COFO – 74/REP.

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Report of the second session of the

# COMMITTEE ON FORESTRY

Rome, 22 – 29 May 1974

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome 1974

## PREVIOUS SESSIONS

First session – Rome, 8-13 May 1972

COFO-74/REP.

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# COMMITTEE ON FORESTRY

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## MATTERS REQUIRING ATTENTION BY THE COUNCIL

### A. MATTERS REQUIRING DECISION

Eighth World Forestry Congress

The Committee adopted without amendment the "Principles governing World Forestry Congresses" as set out below. It asked the Council to endorse this decision.

PRINCIPLES GOVERNING WORLD FORESTRY CONGRESSES

1. The purpose of the Congress is to serve as a forum for the exchange of views and experience and for discussion of matters concerning all aspects of forestry which may lead to the formulation of broad recommendations applicable on a regional or worldwide basis.

2. The functions of the Congress are advisory, not executive. The implementation of its recommendations is a matter solely for those to whom these are addressed - Governments, international organizations, scientific bodies, forest owners, etc. - in the light of their own particular circumstances.

3. The Congress consists of registered participants who may be scientists, technicians or administrators interested in forestry. Irrespective of whether a participant belongs to a government organization, a scientific or professional body, a forestry society, or is attending in a personal capacity, each participant expresses his own personal opinion; neither written papers nor oral interventions made at meetings are taken as committing any government or organization to which the participant may belong or as necessarily representing their views.

4. The Congress conducts its discussions along broad lines designed:

   (a) to bring together knowledge and experience with a view to giving guidance on matters pertaining to the formulation and implementation of forest policy;

   (b) to express views which may guide research organizations in identifying useful lines for their future investigations; the Congress itself, however, should not conduct research nor engage in detailed scientific or technical discussions;

   (c) to express views which may assist international organizations in planning their future work, subject to approval by the governing bodies of these organizations;

   (d) to promote the elaboration and world-wide acceptance of technical standards such as an international forestry terminology, uniform classification of forestry literature, and the unification of research methods, as well as exchange of students and scholars. (para. 102)

While agreeing that the host country for a Congress should be allowed flexibility in organizing discussions and working out the procedures for the conduct of the sessions, the Committee considered that certain fixed provisions should be embodied in the Rules of Procedure for every Congress. It approved the provisions as set out below and asked the Council to endorse this decision.

PROVISIONS TO BE INCLUDED IN THE RULES OF PROCEDURE OF WORLD FORESTRY CONGRESSES

1. The Congress should be open to Participants and Associate Participants from countries that are Members of FAO, the United Nations, any of its Specialized Agencies, or the International Atomic Energy Agency.

   (a) Participants should be:

   - Accredited representatives of governments;
   - Representatives of international organizations;
   - Representatives of scientific, technical or educational forestry organizations;
   - Representatives of industry and of public or private bodies financing forestry activities;
   - Representatives of professional forestry associations;
   - Individuals connected with forestry, forest conservation and the utilization of forest products.

   (b) Associate Participants should be:

   - Relations accompanying Participants;
   - Students.

   (c) Arrangements should be made concerning attendance by the press and by the public.

2. A Nominations Committee should be established. This Committee should meet prior to the opening session of the Congress, and its main responsibility should be to prepare a list of Officers of the Congress for consideration and approval at the opening session of the Congress. The Nominations Committee should include: the Chairman of the Organizing Committee or his representative, who should act as Chairman of the Committee; a representative of the Food and Agriculture Organization of the United Nations; and the Head of each Government delegation or a representative appointed by him.

3. A General Committee should be established to facilitate the orderly progress of the work of the Congress and in particular to settle any differences of opinion that may arise from the interpretation of the Rules of the Congress and to decide on any proposals or questions submitted to it by the President or any other Officer of the Congress or by the representative of the Food and Agriculture Organization of the United Nations. The membership of the General Committee should include the President, Co-Presidents and Vice-Presidents of the Congress and a representative of the Food and Agriculture Organization of the United Nations.

4. When any issue is put to the vote, each duly registered Participant of the Congress present should have the right to cast one vote. Decision should be by simple majority.

(para. 103)

## B. MATTERS FOR INFORMATION

### Approval of Rules of Procedure

The Committee approved the Rules of Procedure as set out in Appendix F to this report. (para. 13)

### The role and participation of forestry in the world endeavour for the conservation of the environment

Recognizing that each project or activity listed in the Secretariat Note is of importance, the Committee encountered difficulty in establishing an order of priority, especially as these differed at the country and regional levels, and recommended the allocation of greater resources to strengthen the environment programme. The importance of surveys and inventories was stressed as a basic step in environmental activities. Many countries gave special emphasis to the value of the Forest Gene Resources Programme and the pressing need for the development of techniques for quantifying in economic terms the indirect benefits of forestry. The evaluation of these benefits assumes greater importance in the continuing debate on environmental issues. (para.22)

### Implications for the world's forest economy of rising costs and prices of wood

The Committee recommended that high priority be given to the establishment by FAO of an international programme of forest products price information and analysis. Some delegations expressed the need for more detailed market information and proposed that FAO supply this service. In this connection, it was noted that the proposed Tropical Timber Bureau, when established, could provide such market intelligence. (para.38)

### Recent developments in forest fertilization: their technical and economic implications

The Committee noted that a Commission on Fertilizers was established by the Sixty-First Session of the FAO Council. In view of the present situation of increased fertilizer prices coupled with decreased supply, an important function of the Commission may be the identification of priority uses. It was agreed that first priority would, understandably, be given to their use for food crops, particularly in developing countries, and some fertilizer originally intended for forestry use may be diverted to the higher-priority crops. The quantity of chemical fertilizers used in forestry annually was estimated to be only 200,000 metric tons, or 0.3 percent of the total world production (in 1971) of about 77,000,000 mt. Thus a change in the forestry use of fertilizer can have little effect on this problem. (para.46)

### Review of FAO's Programme of Work for the forestry sector

#### - General considerations

The Committee approved the format adopted by the Secretariat to present the Forestry Department's medium-term objectives. It was generally felt that the classification of medium-term activities in accordance with the basic functions of FAO offered the best possible picture of the scope and possibilities for programme adjustment in the medium term. (para. 53)

- Review of medium-term outlook of the Department's activities

The Committee endorsed the several problem areas expected to be of major concern to the Department but recognised the difficulty in establishing priorities among them. (para. 56). It recommended the strengthening of forestry administrations, institutions and services and forestry education in order to assist national services to face their increasing and changing responsibilities. (para. 57) It recommended the expansion of work on tropical forestry and voiced its support for the Technical Conference on Tropical Moist Forests, scheduled for 1975. (para. 59) It recommended that priority be given to the contribution of forestry to integrated rural development. (para. 61) It stressed the importance of environment and forest conservation and welcomed the Department's co-operation with the United Nations Environment Programme (UNEP) and other agencies, but urged the Department to develop a dynamic viewpoint towards the conservation of nature. (para. 62)

- Review of sub-programme proposals for 1976-77

The Committee endorsed in general the sub-programme proposals for 1976-77 set out in Document COFO-74/6. (para. 63)

The Committee drew attention once again to the need to strengthen the forestry component of the FAO Regional Offices, as recommended by the Committee at its First Session. It was noted that there had been improvement in the situation in some Regional Offices, but that it had not yet proved possible to strengthen the position of forestry for the African region, despite the recommendation in this sense issued at the last FAO Regional Conference for Africa. The Committee attached special importance to the appointment of an additional Forestry Officer for the African region, so as to cater for both the English-speaking and the French-speaking countries, and strongly recommended the appointment of the officer. (para. 76 (2))

- Multilateral and bilateral assistance in the field of forestry: review of field activities of the Forestry Department

The Committee took note of the rationalization of the field activities of the FAO Agriculture, Economic and Social, and Development Departments. It reviewed and expressed its satisfaction with the present structure of the FAO Forestry Operations Service, which is based on geographic approach by Project Operations Officers who are all forestry professionals and therefore have the technical background required for successful project servicing. The Committee unanimously agreed that the location of this Service within the FAO Forestry Department is correct, and strongly recommended that it remain there, because it is the only means to secure the direct backstopping and feedback which is vital for both regular programme and field activities in forestry. In fact, the cross-fertilization between regular programme and field activities within the FAO Forestry Department was regarded as the key to the success of both of them to such an extent that the Committee emphatically stressed that maintenance of this relationship be regarded as indispensable. Moreover, account should be taken of the longer-term nature of most forestry activities in comparison with agriculture - a fact which also indicates the advisability of maintaining regular programme and field activities together within the Forestry Department. (para. 86)

The Committee noted that the FAO Forestry Department's field programme, in relation to its regular programme of work, is relatively much stronger than those of FAO's Agriculture, Economic and Social, and Fisheries Departments. The Committee requested that this relation be kept under constant review, and ways and means be explored in order to improve the existing imbalance. In doing so the role of forestry in the overall economic and social development of developing member countries should be kept in mind, which advocates against any reduction in forestry field activities. The Committee expressed concern over the inadequate financial compensation to the Forestry Department for its support of field activities, especially its technical backstopping, and expressed the hope that not only the

overall rate of overheads to executing agencies be revised, but also the internal distribution of agency overheads within FAO be reviewed with a view to increasing the allocation to technical departments. (para. 87)

The Committee expressed its great satisfaction with the documentation submitted as background material for its deliberations and which had proved extremely useful. At the same time, the Committee requested that - in the light of its conviction that regular programme and field activities in forestry are indissolubly wedded - consideration be given to presentation of field projects in a way which would further facilitate relating of field activities to individual sub-programmes of the Regular Programme of the Forestry Department. (para. 91)

The role of the Regional Forestry Commissions

The Committee recognized the increasing importance of the functions served by the Regional Forestry Commissions. They are: (a) to provide the Forestry Department and the respective Regional Office with advice and guidance on the preparation of its programme of work; (b) to identify problem areas in which external assistance may be needed and to advise the Forestry Department and the respective Regional Office on the regional strategy underlying its field operations programmes, under UNDP and FAO/Government Co-operative Programme financial assistance, or in collaboration with other donor countries; (c) to examine the policy implications at the regional level of the studies and surveys conducted by the Forestry Department and the Regional Office under the Regular Programme and on the basis of these studies to co-ordinate national forest policies at the regional level; and to advise on the preparation of studies and surveys of common interest as required to provide the governments in a region with information enabling them to implement effectively their national forest policies; (d) to provide a forum in which government representatives of the various segments of the forestry sector can exchange views and experiences and agree on possible schemes for regional co-operation; and (e) to discuss the applicability of recent advances in forest technology to the social and economic conditions prevailing in their respective regions, and to analyse the nature of the measures required to maximize the benefits of these advances. (para. 93)

The Committee agreed that there does not exist any other regional forum which could substitute the Regional Forestry Commissions. There is also no justification to suppress the Regional Forestry Commissions only in order to re-establish them de facto in a different form. Consequently, the Committee recommended unanimously to maintain the Regional Forestry Commissions in their present form. (para. 94)

In discussing the relationship that should exist between COFO and the Regional Forestry Commissions, the Committee unanimously recommended that they should not be established as sub-committees of COFO. (para. 95)

The Committee unanimously recommended that the Regional Forestry Commissions be maintained as independent bodies and not be absorbed into the FAO Regional Conferences, which should, however, as in the past, have an opportunity of reviewing the work of the Regional Forestry Commissions. (para. 98)

In accordance with the trend, supported by the FAO Conference, towards increasing the responsibilities and participation of FAO Regional Offices in the preparation and implementation of FAO's Programme of Work, the Committee expressed the hope that the Regional Offices would be able to take a more active role in the preparation, organization and conduction of the sessions of the Regional Forestry Commissions, of which the Secretary is normally a forestry officer of the respective Regional Office. (para. 100)

Eighth World Forestry Congress

It was agreed that the study tours which it was customary for the host country to organize on the occasion of a World Forestry Congress were of considerable interest and should be continued in the future. It was desirable, however, that they occupy not more than one week, and they they be designed to illustrate specific topics in the programme of the Congress, or to provide case studies on problems common to other countries in the world. (para. 110)

The delegates of Austria and Indonesia reiterated the offer of their Governments to host the Eighth World Forestry Congress. In expressing appreciation of these offers, the Secretariat drew the attention of COFO to the procedure to be followed in designating the host country, as detailed in the Secretariat Note, according to which the final decision on this matter rests with the FAO Council. (para. 111)

Activities of the FAO Consultative Group on International Agricultural Research

The Committee noted with regret that its previous recommendation (May 1972) that the membership of TAC be strengthened by the addition of one or two foresters of world repute had remained unheeded, despite the support of the Fifty-Ninth Session of the Council of FAO (November 1972). It decided to reiterate it vigorously. (para. 112)

## INTRODUCTION

1. The Second Session of the Committee on Forestry of the FAO Council was held at FAO Headquarters, Rome, Italy, from 22 to 29 May 1974.

2. The Session was attended by delegations from 49 Member Nations of the Committee, by observers from 13 other FAO Member Nations and from the Holy See, by representatives of the United Nations, the World Food Programme and the European Economic Community and by observers from 7 non-governmental organizations. A full list of the participants is given in Appendix B.

3. The Session was opened by Chairman H.K. Seip (Norway), who offered introductory welcoming remarks to the delegates. The Committee observed one minute's silence in memory of Dr. Hans Schleicher, Head of the Forestry Department, Ministry of Food, Agriculture and Forests of the Federal Republic of Germany, who died in December 1973.

4. FAO was represented by A.H. Boerma, Director-General, and the Forestry Department by B.K. Steenberg, Assistant Director-General. The opening statement by the Director-General is presented in Appendix D.

### Inaugural Lecture

5. An inaugural lecture on the theme "Remote Sensing and Proximal Sensing as Aids to the Forester of the Future" was given by Robert N. Colwell, Professor of Forestry and Conservation and Associate Director of the Space Sciences Laboratory, University of California; Director, Earth Satellite Corporation. A full text of this lecture is given in Appendix G.

### Adoption of the Agenda

6. The Agenda was adopted with the proviso that the Committee would have an opportunity to exchange views on AGRIS Forestry either during the discussion on the Forestry Department's Programme of Work and Budget 1976-77,[1/] or under the Agenda item reserved for other business. The Agenda is set out in Appendix A to this report. The List of Documents is given in Appendix C.

### Election of Officers

7. The Committee unanimously elected as

| | |
|---|---|
| Chairman: | A.M. Oseni (Nigeria) |
| First Vice-Chairman: | D.A.N. Cromer (Australia) |

8. As Vice-Chairmen representing the remaining FAO Regions (Asia and the Far East, Europe, Latin America, the Near East and North America) the following were elected:

Araujo, Reinaldo de Jesus (Brazil)
Betolaud, Y. (France)
Khalifa, Kamal Osman (Sudan)
Redmond, D.R. (Canada)
Soedjarwo, M. (Indonesia)

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1/ See para. 76 (4)

9. The Chairman, in consultation with the Vice-Chairmen, appointed the following to the Drafting Committee:

Carpio, C. (Cuba)
Clicheroux, E. (Belgium)
Daghfous, M. (Tunisia)
Dickerman, M. (U.S.A.)
Mohammady, M. (Iran)
Wyatt-Smith, J. (U.K.)

The Drafting Committee elected E. Clicheroux as its Chairman.

Approval of Rules of Procedure

10. The Committee examined the draft Rules of Procedure as distributed to member countries of the Committee and considered the suggested amendments received thereon.

11. The proposed amendments to Rule II.2 pertaining to the timing of the Committee's sessions drew lively discussions. In general these centred on the role of the Committee in tendering advice on FAO's Programme of Work and Budget as regards the forestry sector. Several delegations felt that this could best be accomplished by scheduling sessions of the Committee just prior to the June sessions of the Council in Conference years. Other delegations supported the view that sessions in the spring of Conference years would have less impact, since the Programme of Work and Budget would, by that time, be very near completion in its printed form and it would therefore be difficult to influence it. In conclusion, while concurring that only one session should be held during each biennium, the Committee agreed to omit from its Rules of Procedure any specific reference to the most suitable period for its sessions. It therefore decided to delete the last sentence of Rule II.2.

12. Most delegations laid strong emphasis on the need for earlier notice of the date and place of each session of the Committee, regardless of whether or not the provisional agenda could be attached to the letter of invitation. The Committee therefore decided to amend Rule II.4 by changing to at least three months the advance notice of sessions that should be given to member countries, while agreeing to retain the time limit of at least 2 months before the session for circulation of the provisional agenda, as given in Rule IV.1.

13. Subject to the two amendments referred to in the above paragraphs, the Committee approved the Rules of Procedure as set out in Appendix F to this report.

14. Having approved the Rules of Procedure, the Committee wished, however, to leave on record the importance that it attaches to strict adherence by the Secretariat to Rule IV.4, according to which documents not circulated with the provisional agenda should be distributed as soon as possible. This should preferably be at least one month before the meeting.

15. The Committee also recommended that the documentation distributed for its next session should include a copy of the paper on "Methods of Work of the Council".

FOREST POLICY ISSUES

The Role and Participation of Forestry in the World Endeavour for the Conservation of the Environment

16. The Committee noted with satisfaction FAO's activities in environmental forestry as stated in Secretariat Note COFO-74/3. While recognizing that concern for environmental quality was not new to foresters, the Committee felt that growing public awareness of, and mounting world-wide interest in the human environment presented a new challenge to foresters.

17. The Committee therefore felt that the general public should be informed in forestry matters related to environmental quality and conservation of forest resources so as to develop greater public awareness of the problems and possibilities of forestry. Particular attention should be given to explaining the objectives and practices of forestry to special interests groups and decision-makers through the mass media and public relations campaigns. Several delegations quoted examples of mechanisms and procedures which might be used to achieve this at the national and international levels. At the national level the role of forestry schools in this connection was specially commended.

18. The Committee endorsed the philosophy of FAO that forestry must mean the management of forest lands to provide the optimum return in human benefits, on a sustained yield basis, while at the same time ensuring the constant improvement of the resources. These benefits to society include not only tangible commodities such as timber, forage and minor forest products, but also services in the form of protection of soil, flora and fauna, and the satisfaction of the increasingly important recreational and psychological needs of man. Thus the Committee underlined the importance of forestry's role in the ecological management of natural resources.

19. There was a consensus that because of the variety of goods and services to be provided by the forest and forest land and the multidisciplinary approach in fixing the goals of management, participation of the public is needed. It was also pointed out that responsibilities for the management of forest resources should not be divided and the final decision kept in the control of one authority responsible for co-opting services of other specialists where necessary.

