

REPORT AND PROCEEDINGS

Cancun,
Mexico,
10-14 February
1992

**North American
Forestry Commission**
Sixteenth session



Food and Agriculture Organization
of the United Nations

PREVIOUS SESSIONS OF THE COMMISSION

	Mexico, D.F., Mexico	24-29 July 1961
Second Session	Ottawa, Canada	17-22 July 1963
Third Session	Washington, D.C., USA	18-22 October 1965
Fourth Session	Mexico, D.F., Mexico	2-7 October 1967
Fifth Session	Ottawa, Canada	15-20 September 1969
Sixth Session	Washington, D.C., USA	27-31 March 1972
Seventh Session	Mexico, D.F., Mexico	4-8 February 1974
Eighth Session	Ottawa, Canada	23-27 February 1976
Ninth Session	San Juan, Puerto Rico, USA	13-17 February 1978
Tenth Session	Pátzcuaro, Mich., Mexico	18-22 February 1980
Eleventh Session	Victoria, B.C., Canada	16-19 February 1982
Twelfth Session	El Paso, Texas, USA	21-24 February 1984
Thirteenth Session	Chetumal, Quintana Roo, Mexico	3-7 February 1986
Fourteenth Session	Sault Ste Marie, Ontario, Canada	14-17 October 1987
Fifteenth Session	San Diego, California, USA	6-9 February 1990

REPORT AND PROCEEDINGS

of the

SIXTEENTH SESSION

of the

NORTH AMERICAN FORESTRY COMMISSION

Cancun, Quintana Roo,
Mexico
10 - 14 February 1992

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome

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RECOMMENDATIONS AND CONCLUSIONS

The Commission:

Report of the Committee of Alternates (COA)

1. Recommended that COA examine the emergence of new issues and opportunities of continent-wide significance and recommend appropriate response by the three countries (para. 47).
2. Recommended that FAO review its activities in the region from the point of view of rapid transfer and application of knowledge and technologies to address forestry issues (para. 48).
3. Recommended that COA vigorously review the current activities of the study groups in terms of their relevance to current priority problems and opportunities (para. 49).

FAO forestry activities of interest to the region

4. Recognized the development of the FAO programmes and recommended that the political, economic and other key topics related to the transition of the current practices towards sustainable development receive special attention in the future on the part of the Forestry Department (para. 55).
5. Noted with concern that the reduction in the budget of FAO would negatively affect the ability of the Forestry Department to face the growing demands that were imposed by environmental matters of a global nature related to the forests, the political changes in eastern Europe and, in general, the need for greater technical assistance to support developing countries (para. 56).

Review of study group activities

6. Recommended that the study group on forest tree improvement continue its work and urged its members to identify funding sources to support the group's future activities (para. 61).
7. Having examined the report of the study group on forest insects and diseases, recommended that the group continue its work (para. 67).
8. Recommended the restructuring of the study group on multilingual vocabulary and strongly urged the establishment of a work plan (para. 74).
9. Recommended that COA decide, as soon as possible, whether the study group on forest engineering should continue its work (para. 76).
10. Recommended that the study group on light-frame structures continue its work and that it explore the possibility of the private sector financing the publication of the manual which was in preparation (para. 80).

Follow-up to the recommendations of the fifteenth session of the Commission

11. Expressed disappointment that, in spite of repeated recommendations, FAO's current budgetary allocation to the Forestry Department was completely incompatible with the global significance of the forestry sector and noted with great concern that the allocation to the Department had been significantly reduced following the approval by the FAO Conference of the programme of work and budget for 1992-93. It recommended that FAO take explicit and demonstrably effective measures to increase the international profile of the Forestry Department, that without such measures the Department would continue to lose its global leadership role due to lack of support. It further recommended that its concerns be followed up through its countries' representatives to the FAO Council and by means of recommendations to the FAO administration (paras. 110 and 111).

United Nations Conference on Environment and Development

12. Recommended that its member countries make a special effort to participate actively in forestry-related issues at UNCED's preparatory meetings (para. 116).

Cooperation with the European Forestry Commission (EFC)

13. With a view to greater cooperation between EFC and NAFC, recommended that NAFC be represented at the next session of EFC (para. 123).

OPENING OF THE SESSION

1. The sixteenth session of the North American Forestry Commission (NAFC) was held in Cancun, Mexico, at the kind invitation of the Government of Mexico, from 10 to 14 February 1992. The session was attended by 38 participants from the three member countries of the Commission. The list of participants is given in *Appendix B*.

2. At the opening ceremony the participants were welcomed by Dr Manuel Mondragón y Kalb, Under-Secretary of Forestry, and by the Governor of the State of Quintana Roo. Dr Mondragón said that the holding of the meeting testified to the political will of the three North American countries to continue exchanging experiences and providing future support to the forestry sector. He conveyed greetings to the participants from the President of Mexico, Carlos Salinas de Gortari, and the Secretary of Agriculture, Carlos Hank González, and also expressed the Mexican Government's interest in conservation and the sustained use of forests.

3. Dr Mondragón said that, since its establishment in 1961, NAFC had constituted an example of international cooperation and its activities had made a significant contribution to pest control, forest fire control, genetic improvement and sustained forest management. He acknowledged the efforts of FAO to contribute to sustained forest use in the region.

4. In conclusion, Dr Mondragón said that economic integration and constitutional changes in Mexico required NAFC to pay special attention to technical aspects designed to improve production efficiency and to satisfy the demands and needs of Mexican society.

5. Mr Santiago Funes, FAO Representative in Mexico, Guatemala and Belize, represented the Director-General of the Food and Agriculture Organization of the United Nations (FAO). In presenting the statement of the Forestry Department of FAO, Mr Funes thanked the Government of Mexico and, in particular, the Governor of the State of Quintana Roo and Dr Mondragón, for their generosity in hosting the session of the Commission.

6. Since the previous session, the world had witnessed major changes, the creation of new nations and transformations in economic and political systems, especially in the territory of the former USSR; many of those changes had great implications for the region's forestry sector. Moreover, major changes had also taken place in the region itself. Among those of more immediate interest were the measures to liberalize trade between Canada, Mexico and the United States. With specific reference to Mexico, the constitutional changes relating to land ownership merited attention. Although the final effects of such initiatives on the forestry sector would be revealed only with the passage of time, they had opened up new opportunities and challenges.

7. The importance of the North American forests and the region's leadership role in the production and export of wood and timber products should be noted. Environmental considerations were now being discussed with an enthusiasm that nearly excluded other important factors, and it was necessary to remind the public that the forests were also important. At the same time that the public was calling for greater conservation efforts, the peoples of the countries were demanding more goods and services from the forests. Conservation by itself would not guarantee the long-term survival of ecosystems. There was a need for proper management which could strike a balance between the legitimate aspirations of societies to economic development and the needs of environmental conservation.

8. With reference to the need to promote awareness of the value of forests in all their aspects, the economic value of the sector, including its direct contribution to development and its less tangible, but vital, role in ensuring environmental stability, were rarely reflected in national accounts. The arguments in favour of the sector were generally poor and unconvincing. Accordingly, the methodologies for quantifying the forestry sector's real contribution deserved priority attention.

9. Transition and modernization in the forestry sectors of the countries of eastern Europe and the former USSR would require the combined efforts of governments, international organizations and the private sectors of the western countries. NAFC, through its committees, could identify opportunities for cooperation with eastern Europe.

10. Achievements made through the Tropical Forests Action Programme (TFAP) were summarized; since the previous session of NAFC, progress had been made in revitalizing TFAP. The Programme's objectives and targets had been better defined and consensus had been reached on a number of operational principles which were being actively implemented. While discussion was continuing with regard to the establishment of a consultative forum and the role of FAO therein, TFAP was being actively implemented. TFAP continued to constitute the chief international framework for cooperation in tropical forestry; the commitment of FAO to the implementation of TFAP had not diminished and the support provided by the region was deeply appreciated. In the global context of joint action on the environment, FAO had provided cooperation and support to the Secretariat of the United Nations Conference on Environment and Development. The activities being carried out by FAO in following up the recommendations of the tenth World Forestry Congress were reported.

11. The twenty-sixth session of the FAO Conference had been characterized by a number of innovations of significance to the Organization's institutional life. The Baltic countries had been admitted to membership; an associate member, Puerto Rico, had been admitted for the first time; and the European Economic Community had become a full member.

12. The Conference had also adopted by consensus the programme of work and budget which had been submitted to it. The impossibility of providing the funds required for the full implementation of the programme had led to the reduction of the proposed zero-growth budget by approximately US\$ 32 million.

ADOPTION OF THE AGENDA

13. The Commission approved the provisional agenda (*Appendix A*). The list of documents considered by the Commission is given in *Appendix C*.

STATE OF FORESTRY IN THE REGION

(a) Canada

14. During the past two years, vast changes had occurred in the Canadian forest industry. A comprehensive action plan entitled *Canada's Green Plan for a Healthy Environment* had been published in 1990. That initiative had included significant programmes to promote sustainable forestry. A new national forest strategy was in preparation and was expected to be approved at the National Forest Congress to be held in March. In addition, forestry was one of the topics that was being discussed in the current constitutional debate.

15. Another important aspect had been the adoption in 1989 of the Department of Forestry Act. Forestry Canada had been given the responsibility of promoting the sustainable development and competitiveness of the forestry sector for the well-being of current and future generations of Canadians. Under the Act, Forestry Canada was required to report annually to Parliament on the state of forestry in the country. The first report had been issued in 1991, while the second would be issued in 1992.

16. Foresters were now embracing the concept of sustainable development. The concept had been endorsed by the Council of Forest Ministers, a national forum that included federal, provincial and territorial ministers.

17. According to estimates by Forestry Canada, while there was an adequate timber supply for the next 30 to 60 years, the long-term perspectives were less clear.

18. The Policy and Economics Directorate was responsible for the National Forestry Database Programme. Future plans for the expansion of the programme included the implementation of a computerized database for collecting, compiling and reporting data. The database would also be expanded to include non-timber values and information on land use. Recent economic studies had considered the implications of a North American Free Trade Agreement and of environmental regulations on the pulp and paper industry.

19. Forestry continued to be one of Canada's key industries, both from an economic and an employment perspective. Across the country there were about 675 pulp, paper and paperboard mills and more than 3,000 sawmills, plywood mills and mill-working plants. In 1989 the total sales value of forest products had exceeded \$50 billion and had generated \$10.1 billion in salaries and wages. Overall, the forestry sector directly contributed 3.0 per cent to Canada's gross domestic product. Total forest product exports in 1990 had amounted to \$22 billion, and the contribution of forest products to the net trade balance had been \$18.8 billion, or almost as much as that from the mineral, agricultural, fisheries and energy sectors combined.

20. During the past two years, the forest industry had been severely affected by the recession. Recent estimates indicated that the industry had lost more than US\$ 1.5 billion in 1991. Those losses were unprecedented and were far in excess of losses in the recession of the 1980s. Unlike previous recessions, the current one was resulting in structural change in the industry, and six older, less efficient mills had closed.

21. Additionally, the forest products industry was considered to be a major polluter. Forest products manufacturers were now striving to make environmental protection an integral component of their daily business. Environmental management now accounted for 12 per cent of capital expenses incurred by pulp and paper mills, compared to 3 per cent in 1960. New standards approved by the Federal Government would require \$3 billion of expenditures by the end of 1993.

(b) Mexico

22. The Federal Government had formulated and implemented the National Development Plan 1989-1994. The Plan, which accorded a high priority to forest activities, was designed to ensure an ecological balance, promote the well-being of the inhabitants of forest areas, protect and increase forests, guarantee a rational use of forest resources, protect hydraulic structures, modernize the forest industry, strengthen road infrastructure and promote forest education, training and research.

23. Various types of forest lands covered 73 per cent of the country's surface. They consisted of 39 million hectares of tree cover and 105 million hectares covered with low vegetation.

24. Of the forest area, 27 million hectares had timber production potential. The other 12 million hectares protected the environment and served a conservation function.

25. In the past 10 years, forest timber production had remained at approximately 7.5 million cubic meters of roundwood, ranging from 9.9 million in 1985 to 7.7 million in 1991.

26. Since 1981, the apparent consumption of timber products had suffered a serious decline, falling from 12.7 million cubic meters of roundwood to 9.2 million in 1990. The sawmill industry had been the hardest hit, not to mention cellulose products, which had fallen from 6.2 million cubic meters of roundwood in 1981 to 3.9 million in 1990.

27. In the past 10 years, the trade balance for forest products had been negative, with a maximum of US\$ 539.5 million in 1981 and a minimum of US\$ 134.7 million in 1988.

28. In 1991, a million hectares had been incorporated into modern techniques of silviculture, for which the required technical personnel had been trained. To that end, activities to strengthen the producer organizations had also been stepped up, thus promoting broader industrial capacity and output.

29. In response to the changes promoted by the international community, forest technical services had been geared towards the rational use, protection and increase of resources, as well as improving the quality of life of forest area populations.

30. Major institutional changes had included the decentralization of forest technical services, which had been conceded to forest owners, authorized professionals and industrialists. To that end, standards had been developed for the reorganization of forest technical services and 74 concessions had been granted to producer organizations and professionals.

31. The forest products industry had functioned, on average, at 60 per cent of installed capacity. That had been due in large part to supply problems stemming from limited road infrastructures, the lack of standards which had made transport more expensive and a low level of industrial integration. A major portion of the investments provided by the States of Chihuahua, Durango, Guerrero and Oaxaca, amounting to approximately US\$200 million, had been used to improve road infrastructures.

32. Among the major activities carried out in the past two years had been the big-picture inventory in 1991; the control of barker insects, which had made it possible to protect a million hectares; the decrease in the area burned by fires from 290 000 to 269 000 hectares; the reduction in deforestation through the restriction of authorizations from 48 000 to 11 000 hectares; and the reforestation of 93,000 hectares, a figure 160 per cent higher than the average of the past 10 years.

33. Social participation was a fundamental aspect of the Federal Government's strategy for promoting forest development. In order to create public awareness of the importance of natural resources, 566 municipal forest committees had been created in 1991. Those committees promoted forest culture and cared for and restored nearby forests.

34. In the light of the challenges stemming from the international situation and the national population dynamic, which exerted strong pressure on resources, the Forest Under-Secretariat had re-evaluated the importance of forest ecosystems. Accordingly, it had implemented programmes with a modern focus for comprehensive forest management, promoting forest conservation, restoration and rational use.

c) United States of America

35. The manner in which forestry was practised in the United States was under dramatic change, and the Forest Service had responded by fully initiating its "new perspectives" programme. "New perspectives" takes a broader view of forestry: it looks at the forest as an ecosystem and, thus, management strives to perpetuate all ecological values through time; it incorporates greater public involvement in decision-making; and it puts forest ecosystems researchers and managers together as a team for rapid implementation of scientific advances.

36. The strategic planning process of the Forest Service occurs under the guidance of the Resources Planning Act (RPA) and in 1990 a new five-year RPA programme was outlined to direct Forest Service activities. Four themes emerged from the 1990 RPA process: (1) an increase in

priority and greater funding for wildlife, recreation and fisheries; (2) the continuation of commodity production from national forest land, but with greater sensitivity to the environmental services provided by these commodities; (3) a continuing emphasis on the development of scientific knowledge regarding forest ecosystems; and (4) a concentrated and comprehensive response to international forestry issues and problems of global significance.

37. The Forest Service's International Forestry Division had been elevated within the agency, and significant new resources and staff serve to increase levels of technical assistance to partners in the international setting.

38. Forest Service activities based in Puerto Rico will be greatly amplified with the establishment of an international institute for forestry in the American tropics. Already a major new training centre in Puerto Rico was being designed, and funding had been allocated for its construction. In addition, an agreement with IBMMA (the forestry department of the Government of Brazil) was signed in 1991 to increase cooperation in forestry between the two countries.

39. The Bush administration had pushed forestry from the presidential level, with the President making a commitment to plant within the United States one billion trees per year for the next 10 years. The "American Great Outdoors" initiative will provide additional emphasis on outdoor recreation in the national forests of the United States, with a three-year, \$625 million programme to increase the quality and variety of the outdoor recreation experience. The Rural Development Programme is an integrated effort within the Department of Agriculture to promote economic development in rural areas through diversification, education and technical assistance.

40. The wood supply situation in the United States is complex, since the size of much of the growing stock is too small for harvest. The age gap between available harvestable material and the bulk of the supply will mean that for approximately 20 years the Forest Service will be under pressure to utilize its inventories, as they hold 50 per cent of the adequately-sized material. Recycling may help reduce the pressure on this supply, and the Forest Service had accepted the leadership in research on the recycling of wood-derived products.

41. The Forest Service also finds itself as the primary supplier of Pacific yew (*Taxus brevifolia*), a tree the bark of which contains taxol, the most promising substance in the development of drugs to fight cancer. Last year the Forest Service and the Bureau of Land Management produced over 900 000 pounds of Pacific yew bark, enough to treat 12 000 cancer patients.

42. The programmes of the 51 state forests of the United States will focus on two major areas: urban/community forestry and stewardship. A significant element in the urban forestry effort will be on emphasis on environmental education, so that those citizens removed from a wildland setting will recognize and understand ecological values. Stewardship programmes will offer a broader range of services to small private forest landowners to better meet their objectives for the maintenance of non-commodity resource characteristics.

43. The Forest Service will maintain its diversified multiple-use programmes in the production of commodities and services. It will expand its efforts in the international arena, and it will promote partnerships with a broad range of other organizations. The United States is committed to blending the needs of people with the environmental and ecological values of the forest.

REPORT OF THE COMMITTEE OF ALTERNATES

44. The Chairman of the Committee of Alternates (COA) summarized the Committee's activities since the fifteenth session, noting that, during that period, the Committee had played an important role in coordinating and guiding the working groups. The Chairman also reported that the

Committee had met twice in the past two years, in Canada in 1990 and in France in 1991. He underscored the relevance of the results of those meetings.

45. The Chairman submitted for the Commission's consideration the chief questions and proposals concerning the working groups which had emerged during the meetings in Canada and France, as follows:

- **Study group on forest tree improvement:** COA had noted the group's excellent work and the broad possibilities for future cooperation; the Committee proposed to the Commission that it not only endorse the group's work but provide greater support to its programmes.
- **Study group on fire management:** COA had acknowledged the group's outstanding work, emphasized the importance of ensuring full cooperation along international frontiers, and recommended that the group continue its work.
- **Study group on forest insects and diseases:** COA had expressed its appreciation of the group's work and had recommended that it continue its work.
- **Study group on silviculture:** COA had acknowledged the results achieved by the group and had recommended an emphasis on tropical silviculture in its future work.
- **Study group on multilingual vocabulary:** COA had taken note of the limited progress made by the group owing to problems with Mexico's participation, and had recommended that the requisite steps be taken to ensure the completion of the Spanish contribution.
- **Study group on forest engineering:** COA had acknowledged the importance and potential of that area of work, while pointing out some limitations, and had recommended (a) that the group re-examine its future role; (b) that its work include such aspects as roads, extraction and raw materials transport, with an emphasis on the environmental aspects; and (c) that it schedule a workshop, in collaboration with the study group on silviculture, on the environmental impact of silvicultural practices.
- **Study group on atmospheric pollution and deposition:** COA had taken note of the group's good work and had recommended that it continue and that it give consideration to the possibility of holding a meeting with the study group on tree improvement.
- **Study group on light-frame structures:** COA had noted that the lack of economic resources had limited the group's results, and had recommended (a) that the group should continue its work, but that it should examine its objectives and targets, and (b) that the costs of publishing the housing construction manual should be determined and that funding be sought from the private sector.

46. With reference to other matters, the Chairman of COA had pointed to the necessity of providing economic support to the working groups to enable them to publish the results of their studies. He had likewise reported on the agreement which Mexico had entered into to develop a proposal for the establishment of a new working group on watershed management. The next meeting of the COA was scheduled for May 1992.

47. The Commission recommended that COA examine the emergence of new issues and opportunities of continent-wide significance and recommend appropriate response by the three countries. As an example: one specific area with which COA wished the Commission to deal was neo-tropical migratory birds. This was a common resource to the three countries and their population was declining. Since forests in the three countries were the primary habitat, the Commission should get involved in what action could be taken.

48. The Commission recommended that FAO review its activities in the region from the point of view of rapid transfer and application of knowledge and technologies to address forestry issues.

49. It further recommended that COA vigorously review the current activities of the study groups in terms of their relevance to current priority problems and opportunities and make recommendations on the reorientation of their work programmes and, where appropriate, the termination of certain activities or the initiation of new activities.

FAO FORESTRY ACTIVITIES OF INTEREST TO THE REGION

50. Mr J. Gauthier, Director of the Forest Products Division of the Forestry Department, reviewed the forestry activities of FAO which had been carried out during 1990-1991 and those planned for the biennium 1992-1993.

51. Among the most important activities carried out during the biennium 1990-1991 had been measures to rationalize the structure of the Forestry Department. The Policy and Planning Service had been renamed the Forestry Planning and Institutions Service (FODP) and expanded to integrate policy advice and institutional development with the planning function. Beginning in 1992, FODP had been elevated to the category of a Forestry Planning and Institutions Division (FON) in order to strengthen the discharge of its new responsibilities. The Forest Industries Division had been renamed the Forest Products Division so that it could cover the broad range of economic and social services which were generated by forests. TFAP continued to receive the highest priority, which would be more strongly reflected in the 1992-1993 biennium, owing to an increase in the budgetary allotment from \$1.25 million (1990-1991) to US\$ 3.10 million (1992-1993).

52. With regard to activities of world-wide interest, the Forestry Department had contributed actively during 1990-1991 to forestry elements for consideration under conventions on climate change and biodiversity. The Forestry Department had contributed the main technical inputs for discussion of an "international instrument for the conservation and development of forests", which had been proposed by the forestry community in order to encompass those areas not covered by the instruments on climate change and biodiversity. With regard to the United Nations Conference on Environment and Development (UNCED), the Forestry Department had contributed the main technical inputs for the "non-legally binding authoritative statement of principles for a global consensus on the management, conservation and sustainable development of all types of forests" and for the preparation of the forestry component of "Agenda 21". A third activity of major global interest had been the global forest resources assessment which FAO was undertaking; preliminary progress in that area had been reported in 1991.

53. With regard to the programme of work and budget for 1992-1993, while the Conference had approved the Director-General's proposal for a total of US\$676.9 million, it had only appropriated an amount of US\$645.6 million for the period 1992-1993. That implied downward adjustments affecting FAO technical and economic programmes. As indicated earlier, priority would continue to be given to TFAP by the Forestry Department during the biennium. It was also expected that, following UNCED, other priorities would emerge from its programme of action.

54. Among other activities to be carried out in the 1992-93 biennium were the finalization of the synthesis on the evaluation of world resources; continuation of work on genetic resources and the protection of forests; statistics and analysis of trade in forest products; integration of a statistics information system with the World Agricultural Information Centre in order that the data would be available in a legible, computer-readable form, and the concentration of the forest policy element in a greater understanding of the measures that would ensure the contribution of the forestry sector to sustained development.

55. The Commission recognized the development of the FAO programmes but urged the Organization to adopt a more complete approach with respect to sustainable development and its impacts. It recommended that the political, economic and other key topics related to the transition of the current practices towards sustainable development receive special attention in the future on the part of the Forestry Department.

56. The Commission noted with concern that the reduction in the budget of FAO would negatively affect the ability of the Forestry Department to face the growing demands that were imposed by environmental matters of a global nature related to the forests, the political changes in eastern Europe and, in general, the need for greater technical assistance to support developing countries in defining the strategies to be adopted and to practise sustained development.

57. The delegation of Mexico recognized the benefits and positive impacts which had been obtained through the project "Prevention and control of forest fires in the State of Quintana Roo". It noted with concern that insufficient use was made of the numerous technical studies produced by FAO in Mexico, and urged the technicians of the Under-Secretariat to commit themselves to making an exhaustive revision of the existing studies in order to determine their potential application in Mexico.

58. The Canadian delegation pointed out that some strategies to promote sustainable development, such as the recycling of paper, were of special importance, and urged that research and case studies be started in the short term on their potential impact.

REVIEW OF STUDY GROUP ACTIVITIES

(a) Study group on forest tree improvement

59. The Commission was informed of the achievements made by the group in cooperation between countries, technology transfers and exchanges of information, which had resulted in benefits to its member countries. Cooperation had been particularly useful in the work carried out with the research centre of Chapingo, Mexico; research had centred on the conservation and improvement of rare species and species in danger of extinction in Mexico. The current work and future plans had emphasized the development of appropriate species and varieties for reforestation in areas of high ozone pollution and other agents generated by human activities.

60. The study group had suggested that a more active position should be adopted in the area of biodiversity in order to promote that concept. The group had recommended that the governmental agencies responsible for forest management should promote means for supporting biodiversity in forest ecosystems.

61. The Commission welcomed the group's report, noting the excellent work performed and its positive impact. It also welcomed the group's recommendation that activity in the field of biodiversity should be intensified, and recommended that the group continue its work and urged its members to identify funding sources to support the group's future activities.

(b) Study group on fire management

62. The study group reported the results of its twenty-fourth and twenty-fifth meetings, held in Canada in 1990 and in the United States in 1991, respectively. A report was given on the three countries' fire statistics and the members and current authorities of each country.

63. At the fifteenth session, held at San Diego, the Commission had recommended that the training programmes should be continued. That had been implemented through two courses held in Mexico with the cooperation of the United States; 120 students had been trained as instructors

in prevention and firefighting techniques. Likewise, the United States had welcomed a Mexican technician to Oregon for four months, where he had received training in firefighting. Also on the basis of the Commission's recommendation, the journal *Forest Fire News* was continuing to be published by Canada with technical articles contributed by the three countries.

