IMPLEMENTATION OF
UNCCD IN KOREA

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I. Introduction

Through the long history of Korea, wise management of forests and water flows has been the most important among various priorities of dynasties and governments. But during the first half of 20th century, including the Korean War, severe deforestation had occurred across the Korean Peninsula, due to wide-spread illegal cuttings and overcutting practices. Since the early 1960s, in parallel with the Economic Development Plans, rehabilitation activities of forest lands have been strongly propelled in order to green the country again. In 1973 the first 10-year National Forest Plan was devised to complete the rehabilitation of denuded forest lands and to enhance the protection of the existent forests. The subsequent National Forest Plans have been implemented for improving forest resources and consequently providing augmented economic and environmental benefits to the society.

Through the long-term Forest Plans, Korea has been successful in greening the country again. In recent years, sustainable development has been the primary theme in managing the natural resources to achieve and maintain the balance and harmony between development and conservation, as emphasized at UNCED and other various international meetings. The implementation of forest conservation, therefore, has been embodied in the Fourth Forest Plan, which has been launched in 1998.

II. Forest Resources in Korea

1. General Land Use

In Korea, total land area is 9.94 million ha of which forests account for 6.44 million ha. Forests covering 65% of the Korean landscape have been the dominant feature shaping our traditions and culture. Except for forests, about 19% of land area is classified into cultivated l and the rest 16% for other purposes including housing developments, industrial sites, and other public uses. In comparison with other countries, land area for other purposes is relatively low.

From the socioeconomic conditions anticipated in the future, land uses in Korea is expected to be changed a lot, especially the increased demand for housing, industrial sites including leading edge industrial complex, and a variety of transportational uses. In particular, encroachment of urbanization, suburbanization and enlargement of housing development, and wide-spread localization would change the spatial distribution of demand for various land uses across the country.

Also, demand for land development is expected to be very high in the surroundings of metropolitan and large city areas, due to expansion of daily life activities and increased mobility. It seems to be likely that land demand for industrial sites, housing and tourism purposes, and social infrastructure be greatly increased in the near future. In general, land uses in Korea is shown in Table 1.

Table 1. Land use in Korea

Unit : 1,000 ha

Year	Total Land	Forest		Cultivated land		Others	
		Area	Ratio(%)	Area	Ratio(%)	Area	Ratio(%)
1992	9,931	6,464	65	2,070	21	1,398	14
1993	9,939	6,460	65	2,055	21	1,355	14
1994	9,939	6,456	65	2,033	20	1,451	15
1995	9,927	6,452	65	1,985	20	1,490	15
1996	9,931	6,448	65	1,946	20	1,538	15
1997	9,937	6,447	65	1,924	19	1,572	16
1998	9,940	6,436	65	1,910	19	1,594	16

Source : Statistical Yearbook of Forestry. 1999. Forestry Administration, Korea

To meet the future land demand for human settlement, industrial sites, and public facilities including highway, railroad, airport and harbor, and power plant, major supply source would be the conversion from agricultural land, forest land, and land reclamation. The additional land area for human settlement, industrial site, and public facility were estimated to be 40,000 ha, 12,000 ha, and 78,000 ha, respectively, thus totalling up to 130,000 ha during the year of 1992 through 2001. According to the Third Comprehensive Planning of National Land Use(1992 2001), about 65,800 ha of agricultural land and 39,900 ha of forest land should be converted into other uses, as shown in Table 2. If socioeconomic and other conditions in Korea kept the same pace, it is estimated that about 140,000 ha would have converted into other uses by the year 2020.

Table 2. Estimated supply of and demand for land development (1992 2001)

Unit : 1,000 ha

Demand Supply	Human Settlement	Industrial Site	Public Facility	Total
Agricultural Land	27.8	6.8	31.2	65.8
Forest Land	11.4	1.2	27.3	39.9
Land Reclamation	0.5	3.4	19.5	23.4
Total	39.7	11.4	78.0	129.1

Source : The Third Comprehensive Planning of National Land Use(1992 2001). 1992.
Ministry of Construction. Korea

2. Forest Resource

A. Forest Land

Korea is a typical mountainous country where it is difficult to reserve plain forests, and it is also a populous

country characterized by the ever-increased demand for land available for various purposes including industrial and recreational uses. Therefore, the success of sustainable forest and mountain development depends greatly on how we deal with the mountainous forests and the people living in and around rural forest communities which are primarily relying upon forest resources.

