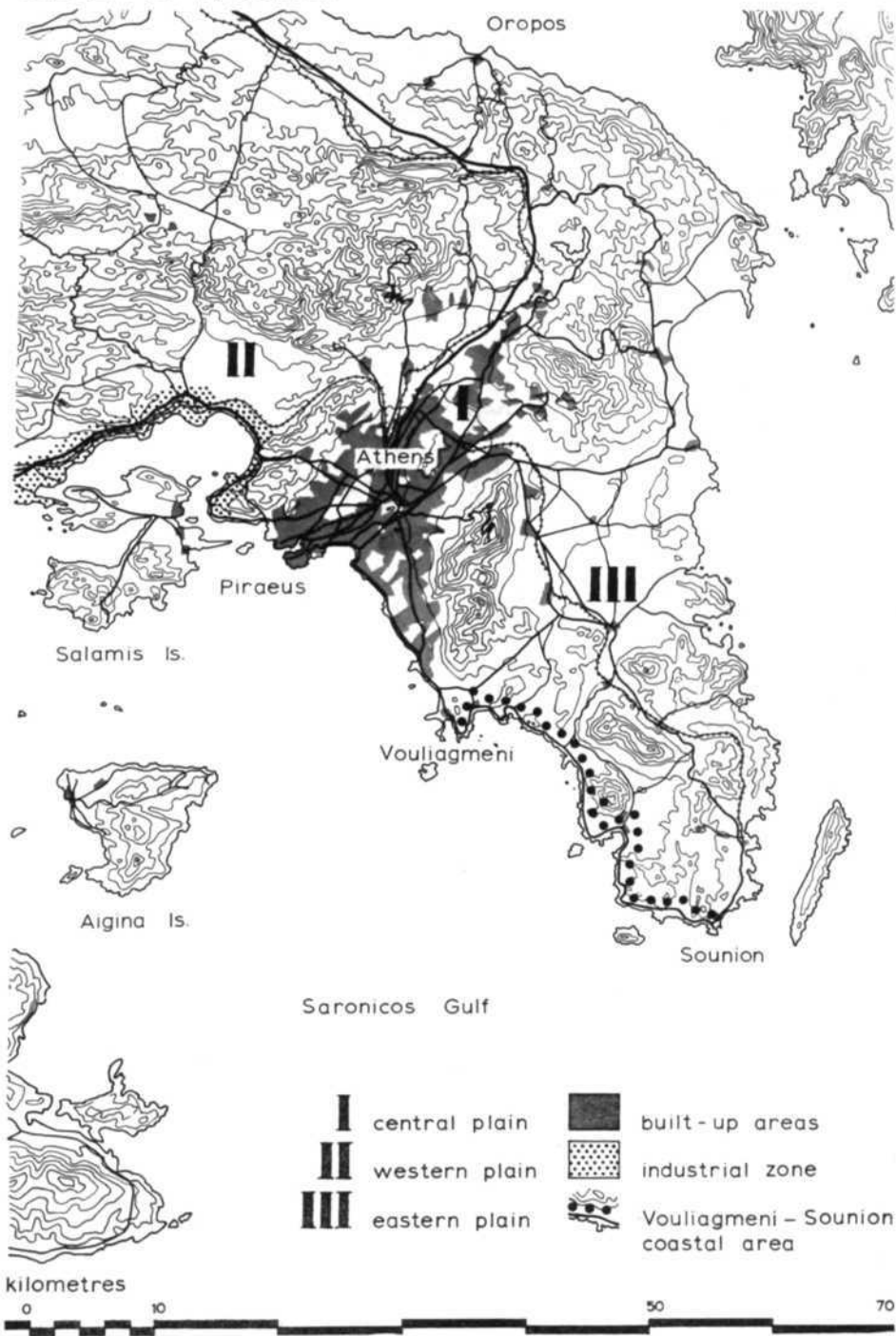
A typical example of coastal landscape erosion initiated by road construction is provided by the southwest coast of Attica, between Vouliagmeni and Sounion (see Fig. 1).

Attica, a triangular peninsula of approximately 3,000 square kilometres, forms the southernmost tip of the Greek mainland. It is separated from the rest of the country by a high mountain range and constitutes a well defined area with long meandering coasts, numerous hills, some scattered mountains and three main plains. The central plain, where Athens is situated, has undergone dramatic landscape changes in the last decades. Athens is a spectacularly growing metropolis, whose population has more than doubled in the last thirty years to well over two million inhabitants. The urban area has greatly expanded, tends to cover the entire plain and is spreading unsystematically and destructively over the mountain sides and along the coast. The other two plains, one to the west and one to the east of Athens, have been less affected by the growing city. The western plain is partly rural but its coast is taken up entirely by heavy industry. Only the eastern plain still retains its traditional rural character.