64. *Work in Progress* - FAO publication No. 70 - was being revised over a two-year period with a view to obtaining a new glossary of terms for forest fires. The three countries would exchange information with a view to establishing a data bank of conventions in the field of firefighting which could facilitate joint actions. Canada would advise Mexico on the use of laser disc technology. The United States would develop a seminar on the use of microcomputers with the participation of Mexico and Canada.

65. The Commission approved the group's report and authorized the development in 1992 of a Mexico-Canada and Mexico-United States training programme.

(c) Study group on forest insects and diseases

66. The Commission was informed of the group's activities and, in particular, took note of the joint meeting which had been held, on the basis of mutual interest, with the study group on atmospheric pollution and deposition; the efforts which had led the North American Plant Protection Organization (NAPPO) to create an *ad hoc* panel on policies relating to the gypsy moth and to propose appropriate measures for the North American region; the creation of three study subgroups and the subsequent elimination of two of them; the training of Mexican professionals in the United States and the holding of several seminars.

67. The Commission examined the report, acknowledging the important contributions made by the group and its relevance to the region. It recommended that the group continue its work.

(d) Study group on silviculture

68. The Commission was informed by the chairman of the group of the progress made in its tasks, as follows:

- The *Directory of Tropical Silviculture*, the second edition of which would be published during 1992, with the costs being shared by the member countries;
- The holding in November 1990 of the international workshop on research in silviculture and jungle management, the report of which was in the final revision stage and would be published in 1992 with funds already approved;
- The completion of 63 per cent of the publication *Useful Trees of the Tropical Region of North America* (12 species out of a planned 19), with the rest to be completed in 1992. The agreement to share the costs of the publication was ratified. As there were plans to expand the publication over the next few years, the group was seeking alternative financing from other interested institutions.

The group submitted to the Commission the following new tasks:

- a manual on tropical seeds: the project, which would include format designs, species of interest and resource requirements, was being developed in detail;
- a forum on the environmental impact of forest use in the Mexican tropics, to be held in Chetumal, Quintana Roo, Mexico, in November 1992.

69. The Commission approved the group's report and urged it to continue with its work plan.

70. The Commission approved the group's plan to organize a forum on the environmental impact of forest use in the Mexican tropics and agreed to provide the requisite financial and organizational support from its member countries.

71. Mexico would provide the logistical and local organization for the meeting and support for the Mexican participants. The United States and Canada would provide approximately US\$ 3 000 each to support the participation of outside experts.

72. The Commission requested the group to work on related tasks which could contribute to the search for solutions to prevent the destruction of the jungles due to a lack of economic alternatives for their inhabitants.

(e) Study group on multilingual vocabulary

73. The Commission was informed that the study group had been inactive during the past two years. Such inactivity was due to the fact that the Spanish version had not been completed. The alternate delegate from Mexico had promised the group that the Spanish version would be finalized as soon as possible. The group's representatives underscored the importance of the project to the cooperation programmes between the three countries of the Commission in terms of communication about forestry and the preparation and implementation of international conventions. Once the Spanish version was received, the conversion of the vocabulary into a computerized database would continue.

74. While recognizing the importance of the work and its potential benefits, the Commission noted with concern the current delay. It recommended the restructuring of the group and strongly urged the establishment of a work plan and compliance with the agreed deadlines.

(f) Study group on forest engineering

75. The Commission again recognized the potential of that area of study. It noted that, in the light of the new trade liberalization policies in the region, the study group could play an important role.

76. The Commission observed that, despite those considerations, the instability of the group's membership had prevented it from defining its objectives and formulating a work plan. It recommended that the Committee of Alternates decide, as soon as possible, whether the group should continue its work.

77. The United States delegation stated that appropriate members should be sought for the group, while recommending that the member countries transmit to the Committee of Alternates specific ideas concerning the objectives of the study group.

(g) Study group on atmospheric pollution and deposition

78. The Commission was informed that the group had held two meetings and had made a number of changes in order to fulfil the broad mandate which it had been given at the previous meeting of the Committee of Alternates. The mandate had included everything from acid rain to atmospheric pollution and the discussion of climate change projections. During the meeting in Mexico in November 1990, the group had strengthened its emphasis on monitoring forest health. In the past two years, the group had also, among other activities, promoted the exchange of scientific personnel; published several documents; held a seminar in Mexico on forest monitoring; and established an ozone monitoring site, also in Mexico. Future work would include monitoring forest

health, the finalization of a report on the state of the North American forests and establishing greater cooperation with other study groups. Lastly, it was reported that the group would meet in September 1992 in the United States.

79. The Commission expressed satisfaction at the group's important achievements and the effectiveness of its work. While recommending the continuation of the group's work, it called for closer collaboration with the other study groups, especially that on forest tree improvement.

(h) Study group on light-frame structures

80. The Commission was informed that the principal activity of the group was the preparation of a manual on the construction of light-wood structures. It recommended that the group examine its work programme, keeping in mind the realities of the countries of the region. It likewise recommended that the group explore the possibility of the private sector financing the publication of the manual which was in preparation.

TECHNICAL ITEMS

(a) Global forestry convention as a means to encourage sustainable forest development

81. This subject was introduced by J. S. Maini (Canada) on the basis of a paper which is reproduced as *Appendix D*. Forests are nature's most bountiful and versatile renewable resource. They simultaneously provide a wide range of environmental, economic, social and cultural functions and services, including: ecological cycles (e.g. carbon, oxygen, hydrologic, climate); industrial forest products; food, fibre fodder and shelter for populations living in and around forests; and recreational, spiritual needs of diverse people, including the indigenous populations. The demand for these numerous functions and outputs of forests was increasing with expanding population - and all this from a globally shrinking forest cover. The challenge facing the world community today is to meet the anticipated increase in demand for diverse forest products, outputs and services while conserving forest environment world-wide.

82. Forests have now emerged as one of the priority items on the international policy agenda, particularly in the context of the UN Conference on Environment and Development (UNCED) to be held in Brazil in June 1992 ("Rio '92"). While special interest groups were focusing on a specific role, service or value of forests (e.g. biodiversity, carbon reservoir), the national and international scientific and policy communities faced the challenge of reconciling the contribution of forests to meet national economic and environmental policy objectives, with the global environmental interests of the community of nations. The broad historic, environmental, industrial, social, cultural and geopolitical context surrounding the issue of the conservation and sustainable development of all types of forests world-wide needed to be considered in order to formulate potential policy responses at local, national and international levels.

83. International approach to forest-related issues was currently fractionated and piecemeal. A patchwork of legal instruments at global or regional levels focused on trade in tropical timber, forestry research, protection of certain species and habitats, etc. What is needed is a forests framework that is cohesive, comprehensive, and deals with both the economic and environmental dimensions.

84. Considering the economic, social and environmental significance of forests and the growing momentum supporting an international instrument on forests (IIF), an international agreement to address a wide range of forest-related issues and opportunities would likely evolve in the near future. Conservation and sustainable development of forests world-wide, that harmonized socio-economic and environmental objectives, was at the heart of an IIF. An IIF would provide a cohesive and comprehensive approach to address forest-related issues and opportunities which were national,

regional and global in scope, through collaboration at national, multinational and international levels, respectively. An IIF would reinforce mutually supportive economic and environmental objectives. It would also provide a policy and institutional framework to: facilitate international trade of forest products, particularly those derived from forests managed in accordance with internationally accepted norms; international transfer of assistance in terms of funds and technology; exchange of expertise, knowledge and credible information; informed priority setting process; collective action to address issues and opportunities of common interest, including science and technology; improve forest management world-wide; and strengthen forestry agencies.

85. An IIF would provide complementarity with other international initiatives such as the biodiversity and climate change conventions. The forest components, which will form part of the proposed biodiversity and climate change conventions, and the proposed IIF, were mutually supportive.

86. The need to establish a formal intergovernmental consultation process following UNCED, leading to an IIF, was urgent, and the active involvement of the forestry community in this process crucial to its success.

87. The Commission noted the potential benefits and advisability of an IIF, as well as a need for a more active participation on the part of the forestry community. It recommended that its member countries ensure active participation in PREPCOM IV, at UNCED, and promote greater involvement at the national level of their forestry professionals in the discussions of matters of global importance related to forests.

(b) Watershed management

88. The subject was introduced by Sergio Varela (Mexico) on the basis of a paper reproduced as *Appendix E*. The current state of deterioration of natural resources, especially forest resources, made it necessary to examine their traditional uses in an attempt to discover new bases of support for immediate and future actions through which better results could be achieved.

89. To that end, alternatives had been sought which, although good, were more geared towards solving specific and occasional problems. However, what Mexico needed now was to reformulate a comprehensive strategy which could ensure coherent actions for the rational use and conservation of natural resources, ensuring social well-being in a way that would lead to integral sustained development.

90. One of the strategies which was considered to be viable in achieving the integral management of forest resources was to use the watershed as a model for the planning, management and monitoring of such resources, making use of the interactive relations between the physical, the biotic and the socio-economic environments which existed in watershed systems. The initial assumption should be that each watershed had its own biophysical and socio-economic characteristics, so that the management of each of them should be based on a specific analysis, making it possible to achieve the best solution.

91. The basic premise for such a solution was the resolute and conscious participation of natural resource users; accordingly, any programme or project that was formulated without that consideration would be unable to satisfy fully the objectives of integral use and appropriate management of watersheds, whether in forests, jungles or arid zones.

92. Furthermore, the amendments to article 27 of the Mexican Constitution guaranteed land ownership, promoting greater interest on the part of peasants in conserving their natural resources. The sum of those actions constituted an opportunity to establish coherence in the use and management of such resources.

93. Since 1985, pilot watersheds had been established due to the need to generate experiences in relatively small areas (sub- and micro-watersheds) that can be applied in larger areas for integral management. These projects were for demonstration purposes, but also served for training the personnel and developing methodologies. Although some were in the early stages, principally in the setting-up of basic studies, interesting experiences in methodological aspects and community participation had been obtained. The most advanced areas were those in which physical work had been carried out, which demonstrated what could and should be done.

94. It should be mentioned that the principal causes or limitations in the advancement of watershed management had been the scarcity of human and economic resources, the lack of participation by landowners and users of the natural resources of the watershed, the proper use of practical methodology for planning and managing land use and the need to incorporate the technology of geographic information systems (GIS) to these areas which had not permitted the proper use of the efforts that had been developed. A factor that was equally, or possibly more, important was the difficulty in concerting action among all the institutions and sectors involved in the watershed.

95. Due to the importance of the ecosystems in the principal mountain ranges in northern Mexico and their relationship with those of the Rocky Mountains in the United States and Canada, it was advisable to promote within the framework of NAFC the exchange of experiences and methodologies in watershed management in order to seek the solutions that were best adapted to the conditions of each country.

(c) New perspectives on managing the US national forest system

96. This subject was introduced by Hal Salwasser (United States of America) on the basis of a paper reproduced as *Appendix F*. Americans were concerned about the future of forests; their health, wildlife diversity, productivity for wood, environmental roles and aesthetics. Consequently, the practices of forestry in the United States were changing to address these concerns. The changes had occurred on all forest land ownerships, most especially in the national forest system. However, not all the changes were the same. Some forests were being managed more intensively for wood and wood fiber while others were being managed primarily for non-wood values and uses.

97. Part of the reason for such high concern over forests was that they were great sources of a nation's wealth and well-being (Marsh 1864, Clawson 1979, Perlin 1991). They are a nation's factory for many renewable natural resources. They are vital organs of planetary health. They are playgrounds. They are sources of livelihood and personal identity. They are an important factor in the standard of living that US citizens enjoyed.

98. The fundamental principles of forestry in the US were not changing. Science-based land stewardship, efficiency in the production and conservation of natural resources, and socially-responsive management to meet landowner objectives remained the bedrock of current and future directions in US forestry.

99. The continuing debate about the US forest issues often left an impression of pending environmental doom or the imminent loss of the last great forests in the nation. This was not the case. But there were valid reasons for concern over the conditions of American forests and how society's institutions carried out their management.

100. Forests in the US cover about 32 per cent of the nation's area. This is about two-thirds of what existed prior to European settlement. About 20 per cent of the nation's forested area is managed by agencies of the Federal Government; 15 per cent by forest industries; 8 per cent by agencies of state and local governments; and 57 per cent by non-industrial private landowners.

101. Today, the US is an urban society. More than 90 per cent of the population lives in cities or suburbs. They are divorced from direct contact with the land and have been so for more than a generation. The linkage between the standard of living in the US and productive management of natural resources is poorly understood, especially the role of forest management in providing both environmental and economic benefits.

102. Today, US forests have recovered substantially from their low point at the turn of the century. In the aggregate, forests in the US are now more productive than at any point in the century. In fact, they have been increasing in growth and standing volume since the early twentieth century in response to forest and conservation policy choices and technology improvements.

103. Because American forests are so abundant and productive, the nation can and is protecting more of its forests locally and regionally, both native and restored, for their environmental services, aesthetic values and amenity uses. The area of productive forest land in parks, wilderness areas and similar reserves in which timber harvest is prohibited has increased significantly in recent years. About 14 million hectares (34 million acres) of productive forest lands in the US have now been designated for non-timber values and uses, nearly double the area in such designations in 1970.

104. Given the foregoing, what are the appropriate factors to consider in sustaining forests for their desired uses, values and environmental services? What mechanisms and incentives should be in place to induce the desired conditions, uses and values of these forests? The first challenge, of course, is to seek to better understand the relevant linkages between people, natural resources, environmental services, and standards of living. The second is to find ways to articulate and frame those linkages and their implications so that people can make truly informed choices through their democratic processes.

105. The difficulty of obtaining public understanding of the full dimensions of forest policy choices are significant. For example, some relevant considerations that are seldom discussed include: how much and where should forests of all ages and types be sustained to protect environmental values and how much and where might they contribute forest products to local, regional, national and global human communities? This question does not inherently imply that an either/or, protect or produce, choice must be made in all cases. Forest management options are being developed to supply combinations of these goals in many circumstances.

106. Strategic direction for managing the national forest system is set for five-year periods under the Resources Planning Act (RPA) of 1974. The current version, the 1990 RPA Programme, identifies four themes and 19 contemporary issues for attention. The balance of management investments among the various multiple uses is being improved through increased attention to recreation, wildlife and fisheries resources. Commodity production programmes are being examined and adjusted when necessary to ensure that they are sensitive to environmental protection standards. Research on natural resources and how ecological systems function is being increased. And research, resource management, technical assistance and international programmes are addressing global resource issues. Each of these themes represents a commitment to the long-term health, diversity and productivity of the land.

107. The challenges in sustaining richer forests in the face of a growing human population calls for renewed vigour in pursuit of the ideals of conservation, land stewardship and multiple use management. They also call for renewing the sense of community between the people, the land and the resources of life.

108. The direction for managing the US national forest system during the 1990s emphasizes greater attention to sustaining ecological systems for a wider variety of current and future benefits and uses. It opens the decision-making process to greater participation by people in making choices

on what to do about their resources. It brings scientists and resource managers into stronger partnerships on adaptive land and resource management. And it seeks better integration of all aspects of a comprehensive conservation strategy. It is a new perspective on what multiple use means.

FOLLOW-UP TO THE RECOMMENDATIONS OF THE FIFTEENTH SESSION OF THE COMMISSION

109. The Secretariat presented the report on the actions taken on the recommendations of the fifteenth session. The Commission acknowledged the Organization's efforts and achievements. However, it noted with concern that the progress made still fell far short of the requirements and the role which the forestry sector should play in sustained development.

110. The Commission recognized that the economic, environmental, social and cultural significance of all types of forests world-wide had risen dramatically among the community of nations. In this context, it expressed disappointment that, in spite of repeated recommendations, FAO's current budgetary allocation to the Forestry Department was completely incompatible with the global significance of the forestry sector. It also noted with great concern that the budgetary allocation to the Forestry Department had been significantly reduced following the approval by the FAO Conference of the programme of work and budget for 1992-93. The Commission considered that the lack of priority to forestry issues and opportunities was recurring, and strongly recommended that FAO take explicit and demonstrably effective measures to increase the international profile of the Forestry Department. It also felt that without such measures the Department would continue to lose its global leadership role due to lack of support.

111. Lastly, the Commission recommended that its concerns be followed up through its countries' representatives to the FAO Council and by means of recommendations to the FAO administration.

MATTERS TO BE REFERRED TO THE COMMITTEE ON FORESTRY

112. The Commission decided that its recommendations and conclusions be brought to the attention of the Committee on Forestry.

BUSINESS OF THE COMMISSION

(a) United Nations Conference on Environment and Development (UNCED)

113. A brief historic overview of the events that preceded UNCED, its objectives and main results expected was presented by Jagmohan Maini (Canada). Twenty years after the UN Conference on Man and the Environment, held in Stockholm in 1972, UNCED will take place in Rio de Janeiro in June 1992. Many changes had taken place since 1972, such as increased population and poverty in certain areas, emergence of global-scale environmental issues (e.g. biodiversity and climate change) and of new countries, trading blocks and alliances. The Brundtland Commission's Report *Our Common Future* highlighted the need to promote sustainable development and had provided the impetus to hold UNCED. About 100 heads of state were expected to attend the Conference.

114. Preparations for the Conference were under way through four meetings of the Preparatory Committee. The current agenda for UNCED was extensive and complex. The profile of the forests issue was increasing significantly, having started as a concern for "combating deforestation" and evolved to the formulation of an "authoritative statement on the guiding principles on the management, conservation and sustainable development of forests world-wide". Many countries were interested in establishing formal UN mechanisms to negotiate an international convention on

forests following UNCED and there was an urgent need for increased involvement of the forestry community in these deliberations as well as for preparing "Agenda 21: Forestry", that was politically attractive to the world leaders gathering at "Rio '92".

115. The UNCED outcome about an earth charter, "Agenda 21" and guiding principles on forests were mentioned as matters of special interest for the Commission. Mr Maini underlined the importance of the discussions and negotiations being held at the PREPCOM meetings and mentioned that, very probably after UNCED, new financial mechanisms, processes of technology transfer and new institutional arrangements would be developed. The region should be prepared for the new developments in the forestry sector. A greater participation by foresters was desirable in the PREPCOM meetings, and it was suggested that the forest services of NAFC countries coordinate their participation with respective foreign ministries.

116. The Commission took note of Mr Maini's presentation and recommended that its member countries make a special effort to participate actively in forestry-related issues at UNCED preparatory meetings.

(b) Implementation of the Tropical Forests Action Programme in Mexico

117. In July 1991, at the request of the President of Mexico to arrest deforestation in tropical Mexico, a group of experts analysed the background of TFAP-Mexico and the ideas that had emerged from the international consensus on the effective role of TFAP. As a result, it was decided that a new working group should be created to take up again the work that had been done and to give it a new approach other than the original one of only having a plan. This consisted of setting up a programme of action for tropical forests (PROAFT) in the future in which the policies to be followed at medium and long term should be indicated to put an effective stop to deforestation.

118. In the preparation of PROAFT-Mexico it will not be necessary to wait to have a definite programme for advancement. It had been established that specific actions could be undertaken with the Mexican international sponsors to help gather the data needed to develop the long-term global programme. At the same time, this strategy allows advancement in the preparation of PROAFT without the assurance of total financing. This will create a favourable climate for PROAFT long-term funding and help Mexico to move one step ahead towards a more integral programme for the tropics. In other words, Mexico wished to become a part of TFAP in accordance with a new type of proposition. To design a long-term programme that would ensure the future of tropical zones, a preliminary phase was needed to:

- obtain accurate information on previous programmes which document the major projects undertaken in the Mexican tropics;
- identify the different interests involved in jungle areas;
- establish mechanisms to allow working directly with local communities.

119. PROAFT had as a global objective the effective arrest of the loss of tropical forests while promoting their sustainable use through the management, protection and recovery of jungles and tropical areas responding to local and national requirements in the interest of present and future generations.

120. It had been proposed that the programme of work of PROAFT be finalized in 1992.

121. The Commission recognized the broad scope adopted in the preparation of PROAFT, the importance of it for the sustainable use of its tropical forest resources, and urged its members and FAO to cooperate in the process of the preparation of PROAFT in Mexico.

(c) Cooperation with the European Forestry Commission (EFC)

122. This item was introduced by Mr Gauthier. The Commission noted with interest the wide range of possibilities for cooperation between the two Commissions and, in particular, the number of important international activities being developed by EFC.

123. On the question of greater collaboration between the two Commissions, the risk of overlapping was noted; however, the Commission considered that it would be useful to have more details of the activities and programmes being developed by EFC and recommended that NAFC be represented at the next session of EFC.

(d) Other business - None

(e) Election of officers

124. The following officers were elected by the Commission to hold office during the forthcoming biennium, the Vice-Chairmen being nominated in accordance with Rule II.1 of the Commission's Rules of Procedure:

Chairman:	J. C. Mercier (Canada)
First Vice-Chairman:	F. Dale Robertson (United States of America)
Second Vice-Chairman:	M. Mondragón y Kalb (Mexico)

The Commission designated Jagmohan Maini as Chairman of the Committee of Alternates.

(f) Date and place of next session

125. Canada invited the Commission to hold its next session in 1994 in the Province of Alberta. The Commission thanked Canada for its kind invitation and agreed that exact dates would be determined in consultation with the Director-General of FAO.

(g) Adoption of report

126. The draft report submitted to the Commission was adopted, with some minor amendments that have been incorporated into the current document.

CLOSING OF THE SESSION

127. The heads of the Canadian and US delegations thanked the Government of Mexico and the State of Quintana Roo for the excellent arrangements made for the session, the field trip and the hospitality offered. Mr Gauthier expressed thanks on behalf of the Director-General of FAO, and the Chairman thanked FAO, the secretariat and the delegates for their contribution to the success of the session.

AGENDA

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2. Adoption of the Agenda
3. State of Forestry in the region
 - (a) Canada
 - (b) Mexico
 - (c) United States of America
4. Report of the Committee of Alternates
5. FAO forestry activities of interest to the region
6. Review of Study Group activities
 - (a) Study Group on Forest Tree Improvement
 - (b) Study Group on Fire Management
 - (c) Study Group on Forest Insects and Diseases
 - (d) Study Group on Silviculture
 - (e) Study Group on Multilingual Vocabulary
 - (f) Study Group on Forest Engineering
 - (g) Study Group on Atmospheric Pollution and Deposition
 - (h) Study Group on Light-frame Structures
7. Technical items
 - (a) Global forestry instrument as a means to encourage sustainable forest development (Canada)
 - (b) New perspectives in forestry (United States of America)
 - (c) Watershed management (Mexico)
8. Follow-up to the recommendations of the fifteenth session of the Commission
9. Matters to be referred to the attention of the Committee on Forestry
10. Business of the Commission
 - (a) United Nations Conference on Environment and Development
 - (b) Implementation of the Tropical Forestry Action Programme in Mexico
 - (c) Cooperation with the European Forestry Commission
 - (d) Other business
 - (e) Election of officers
 - (f) Date and place of next session
 - (g) Adoption of the report
11. Closing of the session

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LIST OF DOCUMENTS

<u>Agenda item</u>	<u>Code</u>	<u>Title</u>
2	FO:NAFC/92/1	Provisional agenda
3(a)	FO:NAFC/92/2(a)	State of forestry in Canada
3(b)	FO:NAFC/92/2(b)	State of forestry in Mexico
3(c)	FO:NAFC/92/2(c)	State of forestry in the United States of America
4	FO:NAFC/92/3	Report of the Committee of Alternates
5	FO:NAFC/92/4	FAO forestry activities of interest to the region
6(a)	FO:NAFC/92/5(a)	Report of Study Group on Forest Tree Improvement
6(b)	FO:NAFC/92/5(b)	Report of Study Group on Fire Management
6(c)	FO:NAFC/92/5(c)	Report of Study Group on Forest Insects and Diseases
6(d)	FO:NAFC/92/5(d)	Report of Study Group on Silviculture
6(e)	FO:NAFC/92/5(e)	Report of Study Group on Multilingual Vocabulary
6(f)	FO:NAFC/92/5(f)	Report of Study Group on Forest Engineering
6(g)	FO:NAFC/92/5(g)	Report of Study Group on Atmospheric Pollution and Deposition
6(h)	FO:NAFC/92/5(h)	Report of Study Group on Light-frame Structures
7(a)	FO:NAFC/92/6(a)	Global forestry instrument as a means to encourage sustainable forest development
7(b)	FO:NAFC/92/6(b)	New perspectives in forestry
7(c)	FO:NAFC/92/6(c)	Watershed management
8	FO:NAFC/92/7	Follow-up to the recommendations of the fifteenth session of the Commission
10(c)	FO:NAFC/92/8	Relevant activities of the European Forestry Commission and possibilities for cooperation

Information documents

FO:NAFC/92/Inf. 1	Information Note
FO:NAFC/92/Inf. 2	Provisional timetable
FO:NAFC/92/Inf. 3	List of documents

TOWARDS AN INTERNATIONAL INSTRUMENT ON FORESTS

BACKGROUND PAPER ¹

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EXECUTIVE SUMMARY

This background document attempts to provide a broad context within which the issue of the sustainable development and conservation of forests has emerged as a priority on the international policy agenda. The challenge facing the world community today is to meet the anticipated increase in demand for forest products while conserving forest environment world-wide.