Until recently, the forests in Korea have been classified into 2 categories, namely reserve and semi-reserve forests, occupying 25% and 75% of all forest lands, respectively. Through the amendment of Forest Law in 1994, forest land has been classified into 3 categories, namely production, environmental, and semi-reserve forests, to reflect the changing socioeconomic conditions and meet the various demand for forest products and services of the general public in more efficient way. In particular, to put more emphasis in the conservation of forest resources and a variety of environmental functions provided by forests, portion of the past reserve forests have been put under new category of environmental forests. Now the details on the new forest land classification scheme are under progress.

Forest land in Korea has been steadily decreased due to the development needs for agricultural croplands and other uses in the past decades. During the past 10 years, average of 8,400 ha forest land have been converted into other land uses. Until 1987, forest land converted into agricultural purposes accounted for more than half of all converted area. But since 1988, larger portion of forest land converted have been for non-agricultural uses including housing projects, industrial sites, public cemetery and graveyard, golf course, ski resorts, and others. In the year 1992, almost 91% of forest land converted into other land uses were for non-agricultural land uses, in particular over 18% of non-agricultural land conversion was for golf course establishment. Since then the ratio has been a little reduced, but remained still high over 80%.

Table 3. Forest land converted into other uses

Unit : ha

Year	Total Forest Land Converted	Agricultural Uses		Non-Agricultural Uses	
		Area	Ratio(%)	Area	Ratio(%)
1985	10,452	6,627	63	3,825	37
1991	7,883	827	11	7,056	89
1992	9,263	814	9	8,449	91
1993	6,366	798	13	5,568	87
1994	7,481	978	13	6,503	87
1995	6,930	1,215	17	5,715	83
1996	7,986	812	10	7,174	90

Source : Forestry Research Institute, 1998. Seoul, Korea

Table 4 shows more details of forest land conversion as of 1996. The total forest land converted was about 8,000 ha, of which about 39% was from reserve forests which was strictly protected from any deforestation and

disturbances in general. The agricultural land converted from forest land accounted for 10%, decreased from 17% of the previous year.

Among non-agricultural land uses, the portion of golf course was reduced into 12.1% from 18% of 1992, primarily due to the increased social awareness towards nature conservation and raised antipathy of the general public. In 1995, the portion for housing projects was decreased to 12%, compared with about 19% of 1995. In general, more land in semi-reserve forests have been converted for other land uses, but in cases of grassland and golf course development more reserve forests have been converted.

Table 4. Forest land conversion for other land uses as of 1996

Unit : ha

Converted From / Into		Forest Land		
		Total	Reserve	Semi-Reserve
Total		7,986	3,076	4,910
Agricultural	Total	812	378	434
	Cropland	442	162	280
	Grassland	370	216	154
Non-Agricultural	Total	7,173	2,699	4,475
	Housing	946	92	853
	Industrial	1,248	231	1,018
	Graveyard	87	8	79
	Golf course	965	787	178
	Ski area	171	86	86
	Others	3,756	1,495	2,261

Source : Forestry Research Institute, 1998. Seoul, Korea

B. Forest Types

Forest types in Korea have been classified into 5 categories which are conifers, broad-leaved, and mixed forests, bamboo stand, and non-stocked areas, totalling up to 6,436,000 ha, as shown in Table 5. Of total forest land, conifers forest occupied the largest portion of about 42.5% and broad-leaved and mixed forests accounted for about 26% and 28.5%, respectively. There are still non-stocked areas included in forests because of topographical features across the country. The coniferous forests accounted for about 44% of total timber stock volume with an average stock volume of 57.64 per ha, while broad-leaved and mixed forest types about 27% and 29%, respectively. Average stock volume per ha for each type of forests was not greatly different among them, averaging slightly over 56 per ha, but broad-leaved forests had the largest average stock volume of 58.51 per ha.