About fifteen years ago, the hilly coast surrounding the eastern plain and the adjoining mountainous end of Attica, was for the most part an isolated, rather inaccessible and scarcely inhabited rural area. In fact, it was the only unspoilt coast in the whole region. With its numerous bays, natural harbours and capes, and a rare scenic splendour, this coast offered the nearby urban population a unique opportunity for the enjoyment of an unspoilt coastal environment. This was especially true of the southwest part of this coast, from Vouliagmeni to Sounion, which excels in physiographic features and climatic conditions. This particular part of the coast, so close to the growing metropolis, was ideal for an escape to nature; a truly invaluable social and economic asset. It offered itself as a conservation area and could have been designated as such in the fifties, when the cost of land was still very low and the main landowners were the State and the Church. Instead, an immediate and intensive exploitation of the area was preferred.

A coastal road approximately 50 kilometres in length was built from Vouliagmeni to Sounion in the late fifties, with the almost exclusive purpose of opening up the coast as a new tourist attraction near Athens. The road was designed

ATTICA



and constructed as an independent engineering project rather than as part of a broader development scheme and, as a whole, does not fit organically into the landscape. In most places it comes close to the sea, leaving a very narrow strip of land next to the shoreline, which cannot be developed and maintained properly. At certain points it has caused unnecessary damage to some beautiful steep and wild coasts. Yet, the road was highly praised at first since it offered a rare scenic drive and did not look like an offending addition to the environment.

Problems were to appear soon, however, with the construction of second homes in increasing numbers, the establishment and growth of settlements and summer resorts, and the unprecedented increase in land values. When this happened, the seriousness of the situation became clear to both the public and the authorities, and conservation measures were urged.⁴

In 1962, a few years after the construction of the Vouliagmeni-Sounion road, the Ministry of Public Works prepared a development plan for this coast.⁵ The plan accepted the coming suburbanization of the area as unavoidable and sought to control building activity and save the best parts of the coast for public use. It defined three types of land use: public tourist facilities; medium-density housing; individual houses on large lots. The plan was slightly modified in 1967 to provide among other things for extensive tracts of green⁶ along the higher parts of the coastal area. This was not a landscape plan but it was all that could be done with the powers given to the planning authority involved. It did not provide for adequate control over the landscape, nor did it treat the fine coast as a resource zone.⁷ Besides, it came about too late, when the rare qualities of the coastal area were already doomed. In this way, the road which was intended to give the public the opportunity of enjoying a fine coastal landscape resulted indirectly in spoiling it.

Nevertheless, the above plan prevented greater damage to the landscape and, if it were to be eventually developed further in terms of landscape planning, it could offer positive control over the changing environment. To be more effective, however, the plan should be extended inland or, even better, be integrated into that long-expected regional development plan of Attica, since no part of the peninsula can be treated independently any longer.

C. A. Doxiadis, predicting that within the next thirty years the population of Athens will more than double and that the metropolitan area will cover all the low parts of the peninsula plus some parts of the surrounding regions, indicated long ago that a special plan for all the coasts, mountains and open spaces of Attica is urgently required.⁸ Such an overall view of the landscape problems of Attica could ensure the conservation of some of the remaining fine landscapes in the region and at the same time give a long-range landscape plan a better chance to materialize.

3. PRESENT POLICIES AND FURTHER POSSIBILITIES

The southwest coast of Attica shows clearly that one-sided planning of coastal roads and careless treatment of coastal areas may result in rapid and irrevocable deterioration of the landscape. The experience gained from this and other similar cases should prove a valuable guide for future coastal development in Greece.

There is evidence that progress is already being made in the right direction. The Ministry of Public Works, which is in charge of the national road network,

is preparing to extend the Vouliagmeni-Sounion coastal road beyond Sounion to Oropos. This section of the road will apparently stay well back from the coastline at several points to leave a sufficiently wide strip of land next to the sea for proper development. The Regional Development Services, which are in charge of provincial roads, are considering them as part of multipurpose development schemes. In fact, the RDS for Attica and the Aegean islands avoided financing coastal roads in 1969 in order to study them properly within the framework of regional development plans. Of course, the various local government authorities, which are in charge of minor roads in rural areas, generally lack the necessary resources to undertake any form of comprehensive planning. They build numerous coastal roads as independent projects and sometimes without much regard to whether their construction is warranted—as in the case of small islands where motorcars are far from being a necessity.

Another encouraging sign is that one of the policy measures proposed in the Economic Development Plan of Greece for the five-year period 1968-1972 is the 'establishment of the possibility of control over the use and landscaping of coastal areas'.⁹ This may be the first significant step taken in this country for a systematic approach to coastal landscape problems. In proceeding further with the elaboration of this measure the experience from existing controls over archaeological sites, national parks, or other special areas in the country, and their effect on landscape, should be given due consideration. If the proposed control involves merely the enforcement of some general restrictions on coastal development, it will be unable to protect the landscape in areas subject to considerable pressure for development. For effective protection in these areas proper landscape plans would be required. A procedure of this kind may prove too slow, however, as indicated by experience with urban planning in Greece; in the meantime, rapid changes in valuable coastal landscapes will continue for the most part unchecked.