International approach to forest-related issues is currently fractionated and piecemeal. A patchwork of legal instruments at global or regional levels focus on trade in tropical timber, forestry research, protection of certain species and habitats, etc. What is needed is a forests framework that is cohesive, comprehensive and deals with both the economic and environmental dimensions. Considering the economic, social and environmental significance of forests and the growing momentum supporting an International Instrument on Forests (IIF), an international agreement to address a wide range of forest-related issues and opportunities will likely evolve in the near future. Conservation and sustainable development of forests world-wide, that harmonizes socio-economic and environmental objectives, is at the heart of an IIF. An IIF will provide a cohesive and comprehensive approach to address forest-related issues and opportunities which are national, regional and global in scope, through collaboration at national, multinational and international levels, respectively. An IIF will reinforce mutually supportive economic and environmental objectives. It will also provide a policy and institutional framework to: facilitate international trade of forest products, particularly those derived from forests managed in accordance with internationally accepted norms; international transfer of assistance in terms of funds and technology; exchange of expertise, knowledge and credible information; informed priority setting process; collective action to address issues and opportunities of common interest, including science and technology; improve forest management world-wide; and strengthen forestry agencies.

An IIF will provide complementarity with other international initiatives such as the Biodiversity and Climate Change Conventions. The forest components, which will form part of the proposed Climate Change and Biodiversity Conventions, and the proposed IIF, are mutually supportive. This process towards an IIF should not impede that of the other two initiatives.

The need to establish a formal intergovernmental consultation process, leading to an IIF, is urgent, and the active involvement of the forestry community in this process crucial to its success.

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¹ Preparation of this background paper has benefited from comments and suggestions from colleagues from Cameroon, Canada, Germany, Sweden and Thailand. The ideas expressed in the document do not in any way reflect the official position of these countries.

The main purpose of this background paper is to stimulate discussion on a topic that needs urgent international action. The author takes full responsibility for its contents and is thankful to Mr J. C. Mercier, Deputy Minister, Department of Forestry (Canada), and Ambassador O. Ullsten (Sweden) for their valuable suggestions and contribution of ideas on this subject.

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TOWARDS AN INTERNATIONAL INSTRUMENT ON FORESTS

BACKGROUND

Forests are nature's most bountiful and versatile renewable resource. They cover a substantial part of the earth's surface (Annex I), are indispensable to the survival of humanity and they meet a wide range of economic, social, environmental, cultural and spiritual needs.

Economically, forests are a major source of development, industrial activity and employment in many countries around the world (Annex II). With economic development, the demand for wood products also increases to meet the industrial, social and cultural needs of a society. Wood products are environmentally friendly, biodegradable and many are recyclable.

Environmentally, the role of forests as provider of wildlife habitat, in soil and water conservation and in local and regional climatic stability are well recognized. More recently, their significance in global carbon, oxygen, nitrogen, hydrological and climatic cycles is receiving increased world-wide attention. The importance of forests in maintaining the desirable biodiversity for the production of, *inter alia*, food, fibre and pharmaceuticals is generally gaining prominence.

Socially, forests are important for the maintenance of social and cultural diversity, particularly for people living in and around them. Indeed, in some instances entire communities depend on forests for their survival.

New forests can be developed to serve as a vehicle for sustainable development both for the subsistence and welfare of local communities, as well as for forest industries to serve national and international markets.

The use of forests by inhabitants in developed countries has shifted with changing socio-economic needs and evolving technological capacities. Historically, forests served as a major source of food, fibre and shelter in pre-agricultural societies. Subsequently, large tracts of forestland were harvested and cleared to meet the need for economic development and capital generation and to create arable agricultural land to produce additional food for an expanding population. This same sequence of events, described above for developed countries, is now being repeated in many developing countries, perhaps at a considerably faster pace and with increasingly powerful technologies. At the same time, the effect of the tropical, boreal and temperate forests on environment is receiving world-wide attention, particularly in developed countries.

There is now increased recognition of a need to shift our approach to forestry from "sustainable yield" aimed at maintaining an annual flow of wood to "sustainable development" which takes into account both economic output (wood) and environmental outputs (wildlife habitat, soil and water conservation). Attaining this shift in the outputs and values would also involve an associated shift from "forest management" to "forest ecosystem management".

During the past two decades, the scale, scope and complexity of environmental issues have been increasing from local and national to regional and global levels. Within this broad context, forest-related economic and environmental issues have recently emerged as a priority on the agenda of world leaders. This is because of the concern for and the need to:

- i) satisfy the anticipated increase in demand for forest products from a rapidly growing world population and for other forest-based economic, environmental, social, cultural and spiritual values in a sustainable manner while recognizing the roles and rights of those who depend on forests;
- ii) facilitate orderly and free international trade in forest products;

- iii) address the issue of constantly shrinking forest cover and the consequent soil erosion, general environmental and watershed degradation, loss of biodiversity and wildlife habitat and increase in the concentration of greenhouse gases. Tropical and sub-tropical forests have received particular attention in this context;
- iv) protect forests world-wide because of their impact on the environment regarding global carbon, oxygen, nitrogen, hydrological and climatic cycles;
- v) protect and conserve forests for their biodiversity and heritage value;
- vi) expand the global forest cover and forest biomass to increase the terrestrial carbon reservoir (by sequestering atmospheric carbon dioxide) and to increase the concentration of atmospheric greenhouse gases. Forest harvesting and deforestation are neither the main cause of the anticipated global warming, nor are reforestation and afforestation the principal solutions. The role of boreal, temperate and tropical forests, in the global carbon cycle, is now receiving special world-wide attention;
- vii) counteract forest soil acidification and forest decline associated with airborne pollutants, in most industrialized countries, particularly in Europe;
- viii) protect forests from the negative impacts of the anticipated global warming.

It is important to note that the right of sovereign nations to conserve, manage and utilize forest resources within their jurisdiction is unquestioned and must continue to be recognized universally. However, with the recognition of sovereignty follows responsibility to consult and cooperate with other nations on the global and transboundary levels. It also involves responsibility to maintain and develop the productive capacity and ecological diversity of land to be inherited by future generations. In an increasingly interconnected and interdependent world, the transboundary and global environmental consequences of forest-related activities in individual countries have evoked interest and concern in neighbouring countries and in the global community. Consequently, through mutual agreement, financial and technical assistance, investment and trade arrangements, nations, both individually and collectively, are searching for an appropriate framework to cooperate and assist in the conservation, management, development and utilization of forests at both the regional and global levels.

The forestry community² around the world now faces the challenge to meet the anticipated increase in demand for forest products, while responding to the need to maintain other values associated with the forest, including those related to the environment. Sustainable development and conservation of forests that harmonizes both the economic and environmental benefits is the most pressing challenge facing forest managers and forest policy makers at national and international levels.

EXISTING INTERNATIONAL FOREST-RELATED INSTRUMENTS DEALING WITH GLOBAL ENVIRONMENTAL CONCERNS

Several international legal instruments which relate to forests are currently in force. These international instruments (Annex III) may be divided into three categories:

- i) instruments dealing exclusively with forests;
- ii) instruments dealing with forests within the context of natural resources conservation and management including wildlife and wildlife habitat; and

² Forestry community includes professional foresters, forest scientists, forest policy makers and all those engaged in the protection, management and utilization of forests.

- iii) instruments dealing with pollution control which impact on forests.

These conventions and agreements focus on specific aspects of forests such as trade in tropical timber, forestry research, the protection of endangered species, and the protection of certain types of forest environment such as wetlands. Others are regional in scope and attempt to set general guidelines for forest development and conservation within the overall framework for the conservation of nature and natural resources. The lack of a proper framework at the global level to deal with all types of forests and all aspects of forest management and the absence of an international consensus on policies and targets to be applied in forest development and conservation has resulted in increased pressure on the world's forest resources. This, coupled with increased attention to the economic and environmental values of this renewable resource, exacerbate the problem.

PROPOSED INTERNATIONAL FOREST-RELATED INITIATIVES

A number of international initiatives are being prepared for the UN Conference on Environment and Development (UNCED) to be held in Brazil in 1992 ("Brazil '92") and will have a significant impact on the conservation, management, utilization and development of forests wherever they are found. Those of particular interest include:

- i) a possible protocol on forests in the proposed framework of the International Convention on Climate Change (ICCC). This would deal with the need to increase the role of global forests as a carbon reservoir;
- ii) a possible protocol on forests in the proposed International Convention on Biodiversity (ICB). This would deal with the need to protect forests around the world as a rich source of genetic material and as wildlife habitat;
- iii) an International Instrument on Forests - IIF - ("Instrument" covers a wide range of forms including: Declaration; Charter; Agreement; Framework Convention; Convention) which is expected to promote sustainable development and conservation of forests and provide a comprehensive framework to formulate mutually supportive, current and future, forest-related international initiatives.

While work on the Climate Change and Biodiversity Conventions has been in progress since 1988, the IIF has emerged on the scene rather recently (Annex IV). A forest convention was proposed in the June 1990 Report (the "Ullsten Report") prepared by the Independent Review Committee on the Tropical Forestry Action Plan (TFAP) established by FAO. The idea received significant political support in the Houston Declaration, signed in 1990 by the G-7 leaders and by the President of the European Commission. Also, the Houston Declaration expanded the initial focus on tropical forests to include temperate and boreal forests. Thus, global forests emerged prominently on the international political agenda. While there is a varying degree of support for the proposed IIF (i.e. enthusiastic to some reservation), the initiative has received attention in many international fora, including the following:

- The European Council, at its meeting in Dublin in June 1990, requested the European Commission to formulate proposals to deal with the threat to the tropical forests, in consultation with the concerned countries.
- The first Preparatory Committee meeting for "Brazil '92", held in Nairobi in August 1990, requested the UNCED Secretariat to provide further information and analysis on a wide range of forest-related issues. This initiative will be reviewed at the second Preparatory Committee meeting to be held in Geneva during 18 March to 5 April 1992.
- The Japanese Government, at the first PrepCom Meeting of UNCED in August 1990, proposed an international Charter for World's Forests.

- In October 1990, the ASEAN Ministers of Agriculture and Forestry agreed to contribute towards the preparation of a comprehensive report on forestry as requested by the first PrepCom Meeting of UNCED.
- Both the Forestry Task Force Report and the "Conference Statement" at the second World Climate Conference, held in Geneva during 29 October to 4 November 1990, recognized the need for an IIF. The Ministerial Declaration following the second World Climate Conference recommended that "the protection and management of boreal, temperate and sub-tropical forest ecosystems must be well coordinated".
- FAO became the first UN Agency to endorse the concept of an international instrument on the conservation and development of forests when the FAO Council met in November 1990 and agreed that FAO would make substantial contributions to the elaboration of such an instrument.

TOWARDS AN INTERNATIONAL INSTRUMENT ON FORESTS

Forest-related economic and environmental issues are high on the international policy agenda. In addition to the proposed international conventions on biodiversity, climate change and forests, a number of international initiatives impacting on forests are either already in existence or envisioned (see Annex V, bottom). At present, there exists a patchwork of legal instruments at global or regional levels addressing various aspects of forestry, including trade in tropical timber, research and protection of species and specialized habitats.

Need

Forest-related issues are, however, being addressed in a fractionated, piecemeal manner. In view of the overwhelming economic, environmental and social significance of forests at local, national, regional and global levels, forest-related issues need to be treated within a cohesive and comprehensive forests framework which accommodates economic, environmental, social and cultural dimensions.

In view of the anticipated investments in the protection, management and development of the world's forests, more effective disbursement of larger international forestry assistance funds, technologies and knowledge, and various forest policy objectives must be harmonized and mutually supported through international or multinational consensus, collaboration and cooperation. Addressing forest-related issues in a fractionated manner is inefficient, not cost effective and undesirable. Furthermore, it is imperative and technically possible to harmonize social, economic and environmental dimensions of forests. An IIF promoting the sustained development and conservation of forests would provide the necessary policy and institutional framework to guide international collaboration and collective action to accomplish this.

Scope

Conservation and sustainable development of forests world-wide, i.e. the harmonization of economic and environmental objectives, is at the heart of an IIF. Such an IIF will provide the necessary policy as well as institutional framework for international consensus and collaboration. There are several possible approaches to address the issues and opportunities related to the sustainable development and conservation of forests around the world. A conceptual framework based on a "geographic approach" is elaborated below.

Forest-related issues and opportunities may be dealt with on at least three geographic scales, i.e. (i) national, (ii) regional and (iii) global, that require response at the corresponding (i) national, (ii) multinational and (iii) international levels, respectively. This geographic approach with a few examples is described below:

i) National Issues and Opportunities

Socio-economic: balancing of macro-economic and trade issues with micro-economic and subsistence considerations to ensure local benefits, involvement and support.

Policy and information: formulation, implementation, assessment and revision of national forest and related policies within the framework of national economic, environmental, social and cultural objectives, incorporating national equity and participatory approaches.

Environment: ensuring a cross-sectoral approach on environmental issues that would on the one side allow for nature conservation and on the other side for sustainable utilization of forests for traditional wood products as well as non-wood products.

ii) Regional and Transboundary Issues and Opportunities

Socio-economic: collaborative management of widespread outbreaks of insects, diseases and fires in contiguous countries, by sharing expensive suppression technologies; developing regional monitoring and early warning systems for insects and disease epidemics and forest fires, and optimizing resource production and its rational use, including industrial utilization, in recognizing the biological and industrial capabilities of contiguous nations.

Policy and information: formulation of complementary policies for mutual benefit; provision of timely and credible information on forests and forest-related issues; sharing of technologies, knowledge and monitoring systems.

Environmental: the management of forests in the conservation of international watersheds as well as of wildlife habitat, particularly of species that migrate across national boundaries; prevention of transboundary airborne pollutants that cause soil acidification and forest decline; collaboration for the protection of the biodiversity in contiguous states.

iii) Global Issues and Opportunities

Socio-economic: provide the basis to facilitate international trade in forest products, particularly from forests managed under internationally recognized forestry norms. These norms would have to be formulated by international consensus. Forest management guidelines developed by ITTO could be used as a starting point.

Policy and information: provision of credible and timely information on the state of the world's forests to permit sustainable forestry practices; harmonization of policies; priority setting; transfer of funds and technologies; and sharing of knowledge.

Environmental: research on global environmental issues associated with the role of forests in global carbon, nitrogen, hydrological and climatic cycles; conservation of biodiversity; formulation of strategies to respond to global warming.

The series of complex issues and opportunities described above are intrinsic and would require collaborative and mutually supportive action at the (i) national, (ii) multinational and (iii) international levels.

Benefits and Activities

Depending on the consensus among the participating countries on the scope, an IIF could provide a policy and institutional framework to accomplish a wide range of benefits and activities, including:

- sustainably develop and conserve the world's forests (perhaps through a statement of guiding principles); improve forest management; strengthen relevant forestry agencies to promote sustainable development; derive multiple benefits from various forest-related activities on the three geographic scales referred to above; establish priorities at the national and through consensus at the multinational and international levels;
- establish institutional arrangements to foster action at national, multinational and global levels; permit transfer of financial and technical assistance; exchange knowledge and expertise; and collaborate on research and development;
- establish, through consensus, internationally accepted norms of sound forestry practices;
- facilitate the flow of forest products in international trade particularly those that come from forests managed in accordance with internationally accepted norms;
- undertake informed priority setting and cooperative activities, such as participating countries, by monitoring, assessing and generating credible and timely information on the state of the world's forests;
- ensure coherence and complementarity with existing and planned legal and other initiatives such as climate change and biodiversity.

Legal Form

The international momentum behind some form of an-IIF is growing and there is every likelihood that eventually there will be an IIF. What needs to be explored is the range of options available so that consensus may be sought on the form most acceptable. Choices could include a Declaration, Charter, Agreement, Framework Convention or Convention. Two basic categories may be considered:

- 1) The first would be a formal legal convention which would impose legally binding commitments on contracting parties. These commitments could be general and hortatory (i.e. make best efforts to...) as in the 1985 Vienna Ozone Convention or they could be specific targets and schedules (i.e. reduce by X per cent by Y date) as in the 1987 Montreal Ozone Protocol. Like the two ozone instruments, a legally binding forest convention could be drafted with general commitments which would then permit the negotiation of more specific protocols at a later date.
- 2) The second would be a political charter or declaration of principles agreed to by all the members of the international body that negotiated the text. Such a charter would then provide guidelines for conduct. Countries that participated in promulgating the charter would be morally or politically obliged to follow its guidelines, but legal obligations would not be established between the contracting parties. The UN's 1982 World Charter for Nature or UNEP's 1985 Montreal Guidelines on Land-based Sources of Marine Pollution are two examples of this approach.

The above may be described as the "hard law" and the "soft law" options. The hard law option clearly registers a greater degree of commitment on the part of governments and makes clear which states consider themselves bound by its provisions and which do not.

A third approach could be considered ranging between a full international treaty and a simple charter or declaration of principles. The form of a legally binding convention, which would be maintained, requiring state ratification and formal membership. However, a high level of voluntarism could be introduced into the convention; signatory states could be allowed to set their own targets. This would facilitate negotiating its provisions and permit a smaller number of ratifications before it comes into force.

Process

One can formulate elegant conceptualization and visionary objectives that would lead to the conservation and sustainable development of world's forests. The real challenge, however, lies in developing a common understanding of the issues and opportunities and in developing concepts, guiding principles and a vision which are shared by most participants. This shared vision has to be developed by consensus and not by coercion; the collective action has to be undertaken firstly and mainly through incentives and benefits and not through punitive actions, and by cooperation and not confrontation. The consensus building process is a valuable product by itself.

Following an international agreement to draft an IIF, the scope and intergovernmental process leading towards it will have to be defined. There are at least four options concerning the process leading towards an IIF:

1. A decision by the Preparatory Committee of UNCED at its second session to approve the concept of an IIF and to start a process of negotiations for such an instrument, aiming to have it signed at the 1992 UNCED. For the negotiation process, the PrepCom could request a UN agency (or a consortium of UN and other intergovernmental agencies, with one agency having the lead responsibility) to provide an "*ad hoc* IIF Secretariat" to a single intergovernmental negotiating body. The Secretariat will serve the participating countries by organizing and negotiations, and by providing administrative services and substantive inputs when requested by participating countries.
2. If consensus on the concept of an IIF cannot be reached at UNCED PrepCom II, then the issue could be taken up at the June 1991 session of the FAO Council for a decision to start a negotiation process which would be open to all nations and serviced by the FAO Secretariat in close cooperation with other relevant agencies. Such a structure would mirror that of the International Convention on Biodiversity. In comparison with option 1, one of the negotiation sessions prior to the 1992 UNCED would have to be dropped due to lack of time.
3. The UNCED PrepCom III could take the decision to begin negotiations at the third session in New York in August 1991. In comparison with option 1, the opportunity for two negotiation sessions prior to UNCED 1992 would be lost.
4. Another alternative would be to launch the initiative in the General Assembly of the United Nations (UNGA) in autumn 1991. A decision by UNGA to start a negotiation process and establish a secretariat servicing the negotiations would resemble the model created for negotiating the International Convention on Climate Change. In comparison with option 1, we would lose time for three negotiation sessions prior to UNCED 1992 (Annex IV).

Funding of the negotiating process

Consideration should be given to securing adequate funds to support a convention secretariat and the participation of representatives from the developing countries. Two drafting sessions involving about 10 participants from developing countries would require about US\$ 75,000 each. Four negotiation sessions, including costs for about 100 participants from the developing countries, would require about US\$ 500,000 for each session. The total cost is estimated to be about US\$ 2.2 million. Holding negotiation sessions outside the "UN Capitals" would involve additional costs, approximately US\$ 200,000 each session.

CROSS LINKAGES BETWEEN THE PROPOSED CLIMATE CHANGE, BIODIVERSITY AND FORESTS CONVENTIONS

At least three aspects of cross linkages, namely, biological, process and legal, between the three international initiatives need to be considered. From a biological perspective, forests are seen as a source of economic development and an important terrestrial carbon reservoir as well as a rich source of biodiversity. The common denominator among the three proposed conventions is the

trees and forest ecosystems; the same trees and forest ecosystems can and do provide other functions as well: soil and water conservation, bioenergy, fibre, fodder, wildlife habitat to name a few. For example, a tree planting program in support of the Climate Change Convention may be undertaken on the watershed of an international river. The multiple benefit of this rather simple action would be the creation of a carbon reservoir, rehabilitation of a watershed and associated soil and water conservation through bi-national and multilateral cooperation. The choice of plantation species could further enrich this initiative by utilizing species that provide other benefits (e.g. food, wildlife), even if it results in accepting somewhat reduced biomass production. These trees can eventually be harvested to meet local and national economic needs such as fuel and fibre.

Depending on the primary and the secondary objectives, and the creative choice of sites and species, it is possible to attain multiple economic, environmental, social and cultural benefits from the anticipated investments in forestry. Focusing narrowly on an initiative having only a single purpose would preclude deriving many potential benefits. Given appropriate policies and institutional framework at national and international levels, professional and technical forestry experts can ensure delivery of multiple services from forest ecosystems. It is therefore crucial that the forestry community be actively engaged in this initiative to help formulate and manage the international forests agenda.

There is a need to formulate coordination mechanisms that would ensure that the process of negotiation and the content of the three conventions is mutually supportive. Also, there is a need to determine legal cross-connections between the three initiatives. For example, is it feasible to formulate forests protocols under the Climate Change and Biodiversity Conventions that are also included in the International Instrument on Forests?

Last, but not least, if the reason that the forest disappeared in the first place is not removed, any plantation effort will have little or no long term effect. Since subsistence necessities is a common if not prevailing such reason, the local population must at least perceive that, firstly, the benefits of the plantation is going to be equitably distributed and, secondly, that their customary rights are not infringed. Any protocol that does not incorporate these fundamental developmental and social dimensions would not be efficient, and most likely unsuccessful.

WILL THE INTERNATIONAL INSTRUMENT ON FORESTS IMPEDE PROGRESS ON THE BIODIVERSITY AND CLIMATE CHANGE CONVENTIONS?

The current work on the drafting and negotiation of the other two conventions can proceed without any interruption. What is urgently needed is to set up a formal institutional mechanism and a process to start formal intergovernmental consultations on an IIF. The first priority for an intergovernmental working group would be to formulate a set of guiding principles and general objectives that accommodate both the economic and environmental dimensions in a mutually supportive manner. These economic and environmental dimensions would be reinforced by special actions and guidelines when dealing with more specific objectives such as carbon sequestering and conservation of biodiversity. An IIF should provide the necessary linkage between biodiversity, carbon sequestering and the sustainable development and conservation of forests.

Launching a process leading to an IIF is not expected to impede the progress on the proposed Biodiversity and Climate Change Conventions. Objectives of the three conventions are mutually supportive and complementary.

CONCLUSION

UNCED 1992 has provided a unique opportunity to expedite work on the sustainable development and conservation of world's forests, the improvement of forest management world-wide and the strengthening of forestry agencies. An IIF would provide the necessary policy and institutional framework and the technical basis for unimpaired international trade in forest products; collaborative international action; international transfer of funds and technologies; and sharing of knowledge and expertise. There is an urgent need to establish a formal intergovernmental process to attain these objectives. Close involvement of the forestry community in every aspect of this initiative is crucial to its success.

**THE MOST IMPORTANT COUNTRIES OF THE WORLD
IN TERMS OF FOREST AREA IN 1980**
(in decreasing order)

Country	Forest area (in million hectares)	% of total world forest area
1. USSR	739.9	20.53
2. Brazil	518.3	14.38
3. Canada	264.1	7.33
4. USA	226.4	6.28
5. Zaire	177.6	4.93(= 53.45%)
6. China	127.8	3.55
7. Indonesia	118.8	3.30
8. Peru	70.7	1.96
9. Bolivia	66.8	1.85
10. India	59.3	1.65
11. Angola	53.8	1.49
12. Colombia	51.8	1.44
13. Mexico	48.5	1.35
14. Sudan	47.8	1.33
15. Argentina	45.1	1.25
16. Tanzania	42.1	1.17
17. Papua New Guinea	38.2	1.06(= 74.85%)

Seventeen countries account for three-quarters of the total forest area of the world.

- (3) Between 30 and 38 million ha of forests: Venezuela, Botswana, Central African Republic.
- (6) Between 20 and 30 million ha of forests: Congo, Gabon, Zambia, Sweden, Japan, Malaysia.
- (16) Between 10 and 20 million ha of forests: Chad, Guinea, Madagascar, Mozambique, Nigeria, Senegal, Zimbabwe, Ecuador, Guyana, Paraguay, Surinam, Finland, France, Cambodia, Laos, Thailand.

N.B. Closed and open forests (> 10% crown cover) including man-made (plantations) forests.

Source: *An Interim Report on the State of Forest Resources in the Developing Countries*.
FAO, 1988.