20. In order better to prepare foresters for this leadership role in the planning and implementation of forest land management, the Committee considered that forestry education must be broadened to include the development of a greater environmental awareness and a better understanding of the impact of human activities on forest lands. The forester must have the technical background to cooperate with an interdisciplinary team while comprehending the desires of society and be able to incorporate them into forest management plans.

21. The Committee recognized the complexity of the task of conservation of the global environment and the many inter-relationships which need to be considered. The importance of the Department's continued cooperation and collaboration with other agencies, principally the United Nations Educational, Scientific and Cultural Organization (Unesco), the United Nations Environmental Programme (UNEP) and the International Union for the Conservation of Nature (IUCN), was stressed. In this connection, the Committee pointed out the importance of distinguishing between static and dynamic conservation concepts and expressed support for the Department's adherence to the latter. The proposal that FAO should report periodically on the state of the natural resources and the environment was welcomed by the Committee.

22. Recognizing that each project or activity listed in the Secretariat Note is of importance, the Committee encountered difficulty in establishing an order of priority, especially as these differed at the country and regional levels, and recommended the allocation of greater resources to strengthen the environment programme. The importance of surveys and inventories was stressed as a basic step in environmental activities. Many countries gave special emphasis to the value of the Forest Gene Resources Programme and the pressing need for the development of techniques for quantifying in economic terms the indirect benefits of forestry. The evaluation of these benefits assumes greater importance in the continuing debate on environmental issues.

23. The Committee recognized the socio-economic and political implications of the problems of shifting cultivation, marginal lands, arid zones and "desert creep", and stressed that these problems were adversely affecting environmental quality in rural areas. Foresters should therefore make a more active contribution towards their solution within the framework of integrated rural development.

Implications for the World's Forest Economy of Rising Costs and Prices of Wood

24. In discussing the Secretariat Note, COFO-74/4, on this subject, the Committee expressed its appreciation for the opportunity to deal with this important and timely item. Attention was focussed on the series of questions raised by the paper.

25. Delegations agreed that the long-term upward trend in forest product prices was related to the declining availability of forest resources, especially on a regional basis, with relative shortages becoming increasingly apparent in most European countries, Japan and the United States. Major remaining wood surpluses existed only in less accessible coniferous forests of Canada and the USSR, and in some tropical areas of South-East Asia, West Africa and Latin America, where transportation facilities and other infrastructures were often deficient.

26. On a world basis, a growing timber scarcity is to be foreseen. However, in the medium-term, shortages of wood could be off-set by the use of a wider range of tree species and qualities and by making new areas accessible. To have sufficient timber supply in the more distant future it is urgent to improve forest management and establish extensive man-made forests now.

27. It was recognized that the rapid rises in the price of wood and wood products over the past year or two were likely to be permanent, but that there would probably be an easing-off from the highest price levels. It was also noted that price increases had been most marked in select grades and species and that in a few countries prices of lower grades had even declined.

28. Some delegations drew attention to the fact that stumpage price returns to private owners or to governments of developing countries had not always reflected the major price increases of logs, sawn timber and other wood-based products.

29. The improved prices for forest products had, in many cases, brought forth additional supplies of wood and wood-based products and had resulted in renewed investment interest in plantation and other silvicultural activities which would increase future output. In other instances, however, general cost increases had largely offset the impact of increased wood product prices.

30. There was no common accord on the likely impact of increased product prices on demand. Some delegations felt that consumption levels of forest products might be affected, with substitutes taking their place. However, most delegations felt that wood's competitors would be even more strongly affected by upward shifts in costs of energy and some other key commodities, and that energy conservation, environmental concern and depletion of non-renewable resources would favour the use of wood products.

31. The desirability of comparing energy costs of the various wood products and their various competing products was noted.

32. A number of delegations drew attention to a strengthened position for fuelwood for both domestic and industrial purposes, resulting from price increases of other fuels. In some oil-deficient developing countries use was being made of the indigenous forest or of wood residues resulting from industrial processing. Attention was drawn to the successful establishment of village fuelwood plantations in several countries and this practice was commended for consideration by developing countries with fuel problems.

33. The Committee strongly favoured the direction of improved economic returns to reinvestment in the forest in the country of origin. It was noted that, in the decade or so preceding the strong price rises in forest products, returns from stumpage were frequently inadequate to cover costs of forest improvements and to keep forest workers' wages competitive with national wage levels. The tight supply situation in many countries and the upward trend of forest product prices drew pointed attention to the increasing difficulty of supplying forest products, particularly under conditions of rapid expansion of demand. Hence, the Committee

took this appropriate opportunity to restate the advice to governments to encourage programmes for increasing forest yields through plantation establishment, intensified silviculture practices and fuller utilization of existing supplies.

34. Several delegates explained the methods used in their respective countries for financing forest investments for improvements by systematically directing a portion of net returns from forest and forest industry activities to a fund for this specific purpose. The possibility of creating an international fund for forest investments was suggested by one delegation.

35. The need for improved accounting methods to determine forestry costs more precisely was recognized and some countries drew attention to the desirability of using programme budgeting to ensure sounder costing procedures. The resulting improved data would greatly strengthen the presentation of forest service programmes to governments.

36. Several delegations felt that higher prices for forest products, fuels and other commodities would favour the establishment of wood industries at sources of wood supplies rather than the export of unprocessed wood. The advantages of joint ventures between countries with wood surplus and those in a deficit position were pointed out.

37. The increased degree of uncertainty in planning forest operations resulting from price shifts and other economic developments emphasized the need for frequent reporting of information on costs and prices and for a continuous updating of appraisals of the supply/demand situation and outlook in various forest product markets.

38. The Committee recommended that high priority be given to the establishment by FAO of an international programme of forest products price information and analysis. Some delegations expressed the need for more detailed market information and proposed that FAO supply this service. In this connection, it was noted that the proposed Tropical Timber Bureau (vide paragraph 75), when established, could provide such market intelligence.

39. The continuing FAO programme of market trend studies for various products, regions and countries was keenly appreciated.

40. The Committee was informed of the proposal at the United Nations Special Session on Raw Materials and Development for a "United Nations Raw Materials Economic Observatory". Interested countries might wish to express to ECOSOC their wish for inclusion of forest product commodities within this plan.

Recent Developments in Forest Fertilization: their Technical and Economic Implications

41. The Committee noted that in the situation where most developing countries are having to devote increasing proportions of their land to food production while at the same time the demand for processed forest products is rising sharply, a greater volume of wood has to be produced from a smaller area of land. Such an increase in wood production could be obtained by measures such as intensive tending and the judicious selection of species and provenance in relation to the site conditions. However, under favourable conditions forest fertilization may have a particularly important role to play in this respect, especially in countries without extensive timber reserves to meet their wood requirements.

42. The Committee stressed its concern that fertilization should not be used indiscriminately. Careful selection of stands, sites and species to be treated and of the type and amounts of fertilizer to be applied, were necessary if satisfactory results were to be obtained at an economic cost. Advantages of fertilization both early and late in the rotation were recognized. However, the fact was emphasised that early fertilization may be critical to the establishment and survival of forest crops on difficult or marginal sites, such as temperate pest bogs and heavily leached tropical soils. Furthermore, in some cases early application may be essential to enable new plantations to overcome weed competition. The Committee also recognised the importance of fertilization in the management of seed orchards, forest tree nurseries, irrigated plantations and taungya.

43. The Committee agreed that there is still a need for a great deal of both basic and applied research in the field of forest fertilization. The Committee urged FAO, in collaboration with IUFRO, to continue to perform the important role of stimulating such research, especially in the developing countries.

44. The need to improve the dissemination of research results and technical information on fertilization was emphasised. In this connection, the Committee was pleased to note the co-operation between IUFRO and FAO and the success of the joint FAO/IUFRO International Symposium on Forest Fertilization, held in Paris in December 1973 at the invitation of the French Government. It was recommended that this co-operation be continued and that FAO explore means of facilitating greater participation by developing countries and of increasing the exchange of knowledge with them.

45. The Committee endorsed the general conclusion of the FAO/IUFRO Symposium that for forest fertilization to be economically profitable the cost of application should be low and all risks involved should be small. In the light of this conclusion, it was stressed that recent supply/demand developments in fertilizers at the world level may have serious repercussions on both agricultural and forest fertilization practices and possibly their economic feasibility.

46. The Committee noted that a Commission on Fertilizers was established by the Sixty-First Session of the FAO Council. In view of the present situation of increased fertilizer prices coupled with decreased supply, an important function of the Commission may be the identification of priority uses. It was agreed that first priority would, understandably, be given to their use for food crops, particularly in developing countries, and some fertilizer originally intended for forestry use may be diverted to the higher-priority crops. The quantity of chemical fertilizers used in forestry annually was estimated to be only 200,000 metric tons, or 0.3 percent of the total world production (in 1971) of about 77,000,000 mt. Thus a change in the forestry use of fertilizer can have little effect on this problem.

47. The Committee recognised that the estimates of fertilizer use presented in the secretariat paper COFO-74/5 were necessarily based on rough approximations, as few reliable figures were available. It urged that all countries review the estimates and update and revise them as appropriate.

48. The Committee also expressed concern over the mounting criticism from environmental groups of forest fertilization as a major cause of pollution, particularly of waterways. Although it was recognised that some adverse effects have occurred on a limited scale, the quantity of fertilizer applied to forestry, as compared with other uses, is so small that such global criticism is unwarranted. Indeed, the judicious use of fertilizers in forestry has a number of beneficial effects on environmental quality which should be emphasised, and it was felt FAO should inform the world community on this matter.

49. The Committee noted that in some countries, bark and wood chips are being used as compost material in nurseries and for horticultural crops. This was considered to be a promising form of fertilization for forest crops, on which more research should be undertaken.

## REVIEW OF FAO'S PROGRAMME OF WORK FOR THE FORESTRY SECTOR

### General Considerations

50. The Committee decided to discuss agenda item 7 (Main features of the Forestry Department's Programme of Work 1974-75) and agenda item 8 (FAO's medium-term objectives and proposals for the Forestry Department's Programme of Work 1976-77) together.

51. In introducing the item, the Assistant Director-General, Dr. Steenberg, reviewed the current state of world forestry as the background setting for the conceptual analysis of FAO's medium-term objectives in the forestry sector. A full text of Dr. Steenberg's introductory statement is given in Appendix E.

52. The Department's medium-term proposals, as outlined in document COFO-74/6, were classified for presentation into three groups corresponding to the three broad functions of FAO, namely: (a) assistance to individual member countries in specific development projects; (b) promotion of international co-operation in the formulation of effective forest policies; and (c) provision of information services.

53. The Committee approved the format adopted by the Secretariat to present the Forestry Department's medium-term objectives. It was generally felt that the classification of medium-term activities in accordance with the basic functions of FAO, offered the best possible picture of the scope and possibilities for programme adjustment in the medium term.

54. The Committee appreciated that in accordance with its previous recommendations a table was provided indicating the changes in expenditure. However, due to changes in the scope and content of sub-programmes the possibility of comparing successive biennial programmes and of identifying trends was not satisfactory.

55. While recognising that in the case of those groups of activities subsidised by extra-budgetary funds FAO had less flexibility in making a prognosis of medium-term trends, some delegates stressed that FAO could actively engage in the preparation of projects for the second cycle of UNDP Country Programming. The need for FAO to assist member countries in policy guidance, country analyses, project identification, formulation and evaluation, and investment procedures, was also stressed.

Review of Medium-Term Outlook of the Department's Activities

56. The Committee endorsed the several problem areas expected to be of major concern to the Department but recognised the difficulty in establishing priorities among them.

57. The Committee recommended the strengthening of forestry administrations, institutions and services and forestry education in order to assist national services to face their increasing and changing responsibilities. The need for manpower training, creation of job opportunities and career prospects was emphasised. Some delegates stressed the need for training programmes for research workers, particularly in developing countries where research institutions were increasing.

58. The Committee expressed its appreciation to the various donor agencies who are assisting FAO in training manpower for forestry and forest industries. In this connection, while recognising the didactic benefits of training courses being organized in one language, the view was expressed that organization of such courses and seminars in two or more languages simultaneously, whenever possible, had certain advantages and this should be explored with special reference to regional activities in West Africa.

59. The Committee recommended the expansion of work on tropical forestry and voiced its support for the Technical Conference on Tropical Moist Forests, scheduled for 1975. The Committee felt that the management of temperate forests had been fairly well developed and a shift in emphasis to the improved management of the tropical forests and the realization of their vast potential was now opportune.

60. While endorsing the need for a conference to delimit and clarify the wealth of knowledge that is already available in respect of tropical forests, many delegates stressed that several other problem areas would require additional research: (a) the problems of the dry tropical forests merited special attention; (b) the chronic problem of shifting cultivation and the many facets of this socio-economic problem required further investigation. The improvement of harvesting techniques and timber conversion methods were also emphasised as promising areas for improving the potentials of tropical forests.

61. The Committee recommended that priority be given to the contribution of forestry to integrated rural development. The Committee felt that emphasis in this area would contribute to the improvement of basic living conditions in rural areas, particularly through forest

employment, which offered great potential. The Committee urged FAO to promote studies of the effect of an integrated forestry development complex on employment in and the economy of rural areas. The possibility of producing food from forest areas was also mentioned as worthy of investigation, particularly as the current concern with adequate food supplies could gain badly needed political and financial support for forestry development.

62. The Committee stressed the importance of environment and forest conservation and welcomed the Department's co-operation with the United Nations Environment Programme (UNEP) and other agencies, but urged the Department to develop a dynamic viewpoint towards the conservation of nature. Some delegates emphasised that the concept of the forest ecosystem has to be enlarged to encompass social viewpoints. However, other delegates cautioned against a major switch in emphasis to environmental considerations and urged that emphasis be placed on the correction of management practices, since bad management or lack of management was often the primary cause of environmental degradation.

Review of Sub-Programme Proposals for 1976-77

63. In reviewing the Department's proposals for the various sub-programmes, the Committee decided to examine them in three separate groups, in line with the respective responsibilities of the main working units of the Department, namely: Forest Resources, Forest Industries and Trade, and Plans Unit. Several delegates expressed the view that the titles of certain sub-programmes should be renamed and that some should, perhaps, be amalgamated.

64. The Committee endorsed in general the sub-programme proposals for 1976-77 set out in Document COFO-74/6. With a view to assisting the Department in establishing priorities within sub-programmes and a satisfactory blend of selectivity and flexibility in meeting the desires and needs of member governments, the Committee put forward the following specific considerations in respect of each sub-programme.

2.1.2.8 - Forestry Education

65. The Committee

(1) Suggested:

i) that activities contributing to employment promotion and to rural development be strengthened in harmony with FAO's total effort in these areas;

ii) that further activities be developed in public relations and information in order to improve society's understanding and acceptance of the role of forestry;

iii) that greater attention be paid to environmental education, to training for better forest management practices, to training of research workers, to continuing education in forestry, and to training for forest industries;

iv) that the publication and dissemination of forestry books be encouraged; and

v) that use be made of the expertise of the FAO Advisory Committee on Forestry Education in providing advice to individual forestry schools.

(2) Noted with appreciation the support that this sub-programme is receiving from FAO/Government Co-operative Programmes and welcomed the integration of all pertinent inputs from that source in the form of a medium-term programme for the mobilization of human resources in forestry.

2.1.3.4. - Strengthening of Forestry Institutions and Services

66. The Committee

(1) Underlined the need for strengthening forestry administration, information services and the methodologies for forest policy formulation as pre-requisites for attacking the problems with which Member Governments, and especially the developing countries, are confronted in the field of forestry, especially in the context of rural development. This showed the importance of the institutional matters dealt with under this sub-programme which, in addition, was concerned with the administrative and organizational measures required to ensure that forestry personnel, from the forest worker to the forestry officer, could make their full contribution to development.

(2) Confirmed the support it had already given to this sub-programme, which should be developed in conjunction with sub-programmes 2.1.2.8, 2.2.4.6. and 2.5.2.1.

(3) Stressed: (a) that in strengthening forestry institutions and services it was essential for FAO to work in close partnership with the countries concerned, and with full consideration of their socio-economic conditions; (b) that work on legislation related to forestry and the environment should receive increased attention; (c) that the organizations of small forest owners and of communities for forestry development can contribute to integrated rural development and should receive due attention; and (d) that institutional development should include forestry research centres and programmes.

2.2.1.2. - Forest Resource Surveys

67. The Committee

(1) Considered the Seminar on the Application of New Remote Sensing Techniques to Tropical Forestry to be of high importance.

(2) Drew attention to the continuing need for forest inventories to provide adequate information for forest management.

2.2.3.2. - Forest Tree Improvement

68. The Committee

(1) Suggested that adequate provision be made by the Department to accommodate in its programme the numerous problems and activities resulting from the expansion of the area of man-made forests, estimated to increase by at least 2 million hectares per annum.

(2) Welcomed the publication of "Forest Genetic Resources Information" and the establishment of the new International Board on Plant Genetic Resources, to which the Forestry Department is to submit proposals for a Global Programme on Forest Genetic Resources, and was concerned that the Board should accord sufficiently high priority to these proposals for forestry, compared with crop plant projects.

(3) Stressed the need for regional seed banks for both conifers and broad-leaved species.

(4) Underlined the special importance of Mexican conifers and, while recognising the current contribution made from FAO Regular Programme funds to support the seed-collecting activities of the Instituto Nacional de Investigaciones Forestales, considered that substantially larger amounts of money were needed to develop an efficient seed centre in Mexico. The preparedness of the Government of Cuba to host a tree seed centre for the Caribbean region was noted with appreciation.

(5) Welcomed the statement of the Australian delegate outlining plans for the Third FAO/IUFRO World Consultation on Forest Tree Breeding, scheduled to be held in Australia in March 1977, which will give special emphasis to breeding of tropical species.

2.2.4.5. - Forest Management

69. The Committee

(1) Stressed the importance of research on tropical forest management and silviculture and reiterated the view expressed at the First Session of the Committee that high priority should be accorded to projects in this area.

(2) Regretted that the training course on the silviculture and management of tropical high forest, foreseen in the programme of work for 1974-75, could not take place due to the lack of UNDP financial support.

(3) Expressed the view that an inter-regional training course on the impact of intensified forest exploitation on the silviculture and management of tropical forests - foreseeen in the sub-programme of work for the coming biennium - would be of major importance to tropical countries.

(4) Re-emphasised the importance of economic and social implications of the environment in forest management planning and the contribution that management plans can make to the integration of all aspects of land use in rural development.