Table 5. Forest land area and stock volume by forest type

Forest Type	Forest Land (1,000 ha)	Total Stock Vol. (mil.)	Average Stock Vol. per ha( )
Total	6,436(100)	363(100)	56.40
Conifers	2,741(42.5)	158(44.0)	57.64
Broad-leaved	1,675(26.0)	98(27.0)	58.51
Mixed	1,838(28.5)	106(29.0)	57.67
Bamboo stand	8(-)	-	-
Non-stocked	172(3.0)	-	-

Source : Statistical Yearbook of Forestry. 1999. Forestry Administration, Korea

C. Forest Ownership and Growing Stock Volume

As of 1999, about 22% of total forest land in Korea was under governmental authority including Forestry Administration and other governmental bodies, as shown in Table 6. A large portion of forest land, over 70%, was under the private ownership. The rest 8% of forest land belonged to public organizations and institutions. As of 1999, total timber stock was 363 million , increased by 4.9% from the previous year in spite of a slight decrease of forest land. Of total timber stock volume, about 61% was from private forests and about 32% from national forests. The public forests accounted for about 7% of total volume. Average timber stock volume nationwide was 56.4 per ha. National forests showed the highest average stock volume per ha of 81.0 , while privately owned forest did the lowest stock volume of 48.6 .

Table 6. Forest land area and stock volume by ownership

Ownership	Forest Land (1,000 ha)	Total Stock Vol. (mil.)	Average Stock Vol. per ha( )
Total	6,436(100)	363(100)	56.40
National	1,419(22.0)	115(32.0)	81.04
Public	487(8.0)	27(7.0)	55.44
Private	4,529(70.0)	220(61.0)	48.58

Source : Statistical Yearbook of Forestry. 1999. Forestry Administration, Korea

In Korea, one of the most difficult problems hindering the effective and intensive forest management practices could be singled out as the excessive number of private owners that consequently resulted into too small size of forest owned by each owner to be managed in efficient way. In many cases, the motives for owning forests privately were not for managing forests, rather for other purpose such as real estate investment for future value increase, family graveyard, and inheritance property.

Also spatial dispersion of small-size private forests caused difficulties in managing forests intensively

because of intermixed between national and private forests spatially. The private forest owners usually have not shown any interest and voluntarily participated in forest planning and management practices. The large portion of private forest owners, 61%, owned forests less than 1 ha. Over 99% of private owners kept forests less than 30 ha but their total ownership accounted for 76% of total private forests and for 53% of total forests in Korea.

During the period of 1987 through 1999, total number of private forest owners has slightly increased from 1.95 million to 2.19 million people, averaging about 2.1 ha per owner, as shown in Table 7. With the recent amendment of regulations on forest land purchase favorable for easier transactions, private forest owners would be increased and consequently average size of forest land owned was expected to be reduced in the future.

Table 7. No. of private forest owner and average of forest size

Year	1987	1993	1999
No. of Owner	1,948,140	1,954,363	2,185,353
Average Forest Land(ha)	2.5	2.4	2.1

Source : Statistical Yearbook of Forestry. 1999. Forestry Administration, Korea

III. Forest Resources Development in Korea

1. Forest Restoration and Early Forest Management

Until the 19th century, forest were rich old-growth forests in Korea. But those forests were severely destroyed by over-cutting and illegal cutting for procurement of construction materials and daily needs including fuelwood, especially throughout the social turbulences in the early 20th century, and Korean War (1950-1953) and immediately following years of social instability. The average growing stock volume per ha in 1960 was 10.6 , only one-tenth of world average and denuded lands amounted to about 680 thousand ha. Deforestation was a dominant factor causing shortage of fuelwood supply and frequent natural disasters including land erosion, severe drought, and seasonal floodings which incurred serious social problems, property damages, and life loss across the country.

Since 1960, vigorous reforestation plan has been pursued in degraded forest lands in parallel with economic development plan. Through the enactment of the Forest Law and Erosion Control Law, and establishment of Forestry Administration, forest management system in Korea began in organized way with directions mandated by relevant laws. The Forest Law of 1961 required the Forestry Administration to set up a national forest plan every 10 years in order to establish and manage the forest resources nationwide.