FOREST PRODUCTS: PRODUCTION, VALUE OF TRADE AND PRICES

	1985-87 average	1988	1989	1985-87 average	1988	1989	1985-87 average	1988	1989	
PRODUCTION	WORLD			DEVELOPING			DEVELOPED			
	Million cubic mt.									
	Fuelwood and charcoal	1668	1719	1741	1391	1448	1475	277	271	266
	Industrial roundwood	1586	1672	1676	378	401	402	1209	1271	1274
	Sawlogs and veneer:									
	Coniferous	694	723	715	76	78	73	618	647	642
	Non-coniferous	267	290	292	163	180	183	104	110	109
	Pulpwood	397	424	433	48	52	52	349	372	381
	Other industrial roundwood	228	236	237	90	94	94	138	142	143
	Sawnwood and sleepers	485	506	501	108	113	114	377	393	387
Wood-based panels	117	127	129	20	24	25	97	103	104	
	Million mt.									
Pulp for paper	147	159	162	19	21	22	128	139	140	
Paper and paperboard	202	225	231	30	35	36	173	191	195	
VALUE OF TRADE	US\$ '000 million									
	Roundwood imports	8.84	11.46	13.06	1.96	2.78	3.02	6.88	8.68	10.04
	Roundwood exports	6.25	8.54	9.03	2.10	2.56	2.66	4.16	5.98	6.37
	Sawnwood and panels imports	19.06	25.52	27.70	3.08	3.46	3.76	16.00	22.06	23.94
	Sawnwood and panels exports	17.65	24.05	26.77	4.45	6.37	7.46	13.20	17.68	19.31
	Pulp and paper imports	38.21	55.18	59.30	6.54	8.50	8.48	31.67	46.68	50.82
	Pulp and paper exports	35.74	53.22	57.80	1.83	3.28	3.30	33.92	49.94	54.50
	All forest products imports	66.61	92.84	100.74	11.58	14.83	15.40	55.03	78.02	85.34
	All forest products exports	60.28	86.68	94.59	8.35	12.18	13.38	51.93	74.50	81.21
PRICES	1982	1983	1984	1985	1986	1987	1988	1989		
	US\$ / cubic m.									
	Coniferous logs (Germany FR)	82	73	58	49	67	77	79	83	
	Coniferous logs (USA)	93	78	75	74	78	90	104	125	
	Tropical logs (Côte d'Ivoire)	93	81	78	78	141	167	165	148	
	Tropical logs (Sabah)	112	97	115	86	95	119	116	112	
	Coniferous sawnwood (USA)	93	123	112	114	119	126	129	146	
	Tropical sawnwood (Pen. Malaysia)	222	237	222	182	215	237	247	347	
	US\$ / ton									
	Wood pulp (Sweden)	338	290	363	327	344	462	551	608	
	Newsprint (USA)	486	465	497	510	500	543	580	564	
	Printing & writing (Italy)	900	799	801	739	932	1068	1097	...	
	Kraftliner (Germany FR)	385	362	438	404	459	578	606	597	

LIST OF EXISTING INTERNATIONAL INSTRUMENTS RELATED TO FORESTS ^{1/}

Forest Instruments

The only forest instrument operating on a global level is the International Tropical Timber Agreement (Geneva, 1983). This agreement provides a framework for cooperation and consultation between tropical timber producing and consuming members, promotion of tropical timber trade, support to research and development, and encouragement of reforestation, forest management and wood utilization. The agreement is administered by the International Tropical Timber Organization (ITTO).

Natural Resources Instruments

Natural resources instruments operating on a global level are: the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, 1971); the Convention for the Protection of the World Cultural and Natural Heritage (Paris, 1972); and the Convention on International Trade in Endangered Species of Wild Flora and Fauna "CITES" (Washington, 1973). The first and second of these conventions apply primarily to areas, and the third to species, identified in each case according to certain criteria and designated for inclusion in lists that afford them special protection. All provide for contributions from the parties.

Natural resources instruments operating at regional level are: the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (Washington, 1940); the African Convention for the Conservation of Nature and Natural Resources (Algiers, 1968); the Treaty for Amazonian Cooperation (Brasilia, 1978); the Convention on European Wildlife and Natural Resources (Bern, 1979); and the ASEAN Agreement on the Conservation of Nature and Natural Resources (Kuala Lumpur 1985). With differences attributable to their largely differing adoption dates, these legal instruments aim at the conservation, utilization and development of soil, water, flora and fauna resources from an economic, educational, cultural and aesthetic point of view. The modernity of the ASEAN Agreement is reflected in its close attunement to the principles of the World Conservation Strategy. The Treaty for Amazonian Cooperation, inspired as it is by the aim of promoting the harmonious development of the Amazonian region, goes beyond conservation to such topics as coordination of health services or freedom of commercial navigation.

Pollution Control Instruments

A pollution control instrument operating on a global level is the Convention for the Protection of the Ozone Layer (Vienna, 1985) aimed at promoting observation, research and information exchange in order to counter the adverse effects of modifications in the ozone layer caused by man. "Adverse effects" are defined as changes in the physical environment of biota, including changes in climate which have significant deleterious effects on human health or on the composition, resilience and productivity of natural and managed ecosystems, or on materials useful to mankind. The Protocol on Substances that Deplete the Ozone Layer (Montreal, 1987) provides a regulatory framework for reducing emissions of CFCs and halons.

A pollution control instrument operating on a regional level is the Convention on Long-range Transboundary Air Pollution (Geneva, 1979) aimed at limiting and, wherever possible, preventing air pollution and at protecting both man and his environment against it by cooperating in the conduct of research and the development of appropriate measures.

^{1/} Source: FAO 1990 - COFO 90/3(a).

SCOPE

1 • Over-arching global objective

2 • First fundamental principle

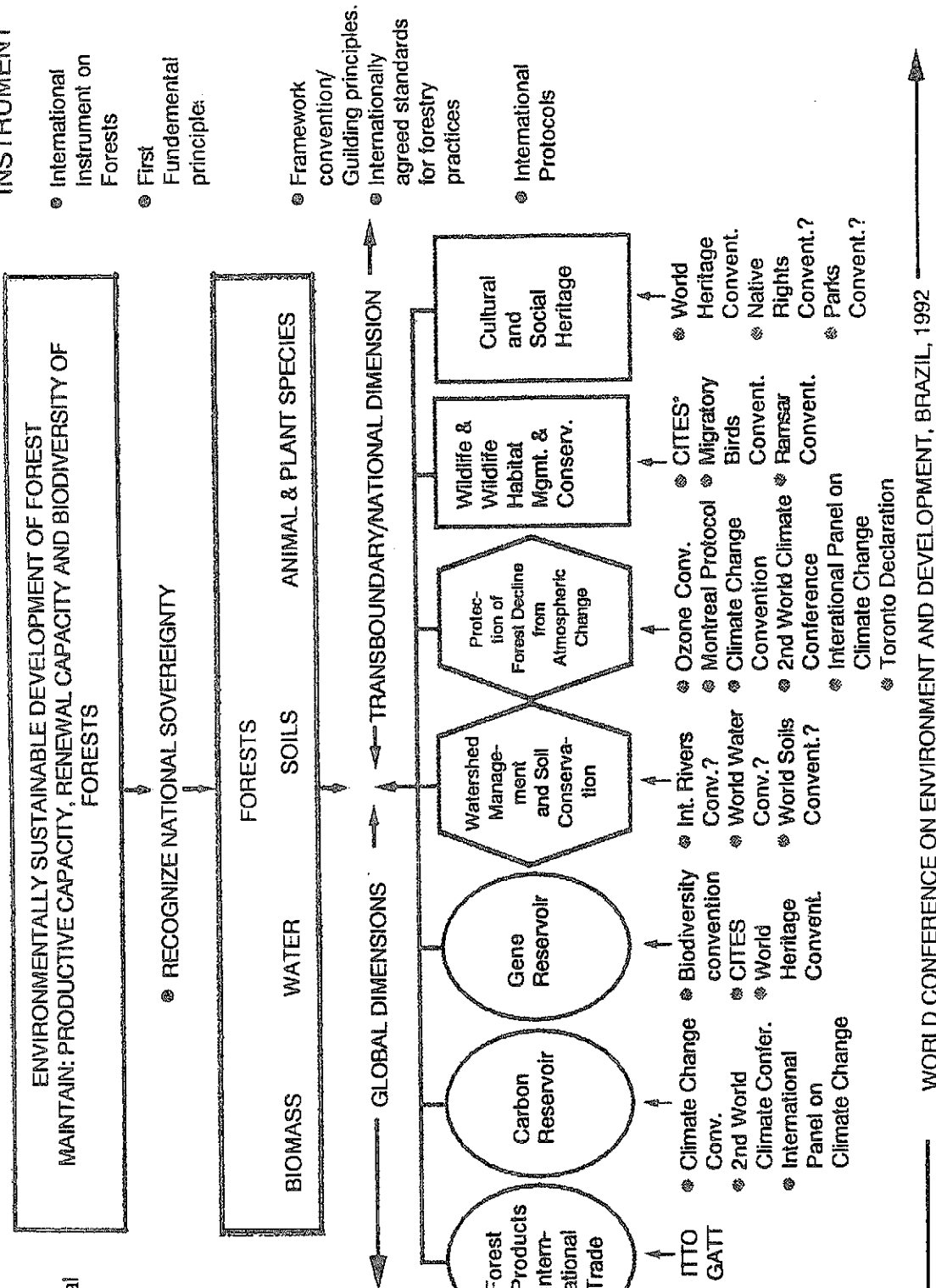
3 • Biological and physical components of forests

4 • Issues & opportunities: Geographic level

5 • Econ. environ. social & cultural role of forests

6 • International instruments impacting on forest

7 • Convention on International Trade in Endangered Species



INSTRUMENT

• International instrument on Forests

• First Fundamental principle:

• Framework convention/ Guiding principles. Internationally agreed standards for forestry practices

• International Protocols

WORLD CONFERENCE ON ENVIRONMENT AND DEVELOPMENT, BRAZIL, 1992

J.S. Maini, Assistant Deputy Minister
Forestry Canada, OTTAWA, Ont Canada October 1990

EXPLANATORY NOTES TO ANNEX V

- ◆ Forests are complex ecological systems and composed of many species and soil types (Line 3) that provide a wide range of economic, environmental, social, cultural and spiritual benefits (Line 5).
- ◆ Nations have the sovereign right to develop and use the forest resource in the context of their own national economic, environmental and social objectives (Line 2).
- ◆ Forests have now emerged on the international policy agenda. Forest-related issues and opportunities may be aggregated into three categories, i.e. national, transboundary regional, and global (Line 4). Addressing these issues and opportunities would require consensus and cooperation at national, multinational and international levels.
- ◆ A number of existing and proposed international and multinational legal instruments, at global and regional levels, aim to address forest-related issues in a fractionated manner (Line 6).
- ◆ In view of the economic, environmental and social role of forests, there is a need to formulate an all-encompassing forests framework that is cohesive and comprehensive and one that accommodates both the economic and environmental dimensions. Sustainable development and conservation of forests is at the heart of an International Instrument on Forests (Line 1). Sustainable forest development involves the maintenance of the productive capacity, renewal capacity and biodiversity of forest ecosystems.
- ◆ UNCED 1992 provides a window of opportunity towards an International Instrument on Forests (Line 7).

WATERSHED MANAGEMENT ¹

Report by Mexico

INTRODUCTION

The current extent of natural resource degradation, particularly forest resources, forces us to review the traditional forms of resource use in an attempt to find a new basis for immediate and future action which can produce better results.

The various means found to achieve this, though they have their merits, have aimed more at solving specific, one-off problems. What the country needs now is a fully revised and coherent strategy to direct our action toward rational natural resource use and conservation, and the guarantees of social welfare that can produce sustained and integrated development.

One strategy considered viable for achieving successful integrated forest resource management is to take the watershed as the scenario for resource planning, management and control. The idea is to make the most of the interaction between the physical, biotic and socio-economic environment obtaining in the entire catchment, wherein each watershed has its specific biological, physical and socio-economic characteristics and therefore watershed management in each is subordinate to a specific analysis which can produce the best answers for that watershed.

The basic premise of this approach implies resolute and conscious participation by the users of these natural resources. Any project or programme which fails to take this as a pre-condition is bound to fall short of the objectives of appropriate and integrated watershed management, in wooded and forest areas as in arid zones.

Imbalances in the individual watershed, mainly in areas which have been deforested for farming or ranching but which are really only suitable for forests, need to be considered in the integrated watershed management plan. Alternative projects representing real economic options for producers, and which minimize or halt the removal of vegetation, need to be put forth. The Secretariat for Agriculture and Water Resources (SARH) is fully committed to a drastic reduction of the annual rate of deforestation.

SARH is also making an emphatic contribution to the studies which form the legal underpinning of land use laws in the country's priority areas, within the watershed management context.

In addition, the modifications to Article 27 of the Mexican Constitution favour secure land tenure which will heighten peasant interest in natural resource conservation on their own land.

Taken together, these actions afford the opportunity to achieve orderly resource management and use.

BACKGROUND

There have been three distinct stages in watershed management in Mexico to date.

Stage 1 - Began in the 1940s with the presidential decree of 1947 which established the Río Papaloapan Watershed Commission, which launched the era of the big watershed commissions

¹ Paper by Sergio Varela Hernández, Director, National Forest Inventory and Land Use Regulation, SARH - Subsecretaría Forestal, México.

covering the country's major rivers and approximately one-fourth of the national territory. Prominent among them were the Grijalva-Usumacinta, Balsas, Lerma and Chapala-Santiago Watershed Commissions, the Valley of Mexico Commission, the Lake Texcoco Commission and the Río Pánuco Commission.

These were all executive, decentralized regional development agencies under the Federal Government. With the exception of the Valley of Mexico and Lake Texcoco Commissions, all the others have disappeared and most of their functions have been taken over by other agencies.

Among their main achievements were the development of Mexico's basic hydraulic infrastructure for flood control and irrigation, the establishment of roads, electrification, health services, new population centres and some reforestation and soil conservation work.

The original objectives were not fully achieved, however, perhaps due to the unpreparedness of some of the technical staff responsible for administering portions of the watersheds, and the fact that priority was given to crop and livestock production in the more heavily populated downstream areas, with little attention to the imperious need to regulate land use in the upper watershed.

Stage 2 - This covers part of the period from 1960 through the 1980s, and a large number of area-specific, spot efforts such as the restoration of degraded areas, erosion control, soil and water conservation, and watershed-management related works, but in most instances the overall watershed was not the decisive element.

Many of these works were carried out by Federal and State agencies and by research and teaching institutions. Some formed the basis for major studies, determining and measuring major parameters, such as those carried out on the Chapingo and Texcoco Rivers, to cite just two. Many unquestionably provided the technical underpinning for better watershed management.

Most of the studies at this stage were concentrated in central Mexico in the States of Tlaxcala, the Federal District of Mexico, Puebla, Hidalgo, Michoacán and some of the northern, desert States. Of outstanding importance were the Barrera Forestal de Oriente (Eastern Forest Barrier) in the Valley of Mexico catchment (Texcoco and Chapingo Rivers), where a great many works such as various types of dams, reforestation and so forth were located.

Stage 3 - The experience of the two earlier stages together with concern over the degree of natural resource degradation gave rise in the 1980s to the desire to achieve better results through more effective management. Watershed management was again put forth but this time from the standpoint of integrated management and the principles and philosophy of integrated management. The forestry sector led the promotion of watershed management, moving away from the traditional approach towards a more universal one in which the watershed is the basic natural resource management unit, and the basic premise is land use management.

WATERSHED MANAGEMENT AND FOREST LEGISLATION

The importance of the catchment basin as the basic unit for natural resource management, including forest resources, was a decisive element in the promulgation of Articles 18 through 29 of the 1986 Forest Law, which made land use management obligatory as an essential component of integrated watershed management. This law incorporates elements which differ from the traditional catchment concept as generally limited to the hydrological function. These included integrated resource management and interaction with the socio-economic aspects -- without which integrated management is simply not conceivable. It introduces the watershed as the basic unit for forest land use planning and defines the mechanisms for land classification and land compatibility with non-forest uses. The law also stipulates that land management will be primarily social in nature, and that it must therefore signify concrete benefits for both landowners and the community at large.

ESTABLISHMENT OF PILOT WATERSHEDS

- ⊙ As of 1985 pilot watersheds were established in response to the need to generate experience in relatively small areas (sub- and micro-catchments) for application to much larger areas for integrated management. These projects serve as demonstration areas and for staff training and the development of methodologies. Although some are only in the early stages (primarily the production of basic studies) they have generated interesting experiences in terms of methodology and community participation. In the more advanced, concrete material achievements provide a yardstick for what can and must be achieved.
- ⊙ In 1991, the Forestry Subsecretariat, through the State branches of the SARH, reactivated the establishment of pilot watersheds. Seventeen demonstration projects in varying stages of development have been set up in 14 States of Mexico, of which the largest in terms of size and scope of their works and action are in the State of Durango and in the Ajusco mountain range.
- ⊙ In Durango, in the "Santiago Bayacora" pilot watershed, achievements include mechanical works (filter dams and gully plugging), reforestation, pasture trials, fish seeding, installation of a weather station and, perhaps the most relevant, enlisting the motivation and participation of the target community.
- ⊙ In the Ajusco mountain area, over 2 million infiltration ditches were built in addition to the traditional land rehabilitation activities: the purpose was to facilitate groundwater recharge. Livestock activities and urban growth are also regulated, these being the main components of forest degradation in these mountains, which also form Mexico City's main forest reserve.
- ⊙ Institutions such as INIFAP also have pilot watersheds: "El Plateado" in the State of Zacatecas, to cite only one.

The main factors promoting or hindering watershed management have been the scarcity of staff and funds, scant participation on the part of the landowners, users and owners of watershed resources, the need for adaptation of practical methodologies for land use planning and management and the need to incorporate geographical information systems (GIS) technology in these areas. Accordingly, the efforts expended could neither be consolidated nor capitalized upon as they should have been. Equally, or perhaps more importantly, the problem of coordinating action among all institutions and sectors operating in the watersheds has been a major constraint.

ACHIEVEMENTS

In 1985, before the ninth World Forestry Congress, a preparatory meeting on watershed management in the State of Mexico was held for the purpose of encouraging the new trend in watershed management in Mexico. A Technical Cooperation Agreement was later drawn up with FAO for Mexico's priority watersheds, with the following river basins included in the Agreement: Nazas, Humaya, Cutzamala, de los Pescados, the Valley of Mexico River Basin (the Ajusco mountain range and the Barrera Forestal de Oriente). A basic component of this Agreement was training, which was provided for a group of technicians working in the project area.

- ⊙ Under this Agreement, the first regional meeting on inter-State watershed management was held in March 1986 in Durango, the need to bring in interdisciplinary groups for watershed management having become apparent.
- ⊙ In 1989 an agreement was signed between the Government of the State of Durango and the University of Arizona, USA, for the same purpose: it provided training for even more technicians.
- ⊙ An international workshop on integrated natural resource management, held in 1987 with FAO support, was attended by 10 countries of the Latin American Network for Technical Cooperation in Watershed Management.

• This same year, in a meeting with the NAFC on forest pests, it was decided to establish contact with the NAFC technicians working in watershed management as there were good opportunities for support for working together, even though the two subjects were not the same.

Later, at the December 1990 meeting of the NAFC's Committee of Alternates, held in Victoria, Canada, discussions were held on the advisability of setting up a new study group on watershed management. Mexico is preparing a proposal which will be submitted for the Commission's consideration.

INTERNATIONAL COOPERATION

Mexico is currently a member of the Latin American Network for Technical Cooperation in Watershed Management and the Forestry Subsecretariat is currently representing Mexico on the Network.

In 1990 Mexico attended the first Latin American Congress on Watershed Management held in Chile. It was agreed that the second Congress would be held in Mexico, perhaps in 1993, although no date was decided upon. The meeting would be Pan-American, with the participation of Canada and the United States. The place will have to be confirmed in 1992: a decision which will be taken within the National Network on Technical Cooperation in Watershed Management, now being formed.

In 1991, the Forestry Subsecretariat attended the meeting of the Latin American Network on Watershed Management which was held in Tegucigalpa, Honduras.

PROGRAMME OF WORK

The Forestry Subsecretariat has planned certain targets for this year concerning the topic before us:

- the system of demonstration watersheds in the 32 administrative divisions will be completed;
- declarations will be issued in five States concerning land use management on 750 000 ha;
- agro-forestry projects will be set up to alleviate deforestation pressure in the 32 administrative districts, in accordance with deforestation prevention and control programmes.
- with these programmes in operation throughout the country, the amount of deforested land will be continually reduced until a balance is achieved, in the short term, between deforestation and reforestation.
- the basic analytical and administrative machinery for five protected areas and three national forest reserves will be put in place.

CONCLUSIONS AND RECOMMENDATIONS

- The modifications in Article 27 of the Constitution concerning the association of owners, holders and groups involved in the long-term conservation and use of forest resources will lead to better land use planning.
- Natural resource management must take the watershed as the basic planning unit.
- Watershed management activities must reconcile the interests of both upstream and downstream dwellers in the search for permanent solutions.

- ③ Natural resource management must take the social, political, economic, ecological, technical and legal factors into consideration.
- ③ The resources needed for watershed management must come primarily from the users of the natural resources of the watershed.
- ③ SARH State branches will be responsible for the development, monitoring and evaluation of the watershed management projects located in their areas of influence.
- ③ Internal and external support and financing is to be sought for the development of watershed management projects (UNDP, FAO, the World Bank, IDB, NGOs, producers' organizations, associations, companies, etc.).
- ③ Natural resource management projects in the watershed must not be subordinate to geopolitical and administrative boundaries artificially established to delineate properties, municipalities, States or even countries.
- ③ The major ecosystems of the mountain ranges of northern Mexico and their connection with the US and Canadian Rockies would make it advisable to promote, within NAFC, an exchange of experiences and methodologies in watershed management in a search for the solutions best adapted to the special circumstances of each country.

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**REPORT TO THE NORTH AMERICAN FORESTRY COMMISSION
SIXTEENTH SESSION
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NEW PERSPECTIVES ON MANAGING THE U.S. NATIONAL FOREST SYSTEM

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INTRODUCTION

Americans are concerned about the future of forests: their health, wildlife diversity, productivity for wood, environmental roles, and aesthetics. Consequently, the practices of forestry in the U.S. are changing to address these concerns. The changes are occurring on all forestland ownerships, most especially in the National Forest System. However, not all the changes are the same. Some forests are being managed more intensively for wood and wood fiber while others are being managed primarily for non-wood values and uses.

Forestry education and research are also changing. They are expanding to address the dynamics of forests as ecological systems and the connections between forest products technologies, forest management, economies, and our society's changing values and needs.

The fundamental principles of forestry in the U.S. are not changing. Science-based land stewardship, efficiency in the production and conservation of natural resources, and socially-responsive management to meet landowner objectives remain

the bedrock of current and future directions in U.S. forestry.

The changes underway in American forestry are good. But media coverage of forest issues in the U.S. often distorts the real story on American forests and, thus, the public's perception of policy choices. Media coverage often stresses inflammatory portrayals of a "war in the woods" (Mitchell 1990), "rage over trees", the "death of nature" (McKibben 1990), or allegations of mismanagement of public forests (Baden 1991, Knize 1991, Knudsen 1991). Sensationalism, rather than facts, appears the order of the day. Issues that draw the most attention include spotted owl/ancient forest/timber supply conflicts (Johnson et al. 1991, Caulfield 1990), forest sustainability (Botkin 1990, Fri 1991, Sample 1991a, Gale and Cordray 1991, Greber and Johnson 1991), clearcutting, endangered species, economics of forestry decisions (O'Toole 1988, Baden 1991), sustaining supplies of forest products (Knudsen 1991), and loss of forest-related jobs.

The continuing debate about U.S. forest issues often leaves an impression of pending environ-

mental doom or the eminent loss of the last great forests in the nation. This is not the case. But there are valid reasons for concern over the conditions of American forests and how our society's institutions carry out their management.

Some American forests suffer from prolonged drought or insect epidemics, especially in the west and east. Others are being degraded through short-sighted selective cutting, especially in the northeast (Nyland 1991). Some forest types have become too abundant and too mature for the long-term health of the land, e.g., pinyon-juniper in the American Southwest and lodgepole pine in the northern Rockies. The incentives for public forestry may be leading to some undesired outcomes, e.g., below-cost timber sales (O'Toole 1988, Baden 1991). The reduction and fragmentation of certain types of forest conditions is a threat to wildlife and fish species that have specialized habitat requirements (Terborgh 1990, Johnson et al. 1991). And people who depend on forests for their livelihood and identity are caught in a vicious crossfire of competing political agendas for control of public resources.

The conditions, trends, and potential futures of U.S. forests have significant economic, social, environmental, and aesthetic ramifications. But wise policy choices depend on valid information regarding the conditions and capabilities of forests and the economic and environmental ramifications of various management options. What are the true conditions of American forests and what are the policy choices regarding their uses and management during the 1990s and beyond? What are the implications of those policy choices for forest management and research?

The knowledge needed for informed choices on forest policies is more than local and regional issues. It includes valid information on global, national, and regional economic and environmental conditions and the potential influence on them of forests, forest products, and alternatives to forest products. It includes a better understanding of the relative effectiveness of different means to induce desired human actions regarding forests and local, site-specific knowledge of how a particular forest and human community might respond to protection, restoration, or management of the land for different purposes. It also requires a sensitivity and caring for the plight of individual people and their families. People need this information to determine (1) the future roles of forests in their economy and the global environment, and (2) the most effective means to achieve these roles.

This paper is offered to briefly describe the U.S. forest situation and stimulate a dialogue that might lead to a broader perspective on people, wood production and use, wildlife conservation, and the environment related to options for managing U.S. forests. It starts with a description of some relationships between people, forests, forest products, and environmental quality. It then describes historical trends and influences that brought about the conditions of forests in the U.S. today. This leads to a discussion of the capabilities of national forests and grasslands to partially address people's needs and concerns. Finally we offer an example of how the USDA Forest Service is responding to these issues and choices through new management direction and a project called *New Perspectives for Managing the National Forest System*.