2.2.4.6. - Forest Operations and Techniques

70. The Committee

(1) Recognised the employment potentials of forestry, and forestry's role as a vehicle for rural development.

(2) Noted that the accessibility of forest resources must be better known for immediate and future utilization of these potentials and that competence in planning, supervision and control of work operations needs to be strengthened in many developing countries.

(3) Underlined the interest of the following activities:

i) completion of the series of regional consultations on employment in forestry;

ii) the pursuit of the Study on Accessibility of Forest Resources;

iii) the promotion of the establishment of centres and institutes for forest operations and techniques, for the purpose of furthering adaptations of forest work to local conditions;

iv) the continuation of the publication of manuals and dissemination of knowledge through seminars and training centres, the latter to include coverage of staff from the private sector of forestry.

(4) Advised that emphasis be given in organizing the Technical Conference on Forest Operations and Techniques, to aspects of employment and local adaptations of technology rather than to the latest technological innovations;

(5) Expressed appreciation of the support from the FAO/Government Co-operative Programme and welcomed expressions of future contributions.

2.2.4.7. - Forest Industries

71. The Committee

(1) Felt that under the new economic conditions, especially in view of the considerably increased prices of wood and fuel, special attention should be paid by the Forestry Department to the establishment of integrated forest industries, which permit concentration and the rational use of wood residues. This aspect is of special importance for developing countries, where the growing trend towards local processing of logs will create conditions for using wood residues as raw material for pulp and paper and wood-based panels and for fuelwood, charcoal and chemical products; these industries also create an opportunity for a wider use of tropical hardwood species.

(2) Appreciated the Department's action on the World Consultation on Wood-based Panels, generously sponsored by the Government of India and supported by contributions from Canada and Finland, and suggested that in the medium-term programme of work particular attention should be paid to follow-up activities recommended by the Consultation.

(3) Noted that the largest single retarding factor in the development of the sawmilling industry is the lack of trained manpower at all levels. Due to the dispersion of the industry and the multitude of individual units, the training of personnel requires strategically-based training centres operating at a national or sub-regional level. It was felt that the national or sub-regional training centres should not only engage in full-time training courses but should also consider part-time training for "in-plant" trainees of individual mills and the development of extension services.

(4) Appreciated the series of sawmilling seminars currently conducted by FAO and sponsored by bilateral aid agencies, designed to provide guidelines for educational planning and the establishment of training institutions for the sawmilling industry.

(5) Felt that increased attention in the medium-term programme of work should be paid to charcoal, wood distillation and minor forest products; quantification of economic and social benefits which could be derived from these should be included in feasibility studies.

(6) Supported the emphasis given in the Department's programme of work to problems related to increasing the utilization of tropical forests, especially of lesser-used mixed tropical hardwoods, and emphasised the need for new imaginative programmes aimed at opening markets for these products. It was felt that special attention should also be given to the utilization of small-sized trees, including thinnings - a major potential source of raw material for pulp and wood-based panels - and to investigations aimed at industrial utilization of "chips".

(7) Noted the current difficult pulp and paper demand/supply situation is likely to last during the next several years. It was felt that this situation could offer specific possibilities for the developing countries to establish pulp and paper industries. The Committee also stressed in this connection the importance of improving the accuracy of the pulp and paper production and capacity surveys in order to improve forecasting.

(8) Stressed the importance of integrating planning activities for forest industries with those of forest management and land use. One delegation also requested the Secretariat to work out model agreements for concessions to assist in ensuring, insofar as possible, acceptable standards of operation by concessionees and so that concessions drawn up were in no way detrimental to the aspirations and policy of the resource-owning country.

(9) Agreed on the need to devote special attention to problems related to increasing the utilization of tropical forests. Particular efforts should be made to identify projects where lesser-known and mixed tropical hardwoods could be utilized and the Committee appealed to FAO to take a new and imaginative approach aimed at opening up fresh marketing opportunities for these timbers.

2.4.1.3. - Forest and Wildlife Conservation

72. The Committee

(1) Stressed that consideration for the conservation of the forest environment and wildlife should be evident in all other sub-programmes, particularly forest management, since man's activities have been the major causes of environmental deterioration.

(2) Strongly supported the proposed World Conference on Arid-Zone Forestry in drawing attention to the urgency of the problems of "desert creep" and requested FAO to promote (a) co-operative projects aimed at its control and (b) the exchange of information among affected countries.

(3) Supported the proposal to strengthen environmental education in forestry; the necessity to ensure better understanding and appreciation of the problems of the environment through education and information of other disciplines was also stressed.

(4) Requested that FAO undertake: (a) the preparation of a reference work defining terms used in management of natural resources; (b) the revision of the Manual of Forest Influences; (c) a compilation of ecological management guidelines for practical application; (d) the publication and dissemination of information on problems of the environment.

(5) Stressed the importance of forest hydrology and considered that it merited greater attention in the programmes because of its contribution to the well-being of man and the conservation of the environment.

(6) Drew attention to the contribution forestry can make to integrated rural development, particularly in ecologically fragile areas.

(7) Stressed the need for continued FAO attention to shifting cultivation in the tropics.

(8) Suggested that the title of this sub-programme be amended to Forest and Nature Conservation.

2.4.1.7. - National Parks and Wildlife Management

73. The Committee

(1) Noted the approach taken under this sub-programme in attempting to reconcile the growing awareness of the value of wildlife with the pressures tending to diminish the resource itself.

(2) Supported the three major projects proposed, but suggested that more stress might be given to matters of forest range management and its inter-relationship with the environment and the socio-economies of rural populations.

(3) Drew attention to the declining numbers of certain species of birds, particularly migratory and predatory species, and suggested that FAO examine possibilities of incorporating a study on this problem in its broader programme on wildlife, in co-operation with other international bodies concerned. Special attention should be paid to the increasing destruction of staging sites on migratory routes.

2.4.2.3. - Forest Protection

74. The Committee

(1) Stressed the importance of the harmful effects of forest fires on forest ecosystems and their environmental, recreational and social values and supported the projects contemplated in this area, particularly the FAO/IUFRO Symposium on Forest Fire Management for the Mediterranean Region.

(2) Supported work on the collection and analysis of information on the relationship between forests and air pollution, to be implemented jointly with sub-programme 2.4.1.3, IUFRO, UNEP, Unesco and WMO.

(3) Suggested that FAO, in conjunction with IUFRO, follow up research work on the use of pesticides and weedkillers so as to inform member countries on the control methods least harmful to forest species and the environment.

2.6.1.3. - Forestry Statistics and Market Studies

75. The Committee

(1) Stressed the need for broadening the resource base through the use of a wider range of tropical species, smaller-sized trees and wood residues, and for the information services and promotional work required to support pursuit of this objective. In particular, classification of tropical wood species on the basis of their properties and uses was needed.

(2) Stressed the need for more detailed information on trade in tropical woods by species.

(3) Specially emphasised the collection, analysis and dissemination of key price series as an additional item in the work proposed under this sub-programme.

(4) Underlined continuation of the work on timber trends studies which constituted a main element of the Department's activities.

(5) Suggested that FAO, in co-operation with other agencies concerned, take action for the establishment of the Tropical Timber Bureau.

2.5.2.1. - Forestry Policy, Analysis and Planning

76. The Committee

(1) Laid special emphasis on the value of the series of introductory seminars on forestry development planning, aimed at improving planning capacity at the national level in developing countries, and commended the idea of organizing follow-up workshops designed to review the progress made by participating countries in applying the planning methods to the problems encountered.

(2) Drew attention once again to the need to strengthen the forestry component of the FAO Regional Offices, as recommended by the Committee at its First Session. It was noted that there had been improvement in the situation in some Regional Offices, but that it had not yet proved possible to strengthen the position of forestry for the African region, despite the recommendation in this sense issued at the last FAO Regional Conference for Africa. The Committee attached special importance to the appointment of an additional Forestry Officer for the African region, so as to cater for both the English-speaking and the French-speaking countries, and strongly recommended the appointment of the officer.

(3) Expressed its great satisfaction at the resumption of publication of the forestry periodical "Unasylva", and suggested that in the new series space should be devoted to information on FAO activities and other international forestry affairs of interest to governments and research centres. Specific types of information suggested were lists of forthcoming meetings and summaries of the conclusions of meetings held in the FAO forestry sector.

(4) Was informed that on 30 and 31 May a meeting was being held to examine the pre-requisites and formulate recommendations for the establishment of an international information network of forestry (AGRIS Forestry) as a co-operative system of documentation and information centres dealing with forestry and forest products literature, within the framework of AGRIS - the International Information System for the Agricultural Sciences and

Technology. In this connection the Committee expressed its concern to avoid a repetition of cases in which decisions were taken without consulting the pertinent technical body of the Council. It therefore recommended that the Secretariat see that any decisions relating to forestry with political, policy and financial implications were duly reported to COFO. In addition, it was recommended that an item on AGRIS Forestry should be presented to the next session of COFO for its consideration.

Multilateral and bilateral assistance in the field of forestry: review of field activities of the Forestry Department

77. The Committee considered the field activities of the FAO Forestry Department on the basis of the Secretariat Note COFO-74/7 and an introduction given by the Director of the Department's Operations Service. The Committee's deliberations were focused on: (1) a critical review of the Department's field operations during 1972/73, including the experience gained with UNDP's new Country Programming procedure and the main problems encountered by the Department in implementing the forestry field programme; (2) an analysis of the current forestry field programme; (3) the prospects of regional, inter-regional and global UNDP projects; (4) multi-disciplinary field projects; and (5) a review of the main recommendations and decisions of the last FAO Conference and Council sessions regarding the field programme.

78. The Committee recognized that the UNDP Country Programming has been a challenge to all three parties concerned: the recipient Government, UNDP and the respective executing agency. As with every change, the Country Programming has brought with it certain difficulties. In spite of these, on the whole the transition has proved a smooth one and the programme has entered the new era with relatively few of the major dislocations which might have been expected. At the same time, a number of hopes vested in the procedure have not, or at least not yet, materialized; the Country Programme is a general framework only, subject to change, and commits neither UNDP nor the respective Government to execute the projects contained in it; UNDP assistance is in many cases only marginal and constitutes generally less than 10 percent of the total (foreign) aid received by any single country, so that its impact on development programming remains strictly limited; in some cases, individual projects have so far only loose connections with the analysis of priorities of national economic and social development programmes.

79. Sharp rises in prices and shortages of certain basic resources have brought the forestry sector to the forefront in many developing countries, either because lack of forest resources endangers implementation of their development programmes - from housing via education, to threat to human survival in marginal, unprotected areas - or because forest resources have turned out to be - or to have the potential of becoming - the basis for a major export industry and thus fundamental to overall economic and social development. At the same time, sharp rises in prices of equipment items vital for project execution, and extreme delays in certain equipment deliveries, have generated stresses for many projects. Similarly, the recent energy crisis has, on the one hand, revived keen interest in certain forest products, such as fuelwood and charcoal, and, on the other, compounded the shipping problem further and only too often led to regrettable delays in project implementation.

80. Delays in the recruitment of experts and the selection and placement of fellows, and a dearth of counterparts, have resulted in many countries - to a degree varying between countries - in a slippage in project delivery rates against planned targets. The Committee noted that in some instances either qualified candidates for forestry field posts had been reluctant to accept offers because of lack of facilities for re-integration in their home services, or else their candidature had not been speedily accepted by the authorities of the country of destination. The Committee therefore urged that both releasing and recipient authorities do everything in their power to assist in the early and smooth appointment of experts which is decisive for project implementation. The Secretariat took note that in some countries provision existed for the re-entry of officers released for fixed-term assignments.

81. Very recently UNDP have introduced new regulations designed to assist in overcoming problems related to project implementation: over-programming, approval of project ideas, establishment of project pipelines, wider use of preparatory assistance prior to full-scale project start and greater authority to UNDP Resident Representatives are expected to assist greatly in speeding up project delivery and counteracting the growing problems in project implementation mentioned previously.

82. In its report to the Committee's last session, the Department had thought it possible to disburse up to US$ 15 million in 1973 for UNDP-financed projects. In fact, actual expenditure barely exceeded US$ 10 million, mainly because of the unexpected problems mentioned above. On the other hand, the trend in forestry field activities expected by the Committee at its last session has, in fact, by and large taken place. The number of projects related to environment programmes has greatly increased, so that one-fifth of all forestry projects now in progress fall under this category: recreation, management of wildlife and national parks are the main objectives of such projects. Similarly, though in a less pronounced way, projects aiming at the establishment or strengthening of forestry institutions have also increased, which augurs well for the future receptive capacity of developing countries for aid to their forestry sector. This important favourable trend has been a direct outcome of the FAO Forestry Department's earlier efforts to assist, as a matter of high priority, in the establishment and strengthening of forestry educational facilities.

83. Forestry schools have been a main element in regional or inter-regional projects. However, most of these schools, which were conceived as regional undertakings, have functioned in reality as national schools, staffed and financed by the respective government, although admitting students from other countries of the region. This latter feature has permitted economies of scale. The Committee expressed its satisfaction with the way in which this problem had been tackled and recommended that UNDP should give favourable consideration to similar requests presently under consideration.

84. Forest management was also regarded by the Committee as another activity of high priority in the forestry sector which would lend itself well to a regional approach. Creaming and depletion of forests, coupled with the growing shortage of roundwood resources, make it imperative to improve forest management, and the experience gained in different countries should be pooled to speed up progress. The Committee therefore emphasised that priority consideration be given to ways and means of strengthening forest management activities through UNDP assistance at the regional level.

85. With regard to multi-disciplinary projects, the Committee recognized the particular difficulties inherent in their successful implementation. At the same time, it was realised that many such projects referred to marginal zones, remote areas with poor economics, or areas of emigration in which other sectors have little interest and for which the forest service in at least some countries has been given specific responsibility. Moreover, most forestry projects are at present more integrated than many other projects enjoying foreign aid and this integrational experience should be brought to fruition by taking a leading part in projects going beyond the strict sub-sector of forestry and forest industries.

86. The Committee took note of the rationalization of the field activities of the FAO Agriculture, Economic and Social, and Development Departments. It reviewed and expressed its satisfaction with the present structure of the FAO Forestry Operations Service, which is based on geographic approach by Project Operations Officers who are all forestry professionals and therefore have the technical background required for successful project servicing. The Committee unanimously agreed that the location of this Service within the FAO Forestry Department is correct, and strongly recommended that it remain there, because it is the only means to secure the direct backstopping and feedback which is vital for both regular programme and field activities in forestry. In fact, the cross-fertilization between regular programme and field activities within the FAO Forestry Department was regarded as the key to the success of both of them to such an extent that the Committee emphatically stressed that maintenance of this relationship be regarded as indispensable. Moreover, account should be taken of the longer-term nature of most forestry activities in comparison with agriculture - a fact which also indicates the advisability of maintaining regular programme and field activities together within the Forestry Department.

87. The Committee noted that the FAO Forestry Department's field programme, in relation to its regular programme of work, is relatively much stronger than those of FAO's Agriculture, Economic and Social, and Fisheries Departments. The Committee requested that this relation be kept under constant review, and ways and means be explored in order to improve the existing imbalance. In doing so the role of forestry in the overall economic and social development of developing member countries should be kept in mind, which advocates against any reduction in forestry field activities. The Committee expressed concern over the inadequate financial compensation to the Forestry Department for its support of field activities, especially its technical backstopping, and expressed the hope that not only the overall rate of overheads to executing agencies be revised, but also the internal distribution of agency overheads within FAO be reviewed with a view to increasing the allocation to technical departments.

88. The Committee noted the gratifying progress which has been made with the Associate Expert scheme in fostering forestry field operations. It invited member governments to consider possibilities of adhering to this scheme, thus increasing in the medium term the range of candidates on which bilateral and multilateral aid programmes might draw and, in particular, increasing the number of candidates with experience in tropical as well as arid and semi-arid zone forestry. At the same time, the Committee requested that efforts directed towards standardization of the conditions of employment of Associate Experts be continued.

89. The Committee expressed satisfaction that the number of FAO forestry field experts originating from developing countries had risen to one-fifth of the total, and recommended that efforts to strengthen this proportion should continue.

90. Whilst the Committee had concentrated its deliberations largely on field activities assisted by UNDP, since it was here that the major changes had taken place since the Committee's last session, it took note with gratitude of the decisive help given under the FAO/Government Co-operative Programme, as well as under the World Food Programme (WFP). An account of 10 years WFP development aid, including description of how the forestry sector had been able to benefit from WFP, had been made available to delegates. The importance of the FAO/Government Co-operative Programme is growing and amounts at present to about one-tenth of the total aid to forestry channelled through FAO.

91. The Committee expressed its great satisfaction with the documentation submitted as background material for its deliberations and which had proved extremely useful. At the same time, the Committee requested that - in the light of its convinction that regular programme and field activities in forestry are indissolubly wedded - consideration be given to presentation of field projects in a way which would further facilitate relating of field activities to individual sub-programmes of the Regular Programme of the Forestry Department.

## MATTERS ARISING FROM FAO COUNCIL AND CONFERENCE DECISIONS

### The Role of the Regional Forestry Commission

92. In accordance with the views expressed in establishing the Committee on Forestry during the 16th Session of the FAO Conference, the Committee reviewed the role and activities of the Regional Forestry Commissions.

93. The Committee recognized the increasing importance of the functions served by the Regional Forestry Commissions. They are: (a) to provide the Forestry Department and the respective Regional Office with advice and guidance on the preparation of its programme of work; (b) to identify problem areas in which external assistance may be needed and to advise the Forestry Department and the respective Regional Office on the regional strategy underlying its field operations programmes, under UNDP and FAO/Government Co-operative Programme financial assistance, or in collaboration with other donor countries; (c) to examine the policy implications at the regional level of the studies and surveys conducted by the Forestry Department and the Regional Office under the Regular Programme and on the basis of these

studies to co-ordinate national forest policies at the regional level; and to advise on the preparation of studies and surveys of common interest as required to provide the governments in a region with information enabling them to implement effectively their national forest policies; (d) to provide a forum in which government representatives of the various segments of the forestry sector can exchange views and experiences and agree on possible schemes for regional co-operation; and (e) to discuss the applicability of recent advances in forest technology to the social and economic conditions prevailing in their respective regions, and to analyse the nature of the measures required to maximize the benefits of these advances.

94. The Committee agreed that there does not exist any other regional forum which could substitute the Regional Forestry Commissions. There is also no justification to suppress the Regional Forestry Commissions only in order to re-establish them de facto in a different form. Consequently, the Committee recommended unanimously to maintain the Regional Forestry Commissions in their present form.