2. Long-Term Forest Planning

The most important turning point in Korean forestry was the initiation of the First 10-year Forest Development in 1973 of which main goal was the reforestation of denuded forest lands. Reforestation of one million ha was the goal with objectives of implementing the national tree planting movement through the public participation and of achieving rapid reforestation of fast-growing tree species. To accomplish this Plan, the National Tree Planting Period and Tree Tending Day was established to encourage active participation in reforestation program and promote various tree tending activities including fertilization and protection against disease and insects. Through implementing this movement the reforestation target of one million ha was accomplished in 1978, 4 years earlier than planned schedule.

The Second 10-year Forest Development Plan was to establish large scale commercial forest zones in order to develop long-term timber resources and thus to meet the demand for timber products. To achieve the objectives, various forest policies initiated by the government, including improvement of reforestation plan, strengthening of forest protection, foundation of forest development funds for supporting private forest management, grouping and enlarging of national forests, and strengthening of forest conservation programs.

This Plan resulted in the formulation of 80 large scale commercial forest zones where 325 thousand ha was reforested successfully. The emphasis was put on consistent management of natural forests and young plantations. Along with reforestation projects, erosion control works also undertaken vigorous to prevent natural disasters across the country. In the prevention of forest diseases and insect damages, advanced scientific methods including biological control techniques were undertaken for improved effectiveness. Also the Forest Works Training Center was established to raise the mechanization level in forest activities and to train forest technicians.

The third long-term forest plan, Forest Resources Enhancement Plan started in 1988 to harmonize the goals of increasing economic development of forests and improving public benefits from forests. Through the first and second long-term forest plans, the denuded forest lands were successfully reforested across the country, but forests were largely too young to be used commercially for various forest products, especially timber production. Due to social and economic changes, there was an increasing demand for conservation of forests and for outdoor recreation opportunities mainly provided by forests.

This Plan, therefore, was to maximize the efficiency of forest land utilization, create forest income sources in rural communities, and improve the multiple benefits to the public. Also, this Plan put emphasis on advancement of management system through the mechanization of forest works and multiple purpose management for timber production as well as for various environmental functions of forests.

IV. Forest Management in Korea

1. Forest Management

Through the successful accomplishment of reforestation programs, forest resources became a valuable resources which was indispensible for sustainable development of the society with the various economic and environmental values. The achievement of reforestation and erosion control have been based on the strong traditional belief on nature that management of forests and water was the most dominating factor for government's responsibility, and on the strong national will and governmental policies and consequently active participation of all communities and social sectors. But rapid changes in socioeconomic conditions within forestry sector and outside in Korea and global movements for environmental conservation has forced great changes and new approaches in forest management in Korea.

Since Korea is too populated compared to land area of which 65% is forests, there has been increased conversion of forest lands for other land uses, which included human settlements, industrial sites, road construction, and agricultural lands. In the past decade, about 9 thousand ha of forest lands a year has been converted into those land uses. Recently the rate of converting forest lands has been decreased due to reduced population growth, increased uncultivated croplands, and strict restriction of forest land conversion. And it is intended that forest land conversion be kept to the minimum level in the future.

With the increasing concern for environmental conservation of the society, forests are now required to provide various benefits including clean water and air, scenic beauty, enjoyable forest recreation, protection of wild flora and fauna, and other ecological functions. To meet various demands for forest resources and achieve sustainable forest management in Korea, forest policies would put more emphases on increasing growing potential and capacity to provide the various benefits to the society.

Recently demand for environmental benefits from forests has increased in the society so that the systematic and intensive forest management techniques including plantation, silvicultural practices and efficient management structures are required to meet the various demands, to maintain ecological health of forest resources, and to improve productivity.

To efficiently meet the changes in management conditions and improve forest productivity, Korean government has established the national forest plans such as National Forest Plan, Forest Resources Enhancement Plan, and forest stand management plannings. To incorporate the spirits of UNCED into forest resource management, the objective of forest policy has been changed from the increase of the economic development of forests to achievement of harmony between development and conservation of forests, for which related policies for sustainable forest management have been pursued in various ways.