The reader should not expect perfectly correct interpretations or answers to difficult issues from this paper. It is not possible to offer definitive answers to issues as broad and complex as those raised by options for forest conservation. Our goal is merely to broaden the dimensions of discussions on the issue: "What to do about our forests."

FORESTS, PEOPLE, AND THE ENVIRONMENT

Forests and National Well Being

Part of the reason for such high concern over forests is that they are great sources of a nation's wealth and well being (Marsh 1864, Clawson 1979, Perlin 1991). They are part of every generation's heritage of biological and cultural diversity. They are part of the legacy each will leave for future generations. They are a nation's factory for many renewable natural resources (Frederick and Sedjo 1991). They are vital organs of planetary health (Silver and DeFries 1990). They are playgrounds. They are sources of livelihood and personal identity. They are an important factor in the standard of living that U.S. citizens enjoy. For some people forests are also places of worship. Americans might be able to live without healthy, diverse, and abundant forests. Most probably would not care too much for the quality of that life.

Trends in Forests Available For Use, Enjoyment, and Environmental Services

Forests and woodlands now cover an estimated 31 percent of the planet's terrestrial surface (4.1

billion hectares--10.1 billion acres--according to World Resources Institute 1990). This is about half the area of world forest that existed in the 1700s (Figure 1). Meanwhile, the number of humans has grown by eleven times: from an estimated 500 million to 5.5 billion. In per capita terms, each person had an average of about 16 hectares (40 acres) of forest resource in 1750, while each human in 1990 has only 0.75 hectares (1.8 acres) on average (Figure 2).

Forests in the U.S. cover about 32 percent of the nation's area (298 million hectares--730 million acres--according to USDA Forest Service 1988). This is about two-thirds of what existed prior to European settlement (Clawson 1979). Approximately 150 million hectares (370 million acres) of the original forest have been converted to other uses, mostly to agricultural lands (Figure 2). About 20 percent of the nation's forested area is managed by agencies of the Federal government; 15 percent by forest industries; 8 percent by agencies of state and local governments; and 57 percent by non-industrial private land owners (Figure 3).

The human population of what is now the U.S. has grown by twenty five times since the 1600s: from an estimated 10 million prior to when introduced diseases decimated the original Americans to 250 million in the latter part of the 20th century. In per capita terms, this equates to a change from 45 hectares (110 acres) of forested area per human inhabitant in the 1700s to an average of 1.2 hectares (2.9 acres) per person in 1990 (Figure 2).

The simple reality is that the ratio of forested area per human has declined dramatically during the past four centuries. This means less potential forest area for each current and future human to occupy as a residence, to find resources, or to provide for various environmental services. This general trend applies to all resources in the biosphere (Figure 4). Yet, it is precisely this growing human population and its intellectual capacity and ingenuity that is the source for improving both environmental quality and the standard of living for all people.

Differences in How Humans Use Forests

To meet this challenge, people must understand how they and forests are related. Today, the U.S. is an urban society. More than 90 percent of the population lives in cities or suburbs. They are divorced from direct contact with the land and have been so for more than a generation. They may visit

the land as recreating tourists, but few experience the land as a resilient, renewable, and productive resource as did most of their parents and grandparents. Many people today do not know that the land is where their food and shelter and water come from. Their daily living in congested, highly modified surroundings shapes their view of the world. Hence, they have little personal experience against which to judge the truth of messages delivered in newspapers, magazines, and on television.

People in developing countries know the reality of forests. They use them to meet their basic needs of existence (Marsh 1864, Thomas 1956, Toynbee 1976, Perlin 1991), just as people did in the U.S. until well into the 20th century (Clawson 1979, Williams 1989). Food, shelter, medicines, and fuels are taken from the forests until the forests are gone or until economies develop to the point where people can afford to conserve their forests. In a typical developing country, about 70 percent of the wood harvested from forests is used for domestic energy.

The use of wood in the U.S. has changed over time. In 1850, wood provided about 95 percent of the domestic and industrial energy (measured as British Thermal Units or BTU's) used in the U.S.. Today, the role of wood in U.S. energy needs is much reduced. The U.S. uses fossil wood and fossil animals in the form of oil, coal, and natural gas for most of its energy. Forty-five percent of wood use in the U.S. is now for construction; about 25 percent goes into pulp and paper; and 23 percent is used for fuel--much of it in industrial processes (USDA Forest Service 1990). Percentages only tell part of the story, however. The total amount of wood used for fuel in the U.S. is now about equal to the amount used in the early 1900s.

Changes in how wood is used in the U.S. and their implications for forest conditions are directly tied to changes in our economic prosperity, lifestyles, and technologies. Yet, the linkage between the standard of living in the U.S. and productive management of natural resources is poorly understood, especially the role of forest management in providing both environmental and economic benefits. So also is the linkage between economic prosperity and environmental quality poorly understood. Further, despite the historic benefits of a free-enterprise economy, individual liberty, and private property rights, some U.S. citizens increasingly call on governments to control and regulate people's choices as the preferred approach to meeting economic and environmental challenges.

Wood Consumption and Supply as Forest Influences

Wood use has long been a major influence in the relationship between people and forests (Clawson 1979, Williams 1989, Perlin 1991). It still is. Both global and U.S. wood production and use continue to rise (Figure 6 and Figure 7; Sedjo 1990, Haynes 1990, Haynes and Brooks 1991). The U.S. produces 25 percent and uses 33 percent of world industrial roundwood production. It uses about about 50 percent of world paper production (Haynes and Brooks 1991): the U.S. is biggest total user of wood and the biggest per capita user (Postel and Ryan 1991).

U.S. per capita use of wood other than for fuel is about 1.5 times that of other industrial nations, and is as much as 100 times that of some non-industrial nations (Postel and Ryan 1991). U.S. wood use increased by 20 percent during the latter half of the 1980s, due primarily to increased use of fuelwood for both home heating and installation of cogeneration and wood-fueled processes by the forest-products industry (Table 1; Figure 7 and Figure 8; Bowyer 1991a). Paradoxically, many Americans tend to view forest conservation choices as if wood should not be used or that it should come from cutting trees in someone else's forests.

The U.S. recently produced about 23 percent of the softwood sawtimber it used annually from trees harvested in the national forests. This percentage is declining due to policy choices to protect public forests for other values, such as watersheds, aesthetics, and wildlife. In 1987, net imports as a percent of total U.S. consumption, were 15 percent for wood pulp and 12 percent for wood and wood products (Bowyer 1991a). About 27 percent of the lumber used in the U.S. was imported from Canada in the late 1980's. Will the U.S. use less wood as production from public forests declines or will it find its wood elsewhere, such as from U.S. private lands or the forests of other nations, as assumed by the recent Resources Planning Act Program for 1990 (USDA Forest Service 1990)?

Material Alternatives to Wood

Many non-wood products are used in concert with wood. Some have the capability to substitute for wood in construction applications. These substitutions, however, have both environmental and economic consequences (Table 2; Koch 1991, Alexander and Greber 1991, Bowyer 1991a, Bowyer 1991b, Bowyer 1991c). These consequences are

not commonly recognized, nor well understood. Comparatively, wood is one of the most environmentally benign of all construction materials. It is virtually the only *renewable* resource that is economically suitable for structural and architectural purposes (Koch 1991). The alternatives to wood in those uses--steel, aluminum and other metals, concrete, and plastics--are not renewable (though they are recyclable at varying energy costs). They use considerably more energy per unit of production than does wood.

For example, Koch (1991) estimates that steel studs may require about nine times more energy to produce and transport to the site than wood studs; aluminum siding requires four times more energy, and brick veneer 22 times more energy compared to equivalent wood siding. Concrete floors need 21 times more energy to produce than do wood floors. Wood is also more energy efficient in use than many manufactured substitutes, paying energy dividends throughout the life of the building. The actual energy efficiencies of wood and alternative materials probably vary according to manufacturing technologies and patterns of material use. The essential point is that there are energy costs and environmental implications associated with substituting other materials for wood and of recycling or remanufacturing any material for further use.

The amount of wood used in the U.S. is approximately equal by weight to the combined amount of all potential wood substitutes used in the U.S. annually (Bowyer 1991a). Thus, replacing any significant percentage of wood with manufactured substitutes could have a substantial effect on both national energy consumption and global carbon dioxide emissions. Koch (1991) estimates that for each 5.7 million cubic meters (1 billion board feet) of wood replaced with manufactured substitutes, annual energy consumption would increase by about 2.7 billion liters (720 million gallons) of oil and carbon dioxide emissions would increase by 6.8 billion kilograms (7.5 million tons).

HISTORIC PERSPECTIVE ON FORESTS IN THE U.S.

In the current debate over American forests and the environment, it would be easy to think this is the first generation to worry about these issues. A look at recent history should dispel this (Fedkiw 1989).

In the later half of the 19th century, the nation's human population was expanding rapidly. Settlement of the American frontier was seen as a laudable national objective. One unfortunate consequence of settlement was the depletion of much of the nation's forests and wildlife. To feed a rapidly growing population, forests were cleared on a massive scale for farmland. Increasing urbanization and industrialization also created a huge demand for lumber and structural timbers to build the growing cities. Large scale logging, especially in the Lakes States, was followed by sometimes massive wildfires (Williams 1989). Nationally, forest growth rates were a fraction of harvest levels.

Wildlife was also under assault (Trefethen 1975, Dunlap 1988). Firearms technology had improved dramatically. Game laws were non-existent or poorly enforced. There was virtually unrestricted market hunting of all kinds of wildlife for food, furs, and feathers (which in the late 1800's were in great demand for women's hats), as well as habitat modification caused by forest clearing for farms, logging, and wildfire.

By 1900, populations of many wildlife species were so depleted that they would have been on an endangered species list had one existed at that time. These include now common game animals, such as white-tailed deer, which had been extirpated entirely from most eastern states; wild turkey; pronghorn antelope; moose; bighorn sheep; and most furbearers, especially beaver, which had been eliminated from significant portions of their ranges. Many waterfowl, including swans and wood ducks, and several other species of ducks; Canada geese; all manner of plumed wading birds, such as herons, egrets, ibises, and others were also on the brink of extinction. Many other species, although not in danger of extinction, were much depleted.

It may be fashionable, from the comfortable perspective of today's prosperity and value system, to criticize those responsible for the resource depletion of the last half of the 19th century. However, it should be recognized that people were doing what they thought was necessary to feed themselves and their families, and to build a strong society and nation. What happened during the late 1800s and into the early 1900s in the U.S. was a logical extension of a long settlement history that was accelerated by European immigrants in the early 1600's. By the 1870's, the impact of settlement was magnified by a rapidly expanding population and advancing technology. What is most important is that there were far-sighted individuals in the latter half of the 19th

century who recognized that new approaches were needed. And they began to take the actions necessary to put these approaches in place (Trefethen 1975).

This recognition set the stage for emergence of the first national environmental movement. The policy framework that emerged emphasized protection of forests from wildfire and of wildlife from over-harvest and the management of both forests and wildlife under scientific principles. Specific actions focused on: (1) the acquisition of scientific knowledge through research on forest and wildlife culture and management, and its enlightened application by resource professionals, both public and private; (2) promoting and encouraging the protection of forests, regardless of ownership, from wildfire, insects, and disease; (3) encouraging the productive management of private forest lands through tax incentives and technical and financial assistance; (4) adoption and enforcement of strong state and federal wildlife conservation laws; and (5) the acquisition and management of public lands for both commodity and amenity uses and values. A key element of the public policy framework was strong cooperation among federal, state, and private sector interests to achieve common goals.

The result of these policies was the general and dramatic recovery of American forests and wildlife (MacCleery 1991).

Forest Conditions and Wood Use Today

Today, U.S. forests have recovered substantially from their low point at the turn of the century. In the aggregate, forests in the U.S. are now more productive than at any point in the century (Figure 8). In fact, they have been increasing in growth and standing volume since the early 20th century in response to forest and conservation policy choices and technology improvements (MacCleery 1991).

Nationwide, wood growth, which in 1900 was a fraction of wood removal, attained a general balance with harvest by the 1940's. Today, timber growth in the U.S. exceeds harvest by 37 percent (Figure 9). The area burned by uncontrolled wildfire has been reduced from a range of 16 to 20 million hectares (40 to 50 million acres) annually in the 1930s to a range of 0.8 to 1.6 million hectares (2 to 4 million acres) today (Figure 10).

Due to forest fire control and investments in reforestation and forest management, tree growth in the U.S. today is three and a half times what it was in 1920 (Fedkiw 1989). Tree planting was at record

levels throughout the 1980's. More than 10.5 million hectares (26 million acres) of trees were planted during the 1980's. This is an area of land the size of the state of Virginia. Last year for every child born in the U.S., more than 400 trees were planted.

The total volume of wood in U.S. forests is now 25 percent greater than it was in 1952. Actively growing forests are great carbon "sinks." American forests sequester the equivalent of about nine percent of total carbon dioxide emissions from all sources in the United States (M. Fosberg pers. comm.).

Because American forests are so abundant and productive, the nation can and is protecting more of its forests locally and regionally, both native and restored, for their environmental services, aesthetic values, and amenity uses. The area of productive forest land in parks, wilderness areas, and similar reserves in which timber harvest is prohibited has increased significantly in recent years. About 14 million hectares (34 million acres) of productive forest lands in the U.S. have now been designated for non-timber values and uses, nearly double the area in such designations in 1970 (Waddell et al. 1989). This is an area the size of the state of Florida.

Harvest and manufacturing efficiencies have also shown tremendous increases since the turn of the century. Early records are sketchy, but since the 1950's, logging residues have decreased by an estimated 10 percent for softwoods and about 40 percent for hardwoods. Although consistent statistical data are not available, it is also well accepted that utilization of trees killed by fire, insects, or diseases has also increased dramatically. Further, the proportion of harvested trees that is effectively converted into lumber or veneer has increased by about 20 percent in sawmills and about 22 percent in plywood plants (Haynes 1990). Advanced technologies such as thinner saw blades, electronic measurement systems, and computer assisted milling have all contributed to improved fiber recovery.

New technologies for increasing the useable wood from a forest (improved utilization), for extending the life of wood in use (preservation), and for using the same fiber several times (recycling) have taken significant pressure off U.S. forests for raw material. All of these efforts have reduced by hundreds of thousands of hectares the area of annual harvest that otherwise would have occurred to supply the U.S. with wood products.

There are opportunities to do even more in the future to improve wood utilization and encourage

recycling (Ince and Alig 1991). Postel and Ryan (1991) estimate a potential for conservation technologies to reduce raw material demand by up to 50 percent. Their work may identify the upper bounds of what is technically, though not necessarily economically or logistically, possible in the near future. While it appears that much of the pressure to recycle paper is coming as much from a local shortage of landfill space as it is from a new sense of global citizenship, it is coming nevertheless. Using conservation technologies to reduce per capita use of raw material will help take pressure off forests until population growth brings total demand back up.

Forest Wildlife Today

While several species of wildlife did become extinct in response to forest changes and human uses during this century, such as the passenger pigeon, heath hen, and great auk, many others which were on the brink of extinction in 1900 have staged remarkable comebacks (Thomas 1989). Due to actions that were set in motion in the early decades of this century, most forest wildlife are both more abundant and more widespread than they were in 1900.

The pattern that has emerged since the 1930's is a substantial increase in forest wildlife that can tolerate a relatively broad range of habitat conditions. The numbers and distribution of the so-called "habitat generalists" have increased dramatically. Fortunately, many U.S. forest-wildlife species are habitat generalists. One reason may be the natural dynamics of North American forests and the frequency of disturbance in the natural regime (Williams 1989, Botkin 1990).

But saying that many wildlife species have staged remarkable comebacks does not imply the absence of problems. Species with specialized habitat requirements are increasingly of concern today. Examples include:

- o The red-cockaded woodpecker and gopher tortoise, which are natives of fire-created southern pine savannas and woodlands.
- o The Kirtland's warbler, which is native of young jack pine forests in Michigan.
- o And of course, the spotted owl, which occupies mature and old-growth forests in the West.

While many forest-wildlife species need large, contiguous areas of habitat, such as grizzly bears, wolves, elk, and forest-interior birds, not all habitat specialists are threatened by loss of old-growth or "ancient" forests. Some require active management of young forests for their survival, e.g. Kirtland's warbler (Botkin 1990). Others, although needing mature forests, require specific habitat conditions, such as open savannas and woodlands which are created by frequent ground fires, e.g. red-cockaded woodpecker. Even the old-growth, Douglas-fir forests required by the northern spotted owl are sub-climax forest types that will eventually move toward different forest conditions without occasional, stand-replacing wildfires. Providing for the needs of habitat specialists will require purposeful and often active forest management, though not always for early successional habitats.

FRAMING THE ISSUES AND POLICY CHOICES

Given the foregoing, what are the appropriate factors to consider in sustaining forests for their desired uses, values, and environmental services? What mechanisms and incentives should be in place to induce the desired conditions, uses, and values of these forests? The first challenge, of course, is to seek to better understand the relevant linkages between people, natural resources, environmental services, and standards of living. The second is to find ways to articulate and frame those linkages and their implications so the people can make truly informed choices through their democratic processes.

We know that there will soon be six billion people in a place--our planet--where 500 million used to live at what was perceived by some to be its natural carrying capacity. In the U.S., between 250-300 million of these people now reside, or soon will, in a place where 10 million used to live in a tenuous, but reverential relationship with the land.

Thus, it is highly likely that, in the future, more resources will be consumed than now and that they will come from somewhere (Chappelle and Webster 1991). Corresponding with more consumption, more wastes will likely be produced and they must also go somewhere or be dealt with in some way.

On the positive side of this challenge, the U.S. today has almost four times the human population it had a century ago, living at a substantially higher standard of living. Yet our forests and wildlife are, in most of their major dimensions, in significantly bet-

ter condition today than they were in 1890. American forests and related wildlife now have an abundance, diversity, and productivity far beyond what was imagined by early conservation leaders at the turn of the century. It is that abundance that has greatly expanded the range of choices available for forest and wildlife conservation. Those gains are a direct result of the relative affluence and technological capacity of Americans and conscious policy choices made in the past. The choices made by this generation will influence future economies and environments, probably also in some ways that we do not now envision.

This leads to the difficulty of framing natural resource issues for the public in ways that informed choices can be made. The communication media's focus on sensational stories of alleged environmental disaster have left the public largely unaware of the significant environmental gains that were made in recent decades and, thus, of the effectiveness of policy decisions on their behalf. Similarly, the coverage of specific environmental issues is often framed so narrowly as to make it impossible for the public to understand in meaningful terms the full dimensions of the choices available to address them, or even what those choices are. A case in point is protection of the remaining stands of old-growth forest in the West.

Americans have been told by certain interest groups through the communications media that the last remnant stands of old-growth in public forests are about to be logged and will be gone within a decade or two. The reality is that the national forests contain about 12 to 14 million hectares (30 to 35 million acres) of old-growth forests, an area about the size of the state of Florida. More than half of this old-growth forest is protected in wilderness areas and other land-use designations that do not permit timber harvest.

In the Pacific Northwest states of Oregon and Washington, where old-growth has been a particular issue, about 2.6 million hectares (6.3 million acres) of old-growth remains on national forest lands--an area of old-growth larger than Massachusetts and Rhode Island combined. More than half of the old-growth in Oregon and Washington is also in wilderness and other land uses that do not permit timber harvest. At the timber harvest rates projected in current national forest plans in Oregon and Washington, about 2.3 million hectares (5.6 million acres) of old-growth will remain in ten years. After these forest plans are revised to include additional protection for the northern spotted owl and

other forest values (Johnson et al. 1991), it is likely that substantially more than 2.3 million hectares of old-growth will remain after ten years.

Unfortunately, much of the public debate over old growth has focused on the relatively narrow questions of jobs versus owls, how much old growth remains, how it should be defined, and what the likely impacts would be of either harvesting it or not harvesting it on local and regional timber-industry jobs, wildlife populations, and biological communities: essentially on local and regional ecosystems and human communities and economies that depend on the forests for wood products. These are important. Yet, there are also national and perhaps global implications to choices concerning forests in the Pacific Northwest because most of the wood they would have produced will either come from somewhere else or be replaced by non-wood materials. These issues are rarely included in the debates over policy. It is important to consider how the choices for protecting and managing old growth in the Western U.S. relate to regional, national, and global timber supply, the energy and greenhouse gas implications of use of substitutes for wood, and biodiversity in other timber supply regions.

The difficulty of obtaining public understanding of the full dimensions of forest policy choices are significant. For example, some relevant considerations that are seldom discussed include: how much and where should forests of all ages and types be sustained to protect environmental values and how much and where might they contribute forest products to local, regional, national, and global human communities? This question does not inherently imply that an either/or, protect or produce, choice must be made in all cases. Forest management options are being developed to supply combinations of these goals in many circumstances (Gillis 1990).

The old growth issue is typical of the hard choices the U.S. faces regarding forest policies. How should forest management occur? What kind of forest conditions should remain after harvest? What technologies will be needed? What are prudent investments in environmental assessments, research, and monitoring to support those decisions? These are complex questions that integrate many social values and needs as well as biological knowledge. Before answers can be found, questions must be posed correctly (Clark and Stankey 1991). Appropriate answers resist simple choices, such as preserve public forests and produce more wood from private lands. Nor are they simple matters of

saving this or that species or promoting this or that industrial development. These matters are all interconnected within regions and with conditions in the larger global ecosystem.

Scale is an increasingly important issue in framing the questions and choices on forest policies, both temporal and spatial scale. This is not just for technical reasons. What people do in their backyard forests affects their economic well being, environmental quality, and biological diversity. What people don't do in their backyard forests also affects these things. And what people do or do not do in their backyards also affects someone else's economic prosperity and environmental quality. This is because markets and environments are global. Thus, there are global ramifications to U.S. consumption of fossil fuels, worldwide use of chlorofluoro-carbons, the Green Revolution of the 1960's, public health advances on human morality factors, wilderness area designation, and high-yield silviculture. Whether these are positive or negative influences on forests, biological diversity, and quality of human life depends on the temporal or spatial scale of analysis, that is how broadly and how long one views the goal of sustaining ecological systems, including forested ones.

In addition to looking only at the inner workings of a forest to determine how to sustain the forest as an ecological system, which is essential but not sufficient, we must also look outside the forest to understand the inner workings of the societies of people (Clark and Stankey 1991), economies (Binkley 1991), and global dynamics that forests influence (Botkin 1990, Silver and DeFries 1990). Such a global perspective may yield opposite conclusions from a local or regional perspective. For example, if steel, concrete, or aluminum materials are substituted for the wood protected for environmental values in American forests how much additional carbon dioxide will be added to the global atmosphere? If wood from somewhere else is substituted will that be better or worse for global biological diversity? The local and regional consequences of protecting forests for endangered species are probably also positive for water quality, landscape aesthetics, wood prices, and biological diversity. Are the global consequences likely to be positive for these matters as well as for greenhouse gasses and biological diversity in other regions?

A global perspective is needed because in the long run it will do little good to conserve biodiversity in local and regional forests if human consumption depletes the same in someone else's forests. Global

responsibility does not necessarily result from the accumulation of positive actions in backyard environments if those actions ignore global ecological dynamics (Botkin 1990, Bowyer 1991a, Bowyer 1991c).

Linking People, Forests, Wood, Wildlife, and Conservation

Given the global wood supply, the large capacity to grow more wood in managed stands, and the potential for conservation, people may reasonably question the wholesale cutting of native old-growth forests, including those of other nations. But it is not unethical to grow and cut trees in ways that leave soils, waters, and ecosystems in healthy condition for the future. What is environmentally unethical and globally irresponsible is to use amounts of wood that we are not willing to produce as prudent land stewards, either in our own backyards or elsewhere, or to ignore the environmental implications of the use of substitutes for wood that use far more energy to produce and are not as recyclable or biodegradable as wood (Bowyer 1991a).

The ultimate challenges in forest conservation, or sustainable forestry, are not saving old growth, jobs, spotted owls, roadless areas, endangered species, or even biodiversity. These are only symptoms of the real challenge: to manage forests for desired conditions, uses, services, values, and products, framed in a global context with full consideration of local and regional human economic and social dimensions.

CAPABILITIES OF THE NATIONAL FOREST SYSTEM

Let us take the largest single forest ownership in the U.S. as an example of one way to pose forest policy choices: the U.S. national forests and grasslands which are owned by the people and managed in trust by the USDA Forest Service under direction from the U.S. Congress.

The national forests and grasslands encompass 77 million hectares (191 million acres) of land, about 8.5 percent of the land area of the U.S., an area of land the size of the states of Texas and Louisiana combined. The national forests are managed under a multiple purpose mandate for both commodity outputs, such as timber, livestock grazing, fishing, and minerals; and for amenity uses and values, such as wildlife, recreation, nature study, and wilderness. They also serve a watershed pro-

tection role. Because of their broad management mandate, there is considerable pulling and tugging in the forum of public debate over their current and future role.

The current role of national forests, both in the economy and as a source of natural and amenity values is significant. For example, national forests provide:

- o More than 70 percent of the Wild and Scenic River System and 84 percent of the Wilderness Preservation System in the lower 48 states.
- o Watersheds that encompass one-half of the West's water supply, 5 percent of the East's water supply, and one-half of the nation's cold water fishery.
- o More than 40 percent of all Federal outdoor recreation, twice that of the national parks.
- o Habitat that supports about 70 percent of the vertebrate species richness that occurs in the nation, including most of the nation's ungulate species and more than 200 threatened or endangered plant and animal species.
- o About one-fifth of the nation's consumption of softwood timber, which generates \$1.3 billion in receipts, 100,000 timber-related jobs, and more than \$3 billion in timber-related income, primarily in local communities.
- o Minerals that generated \$4.9 billion in private sector revenues in 1990, and much of the current unexplored potential for oil, gas, and minerals in the U.S.