95. In discussing the relationship that should exist between COFO and the Regional Forestry Commissions, the Committee unanimously recommended that they should not be established as sub-committees of COFO. However, it was the consensus of the Committee that the relationship between the two should be strengthened and clarified. To this effect the Committee requested that the Secretariat of the Regional Forestry Commissions should include any points for discussion regarding the programme of work of the Department and any other points of multi-regional interest, under a standing item on the agenda for all sessions of the Commissions: "Matters to be referred to the attention of the Committee on Forestry", and that the corresponding section of the report of each session be submitted to the subsequent session of COFO, with such observations as may be considered appropriate to assist COFO in examining the matters concerned.

96. Conversely, the Secretariat of each Regional Forestry Commission should be requested to bring to the attention of the Commission any matters dealt with by COFO which might be of particular interest to the region concerned. This method would not only facilitate the co-ordination of views and activities of bodies having essentially complementary functions, but also enable the Organization to pursue its efforts towards an articulated and yet concerted formulation and implementation of its programmes in the field of forestry.

97. In order to strengthen further the relationships between the Regional Forestry Commissions and COFO, as well as to provide COFO with a comprehensive picture of progress in world forestry activities, the Committee expressed the wish that the Chairmen of the Regional Forestry Commissions attend, if possible, meetings of COFO, in order to submit regional views on agenda items.

98. The Committee unanimously recommended that the Regional Forestry Commissions be maintained as independent bodies and not be absorbed into the FAO Regional Conferences, which should, however, as in the past, have an opportunity of reviewing the work of the Regional Forestry Commissions.

99. As regards the timing of sessions, the Committee recognized that it should be left to the Regional Forestry Commissions to decide on the most appropriate periodicity and timing of their sessions in the light of regional consideration. The Committee agreed, however, that it would be desirable for the Regional Forestry Commissions to meet every two years between COFO sessions and invited the Forestry Department to adhere as closely as possible to the recommendations of the Commissions, taking into account financial considerations and the Committee's recommendations for other activities under the Programme of Work.

100. In accordance with the trend, supported by the FAO Conference, towards increasing the responsibilities and participation of FAO Regional Offices in the preparation and implementation of FAO's Programme of Work, the Committee expressed the hope that the Regional Offices would be able to take a more active role in the preparation, organization and conduction of the sessions of the Regional Forestry Commissions, of which the Secretary is normally a forestry officer of the respective Regional Office.

Eighth World Forestry Congress

101. In compliance with the Council's recommendation, and on the basis of the information and proposals contained in Secretariat Note COFO-74/9, the Committee discussed the principles, scope and procedure of the Eighth and future World Forestry Congresses, with special reference to the programme of the Eighth Congress.

- Principles

102. The Committee adopted without amendment the "Principles governing World Forestry Congresses" as set out below. It asked the Council to endorse this decision.

PRINCIPLES GOVERNING WORLD FORESTRY CONGRESSES

1. The purpose of the Congress is to serve as a forum for the exchange of views and experience and for discussion of matters concerning all aspects of forestry which may lead to the formulation of broad recommendations applicable on a regional or worldwide basis.

2. The functions of the Congress are advisory, not executive. The implementation of its recommendations is a matter solely for those to whom these are addressed - Governments, international organizations, scientific bodies, forest owners, etc. - in the light of their own particular circumstances.

3. The Congress consists of registered participants who may be scientists, technicians or administrators interested in forestry. Irrespective of whether a participant belongs to a government organization, a scientific or professional body, a forestry society, or is attending in a personal capacity, each participant expresses his own personal opinion; neither written papers nor oral interventions made at meetings are taken as committing any government or organization to which the participant may belong or as necessarily representing their views.

4. The Congress conducts its discussions along broad lines designed:

(a) to bring together knowledge and experience with a view to giving guidance on matters pertaining to the formulation and implementation of forest policy;

(b) to express views which may guide research organizations in identifying useful lines for their future investigations; the Congress itself, however, should not conduct research nor engage in detailed scientific or technical discussions;

(c) to express views which may assist international organizations in planning their future work, subject to approval by the governing bodies of these organizations;

(d) to promote the elaboration and world-wide acceptance of technical standards such as an international forestry terminology, uniform classification of forestry literature, and the unification of research methods, as well as exchange of students and scholars.

- Procedures

103. While agreeing that the host country for a Congress should be allowed flexibility in organizing discussions and working out the procedures for the conduct of the sessions, the Committee considered that certain fixed provisions should be embodied in the Rules of Procedure for every Congress. It approved the provisions as set out below and asked the Council to endorse this decision.

PROVISIONS TO BE INCLUDED IN THE RULES OF PROCEDURE OF WORLD FORESTRY CONGRESSES

1. The Congress should be open to Participants and Associate Participants from countries that are Members of FAO, the United Nations, any of its Specialized Agencies, or the International Atomic Energy Agency.

(a) Participants should be:

- Accredited representatives of governments;
- Representatives of international organizations;
- Representatives of scientific, technical or educational forestry organizations;
- Representatives of industry and of public or private bodies financing forestry activities;
- Representatives of professional forestry associations;
- Individuals connected with forestry, forest conservation and the utilization of forest products.

(b) Associate Participants should be:

- Relations accompanying Participants;
- Students.

(c) Arrangements should be made concerning attendance by the press and by the public.

2. A Nominations Committee should be established. This Committee should meet prior to the opening session of the Congress, and its main responsibility should be to prepare a list of Officers of the Congress for consideration and approval at the opening session of the Congress. The Nominations Committee should include: the Chairman of the Organizing Committee or his representative, who should act as Chairman of the Committee; a representative of the Food and Agricul ure Organization of the United Nations; and the Head of each Government delegation or a representative appointed by him.

3. A General Committee should be established to facilitate the orderly progress of the work of the Congress and in particular to settle any differences of opinion that may arise from the interpretation of the Rules of the Congress and to decide on any proposals or questions submitted to it by the President or any other Officer of the Congress or by the representative of the Food and Agriculture Organization of the United Nations. The membership of the General Committee should include the President, Co-Presidents and Vice-Presidents of the Congress and a representative of the Food and Agriculture Organization of the United Nations.

4. When any issue is put to the vote, each duly registered Participant of the Congress present should have the right to cast one vote. Decision should be by simple majority.

104. The Rules of Procedure should also contain a provision in general terms to reflect the decision of the Council to the effect that a permanent feature of the Congress should be discussions at the technical level, followed by examination, through the established formula of panel discussions, of forest policy issues, either on a world-wide or on a regional basis, according to the geographical location of the Congress.

- Scope

105. Different views were expressed regarding the most suitable type of programme for a World Forestry Congress, some delegates favouring a broad, general approach while others preferred a more selective one. It was generally agreed, however, that there should be some kind of limitation of the size and scope of the programme of a congress, while allowing the host country the necessary flexibility in this respect and bearing in mind the necessity to avoid the risk of reducing unduly the number of participants attending a Congress, as this would detract from the impact of the Congress on public opinion.

106. It was agreed that in preparing the programme for a Congress, the final decision should rest with the host country, but that it was desirable for the latter to have the benefit of international advice. As it might be difficult and expensive to establish a committee for this purpose, it was agreed that the present procedure, by which the host country can call on FAO for advice and assistance whenever necessary, was quite satisfactory. An item on the Eighth World Forestry Congress should be included in the agenda for the next sessions of COFO, so that member countries could be informed of the preparations being made and express their views in this connection. The Committee reiterated that, in accordance with the general philosophy adopted by the FAO Conference and Council, the organization of a World Forestry Congress is and should remain primarily the responsibility of the host country, FAO's role being one of service and not one of control

107. Some specific suggestions were made regarding theme and topics for the Eighth World Forestry Congress, and these are listed below for information purposes only:

Theme: Role of reforestation and rehabilitation in maintaining a sound ecosystem

Topics:
- Employment of rural populations in forestry
- Problems of forest management in mountainous regions
- Protection and social functions in well-managed forests
- Models for integrated forest management and forest industries

108. There was general agreement on the necessity of limiting the volume of documentation in some way, and approval was expressed for the idea of achieving this by leaving to the organizing committee some flexibility in accepting papers for distribution during the Congress, but adopting stricter selection criteria for the papers to be published in the Proceedings of the Congress.

109. In order to ensure that the conclusions of the next Congress would be given wide circulation throughout forestry circles without undue delay, it was suggested that (a) the first issue of Unasylva published after the Congress include the conclusions and recommendation of the Congress and (b) at the first session of COFO after the Congress these conclusions be examined and their implications at both national and international level analysed on the basis of a document to be prepared by the COFO Secretariat.

110. It was agreed that the study tours which it was customary for the host country to organize on the occasion of a World Forestry Congress were of considerable interest and should be continued in the future. It was desirable, however, that they occupy not more than one week, and that they be designed to illustrate specific topics in the programme of the Congress, or to provide case studies on problems common to other countries in the world.

111. The delegates of Austria and Indonesia reiterated the offer of their Governments to host the Eighth World Forestry Congress. In expressing appreciation of these offers, the Secretariat drew the attention of COFO to the procedure to be followed in designating the host country, as detailed in the Secretariat Note, according to which the final decision on this matter rests with the FAO Council.

## OTHER MATTERS

### Activities of the Consultative Group on International Agricultural Research

112. The Committee noted with regret that its previous recommendation (May 1972) that the membership of TAC be strengthened by the addition of one or two foresters of world repute had remained unheeded, despite the support of the Fifty-Ninth Session of the Council of FAO (November 1972). It decided to reiterate it vigorously.

113. The Committee agreed with TAC that in the present situation, where the world is experiencing shortages in the supply of food and the prospects are of even greater difficulties in the future, the limited resources of the Consultative Group should be concentrated on food production. This, however, should not preclude international support to forestry research which is complementary to food production and contributes to improved food crop yields in various ways. Watershed management, soil conservation practices, agro-silvicultural techniques for managing shifting agriculture, shelterbelts, fodder trees and shrubs, fruit trees and forest grazing were singled out as cases in point. The Committee welcomed the proposal of the U.S. delegation, and their preparedness to co-operate in this respect with IUFRO and the Forestry Department of FAO, that a co-operative forestry research programme should be developed within the above context. The Committee stressed the importance of developing a programme in the truly wet tropical areas. Meanwhile, the possibility of adding forestry-slanted projects to the work programme of the existing international institutes should be investigated. With regard to purely forestry research, sources of funds other than those of the Consultative Group have to be depended on.

### World Forestry Day

114. Various delegations underlined the interest of the World Forestry Day organized by the European Confederation of Agriculture. They requested the Department to facilitate the diffusion of information on the celebration of this event in the various countries through its normal channels of communication. One delegation suggested that FAO put the celebration of the World Forestry Days under its direct patronage.

### Forest Genetic Resources Information

115. The Committee endorsed a proposal made at the Third Session of the FAO Panel of Experts on Forest Gene Resources that heads of forest services be requested to nominate national co-ordinators of information on forest genetic resources who would be liaison officers and correspondents with "Forest Genetic Resources Information" and focal point for exchange of information on forest genetic resources with other countries.

### Date and Place of Next Session

116. In accordance with General Rule No. XXXI of FAO, the Committee agreed that its next session be held in Rome early in 1976, the exact date to be established by the Director-General in consultation with the Chairman of the Committee.

APPENDIX A

# AGENDA
# FOR THE SECOND SESSION
# OF THE COMMITTEE ON FORESTRY

1. Adoption of Agenda.

2. Election of Officers.

3. Approval of Rules of Procedure.

## FOREST POLICY ISSUES

4. The role and participation of forestry in today's world debate on conservation of the environment: (a) the forestry stand on the environmental problem; (b) international action in course; (c) policy implications at national and international level.

5. The implications for the world's forest economy of the rising costs and prices of wood.

6. Recent developments in forest fertilization: their technical and economic implications.

## REVIEW OF FAO'S PROGRAMME OF WORK FOR THE FORESTRY SECTOR

7. Main features of the Forestry Department's Programme of Work 1974-75, as approved by the Seventeenth Session of the Conference.

8. FAO's medium-term objectives and proposals for the Forestry Department's Programme of Work 1976-77.

9. Multilateral and bilateral assistance in the field of forestry: policy issues and trends.

## MATTERS ARISING FROM FAO COUNCIL AND CONFERENCE DECISIONS

10. The role of the Regional Forestry Commissions.

11. The Eighth World Forestry Congress.

## OTHER MATTERS

12. Progress report on the activities of the Consultative Group on International Agricultural Research.

13. Other business.

14. Date and place of next session.

15. Adoption of report.

APPENDIX B
ANNEXE B
APENDICE B

# LIST OF DELEGATES AND OBSERVERS
# LISTE DES DELEGUES ET OBSERVATEURS
# LISTA DE LOS DELEGADOS Y OBSERVADORES

| | |
|---|---|
| Chairman<br>Président<br>Presidente | - OSENI, A.M. (Nigeria) |
| First Vice-Chairman<br>Premier Vice-Président<br>Primer Vice-Presidente | - CROMER, D.A.N. (Australia) |
| Vice-Chairmen<br>Vice-Président<br>Vice-Presidentes | - ARAUJO, Reinaldo de Jesús (Brazil)<br>- BETOLAUD, Y. (France)<br>- KHALIFA, K.O. (Sudan)<br>- REDMOND, D.R. (Canada)<br>- SOEDJARWO, M. (Indonesia) |

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APPENDIX C

## LIST OF DOCUMENTS

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| 3 | COFO-74/2 | The Rules of Procedure of the Committee on Forestry - Secretariat Note |
| 4 | COFO-74/3 | The role and participation of forestry in the world endeavour for the conservation of the environment - Secretariat Note |
| 5 | COFO-74/4 | Implications for the world's forest economy of rising costs and prices of wood - Secretariat Note |
| 6 | COFO-74/5 | Recent developments in forest fertilization: their technical and economic implications - Secretariat Note |
| 8 | COFO-74/6 | FAO's medium-term objecgives and proposals for the Forestry Department's Programme of Work 1976-77 - Secretariat Note |
| 9 | COFO-74/7 | Field activities of the Forestry Department - Secretariat Note |
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| 12 | COFO-74/10 | Progress report on activities of the Consultative Group on International Agricultural Research - Secretariat Note |

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| COFO-74/Inf.1 | General Information for Participants |
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APPENDIX D

OPENING STATEMENT

by

A.H. BOERMA, DIRECTOR-GENERAL OF FAO

Mr Chairman,

I am very pleased to welcome you all to this Second Session of the Committee on Forestry.

FAO, as you know, has long been involved - deeply involved - in forestry matters. Today, however, we are more keenly aware than ever before of the fundamental importance of the forestry sector in some of the key issues that now confront the world.

I would select just three of these: firstly, the provision and distribution of raw materials; secondly, the conservation of the environment and the enhancement of environmental values; thirdly, the living standards of what is probably the most destitute section of humanity - rural populations in the least developed countries.

As to the contribution that forestry can make towards alleviating the shortage of raw materials, this is chiefly linked to man's ability to make fuller use of tropical forest resources. This in turn means, in the first place, identification of the silvicultural treatment that is best able to ensure a sustained supply of usable wood to the greatest extent possible compatible with the attention that must be paid to the environment. It also means the development and application of the technologies that are required to enlarge and diversify the range of industrial products derived from tropical forests. Even more important, it means definition and acceptance of the institutional and financial policies necessary to ensure that the population of these tropical zones get their rightful share of the benefits that are to be obtained from these forests. I am glad to say that our Forestry Department is planning a major effort to alert public opinion to this issue and to mobilize foresters, forest industry research centres and international development agencies to take concerted action in this respect.

I come next to the contribution that forestry may make to the conservation of the environment. This is a subject on which you, as foresters, will of course know more than I. I do not need to elaborate on the role that well-conceived and efficiently implemented forestry projects can play in fulfilling the objectives outlined by the United Nations Conference on the Human Environment in Stockholm in 1972. The point I want to emphasize today in this connection is the need for interdisciplinary action. I know that conservation is a concern already deeply engrained in the minds of foresters and that it is an integral component of the professional use of forest management techniques. I know, too, that you have every reason to be proud of your pioneer efforts to alert the world to the danger of uncontrolled exploitation of natural resources - as a rapid reading of the proceedings of the World Forestry Congresses is sufficient to demonstrate. But it is also true that, if your work on conservation is to produce lasting results, it must be concerted with the action taken by other professional sectors. Equally important, your technical assessment of the problems involved must take into account social considerations. In the past you have been the managers of an almost reserved domain. Nowadays, when increased leisure and greater concern for conservation have created so many "Sunday foresters", forestry has come much more into the limelight. Probably never before has it been so present in the public's mind. Probably never before have decisions on forestry matters had such wide implications of a political nature. We in FAO are very much aware of the much greater social dimensions in forestry affairs, as is shown by the series of seminars on forestry social relations, comparatively new in their content, that we are organizing on a continuing basis.

But the approach to the social aspects of forestry needs to be more generally strengthened. In this connection, I am glad to note the trend that is developing in forestry faculties - to which, I think, this Organization has made a significant contribution - towards greater recognition of these aspects. There needs to be increasing understanding among foresters of the attitude of the public towards forestry issues, particularly with regard to the question of protection of the environment. But there is yet another problem where I believe there is need for closer integration of the forestry sector with overall land-use and social policies. This is the problem of raising the living standards of rural populations. I do not think that the contribution that forestry can make to measures for dealing with this problem has fully materialized as yet. The two most obvious directions in which it can do so are in the employment of rural labour and the creation of infrastructures in rural areas. Further progress here will depend essentially on more information about the employment potentials of forestry and more research and experimentation to adapt forest operation techniques to local socio-economic conditions. The last World Forestry Congress pointed out that unemployment and the exodus from rural areas may cost society more than can be gained through mechanization. It also indicated the undesirable social effects of carrying out mechanization on the basis of purely financial criteria. There is, however, a third aspect, to which less attention was given at the Congress. This is the integration of forestry practices into the economy of the farm and the creation of small forest industries. This aspect has not been sufficiently explored, and there is good reason to believe that intensive applied research on it would yield extremely useful results.

Generally speaking, the whole concept of social forestry is not making the progress that it should. There is a great need for imaginative action on it to mobilize both external financing and internal community efforts. The importance of social forestry was made clear in a sentence of the Declaration of the Seventh World Forestry Congress that reads: "Foresters recognize that forestry is concerned not with trees, but with how trees can serve people."