2. Forest Productivity

Though reforestation has been successfully accomplished, harvestable forest resources are extremely limited because about 80% of forests are under 30 years old with little economic value, as shown in Table 8. But demand for timber has sharply increased due to national economic development and now about 90% of timber demand is dependent on foreign sources. This trend would last for other 30 to 40 years, since by then most forests in Korea would reach the harvestable stage. In general, medium- and large-size quality timber could be produced from forests mainly over 40 years old which account for less than 7% of all forests. Since any income could hardly come from these young forests due to the low timber price, intensive tending works including thinning have not yet actively pursued in Korea. Age structure of forests in 1998 is shown in Table 8.

Table 8. Age structure of forests in Korea

Unit : 1,000 ha

Category		Age Class						Total
		I	II	III	IV	V	VI	
Total	Area	669	1,935	2,363	825	365	98	6,255
	Ratio(%)	11	31	38	13	6	1	100
National Forest		81	244	407	315	262	81	1,390
Public and Private Forest		588	1,691	1,956	510	103	17	4865

Source : Statistical Yearbook of Forestry. 1999. Forestry Administration, Korea

3. Forest Protection

The forest fire has caused most serious damages to forest resources and ecosystem during the short period of spring and autumn. Also, the forests usually are under great risk of man-made, careless fire due to increased number of people visiting forests for recreational opportunities. In April 1996, a catastrophic forest fire encompassing 3,762 ha broke out in Kosung mountainous area in Kangwon province, which was the most disastrous ever occurred since the establishment of Korean government, caused huge property damages and disturbed forest ecosystems in the surrounding area.

In case of forest fires, Korean Forestry Administration and local governments including city and province founded and maintain the ground and airborne fire squads and supporting teams which immediately dispatch squad members to fire spots by helicopters and ground vehicles to efficiently suppress the fires across the country. Under review of forest fire outbreak in Kosung area during April of 1996, Korea founded forest fire squad and training branches, and immediately dispatch them to fire spots for prompt and effective fire suppression nationwide. The outbreak frequency of and damages caused by forest fires are shown in Table 9.

Table 9. Forest fires occurred

Year	Frequency	Damaged Area(ha)	Damaged Tree Volume( )	Value Loss (US$)
1993	278	1,752	4,880	150,000
1994	433	781	3,620	233,000
1995	630	1,013	3,090	301,000
1996	527	5,368	363,685	299,000
1997	524	1,013	40,815	530,000
1998	265	5,368	44,092	13,321,000

Source : Statistical Yearbook of Forestry. 1999. Forestry Administration, Korea

V. Forest Plan in Korea

1. New Challenges and Opportunities in Forest Resources Management

In recent years, there have been huge changes both at international, regional, and national levels. In the international context, World Trade Organization(WTO) came into force and expected to play a major roles in the flow of technology, capital, and commodities on free trade principle around the world. The overall trade rules put emphasis on the interrelationship between trade and environment and would influence the trade pattern of various forest products and services. Due to the degraded global environment, awareness and concern for conservation of natural ecosystems aroused close partnerships and cooperations among countries to effectively cope with environmental crises worldwide.

The conservation and sustainable development of forests has been one of the critical areas in international and regional initiatives for global environment. Recent years have seen the possibile roles of international regulations and guidelines for forest conservation through the changes in forest products trade. As Korea joined Organization of Economic Cooperation and Development(OECD), socioeconomic changes would be inevitable in almost all sectors including forestry. Also, rapid urbanization and industrial development for the past decades in Korea accelerated the influx of people into urban areas and caused the wide awareness for better living conditions. With the increase of discretionary income and leisure time, social needs for recreational activities have rapidly increased and in turn put more pressure on forests for provision of more recreational opportunities and facilities as well.

To increase the economic value of forests and improve the stand structure suitable for sustainable timber production, commercial forests with inferior tree species would be replaced with highly productive species. In environmental forests, management practices most suitable for improving public benefits functions would be developed and implemented, including abatement of urban public nuisance, water resources, land conservation, scenic beauty, biodiversity conservation, and recreation areas.

In natural forests, intensive silvicultural management would be implemented to improve productivity per unit area, with more emphasis put in hardwood forests usually having high economic value. To efficiently achieve these purposes, proper techniques and skills would be developed to establish ecologically healthy forest stands.