There is every reason to expect that pressure for coastal development in Greece will increase rapidly, threatening more and more sectors of still unspoiled coast. Landscape plans for specific parts of the coast are of course possible with the resources and facilities available for planning in Greece. These, however, involving detailed surveys, lengthy discussions and new legislation, would probably be too time-consuming to be of any real value. Besides, they would only provide piecemeal solutions. The need for a national policy on coastal landscapes, with emphasis on conservation, is evident. The first step would be to place coastal development under control immediately, thereby stopping landscape erosion and permitting further planning at ease.

One way to do this could be the temporary prohibition of road and building construction in coastal areas not coming under approved planning schemes. This temporary prohibition should apply to a coastal zone of adequate width and should remain in effect until the planning authorities lay down their policy.¹⁰

An alternative, affecting only parts of the coastline, could be the immediate selection of the best unspoiled coasts and the establishment of a system of protected coastal areas. In these areas road and building construction should be prohibited temporarily until proper plans are made, which would permit only certain kinds of development, enforce strict control and ensure environmental protection. Some of these areas could be designated as national parks. It is a pity that Greece, with so many fine coasts, has not a single national park along the coastline.

These temporary restrictions should not be considered a negative approach to the overall development needs of the country. On the contrary, this is perhaps the only way left that will permit successful coastal development in the future and, at the same time, ensure the conservation and proper treatment of a valuable natural resource.

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1. John Henry Merryman, *Some Problems of Greek Shoreland Development*, Athens 1965, p. 16.
2. Cf. e.g. A. Kalinskis, Long-Term Tourist Programming, in *Architecture in Greece*, Athens 1967, pp. 116-117.
3. Cf. O. Kraus, Ecological Impact of Products of Tourism and Recreation on the Countryside Adjacent to Highways in *IUCN Tenth Technical Meeting—Proceedings and Papers*, Morges 1967, Part I, pp. 163-164.
4. Cf. e.g. National Landscape and Town Commission, *First Exhibition on the Greek Landscape*, Athens 1963, p. 10, (in Greek).
5. Decree Law of 10 November 1962.
6. However, this is not to take effect until funds for expropriation of land becomes available and in the meantime the construction of houses continues. Cf. Decree Law of 25 February 1967.
7. Cf. R. E. Boote, Coastline, in *IUCN Tenth Technical Meeting—Proceedings and Papers*, Morges 1967, Part I, p. 128.
8. C. A. Doxiadis, *Our Capital and its Future*, Athens 1960, p. 72, (in Greek).
9. *Economic Development Plan for Greece 1968-1972*, Athens 1968, p. 234.
10. This measure should be, of course, subject to exemptions. A similar measure has been taken in Norway applying to a narrow coastal zone; cf. Boote, *l. c.*, 139-141. Temporary prohibition of building construction has also, in one instance, been enforced for conservation in Athens, in the old city area; cf. Athens—Study of the Acropolis—Plaka Area, in *Architecture in Greece*, Athens 1967, pp. 62-65. In both cases further planning efforts were very slow. In Norway thought is being given to prolonging the provisional Act to finalize the plans. In the case of Athens, the temporary prohibition period expired before a final plan could be prepared.

SUMMARY

The coasts of Greece, with their great length, variety and beauty and their often unspoilt semi-natural character, constitute a valuable natural resource of particular cultural and recreational importance.

During the last fifteen years, an impressive network of coastal roads has been constructed to serve, often primarily, tourist and recreational needs. As a rule, however, coastal roads were not properly planned as parts of comprehensive development schemes. They have, therefore, damaged some fine landscapes and often initiated a wave of essentially uncontrolled development threatening the aesthetic, cultural and recreational value of the coastal areas involved. A typical example of coastal landscape erosion initiated by

road construction is provided by the southwest coast of Attica, where a fine coast is changing into a suburban-looking area for second homes and related vacation facilities.

The proper planning of coastal roads and the exercise of adequate control over the use and landscaping of coastal areas are now being contemplated. Although landscape plans for specific parts of the Greek coastline are feasible, they would take too long to be of any real value; besides, they would only afford piecemeal solutions to the problem, while coastal development would continue for the most part unchecked. The need for a national policy on coastal landscapes, with emphasis on conservation, is therefore evident. It is felt that, in the context of such a policy, the first step should be to place coastal development under immediate control, thereby stopping landscape erosion and allowing sufficient time for further planning.

One way to do this could be to prohibit temporarily road and building construction in coastal areas, while drawing up an overall planning policy for the coast. An alternative, affecting only part of the Greek coastline, could be to proceed to the immediate selection of the best unspoiled coasts and establish a system of protected coastal areas. In these areas road and building construction should be prohibited temporarily until proper plans are made to ensure conservation.

RÉSUMÉ

Les côtes grecques, par leur grande longueur, variété et beauté, comme par leur caractère quasi-sauvage souvent intact, constituent une ressource naturelle précieuse d'une importance particulière sous l'aspect de la culture et de la récréation.