About 70 percent, or 54 million hectares (133 million acres), of the National Forest System is forest land. About 30 percent, or 23 million hectares (57 million acres), is classified as suitable for timber production, where timber harvest is permitted as one of the multiple-use objectives, along with wildlife, recreation, grazing, watershed protection, and other uses and values (Figure 11). About 2.9 million hectares (7 million acres) of the land available for timber production is of the highest productive quality for growing wood (Site I and above).

Nationally, wood growth on national forest lands exceeds wood harvest by more than 60 percent. Since 1952, tree growth on national forest land has increased by 67 percent, from about 500,000

cubic meters to 850,000 cubic meters annually (9 billion to more than 15 billion board feet per year). Timber harvest is currently about 500,000 cubic meters (9 billion board feet) annually.

Last year harvest for the purpose of producing forest products and starting a new forest occurred on about 155,000 hectares (384,000 acres), or six-tenths of one percent of the land available for timber production in the National Forest System. In total, more than 202,000 hectares (500,000 acres) of forests were regenerated using natural methods and planting.

In recent years the growing urbanization, affluence, and mobility of the Americans have caused a virtual revolution in the expectations and demands placed on U.S. forests (particularly public forests). Demand for just about every conceivable use or value of the National Forest System continues to rise (USDA Forest Service 1990). Some of the trends pose direct conflicts between new expectations and traditional forest values and uses. The national forests can produce more wood products to meet domestic and foreign needs. They can provide more recreation to enhance local economies and leisure time. They can focus on recovery and conservation of endangered wildlife species. They can emphasize the conservation of biological diversity. They can provide more range forage for livestock. They can provide more access to minerals and energy to reduce foreign dependencies, which are staggering for many resources (Bowyer 1991a). But they cannot keep doing more of all these things without limits or without tradeoffs among different uses and values. Choices must be made on which uses and values to favor and which must give way on their behalf (Niemi et al. 1991).

NEW PERSPECTIVES ON FOREST STEWARDSHIP

New Directions for the National Forest System

Strategic direction for managing the National Forest System is set for 5-year periods under the Resources Planning Act of 1974. The current version, the 1990 RPA Program, identifies four themes and 19 contemporary issues for attention. The balance of management investments among the various multiple uses is being improved through increased attention to recreation, wildlife, and fisheries resources. Commodity production programs are being examined and adjusted when nec-

essary to ensure that they are sensitive to environmental protection standards. Research on natural resources and how ecological systems function is being increased. And research, resource management, technical assistance, and international programs are addressing global resource issues. Each of these themes represents a commitment to the long-term health, diversity, and productivity of the land.

Principal resource issues receiving attention are global stewardship, biological diversity, endangered species, riparian area management, range condition, water quality, air quality, catastrophic fires, old-growth forests, spotted owls, below-cost timber sales, clearcutting, near-term softwood timber supply, timber supply from nonindustrial private lands, wilderness management, changing recreation needs, minerals development, financing options, and appeals and litigation over forest management decisions.

Each national forest has an integrated land and resource management plan which addresses these and other local issues and needs. The plans are developed and kept current through an open, public involvement process, often in collaboration with conservation partners. The plans guide overall management of all the lands and resources in the various units of the National Forest System.

To carry out the direction in the RPA Program and forest plans, teams of land managers, scientists, academicians, and citizens develop on-the-ground projects. Some of the projects stress the practical application of emerging scientific information, new technologies, and new partnerships with the public. These are called New Perspectives projects. The purposes of New Perspectives projects are threefold: (1) to learn how to better manage forested ecosystems to sustain a richer set of values, uses, and services; (2) to improve public involvement in resource decisionmaking; and (3) to improve the partnership between researchers and managers in addressing new challenges.

Managing Forest Ecosystems for Broader Benefits: A Richer Forest

New Perspectives reflects a broader view of forestry that is emerging in the U.S. (Franklin et al. 1989) and other nations (Plochmann 1989). The Swedish call it *Rikare Skog*, a richer forest (Skogsstyrelsen 1990). A richer forest means a wider variety of values, uses, and services from current and future forests. The foundation for this vari-

ety is the role of biological diversity in overall land health and productivity (Society of American Foresters 1991, The Keystone Center 1991, Salwasser 1991a, Hansen et al. 1991).

Conserving biological diversity in managed forests is a primary theme in many New Perspectives projects. So is the application of ecosystem and landscape concepts to the management of forests at multiple scales. Ecological systems are places where plants, animals, soils, waters, climate, people, and the processes of life work as an integrated whole. They are constantly undergoing change, whether human induced or not (Thomas 1956, Burgess and Sharpe 1981, Shugart 1984, Waring and Schlesinger 1985, Botkin 1990). Forests are ecological systems. So are ponds and lakes and rangelands and estuaries.

Foresters, rangeland managers, and wildlife habitat managers have always managed ecological systems. But often the purpose of that management was to produce and sustain the yields of selected products of the systems, usually wood, wood fiber, livestock forage, game wildlife, and recreation. This often involved simplifying the system, for example through clearcutting followed by plantations of desired tree species. The ecological goal was to channel more of the system's primary productivity into the products of choice, essentially an agricultural approach to forestry and wildlife management. This is still appropriate, in fact necessary, in some places to meet people's needs for resources, especially at low elevations on flat terrain with deep soils, high rainfall, and long growing seasons.

But not all wildlands are like this and not all wildlands can produce high yields of commercial products in an environmentally acceptable or economically feasible manner. Many are more suited to an extensive form of management. Thus, the new perspective seeks to fit the management practices to best suit the characteristics of the land and the purposes for which it is being managed. This can range from intensive culture or development for high yields of products or uses to the strictest forms of protection or ecological restoration. At landscape and regional scales this will provide for a richer diversity of native plant and animal species, biological communities, and ecological processes on many sites than would have occurred under previous intensive practices (Salwasser 1991b).

Naturally, management for diversity means that less of the primary productivity of a particular site will be channeled to a single or few products of

choice. Thus, in the short run, wood volume or game-wildlife yields from some sites may be lower. On the other hand, a larger area of land may be suitable for the less intensive forms of management, thus offering yields of resource products from areas that may not have been considered suitable when only intensive practices were considered. Overall, the land's ability to sustain a wide array of values, uses, and services across the landscape and to respond to stresses or climate change should be higher in the long run. This is the ecological rationale of New Perspectives. It still has a lot of technical details to be worked out.

Managing forest ecosystems for a richer set of benefits and future options does not mean that all sites receive the same treatment or serve identical purposes (Forman and Godron 1986, Hunter 1990). Thus, scale is a major factor in policy and management decisions. Because each site can potentially serve different purposes, the challenge is to determine the balance of purposes and the mosaic of sites in watersheds and landscapes that will best provide for all the desired conditions, values, uses, and services. This, of course, is not entirely new thinking. But it does require some changes in how agency personnel conduct their business. Managers and scientists must increasingly interact with people who depend on the forest to determine how best to provide the desired balance. Integration of goals and actions; coordination of plans and projects across multiple spatial and temporal scales; and collaboration among all the interested parties are necessary elements of managing forest ecosystems for broader benefits (Figure 12).

One important concept in New Perspectives is that there is no dichotomy of higher and lower uses of land, e.g., cores and buffers. When one accepts that all sites in a landscape serve some purpose, that people are part of all landscapes, that resources must come from somewhere, and that some places must protect unique environmental values, all places in the landscape and all potential practices that serve the many goals and aspirations of people are valuable (with the exception of those practices that would unnecessarily impair the long-term productivity of the land). Parks, wildernesses, wildlife refuges, and wild rivers are no more or no less important to the whole than are campgrounds, oil wells, ski trails, game ranges, and tree farms (Figure 13).

Principles and Guidelines for Sustaining Ecological Systems

To help visualize what it means to sustain a richer forest, picture in your mind the familiar fire triangle: fuel, oxygen, and heat. Take any one side away and the fire goes out.

Now, envision a forest management triangle. Sustaining forest ecosystems, regardless of the specific goals and objectives, must be: ecologically sound, socially desirable (which implies that it will be politically possible), and economically feasible (Figure 14). If any one of these elements is out of balance the desired ecosystem conditions will not be sustainable, i.e., the integrity of the system is broken (its fire goes out).

This is a critical point in the evolving concept of ecosystem management: there is not a single or "natural" purpose for which ecosystems are to be sustained. Thus, ecosystem sustainability is not defined solely by biological or ecological criteria. Nor is it defined solely by economic or political criteria either. It is continually defined and refined at the intersection of these factors, which constantly change. Scientifically adaptive and socially responsive strategies for managing ecological systems is perhaps the only reasonable way to deal with the constant change in ecological, social, and economic factors.

To help land stewards achieve management is ecologically sound, socially desirable, and economically feasible, four principles are useful guides:

Principle 1. *Take care of the land* by protecting or restoring the integrity of its soils, air, waters, biological diversity, and ecological processes.

Principle 2. *Take care of the people* by meeting the basic needs of people and communities who depend on the land for food, fuel, shelter, livelihood, recreation, and spiritual renewal.

Principle 3. *Use resources wisely to improve the economic prosperity and security* of communities, regions, and nations by producing, using, and conserving the natural resources people need.

Principle 4. *Strive for balance, equity and harmony between people and land* by sustaining what Aldo Leopold (1949) called the land community, meeting this generation's resource needs, and maintaining options for future generations to also meet their needs. The World Commission on Environment and

Development (1987) called this sustainable development.

Continuing work on more than a hundred New Perspectives projects and state and private forestland stewardship projects is helping to refine a set of working guidelines for ecosystem management (Sidebar 1). Many of these guidelines were first developed through the stewardship of state and private forests during the 1970s and 1980s. The essence of these guidelines is to manage for diversity in ecological systems, economic systems and human cultural systems for all their potential values.

SUMMARY: CONSERVATION IS STILL THE BEST MODEL

The current debate over the future of our forests and other natural resources is often tinged with overtones of despair and even eminent catastrophe. Calls are being made for a wholesale change in our institutions and societal priorities to address the situation. Such debate is healthy in a democratic society. But before we decide where we should go, we should seek to understand where we have been, where we are, and how we got there.

To address the resource depletion of the late 19th century, conservation was offered as the model for ethical behavior regarding forests and forest resources. It stressed protection of basic resources, scientific management, and the wise use of resources to serve people's needs. Over the years, new dimensions emerged, including multiple use, sustained yield, wilderness preservation, endangered species protection, and integrated land management and planning.

There is overwhelming evidence that, while some problems remain and others have emerged in the last few years, on balance, multiple use and conservation have worked. The condition of U.S. forests, wildlife, rangelands, agricultural lands, and related resources have improved dramatically during the last century. These trends continue to show an improving situation. This is an indication that past conservation policies and practices have, in large measure, served the nation well. These policies and practices have provided us with a resource situation that offers a much broader range of choices than would have existed had they not been put into place. As we consider changes in forest policy direction for the future, this historical dimension should not be forgotten.

Conservation, land stewardship, and multiple use are still the best models for the future, though they are rightly taking on many new dimensions. Unfortunately, they are also currently much abused by those who would twist them to mean either unfettered exploitation or no human use at all. The challenges in sustaining richer forests in the face of a growing human population call for renewed vigor in pursuit of the ideals of conservation, land stewardship, and multiple use management (Robertson 1991), not their abandonment or distortion to suit a narrow political agenda. They also call for renewing the sense of community between the people, the land, and the resources of life (Bruchac 1991, Simon 1991).

When all is said and done, the choices on what to do about U.S. forests must address the desired present and future conditions of three things: environments, economies, and social norms. They must address them at at least four scales: local, regional, national, and global. And the choices must consider at least the next several generations (Native Americans think ahead for seven generations). To do this effectively, people and environment cannot be separated. We cannot protect the environment in isolation of economic and social trends or vice versa. Marion Clawson (1975) presented a version of this in "Forests for Whom and for What". This remains the essential question facing societies about their forests.

Forest conservation, in its truest and broadest sense, means protecting the environment and meeting people's needs for forest products and services. The philosophical challenge is not to see whether a nature-first (Devall and Sessions 1985) or rights-of-nature philosophy (Nash 1991) can overcome a humans-first philosophy. It is to help people understand the implications of something that has been known for a very long time: humans are integral parts of the planet's ecological systems (Prabhavananda and Isherwood 1944, Leopold 1949, Gia-Fu Feng and English 1972, Easwaran 1985, Weatherford 1988, Sahtouris 1989, Wall and Arden 1990). Perhaps when we understand that our temporal economies operate inside a larger global economy of life we might see that economic prosperity and the human cultural diversity of the planet are as important to the future as is its biological diversity.

The direction for managing the U.S. National Forest System during the 1990s emphasizes greater attention to sustaining ecological systems for a wider variety of current and future benefits and

uses. It opens the decisionmaking process to greater participation by people in making choices on what to do about their resources. It brings scientists and resource managers into stronger partnerships on adaptive land and resource management. And it seeks better integration of all aspects of a comprehensive conservation strategy. It is a new perspective on what multiple use means.

This new perspective still includes balanced roles for forest preservation, forest restoration, and sustainable production of the many goods and services of diverse forests. Some large forested areas are being restored and protected for native ecosystems and rare elements of biological diversity (Johnson et al. 1991). In these areas, natural processes are encouraged, although some human intervention may be necessary to sustain desired ecological conditions, e.g. prescribed fires. Other areas are being managed as resource conservation areas with appropriate, and at times considerable, intervention to achieve specific objectives, e.g. habitats for neotropical migrant birds and ungulate winter ranges.

More of our forest land will contain substantial amounts and distributions of what we call "biological legacies" for long-term diversity, productivity, and resilience of the ecosystems, such as large live trees, standing and fallen dead trees, native hardwoods, riparian areas, the complex flora and fauna of the soil, and the seeds of diversity from native forests (Sidebar 2, Franklin 1990, Skogstyreisen 1990, Hansen et al. 1991, Swanson and Berg 1991).

There will also be substantial areas where economically efficient production of wood, energy, minerals, water, recreation, and fiber serves the nation's needs. Some of these may be patterned after successful private-sector programs on the most appropriate sites (Bingham 1991). But even intensively managed wildlands provide considerable environmental services and values, such as clean water, carbon sequestration, habitat for early successional wildlife, and outdoor recreation.

This is what we are striving to accomplish with New Perspectives in the USDA Forest Service. As a way to implement the new directions in the 1990 RPA Program, forest plans, and our Research Strategy for the 90s, it represents a dramatic change in Forest Service programs from the 1970s and early 1980s. The change has implications for natural resource supplies: some lower in the short run, all potentially higher and more diverse in the long run. It also has implications for the roles of forests and other wildlands in regional, national, and global en-

vironments: more positive, we hope. Because U.S. national forests and grasslands play such significant roles in our economies and environments, these changes cannot be undertaken in isolation of other actions.

- o For example, on high productivity sites and beyond the national forests, to meet increasing demands for wood and wood products without placing undue pressure on other nations, more wood must be grown. And Americans must become more efficient in the conservation, harvest, utilization, manufacturing, and recycling of wood and wood fiber.
- o To better understand the roles of biological, economic, and cultural diversity in sustaining ecosystems throughout the world, research and monitoring must address large-scale, long-term dynamics in landscapes and the linkages between social and ecological factors.
- o To help urban people understand the role of land in their livelihoods and their responsibilities to the land requires increased attention to conservation education and interpretation, perhaps even direct participation in resource management projects to give urban people a chance to reconnect with the land.
- o Most importantly, people must rediscover that they do not operate separate from nature or that nature can be preserved separate from people. We exist within the context of the global environmental economy and we have a great influence on its future.

Conclusion

A new era of wildland stewardship is emerging in the U.S.. It is broader than sustained yield and multiple use. But it does not reject the contributions or future utility of those concepts or even some of the practices that characterized good land management in the past. In fact, the emerging concept of ecosystem management builds directly on the foundation established by previous policies, concepts, and accomplishments; it could not happen without them. Because of what prior generations of political leaders, scientists, and resource managers created we can now move to land management that consid-

ers more than selected resource outputs, more than single species, more than single parks and refuges, and more than a mechanistic, reductionist view of nature.

Our affluent, technological society is fortunate in this regard because it means we can now build the framework for conserving and sustaining ecological systems for a wider array of current benefits and future options. As in the past, the foundation is still scientifically sound and socially responsive management of land and resources. The goals are just broader. They now include the many aesthetic and spiritual values and environmental services of healthy land as well as their many resource uses (National Research Council 1990, Lubchenko et al. 1991, USDA Forest Service 1990). Obviously, we do not know how to do all this yet. But the journey is underway.

This does not mean that controversy over forest uses in the U.S. will soon subside. Our nation's people are still split over the appropriate uses of national forests and they have increasing concerns over private lands as well. Conflict over uses and values will not decline unless the people reach accord on the need for diversity and the relative purposes and juxtapositions of all sites on the landscape. Complementarity of sites—the nature preserves, resource conservation areas, resource production areas, and recreation areas—is needed to sustain a landscape mosaic that protects the environment and provides for people's needs, especially those of local people.

While we move to place more emphasis on managing national forests for broader benefits in the future, we can not assume that our challenges stop at the border of distinct land ownerships. Producing forest products, conserving biological diversity, and sustaining vibrant human communities are regional and national concerns that are always subject to a larger global economy of life.

The data are in and they are conclusive. The biosphere will change whether humans will it to or not. It will not be possible to conserve forests and have a healthy environment in this changing world without a reasonable degree of economic prosperity and vice versa. It is all connected. Education, economic development, land stewardship, equity among people, adaptability, and conservation of natural resources to improve the lives of people are the necessary and sufficient parts of a global stewardship ethic.

Sidebar 1.

GUIDELINES FOR CONSERVING ECOLOGICAL SYSTEMS

1. **Focus on Desired Present and Future Conditions of the Land and Its Human Communities.** Focus management actions to achieve desired current and future conditions of the land at multiple scales (Caplan 1992), always seeking to balance goals for the land:

- o the beauty of the land,
- o the stability and fertility of its soils,
- o the quality and flows of its waters,
- o the clarity of the air,
- o the diversity of plants, animals, and biological communities, and
- o the interconnectedness and character of habitats and landscapes that provide for the health and resilience of ecological systems and processes;

with goals for the people:

- o yields of resources needed to sustain the prosperity, diversity, and vitality of people.

Desired conditions must take into consideration economic feasibility and the health, productivity, and resilience of the land over time in the face of unplanned and uncertain future events such as fires, storms, and insect epidemics (Waring and Schlesinger 1985, Botkin 1990). They must also consider continental and global economic and environmental effects of choices made at local and regional scales, e.g., the energy costs of alternative materials.

2. **Integrate Thinking and Actions at Multiple Spatial and Temporal Scales.** Think about the effects of proposed actions at several geo-

graphic scales and through time (Forman and Godron 1986): at least 1 scale larger and 1 scale smaller than the scale you are working at and at least for several decades in the future; more and longer if possible.

3. **Be Especially Careful in Sensitive Areas.** Protect special places such as wetlands, endangered species, rare plant populations, and cultural resources.
4. **Employ the Ecological Capabilities and Processes of the Land.** Work within the ecological potential of sites and landscapes; maintain native diversity; and employ nature's processes to the greatest degree possible.
5. **Get People Involved in Planning and Carrying out Project Work.** Involve interested and affected people in the full process of making decisions about common resources; plan as if you are in a fishbowl to make sure everyone who wants to has access and knows what is going on; make conservation partnerships the rule rather than the exception.
6. **Involve Scientists through Adaptive Management.** Monitor, research, interpret, and adapt--integrate research with operational management and set resource management up as the continuous experiment and learning opportunity that it always has been and always will be.
7. **Integrate Resource Management for Operational Efficiency.** Integrate resources, integrate actions across geographic scales, and build a community of interests--integrate everything and all the time but not necessarily everything on every acre at all times--this is biologically impossible and, therefore, technically infeasible.

Sidebar 2

A RICHER FOREST

Has a high diversity of native trees, shrubs, herbs, and animals;

Sustains human diversity and economic prosperity;

Sustains its health, diversity, and productivity largely through natural processes;

Is full of the sights, sounds, smells, and feels of a wild place;

Is pleasing to look at;

Sustains productive soils, clean water, clear air, and a rich biota;

Has abundant animal inns (snags), lizard lodges (fallen, rotting logs), nuts, berries, fruits, seeds, and nectar for wildlife diversity;

Has a variety of age classes, habitats, and biological communities that are well connected and well distributed across the landscape;

Is resilient to stress and adaptable to long-term change;

Contributes to a healthy, productive global environment;

Produces good yields of high quality products, uses, and services that people want and need;

Is a place where people can invest their creativity and learn about relationships and responsibilities to the land and other people;

Is managed with the best available technologies according to the best available scientific knowledge;

Yields benefits and values that exceed the costs and resources involved in its management.

A richer forest is a journey, not a destination.

**The goal is to be on the journey,
not to perceive that one has arrived at the
destination.**

**A land steward is one who manages for richer
ecosystems.**

TABLE 1. U.S. consumption of timber products for selected years. Data from Bowyer 1991a and U.S. Bureau of the Census Statistical Abstract of the United States: 1990 (110th ed.), Washington DC.

Year	Total Domestic Consumption (Million Cubic Meters-Roundwood Equivalent)	Per Capita Consumption
1970	340	1.7
1975	314	1.5
1980	369	2.0
1981	346	1.9
1982	338	1.9
1983	387	2.0
1984	420	2.2
1985	419	2.2
1986	451	2.3
1987 (est)	468	2.3

TABLE 2. Estimated energy required in the manufacture of various wall systems for building construction. Estimates include energy consumption involved in logging (or extraction), manufacture, transport to the building site, and construction. Basic data are from CORRIM (1976) as cited in Bowyer (1991c).

Type of Wall	Energy to Construct 100 sq. ft. of Wall (Million BTU Oil Equiv.)
Plywood Siding, No Sheathing, 2X4 Frame	1.99
MDF Siding, Plywood Sheathing, 2X4 Frame	2.54
Concrete Building Block, No Insulation	17.09
Aluminum Siding, Plywood, Insulation Board, 2X4 Frame	4.95
MDF Siding, Plywood Sheathing, Steel Studs	5.11
Brick Veneer over Sheathing	17.89

FIGURE CAPTIONS

Figure 1. Estimated area of land covered by forests with 10 percent or greater canopy of trees.

Figure 2. Land area of the U.S. in crop and forest cover from 1850 to 1980. Data from Waddell et al. (1989).

Figure 3. Timberland ownership as a percent of total U.S. timberland in 1987. Data from Waddell et al. (1989).

Figure 4. Estimated change in forest area per person from 1700s to late 1900s.

Figure 5. Proportional change in the area of the biosphere relative to the estimated human population during the past 300 years.

Figure 6. Trend in world roundwood and industrial roundwood production from 1950 to 1990, estimated out to 2010. Data from FAO (1991) as presented by Haynes and Brooks (1991).

Figure 7. Trend in U.S. production of forest products from 1800 to 1980s. Data from Sedjo (1990).

Figure 8. U.S. trends in net timber growth by major owner from 1952-1987. Data from Haynes (1990).

Figure 9. U.S. timber growth and removals from 1920 to 1986. Data from Haynes (1990).

Figure 10. U.S. trends in area burned by wildfire from 1935 to late 1980s. Data from USDA Forest Service (1989).

Figure 11. Area in different land-use designations in forest plans for the National Forest System in 1991.

Figure 12. Ecosystem conservation requires the integration of actions across multiple geographic scales, from sites (even microsites) to watershed, landscapes, regions, and continents.

Figure 13. Conserving forest ecosystems for desired values, uses, products, and services requires the blending of different approaches to forest protection, restoration, management, and enhancement.

Figure 14. Conserving ecological systems depends on actions that are ecologically sound, economically feasible, and socially desirable. If any of these factors is over or underemphasized, goals for which the ecosystem is being managed cannot be met on a sustained basis: the "fire" goes out.