These are the principal remarks I wanted to make today. There is no doubt that FAO, as the sole international body whose programme encompasses or attempts to encompass the entire range of forestry throughout the world, is in a unique position in world forestry affairs. It has a major part to play in developing further the close interrelationship that necessarily exists between forestry and other relevant activities in the utilization of the world's land and water resources. And, as I have said, it must do so taking the fullest account of social and human factors.

It is all this that makes the role of this Committee so important. It is for you to provide the criteria and directives that will enable FAO's whole forestry programme to respond effectively to the increasing demands that are made on it in the present world. In doing so, you not only have a key influence on a vital sector of economic and social development, but you also serve a wider human cause that goes far beyond that sector.

Thank you very much, Mr. Chairman.

APPENDIX E

# INTRODUCTION TO ITEM ON FAO'S MEDIUM-TERM OBJECTIVES IN THE FORESTRY SECTOR

by

B.K. STEENBERG
ASSISTANT DIRECTOR-GENERAL FAO FORESTRY DEPARTMENT

Mr. Chairman,

I have the honour of introducing to you agenda items 7 and 8-two items which are closely linked together.

I would like to introduce this item under some main headings, so as to make your important task somewhat easier. Thus, as a sort of background, I would like to make some selected general comments on the state of forestry and forest industry and trade, as seen from FAO.

I assume the Programme of Work for the current biennium is well known to you, and I will refrain from taking up your time to introduce this document to you. You will understand that only a few months of the biennium have gone by, and the comments on the ongoing work under this approved programme will be made by the Division Directors.

In introducing in broad terms the medium-term programme, I will instead take the opportunity to inform you about some of the nagging management problems that this programme has for us. I am convinced that this information will be useful in enabling you to give us advice on the form of the coming programme, because only a programme that can be implemented and managed is useful to you.

One authoritative way to analyze the state of forestry is to turn to the official annual reports of the world's forestry services. In fact, they are remarkably similar in their policy statements. They all deal with the vital question: are the forests adequate in area, distribution and composition to satisfy the expanding and changing demands of the people for goods and services? The reply to this sort of question is in the negative, even if qualified by conditions in the various countries.

The head of the forestry service points out that his country cannot afford to leave cut-over forests idle and unproductive, that the rate of restoration is far too low, and that there are compelling reasons to get the land back in production and to improve the productivity of established forests. It is either explicitly, or at least implicitly, said that there is no practical alternative in most areas to the use of genetically-improved native species or in many cases to resorting to exotics. Simultaneously, it is frequently pointed out that afforestation may involve changes that are detrimental to the overall feature of the terrain, and which may change legitimate land use patterns, such as recreation and tourism, and may also destroy important biotopes. The forestry service strongly supports environmental points of view, but also points out that some aesthetics and conservationists have unbalanced and perhaps even immature points of view.

You can read between the lines that the forestry services seem convinced that nobody is going to put more into the forests than the money which comes out of them, and hardly ever that much: so production is the first and the ultimate job for the survival of the forests.

Production is and will be wood, but may also include services of various types, many of them difficult to express in monetary terms. The environmental protection function of the forest for matters such as watershed management is the item which seems to be the focal point of most forestry services.

Scarcely any aspect of maintaining environmental quality can be solved without a land use policy. We know that this is one of the most politically difficult tasks mankind has tried. Almost any sector of mankind's activity is influenced by the lack of guidelines, regulations and enforcement of land use principles. But forestry is perhaps the major scapegoat of this state of flux. In saying this, I do not overlook the importance of land use policy for agriculture, or the decline in environmental quality caused by the sprawling urban regions. The major invasion in and destruction of the forests is in the long term definitely more serious.

Though accepting the need for forest clearing for organized agriculture on land with suitable soil and water regimes for such use, we have to stand by, helpless, during a haphazard unplanned invasion of the forests by illegal cultivators, not to mention the developed countries' often promiscuous development of vocation homes, thereby causing degradation of forests and wild lands. We witness uncontrolled forest concessions being worked on without concern for regeneration and future land use; we see public works causing erosion and forest destruction, often through ignorance and sometimes through negligence. I note as a significant development the decision to make the United Kingdom Forestry Commission a partner in the British Land Use Planning Body.

There is probably no part of the earth, no major sector of the biomass, which has less people speaking for it than the forests, and the reason is of course that there are so few people in the forests. So the foresters have to speak loud and clear. During the last few years there have been several successful public-attention efforts to attract the interest of the public, the politicians and the administrators to this issue. FAO has had a series of seminars, and recently Australia had a National Forest Development Conference which carried wide publicity and public attention. In my opinion, now is the right time for even more concentrated and concerted effort.

Why now? First, the radical global economic changes we have witnessed in many sectors in the last year have made the governments more careful, perhaps not in long term planning per se, but in committing their resources according to such plans. Secondly, the governments, via various tax devices, are getting far higher incomes from the wood sector than ever before. So also does the private sector involved in forests.

In my opinion you might wish to discuss two consequences: first, the importance of informing the governments that forestry is one sector which must have not only long-term planning but also the necessary corresponding long-term commitments, and that in this respect there are few sectors comparable to that of forestry; secondly, that this is the time when economics will permit governments and private entrepreneurs in the sector to commit money to this sector, without causing undue hardship. I am sure the various forestry services have action programmes ready for implementation to demonstrate that the commitments will not be in thin air only. For all the present global interest in saving non-renewable raw material resources for later use, it may be useful to remember that though forests are renewable raw material resources, they are so only when you renew them, and that only in this way can we keep and augment the assets for harder times to come.

May I now turn to some events which are part of my observations on the state of forestry. Forestry is a risky business, due to its long procuration time and to the nature of its produce. The tropical forest ecosystems, as many other forest ecosystems, are today understood to have reached their present state due to the influence of storms, long drought or rain periods, fire, interaction with fungi and insects. Damage to forests through fungi is strongly on the increase, and the monoculture forest, as all monocultures, will need strong protection efforts. In many places, insect pests are destroying forests of about the same order as that produced through plantation programmes. The very severe Tussock Moth epidemics in North America have destroyed in one summer - that of 1973 - more than one million board feet. Under these serious conditions, the overall ban on chlorinated aromatics, such as DDT, would seem to warrant re-investigation. FAO will put a major effort into the sector of insect problems in forestry.

On research in forestry I will select two issues, one in biochemistry and one from social forestry research, as examples of the widening field of forestry research.

Most of the earlier studies on forests have dealt with the physiology of wood production, while rather few studies have dealt with the physiology and biochemistry of wood decay. Destruction of woody tissues proceeds at about the same rate as new production of wood. If cellulose were not subjected to decay, the world's biological bio-carbon supply would rapidly become tied up in woody material. The decay is essentially carried out hydrologically and enzymatically, with fungi playing a major role. The mechanism of extra-cellular cellulose decay by celluloses is now fairly well understood. The simultaneous decay of lignin and cellulose has recently been shown to be due to a cellobiose quinone oxidoreductase, which reacts with both the carbohydrate and the lignin part. This is a major breakthrough in our understanding of the wood decay process. Its positive aspects rest with the new possibility to use woody tissues for production of various protein products, for animal and eventually human consumption.

You may very well have heard of the illustrative events in the Organization during these last weeks confirming the contention and experience which we all share that trees are relatively easy to manage but people are not. One of the main preoccupations for forestry throughout the world is how to identify people's attitudes towards and demands on the forest resources and reconcile them in progressive and operational action programmes and policies. It seems that the rather agitated dialogue between the protection and production phalanx is now entering a more constructive stage, marked by willingness to yield and compromise on otherwise unresolvable issues and conflicts.

Foresters, trained to mobilize the forest resources, are now involved in more systematic and energetic research to find ways and means of mobilizing the human resources for their cause. This research has two objectives. First, to make the public aware of and willing to respond to the specific resource management problems in forestry. Secondly, to find technological solutions to these problems, in order to benefit people directly involved in and physically dependent upon, the way the forest is managed, harvested and developed. This is the reason why more emphasis has been put lately on research into the relationships between the forests and the people.

Social sciences are enlisted and incorporated in the battery of research tools needed for reconciling conflicting demands on the forest resources. A significant trend in forestry research is the identification and quantification of attitudes and expectations of the public towards forestry. Similarly important for foresters is the task of influencing and analyzing those expectations towards outputs of forestry which are biologically and economically possible. Only then can workable solutions be found and corresponding resources be allocated.

Basically, this is a question of mobilizing human resources in general for the cause of forestry, with which forestry is now preoccupied. But another mobilization is also going on, and that is more systematic attempts to persuade and get the involvement of those rural people whose daily work and life depend on forestry. Again it is a question of identifying their expectations and justified demands. The key to success rests with choice of technologies and forms of production which meets as far as possible such expectations and demands. The result is seen, for instance, in logging systems and machines.

So, research and technology, which are both man-made resources and whose abundance can, and is continuing to, increase, will determine the world's future and this holds true for forestry as well.

If I turn to the field of wood conversion, there are some important points to note that are significant also for the foresters.

First, an important general observation. The nagging problem of substitutes for wood in the form of steel aluminium and plastics has more or less disappeared due to the new oil and energy prices. The use of plastic paper and board will be delayed at least 10 years for all but a few speciality items. Bagasse as a substitute for wood in paper has lost position because of its increased value as fuel in the sugar mills.

Perhaps one of the most significant events that has happened in the last period is the advance in fingerjointing of timber. This method has for some years already been used to obtain better yield from small-size woods, but it has been non-acceptable in the field of construction timber. Improved technology in fingerjointing procedures, including development of new glues, and by standardizing testing procedures, has led to fingerjointed construction timber now being authorized in the building code of one country. Yield increase is reported to be up by 15%. This development, which is expected to have international impact, will mean that smaller size trees previously not useful for construction timber will have a new value added. Thus an extension of the raw material supply of construction timber has de facto been created.

During past years the trend towards pre-preparation of logs for sawmilling with squaring methods has considerably increased. Chip and saw methods are becoming more important, as well as micro computer-assisted methods to maximize the yield from each log. Due to the smaller space demand of squared logs, one may see a development in trade of squared tropical wood as a first step towards increased production of sawn goods in tropical areas.

The world is presently experiencing a shortage of pulp and paper. According to FAO studies, this undersupply of the market against the projected demand curves is going to increase for the next three years. The production capacity that is coming on stream during this time is known from our capacity studies. Even if existing mills use their facilities to a maximum, and a maximum recovery feasible of waste paper is reached, there will not be enough paper to meet the projected demand. Prices will be high for both pulpwood and pulp and paper, and some difficulties may be experienced in fulfilling the estimated needs of paper for education, culture and information use, as well as for packaging.

Undoubtedly there will be considerable investment in this area. The FAO Pulp and Paper Advisory Committee has recently expressed the opinion that there is considerable scope for new pulp and paper mills in developing countries that have adequate raw materials.

In view of this some important breakthroughs in the relevant technology are worth mentioning, because this new technology has a bearing on new investment decisions.

In the field of mechanical pulp production the disc refiner method seems to have made a breakthrough after some 15 years of intensive research and development. By a combination of thermal heating and disc refining (thermorefining), wood chips can be converted to mechanical pulp with high strength properties and excellent optical properties. The classical method of grinding logs on grinding stones is thus on the way out. The new method permits the use of saw mill residue and wood chips.

In the sector of chemical pulping, new bleaching and pulping methods have achieved wide acceptance, and it seems possible that within a few decades pulping with sulphur compounds will have lost its absolute preponderance. Pollution of water and air from pulp mills is closely linked to the use of sulphur compounds. Gaseous oxygen and peroxides are now used for pulping and bleaching in several successful industrial installations. The conventional pulping methods have reached a high degree of perfection and integration. Continuous pulping systems now include also the washing stage, and the units have now reached a height and magnitude which indicates that limits are set by strength properties of existing steel materials.

Labour intensity is still decreasing, and a new mill owned by a private forest owners' co-operative produces 900 tons of bleached pulp per day with only three workers per shift for cooking, washing, screening and bleaching operations. New paper-forming methods allow rebuilding of old paper machines in producing multiwire forming systems which are so compact that the dryer section can be considerably increased with resulting higher production. The limitations to this development seem in the short term to be the availability of more pulp.

This ends my review of the state of forestry and forest utilization. I am sorry to have taken up so much of your valuable time and I know the imperfection of the picture, but I trust you will forgive me for the shortcomings. Between the lines you will see, for instance, the very heavy demand on education, modernization of forestry education and training at all levels.

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Turning now to the medium-term programme, you will find that this is outlined under three main headings, A, B and C. Let me list them for easy reference:

A. Assistance to member countries in the design and implementation of development projects.

B. Promotion of international action to gain recognition at world and regional level of the principles that should inspire forest services for the conservation and development of forest resources and also to improve the effectiveness of these national forest policies.

C. Provision to member countries of a certain number of standing, periodical services.

Organized in this way, you will no doubt note that these three types of tasks will require quite different types of work technologies - we even have to use different channels to work with the governments. But this is only one dimension of the problem confronting FAO. Our main obstacle is that we are short of personnel, short of everything - but full of unpredictables. That, put in this way, is a tiresome observation. But shortage of means is tantamount to excess of purpose. And the unpredictable is another way of expressing excess of purpose, but purposes not earlier realized.

Expressed in this way, the obvious and immediate conclusion to be drawn is the imperative need to select our priorities - which is a continuous process because of the new emphasis forced on us - and the equally imperative need to define in tangible terms either the objectives to be achieved or the functions to be performed. The problem in reality becomes how to identify achievable goals and plan for them, allowing a maximum scope for the unpredictable.

Confronted with the need for priorities, it seems to us that it would be more useful to approach the problem from the angle of the type of functions or services we provide, rather than solely from the subject-matter base. This means in essence that we have to work with what is called "management by objectives".

I think it is in line with the purpose of this discussion to bring our nagging management problems to the attention of this Committee and request its advice on how to solve them.

Let me start with the assistance part of the programme.

The Secretariat note has pointed out that this is a sector which offers little scope for any prognosis of medium-term activities. The reason is that FAO's role in this is essentially that of an honest broker between governments asking for assistance and donors willing to provide such assistance.

Let me take the sector of training as an example of a method of work. The method of work is essentially one of arranging seminars and training courses and the production of educational material such as manuals. This can only succeed to the extent that we can mobilize donor countries, and we have in this sector to concentrate on those donors who have special interest and experience in human resource problems.

This is the method of work which we apply quite extensively in the units dealing with education and institution building and also in the sector of forest operations.

Under another item we will deal with multi and bilateral assistance in the forestry sector. There is obviously no possibility in reality to separate the regular programme activities from the so-called field programme, because of the very nature of how you give assistance, where you give it, and the nature of the assistance and type of donor/recipient relationship. But even in other sectors of the medium-term programme you will find specific action programmes, which although clearly regular programme activities have action elements making them similar to field projects. Let us take the Forest Gene Pool Programme as a typical example.

Here, our main emphasis is on the selection and utilization of high-yielding genetic varieties of various tree species. The Forestry Department stimulates and assists local forestry services - sometimes also financially - in seed-collecting in key areas. Then, provenance trials are carried out under standard international procedures in many countries, and from seed orchards promising material is put at the disposal of national forest services. This programme, implemented within the framework of a 10-year programme suggested by the FAO Panel of Exports on Forest Gene Resources, is a good example of widespread international co-operation in a well-defined field and it shows that effective and practical action is possible within the regular programme.

If you analyze section B of our medium-term programme you will find that it deals essentially with the biggest single problem of international forestry of our day - that of the tropical forests. To make an impact here we need research, development, technology, change in attitude - and investment. This must be done not in a piecemeal fashion but in a balanced network of action. For this purpose we utilize another method of work - that of convening conferences to alert the world. The climax of our programme is the world's first Technical Conference on the Tropical Moist Forests, to be held in 1975. We hope to have substantial extra-budgetary funds for this conference to give it the desired dimensions. The conference will be co-ordinated with outside activities-for instance, the start of the United Nations Environment Programme's tropical forest cover monitoring programme.

I now come to the medium-term programme under sector C.

Our product is essentially publication material such as Unasylva, annual yearbooks, world forest inventories and trade bulletins. The method of work here includes analysis of data collected by various methods, preparation of discussions documents for review by various statutory bodies, and final production and distribution of the documents. But the modalities of work in this sector can vary widely from one problem area to another. In some areas we have an interface with private industry on research and development and on capacity studies, and we have a network of correspondents for many of these items, but the task is essentially carried out by the professional staff at headquarters.

In other sectors we use different methods. One of our tasks is to feed information to the countries on technical development. We cannot do that on a continuous scale, so we make intermittent efforts to produce such material. An important example of this method of work is the Third World Consultation on Wood-Based Panels, to be held in New Delhi next year at the kind invitation of the Government of India. Here the method of work is essentially one of the use of short-term consultants.

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I have introduced the medium-term programme in broad terms, informing you about some of our various methods of work, and this will, I hope, make it somewhat easier for you to give us guidance on how the problem should be oriented and where priorities should be given.

I have refrained from mentioning the problem of the unexpected. With the production of a programme for a long time ahead, I am sure you realize how full of unpredictables this world is, and that FAO has to try to adapt itself to changing needs, within a budgetary straight-jacket and the necessarily heavy administrative routines, partly determined by the various types of work we carry out at the same time.

I am looking forward to your guidance on these important matters.

Thank you.

APPENDIX F

# RULES OF PROCEDURE
of the
# COMMITTEE ON FORESTRY

## Rule I

### Officers

1. At the first session after the appointment of its members by the Council, pursuant to Rule XXXI.1 of the General Rules of the Organization, the Committee shall elect a Chairman, a First Vice-Chaiman and five other Vice-Chairmen from among the representatives of its members, who shall remain in office until the election of a new Chairman and new Vice-Chairmen and who will act as a Steering Committee during sessions.

2. The Chairman, or in his absence the First Vice-Chairman, shall preside at meetings of the Committee and exercise such other functions as may be required to facilitate its work. In the event of the Chairman and the First Vice-Chairman not being able to preside a meeting, the Committee shall appoint one of the Vice-Chairmen or, failing these, another of its members to take the chair.

3. The Director-General of the Organization shall appoint a Secretary, who shall perform such duties as the work of the Committee may require.

## Rule II

### Sessions

1. The Committee shall hold sessions as provided in Rule XXXI.3 and 4 of the General Rules of the Organization.

2. The Committee shall determine the date and place of its sessions. Normally, the Committee shall hold one session during each biennium, to be convened by the Director-General in consultation with the Chairman of the Committee.