Au cours des quinze dernières années, il s'est construit un réseau impressionnant de routes côtières, souvent essentiellement dans le but d'ouvrir au tourisme et à la récréation leur accès. En général, cependant, ces routes n'ont pas été créées d'après un plan soigneusement pré-établi comme des parties de projets de développement compréhensif. Donc elles ont détérioré certains beaux paysages, et souvent ont initié un courant de développement essentiellement incontrôlé de construction, menaçant les valeurs esthétiques, culturelles et de récréation, des régions côtières en question. Le littoral sud-ouest de l'Attique, où une belle côte se change en un terrain d'aspect sub-urbain de 'deuxièmes maisons' et de facilités de vacances y conséquentes, offre un exemple typique de l'érosion de paysage côtier initiée par la construction de routes.

On contemple maintenant la planification contrôlée de routes côtières et la pratique d'un contrôle adéquat sur l'usage et l'aménagement du paysage des régions côtières. Quoique des plans de paysage pour des parties spécifiques du littoral grec soient faisables, ils prendront trop de temps pour avoir une valeur réelle; en outre, ils n'offriront que des solutions fragmentaires au problème, tandis que le développement côtier continuerait pour la plupart incontrôlé. Le besoin d'une politique nationale pour les paysages du littoral, avec l'emphase sur la conservation, est donc évident. On considère que, dans le contexte d'une telle politique, le premier pas serait de placer le développement du littoral sous un contrôle immédiat, ainsi mettant fin à l'érosion du paysage et permettant assez de temps pour un développement ultérieur.

Une méthode de faire ceci serait, par exemple, d'interdire temporairement toute implantation de routes et de constructions dans les régions côtières et de lancer un plan d'aménagement du littoral. Comme alternatif, en ne touchant qu'une partie du littoral grec, on pourrait procéder à la sélection immédiate des plus belles côtes encore intactes en établissant un système de régions du littoral protégées. Dans ces régions on devrait prohiber temporairement toute implantation de routes et de construction jusqu'à l'établissement de plans adéquats pour en assurer la conservation.

On ne devrait pas regarder ces restrictions temporaires comme allant à l'encontre des besoins de développement général du pays. Au contraire elles offriraient peut-être la seule possibilité d'un heureux développement du littoral et à la fois d'un traitement adéquat d'une ressource naturelle de valeur.

Section B

Effects of Urbanization on Rural Land Use Patterns

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The effect of urbanization upon the rural land use patterns is extremely complex. Construction of new and expanding cities creates many regional problems and in most cases the impact on the rural scene is not considered in sufficient detail at master plan stage, resulting in many instances of planning chaos. The designers of the cities are often too preoccupied with their own planning problems within the city boundaries to give much thought and consideration to the impact of urbanization on rural life.

As world population continues to increase, a greater percentage of people will live in towns and cities and there may well continue, in the next few decades, to be an increasing drift of population from rural to urban areas.

With the continuing increase of these problems, far greater attention must be paid, in the future, to solving rural land use problems well in advance of the construction of the cities.

No master plan can be prepared unless the existing conditions of the rural areas are known. A landscape planning survey is therefore of vital importance and must be prepared before any analysis can be carried out. Results of the survey and analysis must be made available to all the consultants working on development in order that any decision that is made affecting their work gives due consideration to the problems of the landscape.

The planning of many of the services in rural areas resulting from organizations such as those concerned with communications, recreations, etc., is often the responsibility of many Ministries, public Authorities and in some cases private authorities. These authorities in many instances have not pre-planned the changes which may have to be made, and it is therefore not surprising that there is little co-ordination. The individual pieces of the jigsaw puzzle never fit together as a unified whole.

The pressures on the countryside surrounding the city may be strong enough to influence great changes. These changes must be channelled into the right direction in order to avoid serious deterioration of the rural environment.

The planning of the rural areas must be positive rather than negative if good development is to be achieved.

In order to avoid over-use, it may be necessary to define areas of outstanding natural beauty and to exercise very strong control over any developments which may be allowed in these areas. Once damage is caused, it may take decades to repair it, and it is therefore more expedient to give protection from the outset, prior to the influx of population.

Before looking into some of the details of the changes in the land use pattern, mention must be made of the strict policy which is essential to control the pollution of the environment. Legislation must be enacted to minimize the pollution of rivers in order that the effects of industrialization, etc. will not

turn them into open sewers, and firm control must be exercised over the type of fuel and equipment used for heating etc., in order to avoid polluting the air. It is often an extremely expensive item to enforce clear air legislation after the buildings have been equipped indiscriminately with any type of fuel medium.

From an ecological viewpoint, population increases may have a marked effect on forestry, agriculture and wildlife. Again, one of the great dangers is over-use. Woodland areas may cease to regenerate naturally due to trampling underfoot and the removal of plant material.

The effects on plant material due to the extraction of vast quantities of underground water for drinking and industrial purposes may be profound. Many mature trees are unable to adapt to sudden changes in their natural environment. If it is likely that fundamental changes such as these will take place, then positive steps must be taken to replant rural areas in order that the new planting may naturally adapt to changed conditions.

By far the greatest damage to visual amenity is the construction of buildings and structures in the landscape which are essential in supplying the needs of urban areas. The siting of a power station is a complex operation. Not only must it be near sources of water for cooling purposes and, if possible, local supplies of fuel, but it must be sited so that its impact on the landscape is minimized. A thorough landscape survey and analysis should determine which sites are most desirable in order that they do not destroy the scale and amenity of the rural areas.