2. The Fourth Long-Term Forest Plan

The Fourth 10-year Forest Plan would put emphasis on founding groundworks for the intensive forest management and sustainable forest management to keep healthy and vital forest ecosystem and produce forest products sustainably. Table 10 shows the brief description of the Fourth Forest Development Plan in context with the previous Plans.

The ultimate goal is the foundation of groundwork for sustainable forest management through accomplishment of major programs based on major strategies. To accomplish the policy goal, target areas were established including establishment of more valuable forest resources, fostering of competitive forest industries, and maintenance of healthy and enjoyable forest environment. To achieve these targets, several critical strategies were devised and included in each strategy were more specific programs encompassing various subjects. The overall strategies and programs are shown in Table 11.

Table 10. Forest Development Plans and major features in Korea

Period	Major Features
Forest Restoration (before 1972)	Forest Restoration and Forest Management System
	• Forest Law, Erosion Control Law('62) formulated • Forestry Administration established ('67)
Greening and Erosion Control (1973 - 1987)	Reforestation and Greening
	• Restoration of degraded forests, strict protection • Large-scale plantation of fast-growing species • Introduction of forest land use system
Forest Resources Development : 1st half (1988 - 1992)	Groundwork for Forest Resources Development
	• Diversification of plantation species • Enlargement of plantation projects • Groundwork for forest management
Forest Resources Development : 2nd half (1993 - 1997)	Enhancement of Forest Institutions
	• Comprehensive Forest Policy launched • Responsible Forest Management System introduced • Forest Promotion and Advancement Law formulated
Intensive and Sustainable Forest Management (1998 - 2007) - 4th Forest Plan -	Infrastructure for Intensive and Sustainable Management
	• Raise of more valuable forests • Competitiveness of forest industry • Amenity of green environment for living • Forest ecosystem management system
Sustainable Forest Management	Accomplishment of Sustainable Forest Management
	• Environmentally sound and sustainable development • Harmonization of conservation and development • Symbiosis of human and natural environment

Table 11. Goal and Major Features of the Fourth 10-year Forest Development Plan(1998 - 2007)

Policy Goal
Foundation of Sustainable Forest Management

Targets	Strategies	Major Programs
Valuable Forest Resources	Forest Land Management System	Efficient conservation and use of forest lands
		Establishment of sustainable mountain development system
		Expansion of regional forest planning unit
	Sustainable Management of Forest Resources	Enhancement of commercial forest and self-sufficiency
		Enlargement of national forest block
		Advancement of forest technology and research
		Networking of comprehensive forest information
	International Cooperation	Strengthening diplomatic efforts on forest resources
		Broadening of overseas plantation and forest development
		Concept of peninsular forest management upon reunification
Competitive-ness of Forest Industries	Competitiveness of Forest Industry	Infrastructure for production of forest products
		Strengthening of timber industry and domestic timber use
		Emphasis on strategic items for income raise
		Infrastructure for distribution system of forest products
		Strengthening of forest industry for export
	Private Forests and Foresters	Enhancement of cooperative management system
		Introduction of surrogate management programs
		Joint management programs by ownership and purpose
		Training of professional foresters
Healthy and Enjoyable Forest Environment	Forest Environmental Values	Conservation and management of forest biological resources
		Enhancement of watershed
		Land conservation and disaster prevention in forests
		Enlargement and intensive management of urban forests
	Recreation· Forest Culture and Comprehensive Development	Enlargement of forest recreational space
		Program development of forest-related culture
		Comprehensive development of rural forest community

VI. Approaches for Sustainable Forest Conservation in Korea

1. Forest Land Use System

National land use is one of the important factors affecting the implementation of forest conservation. In Korea, forest lands were classified into two categories of reserve and semi-reserve forests until recently. The two-type forest land classification had hindered more efficient and rational forest land development mainly because of lacking suitability for conservation and utilization of forest lands. For more efficient use system, therefore, of forest lands and more comprehensive management of economic and environmental values of forests, forest land use system was revised into three categories including production, environmental, and semi-reserve forest lands through the amendment of the Forest Law in 1994. The reserve forests were divided into two classes of production and environmental forests and semi-reserve forests remained as the same but designation and spatial distribution would be different.

