Development and Situation of Chinese Forest Resources

Ming Cheng · Sheikh Ali Ahmed · Su Kyoung Chun and Jong-In Kim

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Ming Cheng[*2] · Sheikh Ali Ahmed[*3] · Su Kyoung Chun[*4] and Jong-In Kim[*5†]

ABSTRACT

This article is composed of three parts in this article. The first part reviews, in the general, condition on Chinese forest resource history and analyzes the change in different historical times. The present condition and existing problems are discussed in the second part, where analyzes the existing problems in different distribution areas. In the third part, the solutions are raised to solve the problems mentioned in the second part. Finally the objective and strategy for sustainable development of Chinese forest resources are put forward.

Keywords: China forestry, forest region, forest resources, sustainable development.

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*1 Received : 2006. 9. 11

*2 College of Material Science and Technology, Beijing Forestry University, Beijing 100083, China and

*3 Graduate student and

*4 Professor, Department of Wood Science & Technology, College of Forest Sciences, Kangwon National University, Kangwon-do, Chunchon 200-701, Republic of Korea

*5 Quality Control & Standardization Team, Department of Forest products, Korea Forest Research Institute (KFRI), Seoul, 130-712, Republic of Korea

† Corresponding author : Jong-In Kim (E-mail: jikim99@foa.go.kr)

1. Introduction

China is a developing country with a large population. For the sake of sustainable development at this critical turning point to new times and opportunities, it is necessary and useful to review the history of forest resources in China. Moreover, through the listing and analysis of historical dates, we can get a general view of Chinese forestry and what its present condition is. China's economy has rapidly been developing and industrialization is growing, which leads to an increasing demand of timber and foodstuff. At the same time, the continuous development, exploitation, disturbance, and destruction of forest resources causes Chinese forest to lessen year by year. All the actions of short-term economic interests at the price of ecology and the environment lead to an unceasing decrease in primeval forest resources, a decline in the productivity of natural secondary forests, of artificial forests, and of forest function as well. The consequence has also created a sharp decrease in species number and an increase in land desertification, soil erosion and themed-rock flow. As a result, all kinds of disasters frequently occur and the human living environment is deteriorating. The way to solve these problems is the key point for our environment and for the entire country's economic development. This article presents some solutions and puts forward an objective of the forest resources in China. The preservation and development of forest area (26%) needs cooperation among all walks of life. Policy should be refined, strategy should be shifted, and programs need to be better launched so as to realize the sustainable development of society, economy, resources, and environment.

2. General review of Chinese forest resource history

2-1 Forest resource in Ancient China

Nearly four to five thousand years ago, in the mainland of China, there was an area of about 60% covered by forest. The forms of forest were totally original, due to the non-existence of destructive human activities. In the northeast mountain area, the forest coverage could get to 90%. There was an 80-90% coverage in the moist regions of the southeast of China and in the half-moist, and half-drought regions of the middle of China forest coverage equaled 40-50%. Even in the drought area and the high Tibet-Qing plateau, the coverage of forest could reach 10-20%.

2-2 In the dynasty period and modern times

Even in this period, human activities began to affect the forest resource. With the development of agriculture, the original forest was destroyed quickly for the sake of meeting the demand for the planting of large areas. Opening up the wasteland and planting, therefore, became the main cause of destroying the forest. According to some data, forest coverage had declined under

50% in the Han dynasty nearly two thousand years ago. Between the Tang and Song dynasties, with their quickly increasing population, more and more forest land was as altered to farm land, especially in the south and the center of China where the forest was seriously destroyed and the forest coverage came to be under 40%. At the end of the Ming dynasty and at the beginning of the Qing dynasty nearly four or three thousand years ago, in north China, the forests were completely destroyed, and in some regions of south China where water traffic was convenient, the forest was seriously destroyed and the forest coverage declined to 20%. Seventy years ago, because of the Japanese plundering and unreasonable development, the original forest disappeared in the northeast of China and in the southwest forest were continuously reduced, until the forest coverage declined to 12.5%. From that time, the original forest almost disappeared in China, leaving only some low quality secondary forests until now

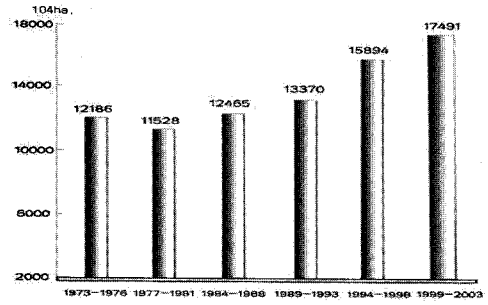
2-3 After the foundation of the People' s Republic of China