The landscape treatment of these stations must not be limited to their own immediate sites. It is not sufficient to plant a mature tree near a cooling tower for it may only reach one third of the height of the tower. If adequate screening of the buildings and structures is to be satisfactorily carried out, then the planting must extend for many miles into the rural areas. It has been done for a number of power stations in Britain. This operation is not easy as it requires the co-operation of owners, tenants and many public and private authorities. The transmission lines emanating from such power stations become eyesores if badly sited and unrelated to the natural land form and vegetation. The routing of these lines must be carefully planned and sited, if possible, away from hilltops and areas of outstanding natural beauty. One of the most satisfactory methods of screening transmission lines is to clothe the landscape with trees and that is why it is so essential that there should be, within the master landscape plan, a detailed programme for tree planting; this will not only screen the lines from view but also reduce risks of soil erosion and accommodate wildlife.

Telegraph poles are an even greater menace to the rural landscape than transmission lines, as they are generally situated alongside roads and places of easy access. Once overhead lines are erected, it is almost impossible to get them placed underground due to the high cost involved. Should they be placed underground at the outset, a great deal of money would be saved. In selected areas, the cost of undergrounding, which is many times that of overhead lines, must be accepted by the authorities as the price to pay for visual amenity.

The supply of vast quantities of water often requires extensive storage facilities in the form of reservoirs. Every advantage should be taken to use them for recreational purposes such as fishing, sailing and any other use which will not pollute the water. No other development in the landscape can create such visual assets and recreational potential as lakes and reservoirs.

Urbanization requires vast quantities of building materials, such as sand and gravel, and in order that sufficient supplies are available, early decisions must be made as to the precise location of these extractive industries. Partial screening of these operations may be desirable and good pre-planning may enable planting to be carried out before extraction of the minerals commences. This is another reason why the master landscape plan for the region is so essential.

One of the major developments on the rural scene resulting from urbanization is the construction of the road network and it is here that the greatest co-ordination is required between all consultants in order that the vertical and horizontal alignment of the road should fit perfectly into the landscape. Ribbons of carriageway unrelated to the contours of the surrounding land create scars which are often costly to heal. Due consideration must be given to the siting of the road in order to avoid fragmentation of agricultural holdings. Bridges which are always prominent in the landscape must be designed to the highest possible standards. Landscaping of the road should not consist of a narrow ribbon of cosmetic treatment, but of an imaginative design involving the contouring of adjoining land to assist in fitting the road into the landscape, and planting in accordance with the character of the rural area through which the road passes. In order to reduce the impact of the road on the landscape, it is recommended that the landscape treatment be considered at least half a mile on either side of the carriageway. Existing woodlands and hedgerows should be carefully extended, if necessary alongside, and in some cases across the road, in order to achieve harmony between the road and the landscape. Many arguments are put forward that trees add to road hazards because their leaves make the surface slippery and the shade often causes icy conditions and variation of the road-holding qualities, but research has shown that tree planting along roads actually improves standards of road safety. There are also many other advantages, most important of which are visual amenity and the avoidance of monotony.

It is of course all very well to provide elaborate plans for the rural areas, but all this will be of no avail unless adequate financial provision is made to implement these plans, and it is at this point that the greatest difficulties lie. The cost of planning and changes in the rural areas must form part of the costs of the urbanization, as these two aspects cannot be considered in isolation. The cost, for example, of undergrounding services in rural areas must form part of the total costs of the city itself.

The landscape is constantly changing and the increased use of the rural areas will mean increased maintenance. Adequate funds must be available, not only to maintain the areas in their present condition, but to constantly improve them.

To summarize, therefore, I have tried to show, in the light of the many changes which take place in rural areas affected by urbanization, how essential it is to prepare a landscape survey and analysis at the earliest possible opportunity and also how essential it is to have a master landscape plan in order that all the conflicts of land use may largely be resolved. The plan must, of course, be flexible and must be constantly brought up-to-date. Without a plan, there can be no co-ordination and the monies spent on preparing a plan will result in the future saving of vast sums of money.

Islambad, the new capital city of Pakistan, where the writer has been acting as landscape planning consultant, is still in the early stages of development and has already influenced rural areas. The urgent need for water conserva-

tion has expedited the construction of reservoirs in upland catchment areas, but unfortunately their planning and design were not considered early enough in the construction of the city. Consequently, many water features of the city such as planned lakes and fountains, etc. so essential in ameliorating the harsh effects of the climate in summer, have had to be abandoned. During the last century, the natural vegetation had been denuded by the wandering herds of goats. Strict control on the movement of cattle, together with an afforestation programme, has achieved some regeneration of this vegetation in the rural areas. Unfortunately, the construction of a capital city has been a great strain on the economy of Pakistan, but the increased urbanization is forcing the government to plan the rural areas.

Around Lahore, the results of decades of irrigation have raised the water table to such an extent that the effects of severe evaporation have raised salts to the surface causing salination of the soil. Consequently, millions of acres have become sterile. The drilling of hundreds of wells and the pumping of ground water back into the irrigation canals in order to lower the water table, also increases irrigation which can help to leach out the salts. This operation is assisting to alleviate the problem and provide more fertile land for cultivation to meet the needs of a growing population, chiefly in the towns and cities.