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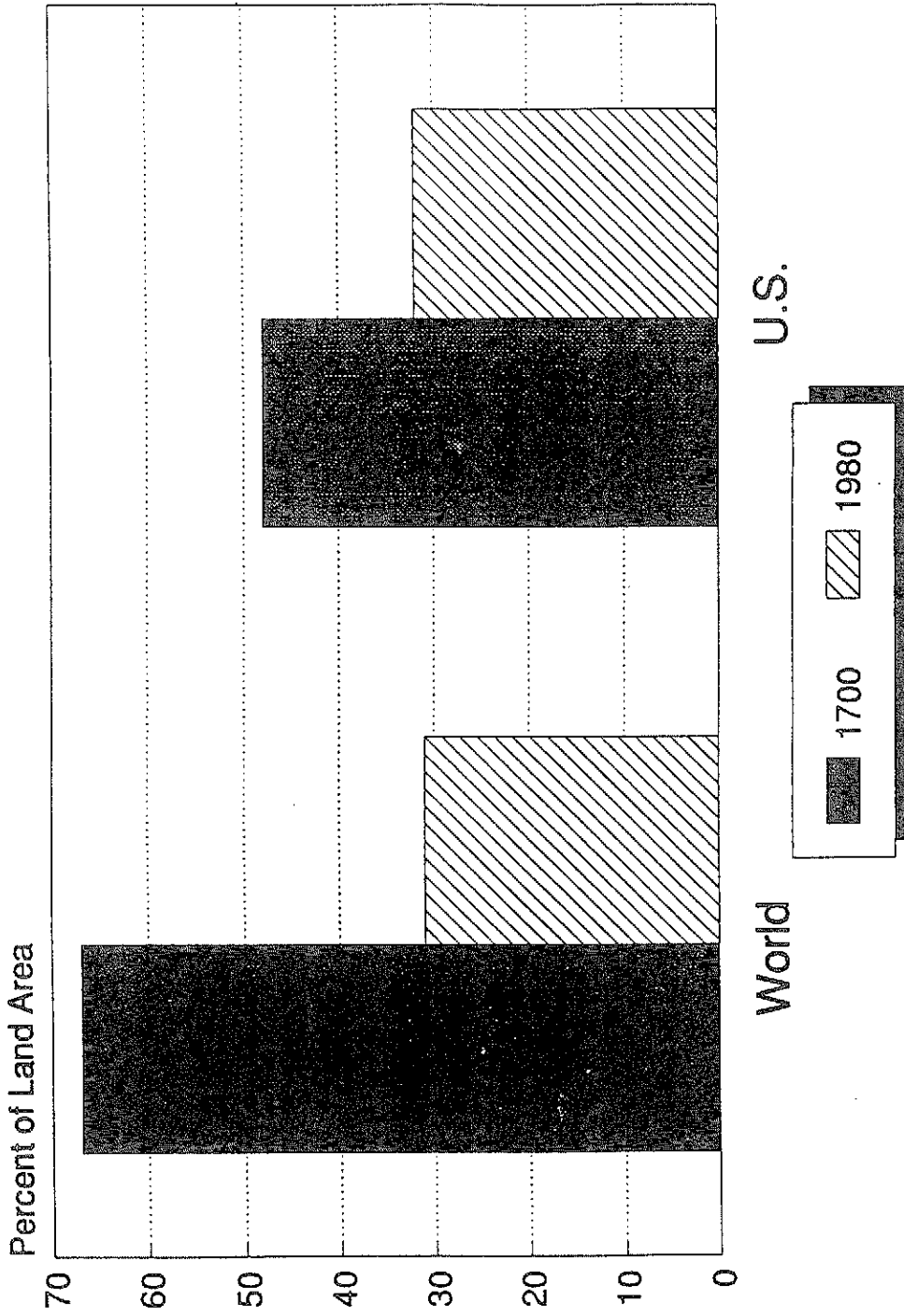
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Figure 1

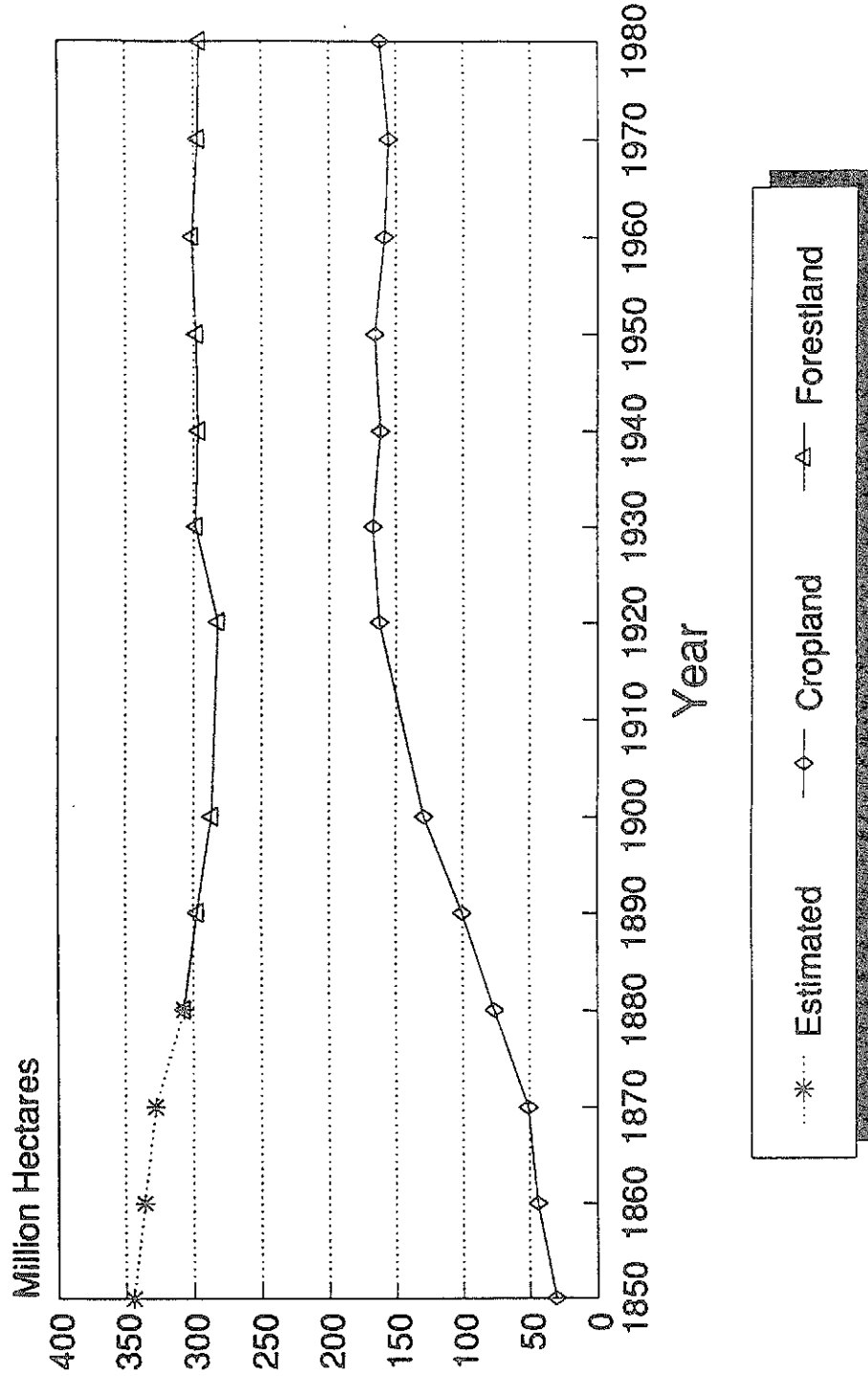
Forest Coverage



Source: Clawson (1979), WRI (1990)

Figure 2

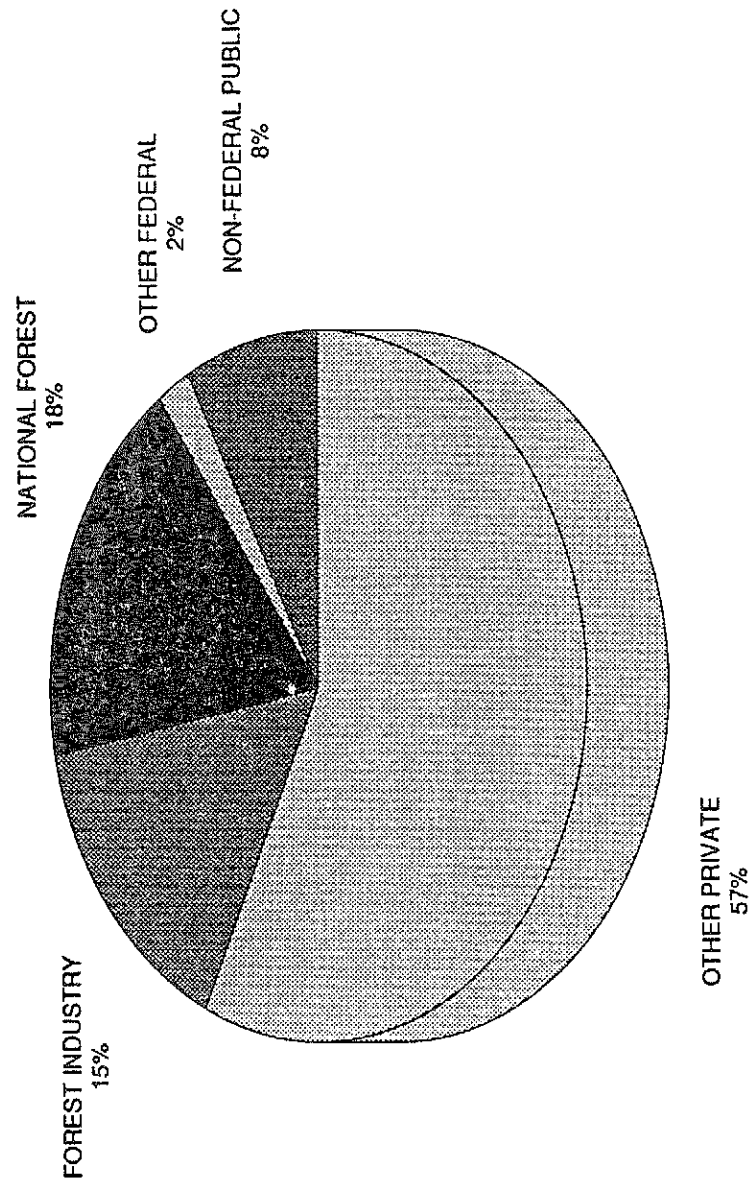
U.S. Crop & Forest Land Area 1850-1980



Source: Waddell et al. (1989)

Figure 3

Ownership of U.S. Timberland Percent of Total Held by Major Owners



Source: Waddell et al. (1989)

Figure 4

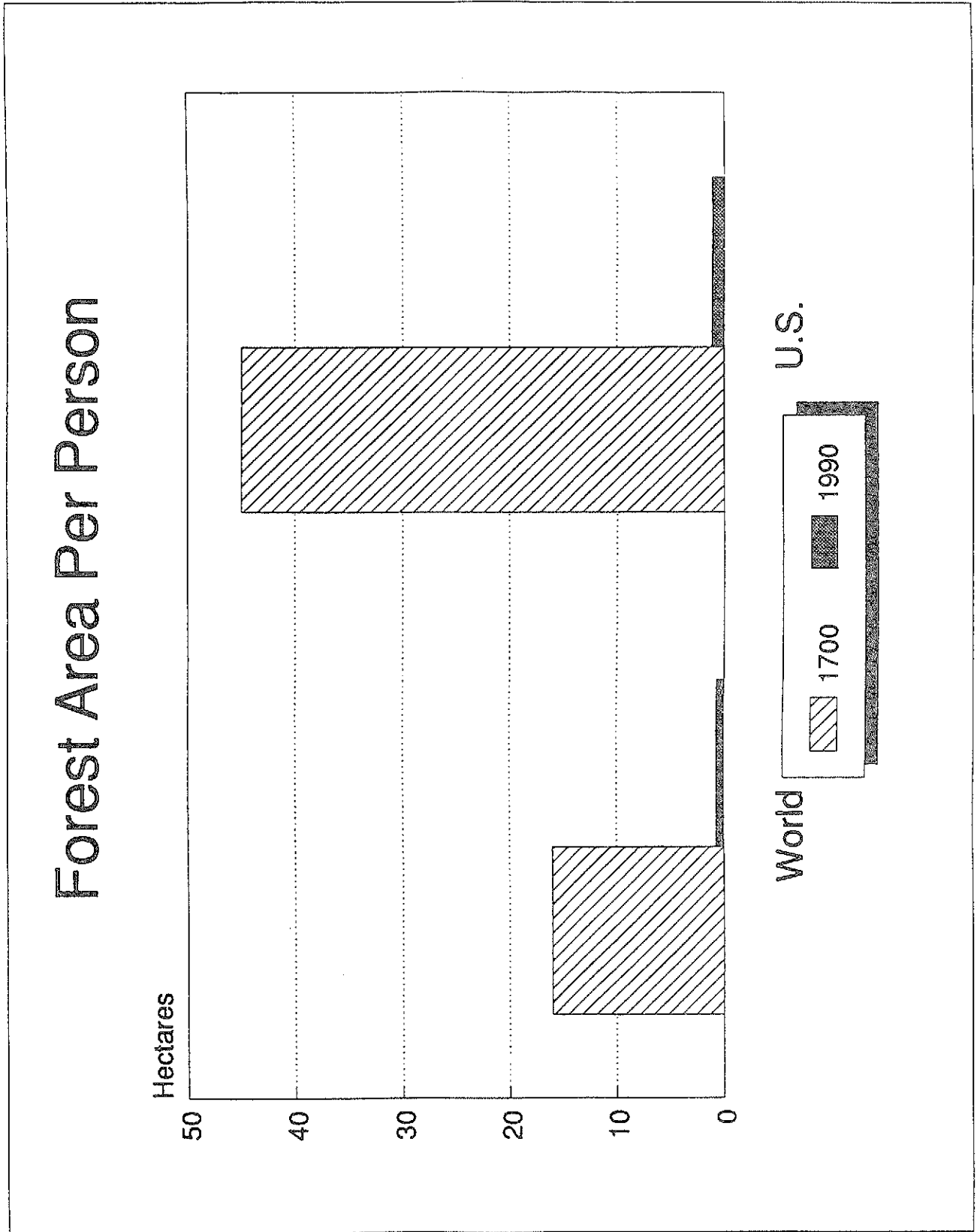


Figure 5

Biosphere per Person

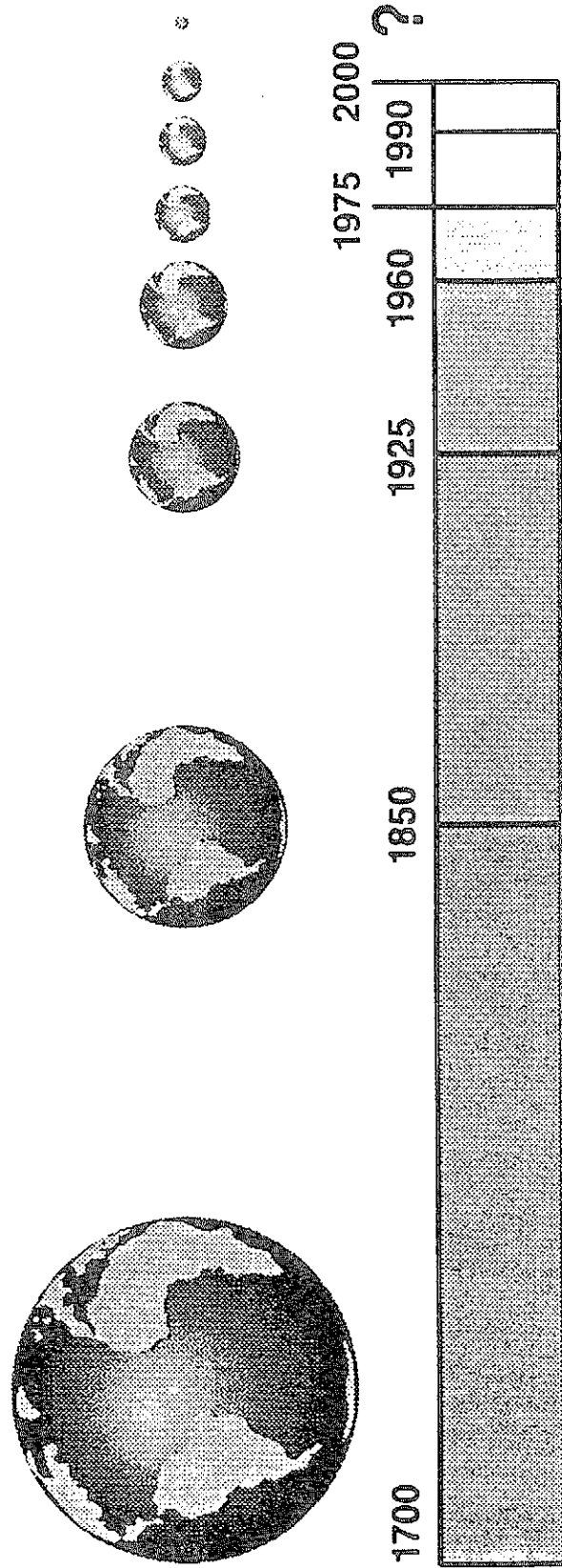
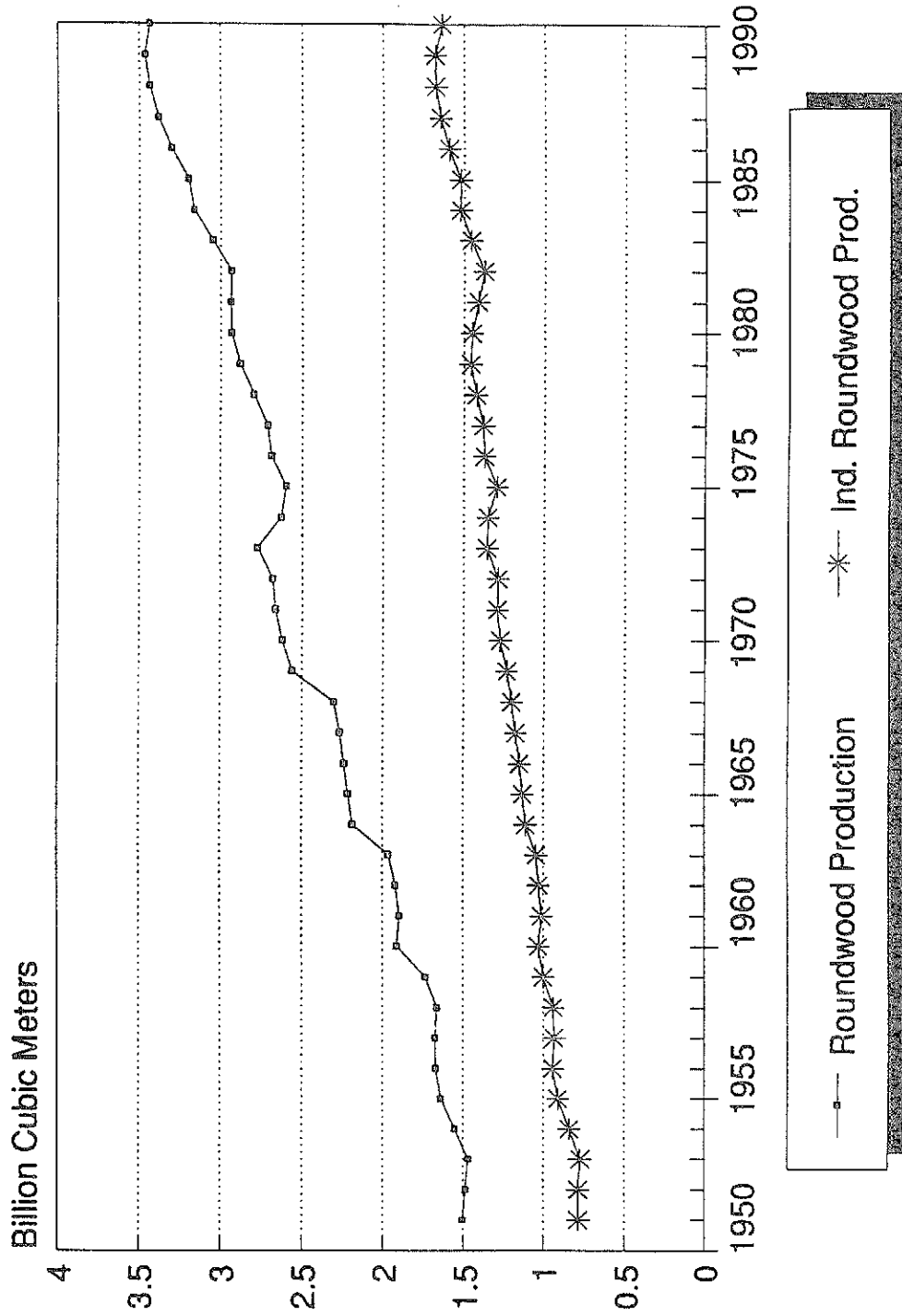


Figure 6

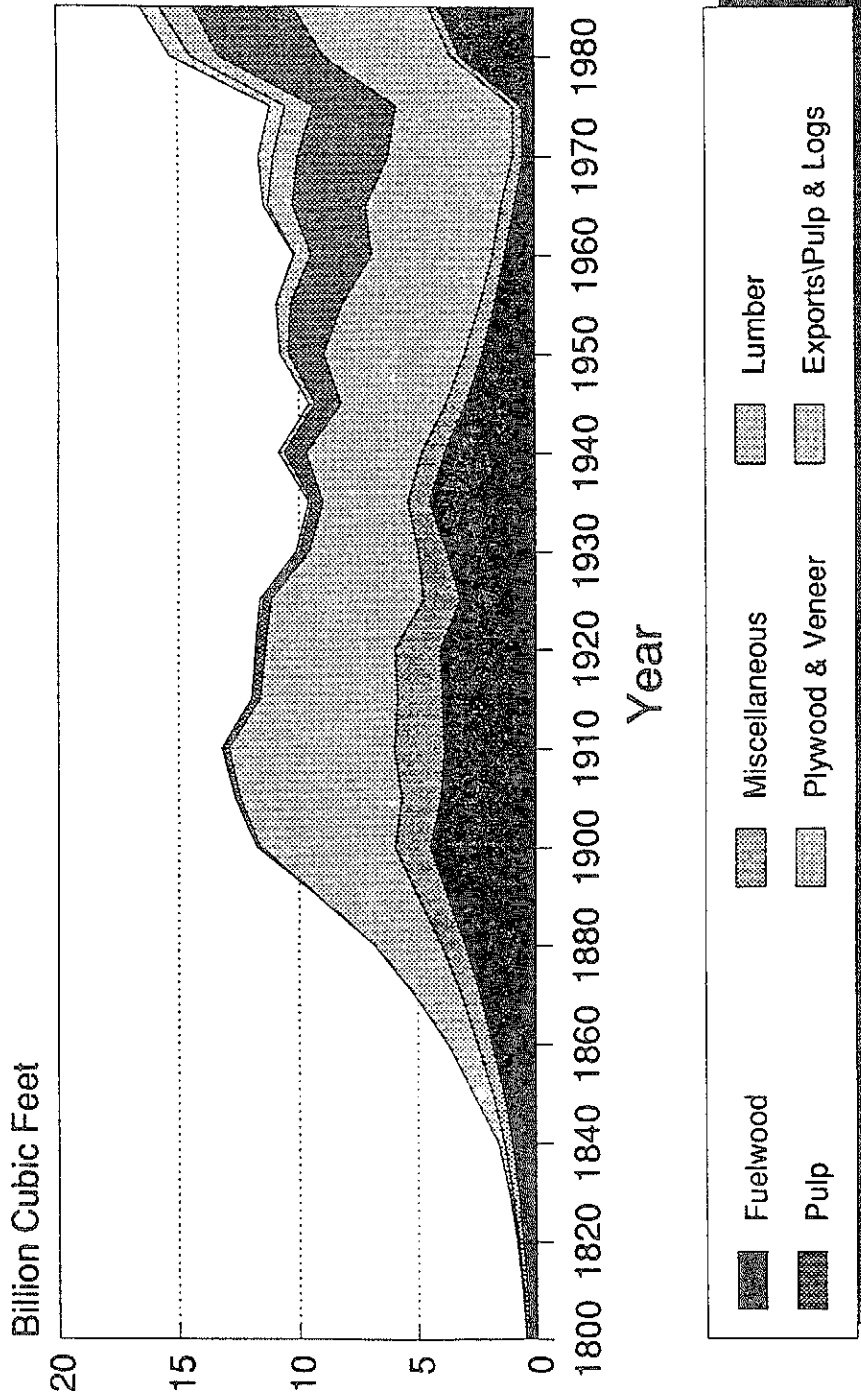
Global Trends in Roundwood Production



Source: Haynes and Brooks (1991)

Figure 7

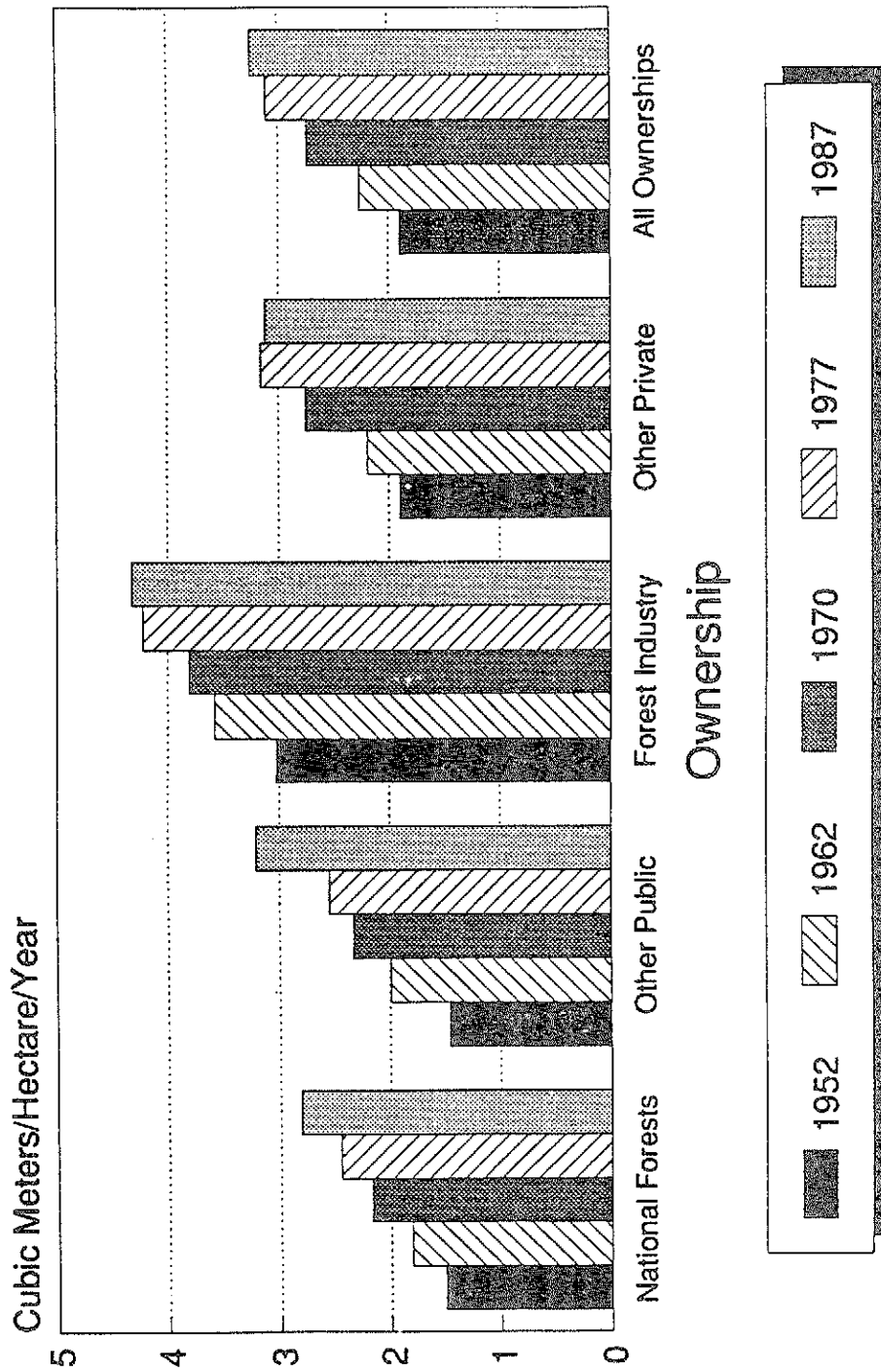
U.S. Production of Forest Products 1900-1985