Table 1shows the change of forest resources in China beginning in 1949. Drawing upon the data of five investigations of the forest resources, it clearly indicates that the area of forest resources decreased sharply from 1949-1981, but they increased gradually from 1981 to the present. Just as we have known, however, that to meet social demand, mature forests were gradually reduced and young forests increased. Even though we can see some extent increase in the total volume of forests by reference to the table because of the planting project, the table also shows that forest quality was declining and that young forests accounted for much of the forest land in China. Fig.1 shows that there is a turbulent change of forest coverage from 1949 to the time of the second investigation. This change resulted from the introduction of mechanical forestry machine into China, which led to the destruction of large area forests. Furthermore, from 1966-1976, as a result of the neglect of forest management, forest resources were destroyed in even larger numbers. In 1981, the forest coverage was reduced to the lowest point owning to the default of the

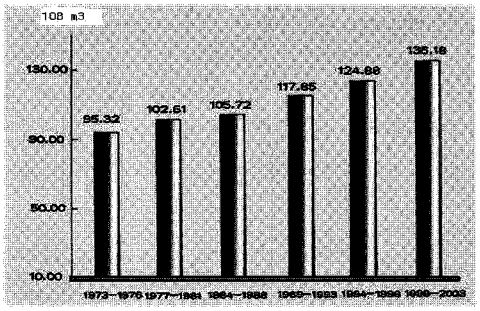
〈Table 1〉 Change of forest resources in China from 1949-1998.

Period of investigation years	Areas of forest (10000km^{2})	Forest coverage (%)	Total volume (100million cubic meter)
1949	76.0	7.9	95.3
1973~1976 first investigation	122.0	12.7	102.6
1977~1981 second investigation	115.2	12.0	105.7
1984~1988 third investigation	124.6	12.98	117.85
1989~1993 firth investigation	133.6	13.92	124.90
1994~1998 fifth investigation	158.9	16.55	

Source: http://www.cfsdc.org, Chinese Forestry Statistic Date Centre.



〈Fig.1〉 Change in the forest areas (1973-2003).



〈Fig.2〉 Change of the total forest (1973-2003).

economy and political policy. In the recent 20 years until 2003, due to the economy reform and the opening-up of the economy, the total forest resource increased every year. Especially when the six key forestry programs which covered more than 97% of China's counties were carried on in China, the total afforested area was expected to reach 76 million hectares. But the reality provided less optimistic results due to the destruction of the ecological balance, the frequency of floods, sand-dust storms and drought. The challenge would exist for a long time.

3. Present condition and existing problems of Chinese forest resources

3-1 Distribution of forest resources in China

Now there are a total of four main parts where the forest resources are distributed. They are called: Northeast forest region, southwest, northwest and the collective forest region in the south. Table 2 shows the distribution condition of Chinese forest resources. The development of agriculture, animal husbandry, fishery, and industry cannot be separated from the development of forestry. The broad leaved/Korean pine forest and dark coniferous forest are the high-productivity forest types in this region. The former is the timber famous and precious in the world. The Japanese plundering and the unreasonable development in the recent 50 years led to the disappearance of the original broad leaved/Korean pine forest and dark

〈Table 2〉 Distribution condition of Chinese forest resources (~2003).

Main forest region	Forest region area/land (%)	Forest volume/total volume (%)
Collective forest region	36.1	19.0
Northeast forest region	24.8	30.7
North forest region	20.0	11.4
Southwest forest region	19.1	38.9

Source: http://www.cfsdc.org, Chinese Forestry Statistic Date Centre

coniferous forest in most parts of the region. Now they have been generally replaced by the secondary forest and artificial forest, and can only be found in the natural reserve and at the steep slope of some high mountains.

A series of ecological problems have been caused by the destruction of forests, such as the shortage of resources, soil erosion, and land degradation. Consequently, the frequent inundation (floods) directly endangers regional agriculture and economic development as well as people's lives. Therefore, the renovation and restoration of the forest ecosystem, scientific management and sustainable development of forestry are the primary tasks. After 1949, the natal year of China, the artificial pure Larch forest was planted on a large scale in the northeast region. Larch is the famous fast-growing timber tree in the northeast regions, and has a great effect on restoring and reconstructing the forests of the northeast forest region and on enhancing the region's economy. However, unduly emphasizing timber production, ignoring soil acidulation, and the decrease of soil fertility caused conifer forest diseases, insect pests, and sharp decrease in production. The second-generation's production of Changbai larch forest decreases on average to 15% per year. The decrease of soil fertility and productivity and low stability are the major problems affecting the sustainable development of the northeast forest. Therefore, another chief measures in the construction and development of the northeast forest are to control the decrease in the soil fertility and productivity and to build the optimized forest ecosystem for the Changbai larch forest.