The more experience one has of urban and rural planning in developing countries, the more one realizes their complete interdependence.

SUMMARY

Urbanization often results in planning chaos through lack of a detailed master plan, which should be prepared in the light of a landscape analysis and survey of the surrounding rural areas. The planning of services demands close cooperation from the various authorities concerned. Areas of natural beauty should be put under strict development control. A strong policy and suitable legislation is essential for environmental pollution control. The author describes various damages caused to the surrounding countryside through lack of foresight and proper planning.

RÉSUMÉ

L'urbanisation se traduit souvent par le développement chaotique d'un espace, par manque de plan directeur détaillé. Ce dernier devrait être établi à partir d'une analyse du paysage et d'un examen approfondi des zones rurales environnantes. La planification des équipements publics exige une étroite collaboration des diverses autorités concernées. Le développement des zones d'une grande valeur esthétique naturelle devrait être soumis à un contrôle très strict. Une politique énergique et une législation adéquate constituent deux facteurs essentiels de la lutte contre la pollution des milieux. L'auteur cite plusieurs cas où le manque de prévoyance et de planification adéquate ont entraîné la détérioration du paysage environnant.

Section B

Impact of Urbanization and Integrated Landscape Planning of Urbo-Rural Complex

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INTRODUCTION

Since the dawn of civilisation Man has been playing with the natural landscape for the purpose of satisfying his basic requirements of living, work and recreation. The impact of his activities on the landscape has varied with the basic characteristics of the area, extent and nature of his demands, and the means available to him for affecting changes. However, much more of the countryside has been devoured since the turn of the century than ever before, due to the growing pace of urbanisation and industrialization. Over and above this, the rural landscape is losing its indigenous qualities under the sway of urban influence. These damages can generally be attributed to the unplanned and haphazard growth of towns and cities. Such utter disregard of nature and lack of landscape sensitivity in planning activities are now attracting the attention of conservationists and ecologists almost everywhere.

The effective blending of urban developments with the indigenous landscape of rural areas cannot be achieved unless a sound approach for the integrated planning of the urbo-rural complex is adopted. The essentials of such an approach to planning is discussed in this paper, which also suggests some measures for the preservation of our valuable landscape resources.

LANDSCAPE CHARACTERISTICS

The basic characteristics of the landform, vegetation, water bodies and other features contribute to the spirit of every landscape. These characteristics constantly change with the interaction of natural and biotic forces. In a virgin landscape natural agencies cause the change. Equally the impact of human activities is reflected in the changing face of rural areas and urban agglomerations. The intensity of such biotic influence is much less marked in rural areas as compared with centres of human habitation.

Ruthless stripping of vegetation, levelling of natural undulations, filling or canalizing of water bodies, and the ransacking of landscape features are all very common in urban areas, in the effort to provide for higher concentrations of population and growing industries. Replacing of natural vegetation with agriculture, minor changes in the configuration of natural landform and additions of well-blended organic village structures are generally fairly typical

of rural areas. As a result, urban and rural areas have acquired basically different characteristics, which must be properly understood, appreciated and preserved in the process of planning. The main characteristics of the two different landscapes can be summarized as follows.

(a) The Urban Landscape

1. Diverse types of man-made structures, buildings, roads, utilities, and enrichments are the main elements, which contribute a variety of effects greatly divorced from the natural landscape. The natural landform, vegetation and water bodies undergo major transformation, in order to relate them to requirements of urbanization.
2. Formal and rigid patterns, with straight lines, dominate the scene, although informal, curvilinear and abstract patterns are also employed to relieve the monotony. Normally the building volumes, façades and other surfaces which characterize the quality of urban scenes and spaces, exhibit excessive variety.
3. The natural landform and other significant physical features are often disturbed by large-scale cutting and filling, as the various urban elements and patterns are juxtaposed to create new urban forms. Only major configurations of land could withstand these operations.
4. To a large extent 'domesticated' or 'humanized' versions of vegetation—ornamental avenues, clumps of trees, shrubberies, clipped hedges, creepers, flowerbeds of annual species, potted plants—, not to mention rules and regulations, are introduced to blend with the urban formality. Some wilderness with natural vegetation may also be found in the outlying areas and inaccessible spots and set aside as natural reserves or areas kept for potential future developments.
5. Where prominent natural water bodies such as rivers, lakes and sea are available, these too are subjected to urban influence. The river front, lake shore, and sea shore developments added to beautify them may be carried out in a sensitive way or, on the other hand, may be spoiled by the addition of odd structures such as 'ghats', breakwaters or groynes, and jetties. In many cases the water bodies are polluted with the discharge of sewage and industrial effluents. At the other end of the scale, aqueducts, ponds, and fountains feature in the parks, gardens, and open spaces, to enliven and refresh the environment.
6. Urban open spaces are accented with a variety of man-made features such as monuments, statues, signs, seats and other fixtures, which give them a touch of art and technology.
7. The open spaces are crowded, too, with human beings and automobiles, while the atmosphere is intensely polluted with noise, smoke, fumes and industrial wastes.