3. If required, the Committee may hold additional sessions on the call of its Chairman or the Director-General, or on request submitted in writing to the Director-General by the majority of the members of the Committee.

4. Notice of the date and place of each session shall normally be communicated at least three months in advance of the session to all Member Nations and Associate Members of the Organization, and to such non-member nations and international organizations as may have been invited to attend the session.

5. Each Member Nation of the Committee may appoint alternates and advisers to its representative on the Committee.

6. Presence of members representing a majority of the Member Nations of the Committee shall constitute a quorum for any formal action by the Committee.

Rule III

Attendance

1. Participation of international organizations in an observer capacity in the work of the Committee shall be governed by the relevant provisions of the Constitution and the General Rules of the Organization 1/, as well as by the General Rules of the Organization on relations with international organizations.

2. Attendance by non-member nations of the Organization at sessions of the Committee shall be governed by the principles relating to the granting of observer status to nations adopted by the Conference.

3. (a) Meetings of the Committee shall be held in public, unless the Committee decides to meet in private for discussion of any items on its agenda.

(b) Subject to the provisions of subparagraph (c) below, any Member Nation not represented on the Committee, any Associate Member or any non-member nation invited to attend in an observer capacity a session of the Committee, may submit memoranda and participate without vote in any discussion at a public or private meeting of the Committee.

(c) In exceptional circumstances, the Committee may decide to restrict attendance at private meetings to the representative or observer of each Member Nation of the Organization.

Rule IV

Agenda and Documents

1. The Director-General, in consultation with the Chairman of the Committee, shall prepare a provisional agenda and shall normally circulate it at least two months in advance of the session to all Member Nations and Associate Members of the Organization and to all non-member nations and international organization invited to attend the session.

2. All Member Nations of the Organization and Associate Members may request the Director-General normally not less than 30 days before the proposed date of the session to insert an item on the provisional agenda. The Director-General shall thereupon circulate the proposed item to all members of the Committee, together with any necessary papers.

3. The Committee in session may by general consent amend the agenda by the deletion, addition or modification of any item, provided that no matter referred to it by the Council or on the request of the Conference be omitted from the agenda.

4. Documents not already circulated shall be dispatched with the provisional agenda, or as soon as possible thereafter.

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1/ It is understood that in this context the terms "Constitution" and "the General Rules of the Organization" are to be taken to include all general rules and policy statements formally adopted by the Conference and intended to supplement the Constitution and the Rules, such as the "Statement of principles relating to the granting of observer status to nations", the "Principles and procedures which should govern conventions and agreements concluded under Articles XIV and XV of the Constitution and Commissions and Committees established under Article VI of the Constitution" and the general rules regarding relationships between the Organization and governmental and non-governmental organizations.

Rule V

Voting

1. Each member of the Committee shall have one vote.

2. The decisions of the Committee shall be ascertained by the Chairman, who shall resort, upon the request of one or more members, to a vote, in which case the pertinent provisions of Rule XII of the General Rules of the Organization shall apply *mutatis mutandis*.

Rule VI

Records and Reports

1. At each session, the Committee shall approve a report to the Council embodying its views, recommendations and decisions, including when requested a statement of minority views. Any recommendation adopted by the Committee which affects the programme or finances of the Organization or concerning legal or constitutional matters shall be reported to the Council with the comments of the appropriate subsidiary committees of the Council.

2. Reports of sessions shall be circulated to all Member Nations and Associate Members of the Organization and to non-member nations invited to attend the session, as well as to interested international organizations entitled to be represented at the session.

3. The comments of the Committee on the report of any of its subsidiary bodies and, if one or more Member Nations of the Committee so request, the views of those Member Nations, shall be incorporated into the Committee's report. If any Member Nation so requests, this part of the Committee's report shall be circulated as soon as possible by the Director-General to the nations or international organizations which normally receive the reports of the subsidiary body in question. The Committee may also request the Director-General, in transmitting the report and records of its proceedings to Member Nations, to call particular attention to its views and comments on the report of any of its subsidiary bodies.

4. The Committee shall determine the procedures in regard to press communiqués concerning its activities.

Rule VII

Subsidiary Bodies

1. In accordance with the provisions of Rule XXXI.9 of the General Rules of the Organization, the Committee may, when necessary, establish subcommittees, subsidiary working parties or study groups, subject to the necessary funds being available in the relevant chapter of the approved budget of the Organization, and may include in the membership of such subcommittees, subsidiary working parties or study groups Member Nations that are not members of the Committee and Associate Members. The Council may admit to membership of sub-committees, subsidiary working parties and study groups established by the Committee nations which, while not Member Nations of the Organization, are members of the United Nations.

2. Before taking any decision involving expenditure in connection with the establishment of subsidiary bodies, the Committee shall have before it a report from the Director-General on the administrative and financial implications thereof.

3. The Committee shall determine the terms of reference of its subsidiary bodies, who shall report to the Committee. The reports of the subsidiary bodies shall be made available for information to all members of the subsidiary bodies concerned, all Member Nations and Associate Members of the Organization, non-member nations invited to the sessions of the subsidiary bodies, and to interested international organizations entitled to attend such sessions.

Rule VIII

Suspension of Rules

The Committee may decide to suspend any of the foregoing Rules of Procedure, provided that 24 hours' notice of the proposal for the suspension has been given and that the action contemplated is consistent with the Constitution and the General Rules of the Organization1/. Such notice may be waived if no member objects.

Rule IX

Amendment of Rules

The Committee may, by a two-thirds majority of the votes cast, amend its Rules of Procedure, provided that such amendment is consistent with the Constitution and the General Rules of the Organization. No proposal for the amendment of these Rules shall be included in the agenda of any session of the Committee, unless notice thereof has been dispatched by the Director-General to members of the Committee at least 30 days before the opening of the session.

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1/ See footnote to Rule III, paragraph 1

APPENDIX G

# INAUGURAL LECTURE:

# REMOTE SENSING AND PROXIMAL SENSING AS AIDS TO THE FORESTER OF THE FUTURE

by

Robert N. Colwell

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## INTRODUCTION

To paraphrase a popular saying: "It is easy for a forester to do the right thing, once he knows what is the right thing to do".

The "forester" within the context that we will consider him here, is one involved in managing forest resources, whether at the national, regional or local level. The forest resources which we will presume to be of concern to him include not only timber, but also forage, soils, water, minerals, livestock, fish, wildlife and other resources which collectively constitute the entire "resource complex" of the area which the forester seeks to manage. Ordinarily his primary objective will be to manage this resource complex in an optimal way for the sustained production of wood and associated forest products.

The information needed by a forester in attempting to manage wisely the forest resources of an area usually is acquired by a process which recently has come to be known as "sensing". If the sensing is done from a distance with respect to the forest area of interest (as from a camera mounted in an aircraft or spacecraft), the process is termed "remote sensing"; if the sensing is done within the forest itself (i.e., in close proximity to or even in contact with, the resources that are to be managed), the process is termed "proximal sensing". The primary purpose of this paper is to demonstrate ways in which both remote sensing and proximal sensing are likely to serve as important aids to the forester of the future.

## BASIC CONSIDERATIONS

The first step which a forester usually must take as he seeks to manage forest resources wisely is the inventory step, by means of which he can obtain accurate information as to the amount and condition of each type of resource that is present in each portion of the area which he seeks to manage.

The example of a forest survey which presently will be given should serve to document two important facts: (1) in obtaining inventories of the resources of the forest the forester of the future almost certainly will need to rely primarily on remote sensing techniques, such as those which employ cameras and other sensing devices that can obtain photographs and related imagery of the forest during overflights by aircraft and/or spacecraft; and (2) in obtaining such inventories, however, he will need to rely secondarily on proximal sensing techniques, such as those which employ direct on-site measurements and observations, as when making conventional timber cruises, forage surveys or water yield predictions.

But in the performance of this inventory step, and to a far greater extent than in times past, the forester of the future is likely to experience a need for a second type of inventory, viz., one concerned, not with the resources of the forest, but with the attitudes

of the people. The people referred to here are those most affected by the manner in which a forest's resources are managed, and it is becoming increasingly common for them, in turn, to exercise political pressures as necessary to ensure that such resource management will be in conformity with their own desires. In order to cope with this situation foresters are spending far more time than in the past both in briefing the public and in surveying public attitudes relative to forestry matters.

The examples of attitude surveys which presently will be given serve to document two important facts: (1) in obtaining inventories of the attitudes of the people, the forester of the future almost certainly will need to rely primarily on proximal sensing techniques, such as the direct questioning of individuals; and (2) in obtaining such inventories, however, he will need to rely secondarily on remote sensing techniques such as those which will enable him to "picture" the different environmental situations that exist where these people live and which thus help to account for their correspondingly different attitudes.1/

A second step which the forester usually must take as he seeks to manage forest resources wisely is that of analysis. To the extent that the pertinent parameters involved in forest resource analysis can be quantified, this step can be reduced to the mere making of arithmetic computations. In such instances only two kinds of input ordinarily are needed: (1) resource inventory data applicable to each of the areas that are to be managed; and (2) benefit-cost data applicable to each of the management measures that might be applied. Of the various management alternatives being considered in any such simplified kind of analysis, the one selected for application in any given area ordinarily should be merely the one which, by means of these computations, is revealed as being the most "cost-effective".

In this analysis step, however, just as in the inventory step, consideration must be given, not just to forests and their resources, but also to people and their attitudes. In fact it is only by balancing these two categories of considerations that the forester of the future can hope to arrive at a satisfactory determination of (as previously stated) "what is the right thing to do".

It is at this point that the value of highly quantified benefit-cost analyses becomes subject to question. Unfortunately personal attitudes are not as easy to quantify as forest resources. Furthermore, the exercise of some particular forest management practice may simultaneously be to the benefit of one group, and to the "disbenefit" of another. The problem is further complicated because, just as the resources of a forest can be dynamic, and hence subject to change, so can the attitudes of individuals. As will be illustrated presently, in the analysis step just as in the inventory step, remote sensing and proximal sensing techniques can be used in concert to great advantage by the knowledgeable forester.

The third and final step leading to the better management of forest resources is commonly referred to as the operations step. It is in this step that the forester implements, in each portion of the forest, those management measures which his analysis has indicated might best be undertaken. In this regard, it is important for us to recognize that, despite the great expense that may have been incurred and the great effort that may have been put forth during the performance of the preceding inventory and analysis steps, once those steps have been completed the forest resources around which they were centered are likely still to be lying out there on the landscape, essentially unchanged by all of this preliminary, time-consuming and costly activity. But once the forester begins to implement, in the operations

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1/ For example, aerial or space photographs taken with a special color film known as infrared ektachrome readily locate the ghetto areas of a city, within which there is little vegetation, and the houses tend to be both small and densely spaced. Unlike their affluent neighbours, residents of a ghetto are likely to be concerned far more with their own day-to-day survival than with ensuring that some distant forest is so managed as to preserve an endangered species of plant or animal.

step, the various decisions which he has arrived at in the analysis step, dramatic and often irreversible changes begin to occur in the forest. The axe and saw, as well as the bulldozer and concrete truck, can alter in a few moments the "climax forest" which is the product of centuries of nurture by nature. This is why the three-step process just described needs to be performed as intelligently and adequately as possible by the forester of the future. For if that process is intelligently performed, the forest and mankind are the beneficiaries - and it is the forester who deserves the credit. If, however, that process is performed in a manner that is fraught with errors, neither the forest nor the humans who depend upon its resources may be able to recover, in many years, from the damage done in this brief but dramatic "operations" phase - and in that event it is the forester who deserves the blame.

These considerations would seem to place the forester exactly where he should be - in a pivotal and extremely important role as custodian of some of the world's most important natural resources.

Sensing, both remote and proximal, can again be used to great advantage by the forester of the future in this third, or operations, phase as he seeks to make sure that, in implementing each management decision, he does the right thing in the right place. Let us presume, for example, that remote sensing and proximal sensing techniques have detected the presence of and verified the identify of an insect-infested tree in the forest (the inventory phase) and that a careful consideration of benefit-cost data has established that the tree should be removed (the analysis phase). The best way for the forester to find his way through the forest to that particular tree so that he can, indeed, remove it (the operations phase) is by travelling along a preselected route, with annotated aerial photos of the area in hand, using proximal sensing techniques to locate and identify on the ground various selected "check points" along that route.

The removal of insect-infested trees from a forest, like almost any other activity in which the forester of the future will engage as he implements the third, or operations phase, is likely to have a significant effect on both the resources of the forest and the attitudes of the people. In order for the forester of the future to determine the impact which his various forest management activities are having on the forest itself, he should periodically acquire new inventory data and make new analyses in the light of such data. Then he should implement new decisions in the light of such analyses. The term "monitoring" is commonly applied to that portion of this repetitive process that frequently acquires new inventory data about the forest. In fact, the forester's acronym "CFI" for "continuous forest inventory" is indicative of his appreciation that such monitoring is essential. But in order to determine the impact which his various forest management activities are having on people, the forester of the future also will need to re-inventory their attitudes periodically. Alternately stated, because of the ever-increasing importance of "people pressures" as a factor governing forest management, the successful forester of the future will need increasingly to be part resource manager (and in so doing to continuously monitor the "dynamics of the forest") and part politician (and in so doing to continuously monitor the "pulse of the people").

## A PAIR OF CONTRASTING EXAMPLES

### A. Remote Sensing as the Primary Factor in a Large Timber Inventory Project

Shortly after the Apollo 9 astronauts had acquired space photography of vast areas of the United States, Langley et al (1969) sought to determine timber volumes by species throughout an area which encompassed approximately 10,000 square miles (2,500,000 ha) in the state of Louisiana, U.S.A. They studied timber stands in the entire area, as imaged on a single infrared ektachrome space photograph, and by this means selected representative subsample areas for progressively more detailed study from aerial photography (remote sensing) and ground survey (proximal sensing). They demonstrated that, by means of this multistage sampling process which entailed examining only one-millionth of the area on the ground, they were able to obtain essentially the same accuracy in their timber volume estimates for this vast area as would have been obtained by ground sampling (i.e., by the conventional "timber cruising") of one-tenth of the area without the aid of aerial and space

photography. Figures 1 through 5, and the captions accompanying those figures, illustrate the techniques which they used.

That particular survey has not yet progressed through the analysis and operations phases. It already is known, however, that a basic "conflict of interest" problem exists for major parts of this area between two segments of the general public: (1) those who advocate that the forest resources in this vast area be managed primarily for timber production and (2) those who advocate management with a view primarily toward the protection of wildlife habitats in such a way as to ensure the preservation of certain "endangered species" of both plants and animals and to enhance the area's usefulness for recreation purposes.

B. Proximal Sensing as the Primary Factor in a Large Water Development Project

In the state of California, U.S.A., the following salient fact was aptly pointed out more than two decades ago by that state's Director of Natural Resources: the most important natural resource derivable from California's forested areas is not the timber, nor is it the forage, soils, minerals or wildlife; it is the water resource. Furthermore, in this instance, unlike the previously described one for Louisiana, it was (and it continues to be) more important to use proximal sensing techniques in determining the attitudes of people than it is to use remote sensing techniques in determining the quantity and quality of the available resource (in this case water). Two decades ago, even the most cursory of inventories was adequate to show that, in most years, there was a sizable excess of water in the sparsely populated mountains of northern California, while there was an ever-increasing lack of water in the densely populated urban areas and agricultural basins of southern California.

In this instance, decisions as to what to do about northern California water resources were arrived at primarily through the use of questionnaires, personal interviews, public hearings, election ballots and other proximal sensing techniques and media. Since the democratic process (based on the premise of "one person, one vote") was employed at the polls, it was the largely unknowledgeable multitudes in populous southern California, rather than the professionally competent but relatively few foresters and hydrologists of northern California, who ultimately decided what would be done with these water resources. Now, two decades later, and largely in response to the mandates of southern California's voting populace, more than $3 billion have been spent in engineering projects designed to temporarily impound and subsequently transport northern California's water to southern California. But now new voices are being raised at some of the highest political levels in an effort to influence the attitudes of the electorate relative to this mammoth and costly project. As a result, the following situation now exists in California as the time approaches for another statewide election: at the very time when the present governor of that state is ceremoniously turning on the water valves which permit southern Californians for the first time to use northern California's water, the governor's primary political opponent and the man whom many consider most likely to be California's next governor is loudly proclaiming that the entire water project was a big mistake. More specifically this opponent asserts that: "The most limiting resource in southern California is not water; it is air. Until such time as that area's air pollution problems can be solved, people must be encouraged to move away from southern California (by decreasing the supply of water) rather than their being encouraged to move into southern California (by increasing the supply of water)."

Thus it is seen in this instance that the primary kind of inventory data that initially was needed in order to decide how to develop California's water resources, and also the primary kind of monitoring data still needed (the better to decide how to manage California's water resources) pertains not to the water resource itself, but to the attitudes of those people who are potential users of the water resource. It follows that in this California example the primary data collection techniques needed have been, and continue to be, those which employ proximal sensing rather than remote sensing. This, then, is seen to be essentially the opposite of what was needed in the Louisiana example.

Figures 6 and 7 provide relevant information as to the magnitute of the California Water Project and as to the stepwise approach that is being used in assessing the impact of modern remote sensing techniques on the management of California's water resources. Detailed information relative to both the remote sensing and proximal sensing aspects of this project is contained in a report by Colwell et al (1973).

## RESOURCE-ORIENTED ATTITUDES IN DEVELOPED VS. DEVELOPING COUNTRIES

### A. Attitudes in Developed Countries

In developed countries attitudes on the part of the general public now strongly trend toward the conservation rather than the exploitation of forest resources and toward the preservation or improvement of environmental factors associated with those resources. The thought processes which have led the people in developed countries to this conservative viewpoint appear to have been somewhat as follows:

1. Whether on a local, regional, national or global basis, the supply of most kinds of natural resources is rapidly dwindling at the very time when the demand for them is rapidly increasing. (The increasing demand is attributable not only to the increasing population but also to the increasing per capita demand for resources occasioned by the fact that people at all economic levels, and in all parts of the globe, are demanding higher and higher standards of living).

2. Consequently the imbalance between supply and demand is becoming progressively worse and the deterioration of the environment associated with the increased exploitation of forest resources also is becoming progressively worse.

3. The continued exploitation of natural resources by the present generation is tending to deny future generations one of their most fundamental "birthrights".

4. In view of these facts, foresters of the future must conserve forest resources as never before and implement measures that will maintain or improve the forest environment.