The production forests are mainly for production of various forest products to meet the social demand and would serve as stock base for timber production. The environmental or protective forests would be managed primarily for the values of environmental and recreational functions for public benefits. The semi-reserve forests would be available for development of rural community surrounding the forests, and utilized to meet the demand for various land uses including housing projects and industrial sites, while forest conversion would be restricted more or less. In production and environmental forests, forest conversion into other uses would be strictly restricted to maintain the necessary forest cover and silvicultural activities would be carried out according to their functional purposes which would be identified for specific details and in accordance with forest management plans and guidelines.

It has been emphasized that environmentally sound forest management or sustainable forest land management should be incorporated into forest resources management and planning. Also environmental impact assessments in forest development have been recommended to achieve sustainable forest management. Therefore feasibility assessment system for large-scale forest conversion has continuously studied on its possibility of introduction. The regulations on restoration of degraded forest lands would be reinforced, and criteria for forest conversion into other land uses would be established to help decide more suitable forest land for development and more environmentally sound facilities based on the characteristics of surrounding natural and other environments.

2. Forest Health and Productivity

The major objective of forest conservation has been to harmonize the balance of conservation for environmental benefits and economic utilization of forest resources. The economic utilization of forests usually comes from timber and other forest products which are largely dependent on commercial species. The plantation

forests would be sustainably managed to increase the economic and environmental values. Therefore forest policy and planning has emphasized on the enlargement of commercial forests and thus tried to raise the self-sufficiency ratio of various forest products. According to long-term estimates, commercial forest lands would occupy about 44% of all forest land, totalling 2.9 million ha by 2007 and up to 55% of all forests totalling 3.5 million ha by 2050.

To advance the forests for more valuable economic and environmental resources, various plantation methods would be introduced and adopted through enlargement of plantation of timber species, of large trees in environmental forests surrounding human settlements, and of fruit bearing species for income raise. The silvicultural practices would be intensively applied to produce high quality timber through consistent thinning of conifer forests, silvicultural works of broad-leaved forests, and timely tending including understory removal and prunnings. Due to insufficient management of most private forests, national forests expected to play major role in conservation and development of forest resources in Korea.

The forest policy emphasized the enlargement of a national forest unit because small size and spatial distribution of national forests interlaced with other ownerships posed a great difficulty in intensive and efficient silvicultural practices. Since the enforcement of decentralization of governmental systems, the balanced development across the country has become an important factor in every sector including forestry. The enlarged national forest units would be spatially distributed in balanced way nationwide for equitable benefits among rural communities. To pursue more productive forest development projects, national forests would be classified into large-scale mountain and regional areas which would be considered as a management unit for forest planning and developed for multiple purposes.

3. Researches for Sustainable Forest Conseravtion

To support the implementation of forest conservation a more comprehensive and focussed approach to research is required and forest researches should be strengthened. Also it was clearly stated that enhanced international efforts in more focussed and effective funding for forest related researches are necessary worldwide. The possible institutional needs of forest research organizations, including the strengthening of existing national research institutions, regional research networks, joint research ventures, approaches to enhancing and strengthening of existing international, regional, and national forest research institutions participation in an international network related to forest conservation, and creation of appropriate mechanisms that enable research findings to reach policy and field levels more effectively for concrete action.

The application and implementation of forest conservation should be supported by forest researches on forest ecosystems and forest technologies. The forest researches would focus on improvement of forest productivity and practical technology applicable in sites. Also to identify new income sources and solve technical problems in rural communities, researches have been carried out and results and experiences have been distributed as extension services.

In particular, researches on biotechnology have been focused on development of new materials for medicinal and other uses. In this context, systems for incentives and intellectual properties would be established, and information and experience sharings with other institutes and organizations would be encouraged in forestry sector.