Some of the characteristics listed are the essence of the urban landscape, whereas others are due to the neglect of planning efforts and call for immediate conservation measures to check further deterioration.

(b) The Rural Landscape

1. The main elements of a natural landscape are usually much less 'humanized' and do not suffer the rigours of intense usage or major transformation.
2. Informality dominates the rustic patterns of fields and crops, and the lay-out and spacing are created by the ridges and valleys of the landform

rather than by tall structures. Masses of vegetation, randomly dotted as shelter belts, groves, orchards and village preserves, add further interest to the spatial character of the landscape. Human habitations also organically relate to the basic characteristics of the area.

3. The natural configuration of land is invariably retained, except when terraced fields are carved out of slopes and eroded land to conserve the soil. Ponds are frequently made within and around the villages, for the purpose of obtaining building materials as well as providing water, but they blend well with the basic characteristics of the landform due to their random configuration.

4. The wild vegetation of scrub, forest and grassland is cleared in rural areas to introduce diverse crops. However, the larger trees are generally retained and a variety of fruit and timber trees are planted for commercial and physical benefit. In addition, natural grasses and plants of adventurous species still thrive in the wastelands and village preserves, which help in establishing a reasonable transition of the landscape into that of neighbouring forests.

5. Where natural water bodies exist, they are generally free of human interference. Village ponds, reservoirs, and channels for irrigation are the man-made form of water body, usually added to the rural landscape for purely functional purposes.

6. No man-made enrichments of village spaces and rural landscaping are needed to enhance the natural features.

7. The wide stretches of countryside offer reasonable habitat for domesticated, semi-wild and wild animals, birds, insects and other living creatures, which adds variety of life and music to the rural scene. A sense of freedom prevails in the rural landscape, where every element mellows and moves in its natural cycle.

Unfortunately, the proper values of the characteristics listed are not being recognized by the planners, any more than by the villagers, and many of the urban influences are penetrating the rural scene, bringing a note of discord: the picture presented above is changing very fast.

PROBLEMS AND POTENTIALITIES

The diversities between the landscape characteristics of rural and urban areas indicate that none of those in either group can be divorced from one another or ignored for purposes of developing 'Total Landscape'. The situation cannot be resolved by introducing rural characteristics into urban areas or vice versa. The real solution lies in honouring and preserving the basic qualities of each group and the integrated development of both. Up till now rural areas have always been neglected in the planning of towns and cities, because the authorities responsible for the latter have no jurisdiction over the adjoining countryside. As a result of this anomaly the rural landscape is succumbing to urban and economic pressures and its basic and unique characteristics are vanishing. In the absence of effective planning controls, pseudo-urban buildings are appearing along the lines of communication, as ribbon development, and jeopardize visual contact by the traveller with the rural landscape flanking the roads. Furthermore that roadside landscape is scarred with the cuts and fills made when the roads and rail tracks were being aligned and levelled, or excavated from good agricultural land, in the

heart of the countryside, in order to supply bricks for the cities. Meanwhile, natural rocks and hills along the roads and railways are blasted for extracting building stones and aggregates, while natural depressions and ponds are frequently used as dumping grounds for domestic and industrial waste. Under the onslaught of urban influences, formal patterns are being imposed on the organic growth of villages and the indigenous soil, while thatched huts are being replaced by new, ugly and characterless structures, which are out of keeping with the rural scene. Yet there are enormous potentialities for the sensitive development of rural landscape, so that its essential characteristics can be preserved effectively as a recreational resource for the city folk.

In the urban landscape, too, striking natural features such as mounds, ridges, watercourses, marshes, forests and wild areas, which should be preserved as important resources to satisfy immediate recreational demands, are being destroyed and neglected. When one of these features is converted into a building site, it is lost for ever and often, when neglected, turns into a slum or dumping ground for all sorts of wastes. The Ridge, an offshoot of the Arvali range, traversing the heart of Delhi, and the river Jamuna, can be cited as two such natural features which have partly suffered in the past, through unplanned and haphazard urban growth, but are now being preserved in their natural form although parts of them are in the process of development. There are many problems to be faced at each stage in such development, despite or in view of the enormous potentialities of integrating the urban landscape with that of surrounding areas. Thus, for the planned development and growth of Delhi, 207 villages have been included within the Rural Planning Areas: of these, it is believed that 46 can be expected to lose their rural character by 1981. If this trend is not checked and the potentialities of the rural areas are not identified and developed in such a way as to arrest urban sprawl, the problems will multiply. This calls for intensive study and a sound approach aimed at the conservation of natural characteristics and integrated planning.

Integrated Landscape Planning

The principles of Integrated Landscape Planning emerge from the concept that, basically, urban centres form an integrated part of the vast expanse of rural landscape. Therefore, it is essential to relate both of these intimately, after thorough survey and evaluation of their landscape characteristics. The difficulty is that, generally, urban planning is confined to municipal limits which do not encompass the outlying rural areas. In only a very few countries, like the Netherlands, does the Municipal jurisdiction of a city extend over a large rural area on its periphery, so that none of the small communities or countryside involved is left to be developed by some other authority. This greatly helps integrated development, because no uncoordinated growth is allowed on the urban fringes, and the city is held responsible for the preservation and development of the rural areas, with due regard to urban demands.