### B. Attitudes in Developing Countries

In developing countries attitudes now strongly trend toward the exploitation rather than the conservation of forest resources. In this respect the attitudes in developing countries are essentially the some as they were, until recently, in developed countries. The thought process which has led the people in developing countries to this view-point appear to have been somewhat as follows:

1. There is a need for improving the living standards of the residents of our country as rapidly and fully as possible.

2. This need can only be met if our country's present economic base can be broadened and the large amounts of raw materials and capital that are needed for making domestic improvements can be acquired.

3. One of the best ways in which to satisfy this need for augmenting our country's economic resources is through the rapid and complete development of its forest resources.

4. In achieving this necessary development, we should not be unduly concerned with any admonitions that might be expressed by our neighbours in developed countries urging that resource conservation and environmental protection measures be vigorously implemented on a global basis. Instead we need only to recognize that those developed countries acquired their high living standards and economic well-being by exploiting their resources in the same way as we propose to exploit ours and, just as no strong objections were raised only a short time ago when they were so doing, neither should strong objection be raised now to our so doing. Once we have engaged in such resource exploitation to a sufficient extent to

improve the living standards and economic well-being of our country's residents, then will be soon enough for us to join in a global crusade for the conservation of natural resources and the protection of the environment.

## THE GLOBAL APPROACH TO FOREST RESOURCE MANAGEMENT

It was Abraham Lincoln, one of the greatest statesmen ever produced within the United States, and its national president a little more than a century ago, who made the following astute observation. "If we better knew where we are, and whither we are trending, we would better know what to do, and how to do it." Although his observation obviously was made in a quite different context than the one dealt with in this paper, it expresses both a need and a philosophy that are well worthy of consideration by foresters of the future, and on a global basis. Lincoln's statement is especially worthy of consideration at this meeting because of the fact that we have at least one of the leading professional foresters present here today from virtually every country in which forest resources are of significant economic importance. In fact this FAO Committee on Forestry would seem to be an ideal group through which to make progress toward developing (1) a globally uniform inventory of forest resources and (2) a globally integrated attitude about how the world's forest resources might best be managed.

### A. Remote Sensing as an Aid in Making a Globally Uniform Forest Inventory

In order for a global inventory of forest resources to be of value it should be made in a sufficiently short period of time to ensure the global comparability of inventory data. Otherwise serious inaccuracies could develop (especially with the passage of long periods of time while various parts of the inventory were being made) because of (1) the extensive depletion of forest resources in some geographic areas as a result of logging or the depredations of fire, insects and diseases and (2) the extensive accretion of forest resources in other geographic areas as a result of ingrowth and the establishment of new timber stands by either natural or artificial means.

Not only should the inventory be made in a suitably short period of time, but also to globally uniform standards. Otherwise problems relative to the comparability of inventory data could be so enormous as to negate any efforts we might make in using such data to develop intelligent forest management plans on a global basis.

Until recently it was virtually unthinkable that man would ever have the means for making a globally uniform inventory of forest resources. The first indication that foresters were on the verge of an important breakthrough in this regard came shortly after the dawning of the space age, when it was found possible by remote sensing to obtain on a single space photograph an essentially uniform look at an almost unbelievably large forest area (e.g., 3 million ha) and to discern thereon a very significant amount of detail (e.g., timber boundaries positioned to within 100 m).

This important capability improved with successive space shots and hit a new plateau with the launch of the world's first Earth Resources Technology Satellite (ERTS-1) on July 23, 1972. The highly successful operation of that vehicle's "cameras" and other sensors has continued since then, even up to the present time.

The characteristics of ERTS-1 which contribute to its suitability for the making of globally uniform forest inventories include the following. (See Figure 8).

1. ERTS-1 is in a nearly polar orbit. Hence, as the globe turns beneath it, ERTS-1 is able to photograph all of its forested areas.

2. ERTS-1 is sun-synchronous. Hence virtually all of these forested areas are photographed at essentially the same mid-morning hour. The nearly uniform angle of illumination increases the likelihood that forests throughout the globe that are similar with respect to type, size class and density will exhibit similar tone or brightness values on the ERTS-1 photographs, thereby facilitating uniform classification.

3. The multiband sensors of ERTS-1 are optimum for forest resource identification. If we are to adequately appreciate this capability, we must make the following series of points:

a. Electromagnetic energy, such as that used in taking aerial and space photographs, travels in a wavelike motion.

b. Some of this energy travels within one range of wavelengths (known as a band) while other portions of this energy travel in other wavelength bands.

c. When the sun's electromagnetic energy strikes any given type of forest feature, the amount of that energy that is reflected back from the feature to an earth-orbiting camera is different in one wavelength band than in another, depending primarily on the molecular and macromolecular composition of the resource feature itself.

d. The amount of energy that is reflected to the camera within the wavelength band exposed for by that camera's film-filter combination governs the photographic tone of that feature.

e. It follows from (c) and (d) that since each type of forest resource feature tends to have a unique molecular and macromolecular composition, it tends to exhibit a unique "spectral response" and hence a unique multiband "tone signature", provided that the wavelength bands, as in the ERTS-1 camera system, have been properly selected.

4. ERTS-1 provides nearly optimal spatial resolution for the delineation of forest resource boundaries at the level of detail that is most appropriate when making a global resource inventory.

5. ERTS-1 can cover all the forested areas of the globe in a short period of time. Specifically, in each 18-day period all of the forested areas of the globe can be viewed by the ERTS-1 cameras, except when cloud-cover interferes. If, for example, the objective were to photograph all of the forested areas of the globe within a one-year period, twenty separate opportunities would exist during that period of time for encountering suitably cloud-free conditions over any given forested area.

6. The feasibility of obtaining repeated inventories by ERTS-type vehicles adds to the feasibility of monitoring forest resources on a global basis in order to study rates of forest resource accretion and depletion and to better determine the rate and direction of plant succession, area-by-area, throughout the globe. Thus given the original "benchmark" type of coverage already acquired by ERTS-1, together with similar coverages at later dates, we would be in a position of knowing (with respect to forest resource inventory and management, and consistent with Lincoln's assertion) "where we are and whither we are trending".

Consequently we would better know, on a global basis "what to do, and how to do it" with respect to those resources.

B. Proximal Sensing as an Aid in Developing a Globally Uniform Forest Policy

Let us presume that, at some point in the near future, and with the aid of the remote sensing capabilities that have just been described, an adequate and globally uniform inventory of forest resources was completed and that subsequent monitoring operations also had been performed, with the aid of these remote sensing techniques. We would then, for the first time, be in a position to develop and implement an intelligent forest policy and an intelligent set of forest management plans, area-by-area, in conformity with that policy. Hopefully the policy would be more substantive than the one announced many decades ago by a prominent U.S. forester: "To manage forest resources so as to provide the greatest good for the greatest number in the long run".

In any event, how then might proximal sensing techniques be employed in order to facilitate our bringing both the policy and the consequent forest management plans to fruition throughout the globe? Needed at this point would be a globally representative "Committee" remarkably similar to the FAO Committee on Forestry that is convened here in Rome this week. In developing the global forest management plan, such a committee would, of course, make use of the global inventory data just described (as acquired primarily by remote sensing techniques). In this way, each member of the committee would be able to acquire a more informative "picture" (both literally and figuratively) of the world's forest resources than ever before, and this would stand him in good stead in the later analysis and operations phases. Once such a picture had been conveyed to him, however, use would be made primarily of proximal sensing techniques, to determine the attitudes (relative to forest policy and forest resource management) of other committee members and also of the general public in those countries which have forest resources of economic significance.

For a world-wide forestry committee of the type here assembled, it would be difficult to envisage a more useful activity than the one just described, leading as it might to an intelligent management of forest resources on a global basis. Much as I would like to elaborate on this matter, it clearly is not within my purvue to do so; therefore I will abruptly summarize and conclude.

SUMMARY AND CONCLUSION

In this paper consideration has been given to the use of both remote sensing and proximal sensing techniques as aids to foresters of the future. Some of the basic considerations that are pertinent to this theme are first described and illustrated. Thereafter detailed consideration is given to two specific examples, based on experience in the United States. One of these examples pertains to wildland resources in the state of Louisiana, and the other to wildland resources in the state of California, U.S.A. In both instances there was found to be a need for at least a minimal amount of information about both the resources of the forest and the attitudes of those people who would most likely be affected by the manner in which such resources were managed. Although the acquisition of information about the resources proved to be primarily dependent upon remote sensing techniques, proximal sensing also was of some help and, conversely, although the acquisition of information about people's attitudes proved to be primarily dependent upon proximal sensing techniques, remote sensing was also of some help.

This paper next considers certain resource-oriented attitudes that currently exist in developed countries versus those that exist in developing countries. The differences found have led the author to conclude that the use of space photography and other modern remote sensing techniques, by permitting a globally uniform inventory of forest resources to be made, would do much to reconcile the two opposing view-points. This in turn, probably would lead to closer agreement as to how the world's forest resources might best be managed, area-by-area, and country-by-country, for the benefit of all mankind.

The paper concludes with speculation on the possibility that, given such an inventory, some kind of international forestry committee, such as the one convened bienially under FAO sponsorship, might constitute the ideal group for developing a globally uniform policy relative to the management of forest resources. Such a policy, based on accurate information made available for the first time as to "where we are and whither we are trending", would go far in pointing out "what is the right thing to do" in pursuit of the objective of managing the world's forest resources in a manner that would provide in the fullest and most meaningful sense "the greatest good for the greatest number in the long run".

## LITERATURE CITED

Colwell, Robert N. et al. "An Integrated Study of Earth Resources in the State of California Using Remote Sensing Techniques". A report of work done by scientists on 6 campuses of the University of California under sponsorship by the National Aeronautics and Space Administration. December, 1973.

Langley, Philip G. "Multistage Sampling of Earth Resources with Aerial and Space Photography". Chapter 8 in NASA Special Publication No. SP-275 entitled "Monitoring Earth Resources from Aircraft and Spacecraft". 170 pp, illustrated. 1971.

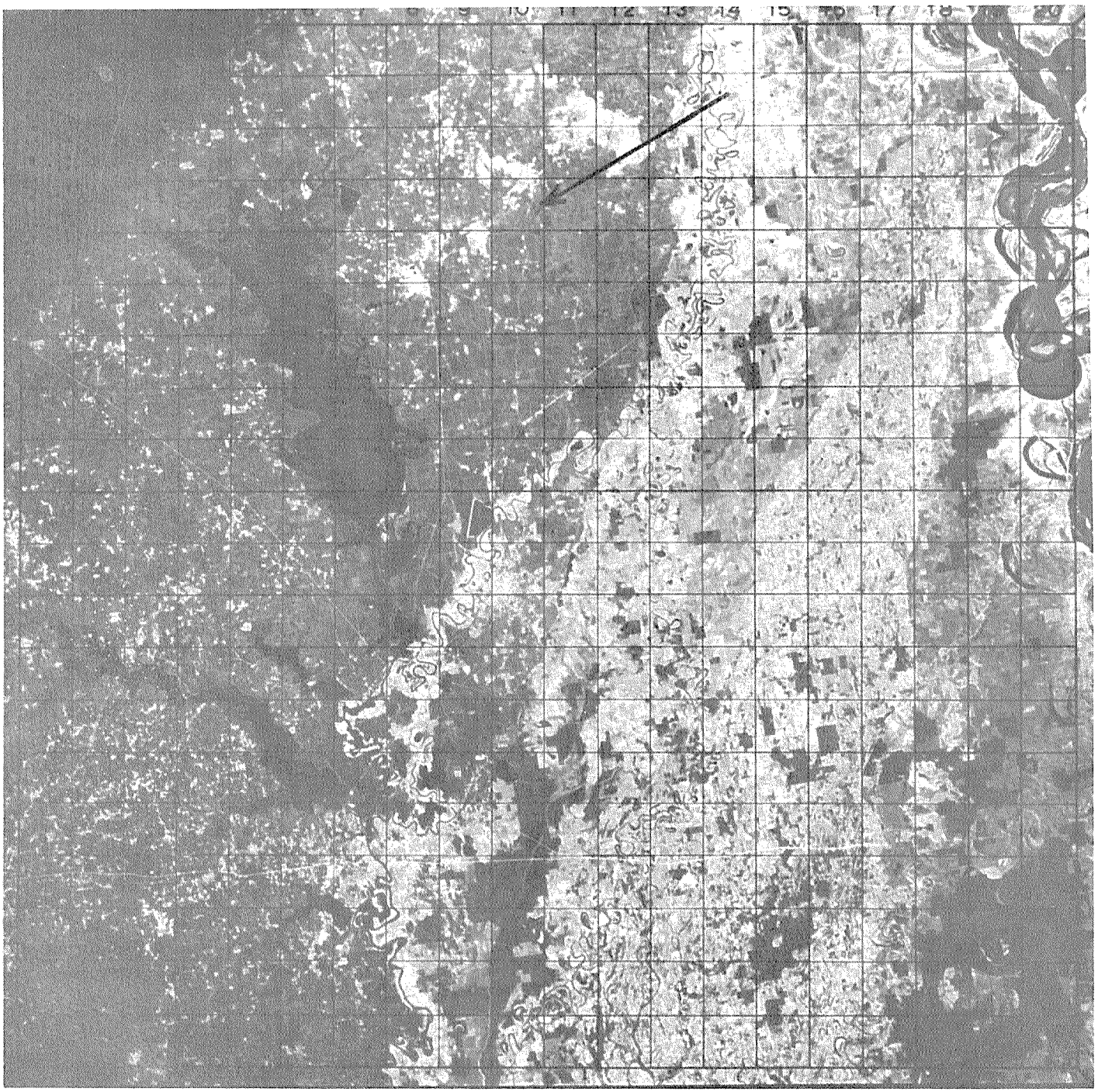

Figure 1. A black-and-white reproduction made from an Infrared Ektachrome color photograph that was taken by the Apollo 9 astronauts from an altitude of approximately 120 miles while orbiting over the state of Louisiana, U.S.A. The original 70 mm photograph has been enlarged approximately 3 times as shown here. The grid of 4- by 4-mile squares was used to predict timber volumes for the first level of inventory information, even though little more could be determined than the presence or absence of dark-toned forest vegetation. The arrow indicates one of these 4- by 4-mile cells selected for subsampling as shown in Figures 2 and 3.

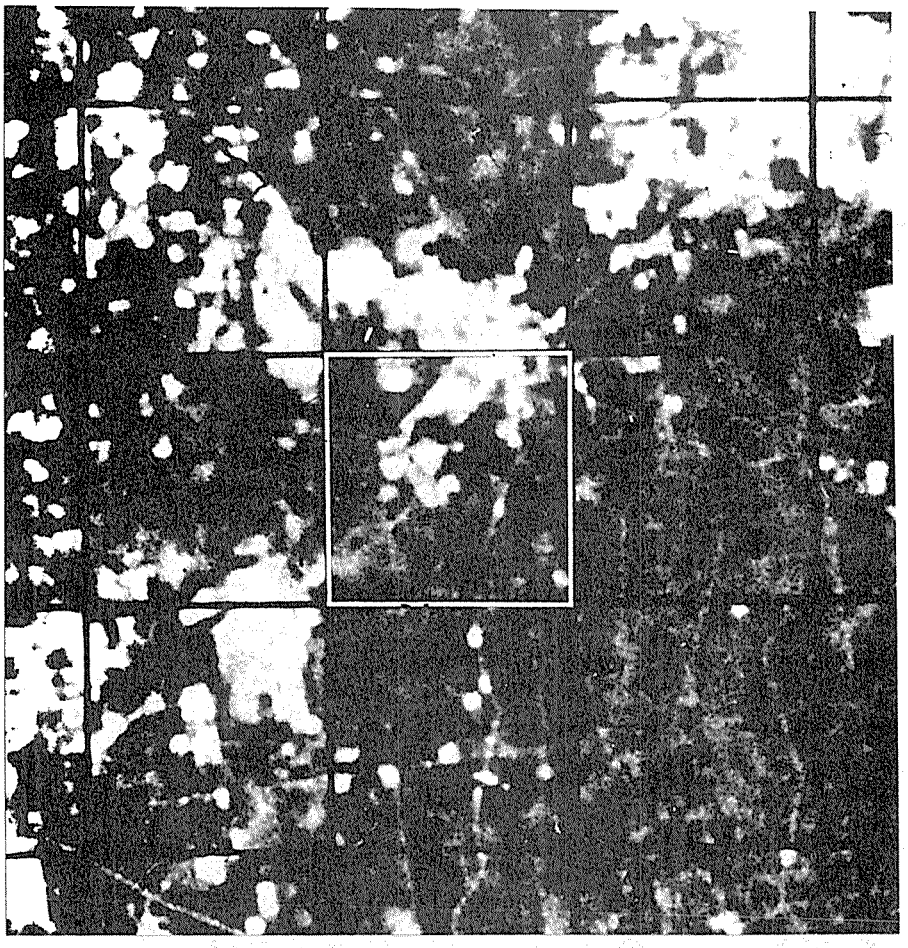

Figure 2. Each 4- by 4-mile square within the Apollo 9 frame was examined, and the proportion of the area occupied by forest land was estimated. The center square, outlined in white above, is the one indicated by the arrow in Figure 1 and was one of those selected for subsampling. Since the next phase in the multistage sampling scheme required that this particular square area be photographed from an aircraft, it is important to note that sufficient detail appeared on this greatly enlarged space photograph to permit the pilot to locate the area and navigate an east-west flight line directly across the middle of it in obtaining the results shown in Figure 3.