Source: Sedjo (1990)

Figure 8

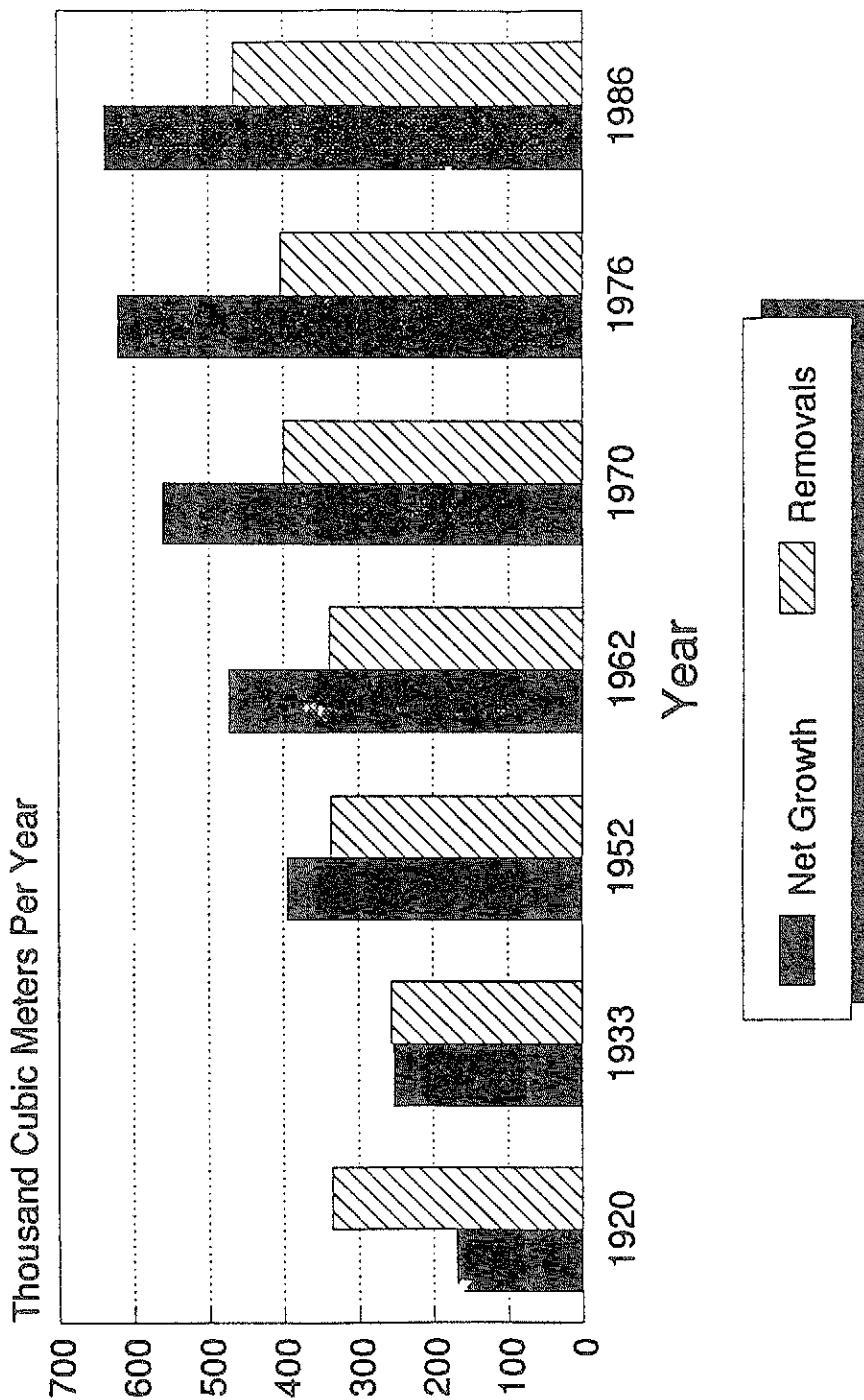
U.S. Trends in Net Timber Growth/Hectare By Major Owner--1952-87



Source: Haynes (1990)

Figure 9

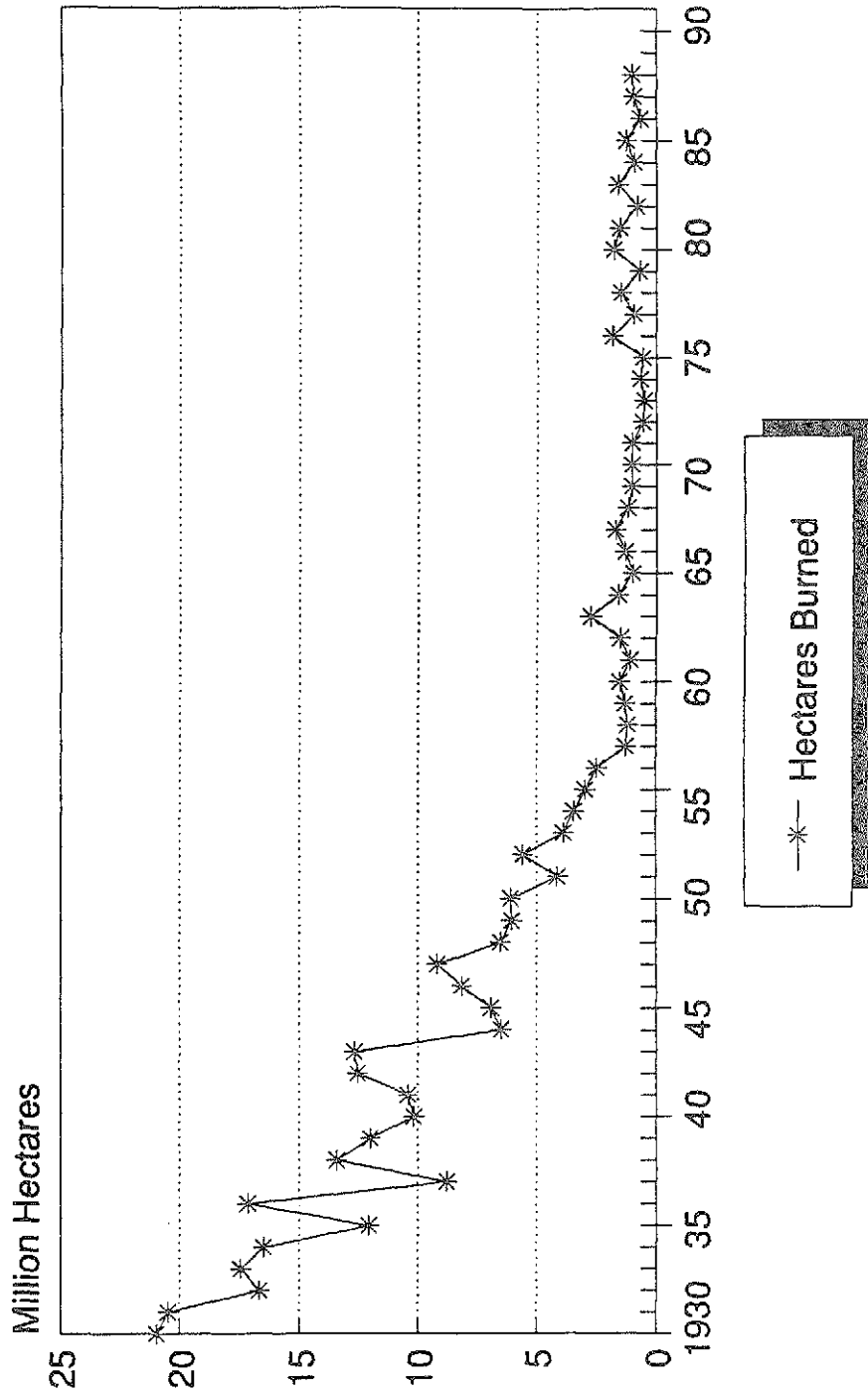
U.S. Timber Growth & Removals 1920-86



Source: Haynes (1990)

Figure 10

U.S. Wildfire Trends Area Burned--1930-87

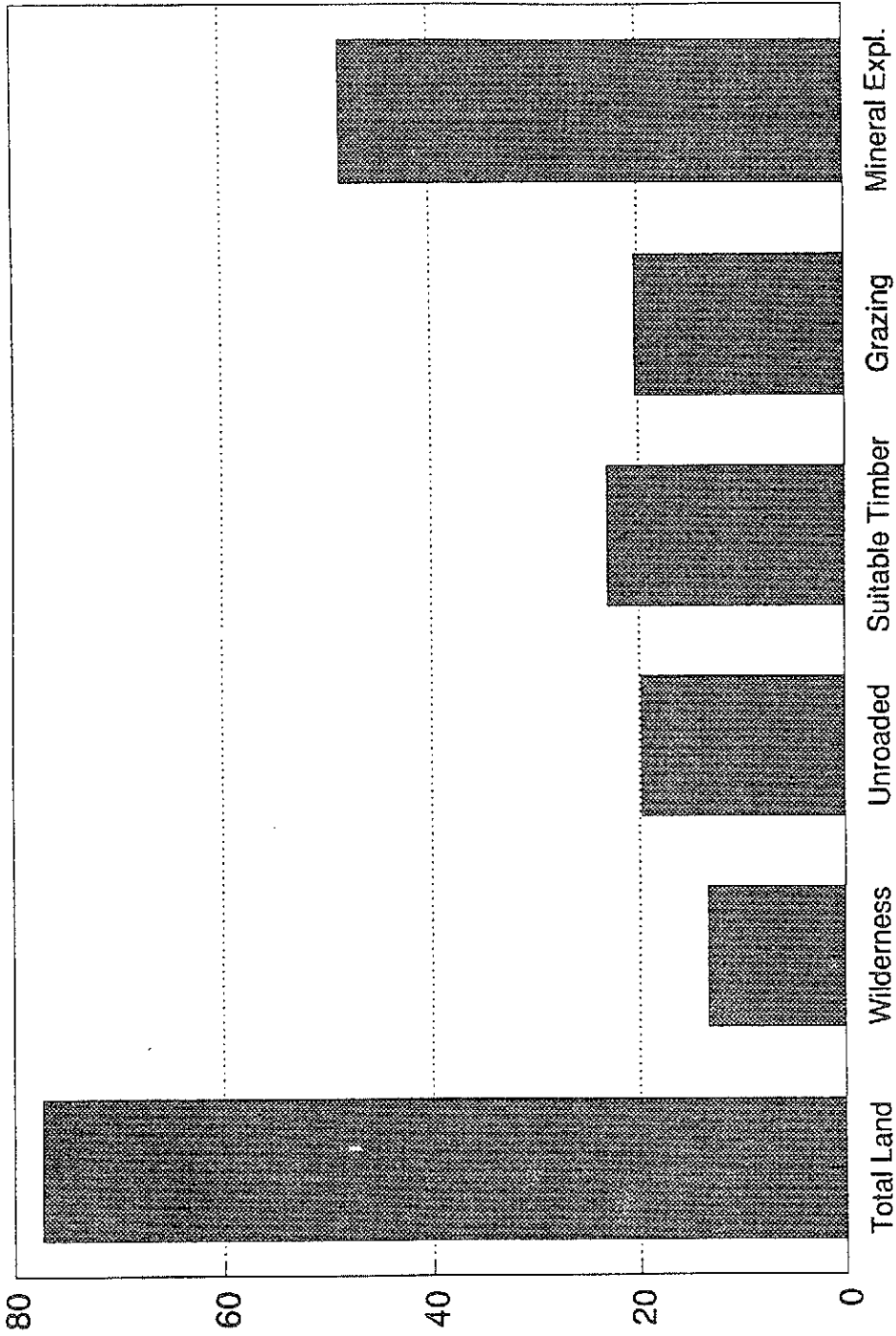


Source: Wildfire Statistics, USDA-FS

Figure 11

National Forest System Land Area

Million Hectares Designated For Use (1991 plans)



There is overlap among these categories.

Figure 12

Blending Wildland Uses

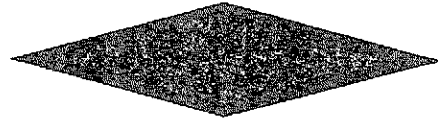
Emphasis		
<u>Protect Nature</u>	<u>Balance Uses & Values</u>	<u>Produce Resources</u>

Class

Native Wildland Reserves



Multi-Use Wildlands



Production Wildlands

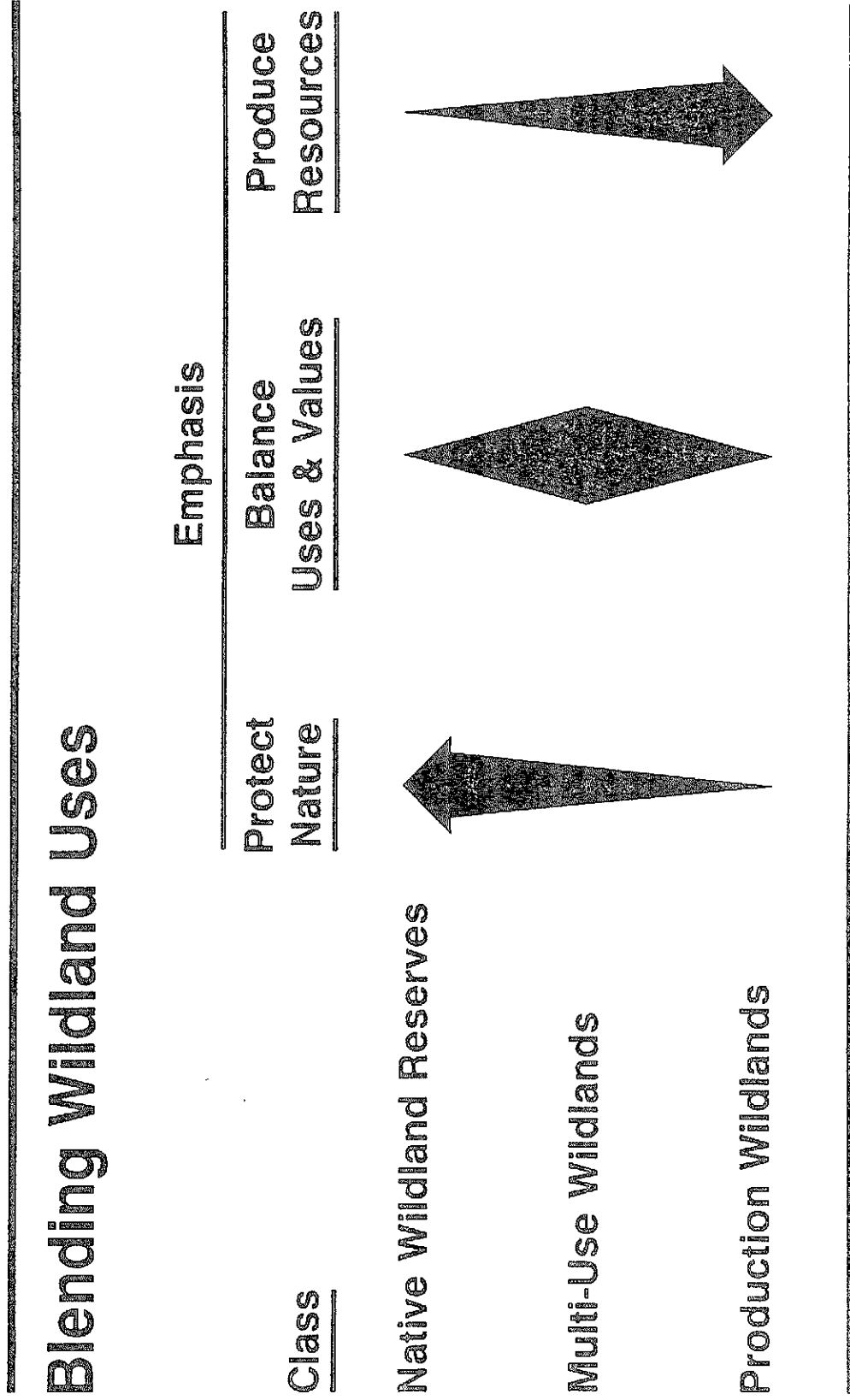


Figure 13

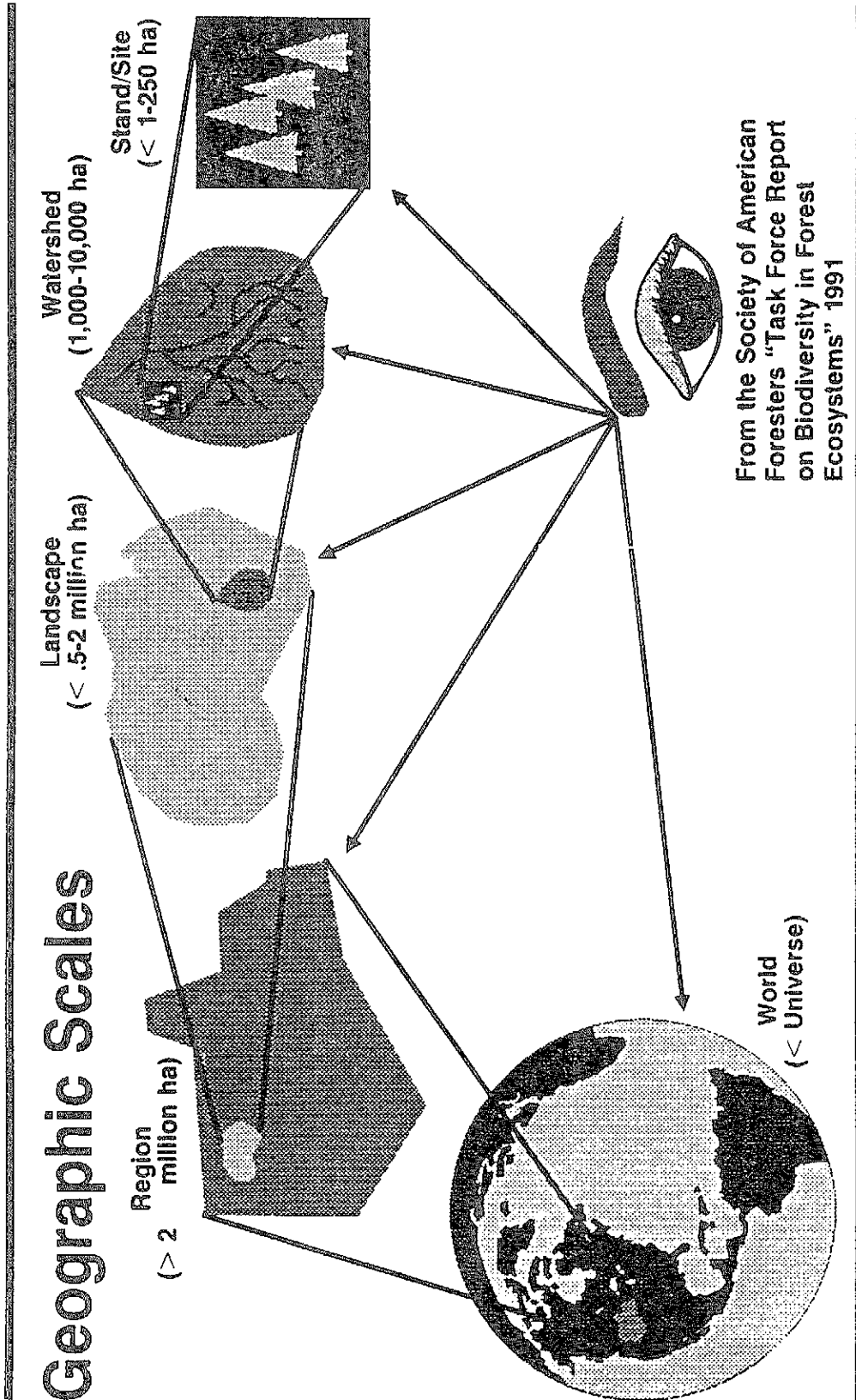
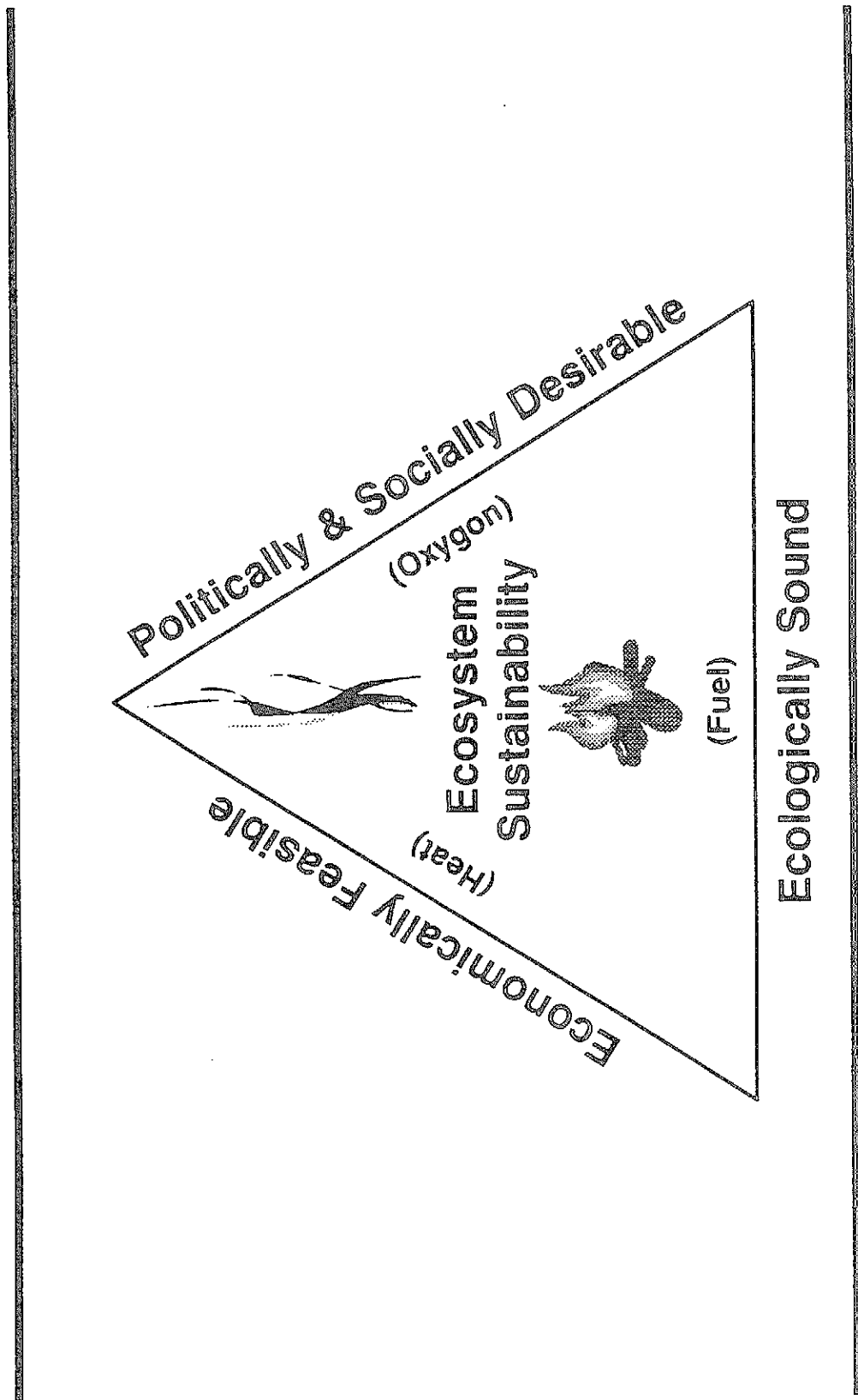


Figure 14



MEMBERS OF THE COMMISSION

Canada

Mexico

United States of America