Once the main geographical and geological features and all the relevant information about vegetation and water bodies, etc. have been analysed, guidelines for the preservation of important characteristics can be drawn up and the urban growth patterned accordingly. A network of parks, open spaces and water bodies, on various scales, can be integrated with other activities and developments. The necessary regulations for the controlled growth of rural areas, with due regard to their special architectural and landscape characteristics, can be introduced, in order to maintain the desired visual qualities. Unregulated expansion of towns and cities, leading to linear urbanization, can be checked by the combination of large green belts with the agricultural or

rural landscape encircling neighbouring communities, so as to afford visual relief, while ensuring the identity of each of the combined elements. An interwoven pattern of urban and rural landscapes of this kind can help in linking the rich more or less natural sectors together to form a well-conserved basic area dotted with urban areas. This is rather more difficult to achieve if, on one pretext or another, towns and cities are simply allowed to continue spreading over the countryside.

CONCLUSION

India is rather fortunate that many of its natural landscape resources are still intact. But this is unlikely to continue for long if no measures are taken to preserve and develop the rural areas and to integrate them with the urban centres in a process of planned growth. We need greater awareness of landscape values and love for nature to accomplish this. Suitable legislation to control the integration of rural areas with urban centres and prevent haphazard growth is also necessary, but the proper education of all concerned in the appreciation of the values involved is the essential prerequisite.

SUMMARY

Due to intensive urbanization and growth of industrialization, landscape resources are suffering heavily both in the urban and rural areas. This can be attributed to the lack of landscape awareness and of integration of urban planning with the rural areas. The basic characteristics of urbanized and rural landscapes are presented in this paper and an integrated approach to the landscape planning of the urbo-rural complex is suggested so that vanishing resources can be preserved and developed sensitively.

RÉSUMÉ

Par cause de l'urbanisation intensive et de la croissance de l'industrialisation, les ressources du paysage souffrent sévèrement, et dans les terrains urbains et dans les pays ruraux. On peut attribuer cela à un manque de conscience du paysage et de l'intégration avec les terrains ruraux de l'urbanisme. Dans ce compte-rendu on a présenté les caractères de base de paysages urbanisés et ruraux, avec la suggestion d'un abord intégré à la planification de paysage d'un complexe urbo-rural, afin que les ressources disparaissantes puissent se préserver et se développer d'une manière sensitive.

SECTION B: INTEGRATION OF URBAN REQUIREMENTS INTO RURAL LAND USE PATTERNS

POINTS MADE IN DISCUSSION

One might link education and landscape planning by using carefully selected areas as models to demonstrate that such planning can produce great social and economic returns to the community. The best education is by example and the best advertisement is success (M. E.D. Poore, U.K.).

Recently a successful approach has been made to the authorities in India to include landscape planning in the scope of urban planning, and current work in our cities is now proceeding on this basis (Bhagwat P. Bhalchandra, India).

There is always a need for an interdisciplinary council on planning (Adele Wilson, U.S.A.).

Are there any landscape plans to cope with the problem of the ever-growing metropolitan areas and cities in Australia? (M. Zekai Bayer, Turkey).

There are plans for all the big and many of the smaller cities in Australia, which give planners the power to control their growth. In Melbourne, for example, one planning objective is to retain rural areas within the expanding city (D.W.Goode, Australia).

Is there any city in the world which is actually prohibiting the further inflow of population? (Z. Futehally, India).

We tried to set up a plan of that kind to limit the growth of Hilversum in Holland. Unfortunately it did not last very long and now the town is growing again (R. J. Benthem, Netherlands, Chairman).

Urban expansion, especially in India, is nearly always at the expense of wilderness or natural areas, involving the cutting down of all trees, blasting of rocks, etc. There is a great need for keeping wilderness areas intact near or even in cities (as in the case of the Delhi Ridge). Where rock formations are available, they can often be usefully integrated in a development plan (P. Kumar, India).

It is worth drawing attention to the report prepared by Professor Steers of Cambridge University, U.K., as an expert for the Council of Europe, on coast use in Europe. The report deals with various problems like urbanization, industry, recreation, tourism, fisheries and pollution (M. F. Mörzer Bruyns, Netherlands).

In Greece, considerable research work has been done in coastal areas. However, the problem is financial. The price per acre on the coast in one area was originally \$ 100, but after the construction of a road it rocketed to \$32, 000. No planning has been possible after this increase (G.Anagnostopoulos, Greece).

This is also happening to the U.S. coasts. The public does not realize that by threatening the coasts we are also threatening marine life (C. H. Southwick, U.S.A.).

The Countryside Commission in the U.K. is shortly publishing a detailed study of the coast of England and Wales covering the situation and potential for development, recreation, amenity, nature conservation and other purposes (M.E.D. Poore, U.K.).

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