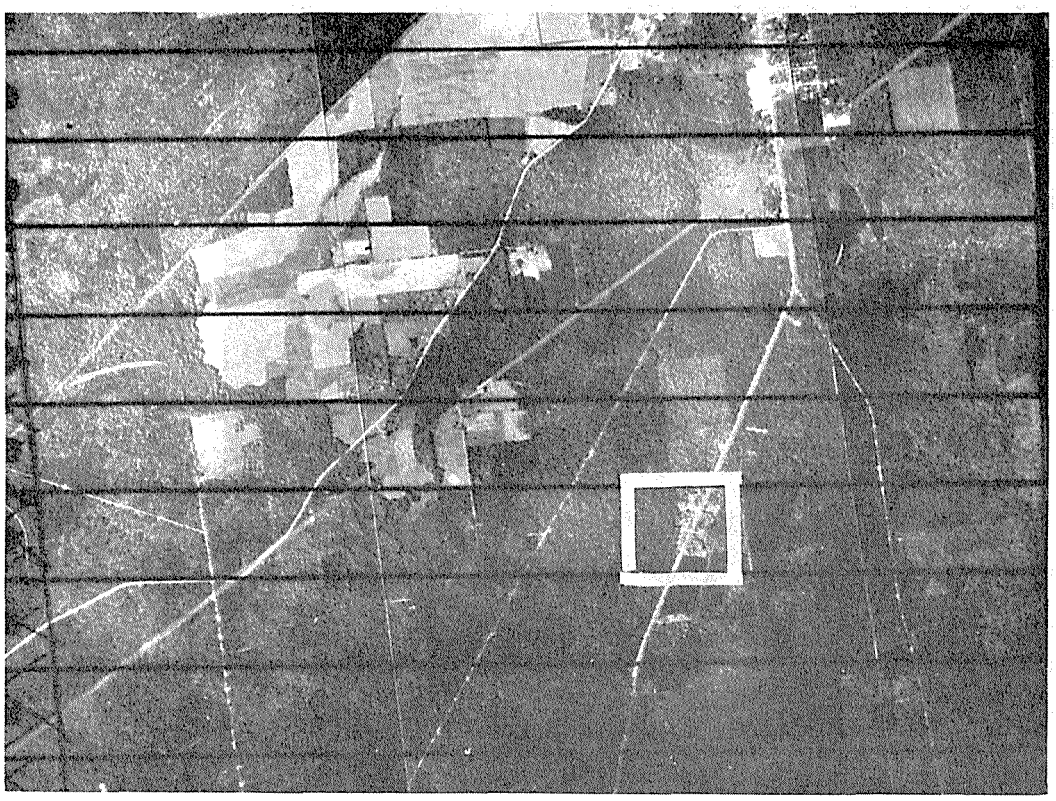

Figure 3. By the flying of a strip of polaroid photographs such as these at a scale of 1:60,000 and directly over the selected 4- by 4-mile sampling unit, complete coverage of the unit was obtained in a single flight line. Polaroid photography was used so that, even while the aircraft was in flight, the resulting rapidly-processed photographs could be subdivided into subsampling units using a transparent strip grid as indicated above. Stereoscopic study of this gridded photography, while the forester was still in flight, permitted him to obtain a more refined estimate of timber volume than on the space photography and resulted in the selection of a still smaller area (outlined in white) for photographing at still larger scale only a few minutes later while on the same flight.

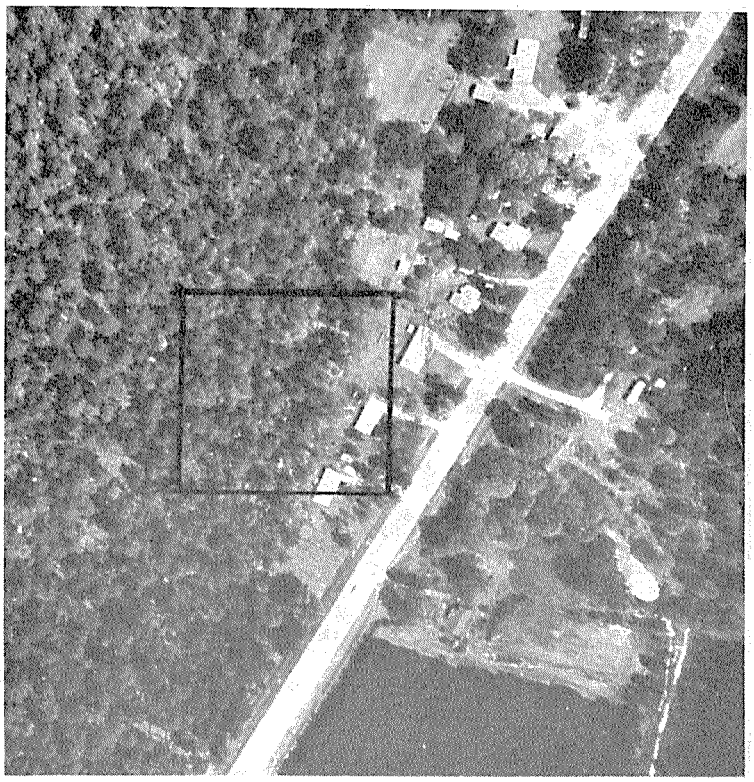

Figure 4. A 1:12,000-scale vertical aerial photograph of the area outlined by the white square in Figure 3. On this photograph still more detailed information related to timber volume estimation proved to be obtainable. The area outlined in black, above, corresponds to the coverage of the 1:2,000-scale photograph in Figure 5.

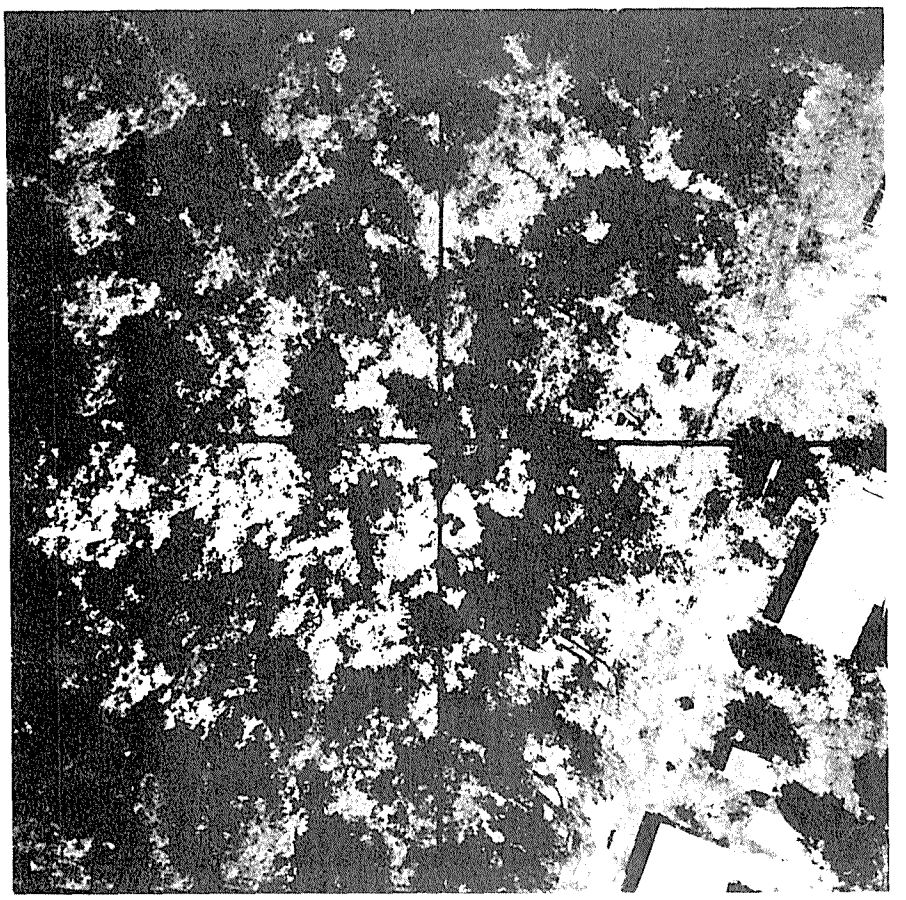

Figure 5. A 1:2,000-scale photograph corresponding to the area outlined in black on the 1:12,000-scale photograph in Figure 4. The above photograph was obtained at the same time as that shown in Figure 4, and from the same aircraft, but using a camera of 6 times longer focal length, in order to obtain still greater detail for this still smaller subsample. The grid appearing on this photograph divides it into four sample plots, each of which is approximately 0.625 acres (0.25 hectares) in size, on the basis of which the final and most detailed subsampling observations were made by means of direct on-site measurement of every tree. Thus, these five figures taken from an article by Langley et al (1969) illustrate the interplay between remote and proximal sensing and the assistance which both sensing techniques, when properly used in concert, will be able to provide to the forester of the future. Further details relative to this and other examples will be found in a NASA-sponsored book by Colwell et al (1971).

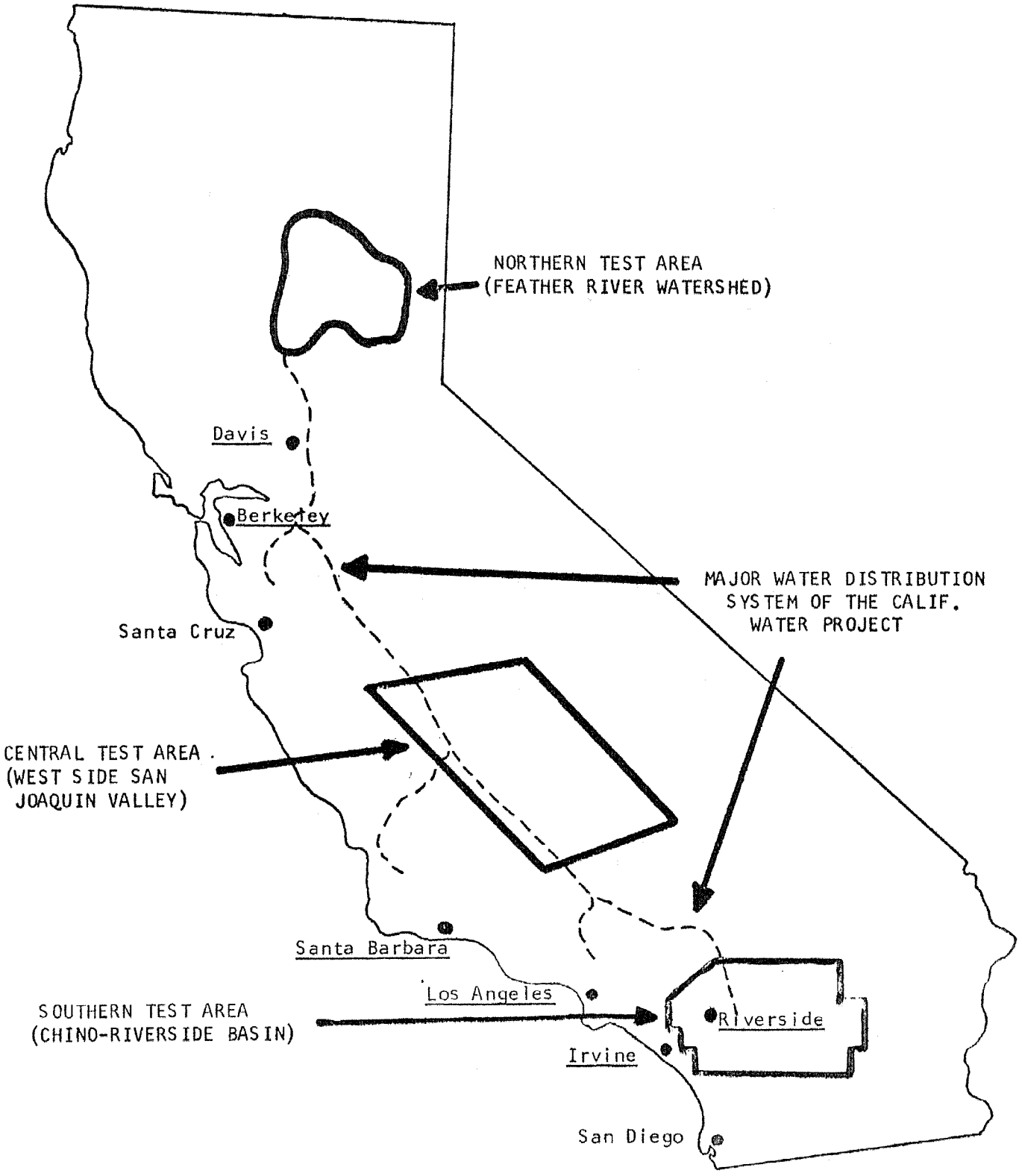


Figure 6. Shown here is a map of the state of California on which the following kinds of information have been indicated: (1) The primary area in northern California from which water is obtained for transport to southern California, viz., the Feather River Watershed; (2) Route followed by the 600-mile long canal system; (3) Location of the various University of California campuses engaged in studying this project; and (4) Test areas within which remote and proximal sensing studies relative to this project are being made by foresters and hydrologists.

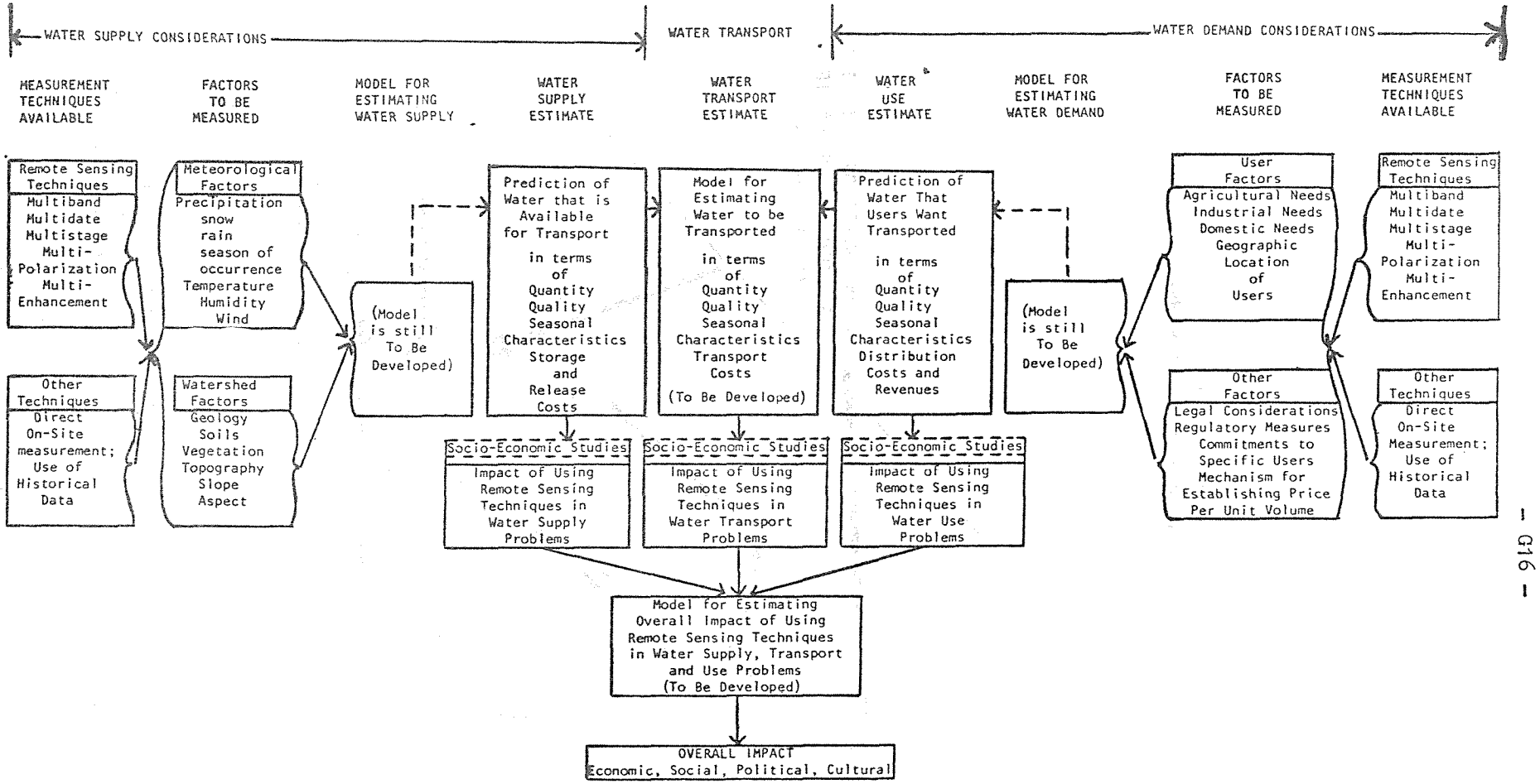


Figure 7. Block diagram applicable to the water plan that is diagrammed in Figure 6. On the left are water supply considerations and an indication of how they are measured by remote and proximal sensing techniques. On the right are water demand considerations, similarly treated. The central part of the diagram deals with water transport considerations and with estimating the impact of water on California's residents fromthe economic, social, political and cultural standpoints. Foresters of the future quite commonly will become involved in all aspects of various complex resource management problems such as this one.

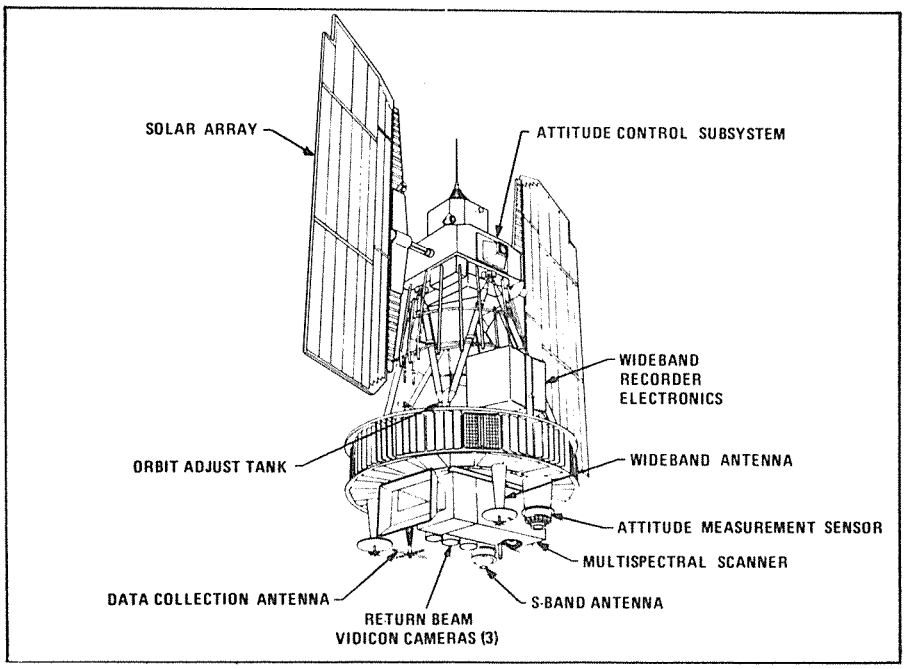


Figure 8. The ERTS-1 spacecraft, shown here in diagrammatic form, is 10 feet tall and weighs 2,000 pounds. It is in a near-polar "sun-synchronous" orbit and passes over any given part of the earth at essentially the same mid-morning hour every 18 days. A 115-mile wide strip that is photographed on one mid-morning pass is overlapped by a similar strip to the west of it on the following day. Data collection antennas on the spacecraft receive information from the ground on environmental conditions at various selected test sites. For further explanation, see text.

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