The latest technologies such as geographic information system(GIS) have been utilized for forest resources assessment, planning and other purposes. To achieve sustainable forest management, comprehensive information system would be devised by combining geographic information on forest resources and management information on forestry. Included in geographic information on forest resources could be growing timber stock, characteristics of natural environments, and informations on forest ecosystems. The data on production, technology, labor forces, distribution, and administrative information would be included in management information on forestry. Based on the comprehensive information system, specific management systems for forest fire prevention and control, service road, and ecosystem management could be developed. The channels for information exchange and search among related agencies and organizations would be established for forest conservation.

4. Infrastructure for Forest Products and Forest Industries

Due to the mountainous areas and geographical characteristics of forests, development of forest roads and application of mechanical equipment have been very difficult tasks in forest conservation. Forest road network should be expanded for better accessibility of mechanical equipment and low overall cost for forest management, up to 10 m per ha by the year of 2010 from 1.7 m per ha of 1996. Forest road would be concentrated in the production forests for mechanized silvicultural works and expanded through advanced and environmentally sound construction techniques which could minimize the damage to forest environment. To increase the productivity, a variety of forest mechanical equipment would be developed to be adaptable in mountainous forests in Korea. Also, regional mechanical equipment center would be established for forest owners and forest products producers to rent them in cases.

The wood processing facilities including plywood manufacturing would be equipped with the latest technologies to be more competitive and efficient. The technology for timber quality enhancement including antiseptic treatment techniques would be improved to high quality forest products. The researches and development projects in the field of forest products utilization would be strengthened and more investments would be infused to develop new materials, to broaden the scope of utilization including thinned small size timber, and to identify highly value-added forest products.

The comprehensive forest products distribution center would be established and enlarged for more effective collection, storage, processing, and sales of forest products. The private investments in timber distribution structure would be induced through incentives and provision of information on production and distribution to ensure their safe and profitable operations.

5. Legislation

To accomplish forest conservation, reflect the global forest initiatives, and fulfill the various socioeconomic demand for forest management, the existing laws and regulations were recently amended and new forest-related law was formulated. Through the amendment of the Forest Law in 1994, enforcement regulations were revised and included the assessment of forest conservation implementation.

Included in the regulations as criteria were conservation of biological diversity of forest ecosystems, maintenance of productive capacity of forest ecosystems, maintenance of forest ecosystem health and vitality, conservation of soil and water resources in forest ecosystems and other internationally agreed criteria to assess the implementation of forest conservation.

Recently the Forestry Promotion and Advancement Law was formulated to promote the intensive management of private forest which is occupying 70% of all forests in Korea. The management of private forests has been negligible because of shortage of labor force in rural communities, sharp increase of wage level, and low price of timber. Its major goals, therefore, are to induce private forest owners to active participation in managing forests and to strengthen the governmental subsidy systems in order to increase the timber resources through strong governmental support and assistance.

The main objectives of the Forestry Promotion and Advancement Law are ; improvement of private forest ownership structure through achieving economy of size by joint management system ; establishment of forest management cooperatives consisting of forest managers including model forest mangers, forest successors, and entrepreneurs; enhancement of productivity in forestry sector through enlarging infrastructure for forest management, promoting mechanization, and maintaining forest labor force ; improvement of distribution channel for forest products ; strengthening of support system including procuring forest investment funds and improving financial assistance and tax incentives ; establishment of review committee on forestry promotion and policy.

To achieve sustainable forest management in Korea, changes in organizational structure were made lately. These were; foundation of Bureau of Forest Fire at the Forestry Administration to effectively prevent and control forest fires in 1996; establishment of Forest Environment Division at the Forestry Administration to improve forest environment for the public benefits and management of wildlife in 1995; establishment of Biological Engineering Division at the Forest Genetics Research Institute to improve researches and development of new materials from forest genetic resources in 1995. Also, research institutions were incorporated into one national forestry research institute through merging the former Forest Genetics Research Institute, which became a bureau of Korean Forestry Research Institute since August of this year. It is expected that the merge generate synergy effects in the forestry research field in Korea.

6. International Cooperation

Korea government has a bilateral treatment with China, Miyanma, Mongol for semi-arid plantation. KOICA support 180.000 dollar for the plantation in semi-arid zone in Miyanma. From 1996 to present two Institute of forestry have been pursued the yellow sand prevention in China and it will be expended widely, and Korea will start plantation project on semi-arid area in China this year.