Southwest forest region

Chinese fir is a special fast-growing species of conifer in the southwest forest region of China. Chinese fir, whose timber production accounts for 1/4 of the commercial timber of China, is distributed in 16 provinces. However, many plant diseases and pest insects also occur in the Chinese fir forest. The decrease of soil fertility is the crucial problem which delimits the local economic development. Therefore, the primary task is to resolve soil fertility and productivity which decrease the Chinese fir forest, and to construct an optimized model for the sustainable development of fir forests.

Forestry in hilly regions of south China

The agriculture and forest development took place mainly in the south hilly region at all times. Table 2 clearly shows that, in this area, the forest volume is quite large, occupying 1/3 of the entire country's forest volume. But in recent years, the population in this region has been increasing rapidly, and the contradiction between agriculture and forest is outstanding. Most of the peasants reclaim forest lands, and this leads to the destruction of forest vegetation, soil erosion and the decrease of soil fertility. With economic development, improvement of people's living conditions and the

increasing demand of resources by society, some short-term economic behaviors lead to the deterioration of the hilly ecosystem. Soil erosion and declining soil fertility significantly limit local agricultural and economic development. Therefore, the way to renovate and utilize hills and soil resources reasonably is an important scientific inquiry. With the development of restoration ecology, the protection and reconstruction of the deteriorating ecosystem is a main topic in modern ecology. Regenerating the fundamental function of the ecosystem in the degenerating hilly region and the sustainable utilization of renewable biological resources are the inevitable requirements of local social and economic development.

North forest region

Only 11.4% of the forest storage makes this area the smallest forest region in China, but with the processing of the Shelter belt Construction Program in the north, the coverage of forest in this region will gradually increase and the ecological environment can be notably improved.

3-2 Present condition of Chinese forest resource

The result of the fifth investigation of the value of forest resources indicates that the area of forest land was 263 million square hectometer and the forest area was 15.9 million square hectometer. The coverage we could get was, therefore, 16.55%, and the total volume of live stand was 1,127 million cubic meter. The conifer forest area was 69.36 million square hectometer and its volume was 633 million cubic meter. The broad-leaved forest area was 64.5 million square hectometer and its volume was 494 million cubic meter. According to this result, the volume ratio of conifer forest to broad-leaved forest was 56 to 44. Based on the data of The Food and Agriculture Organization of the United Nations, the forest area of China was ranked the fifth, following Russia 67.0%, Brazil 58.0%, Canada 39.0% and America 31.3%. The forest volume ranked the seventh, following Russia, Brazil, Canada, America, Zaire and Indonesia. Compared with the world average of 0.94 hectare, the per capita forest area of China is very low. In China, it is only 0.11 hectare, accounting for 11.7% of the world average. China's forest storage per capita is also very low compared to the world average. The world average per capita forest storage is 68.25 cubic meters; while in China it is only 8.6 cubic meters, accounting for 12.6% of the world average. There is no doubt that China is a country which lacks forest cover. Additionally, the young and middle age forest resources accounted for much, because of destruction and over-consumption in the last thirty years. Even if our country launches unprecedented Forestry Programs, the programs still need time to mature. Therefore, the conservation and sustainable development of forest resources are very important to the country.

3-3 The existing questions of Chinese forest resources

(1) A big gap between the supply and demand of timber

Although China achieved a growth in both forest area and forest storage by the early 1990's, there is still a big gap between the supply and demand for timber. The reason is that the increasing part of forest area and storage is mainly due to the growth of young forests unsuitable for logging. The existing area and the storage of matured and over-matured forests is not large enough to maintain a sustainable yield of timber. They cannot even afford to meet the rather low level of timber consumption in China. The annual deficit of standing forest storage from 1984 to 1988 was 40 million cubic meter, and the deficit in national wood consumption in 1993 was 34 million cubic meter. Basically, two methods were applied to fill the gap. One was to log more of the existing matured and over-matured forests; the other was to import timber. Neither of the methods was good. The first one intensifies the timber deficit; the second not only causes a large financial burden, but also increases pressure on the world forest resources.

(2) Serious ecological consequences of over logging

The loss of forest has caused serious ecological problems.

Soil erosion: The Yellow River is famous for her muddy water. The soil and sand in the water coming from the upper and middle reaches of the river. In those areas, the forest coverage has been gone for thousands of years. In another major river basin, the Changjiang River (Yangtze River), the soil erosion area increased from 360 thousand square kilometers in the 1950's to 560 thousand square kilometers by the 1980s. The loss of forest coverage in the upper and middle reaches of the river is one of the main causes of the destructive floods in the middle and lower reaches.

Desertification: The loss of forests has caused the expansion of the desert in northern and northwestern China. Every year, 170,000 hectares of land turns into desert. In the northwestern, north and northeastern areas, 13.33 million hectares of farmland and 100 million hectares of grassland suffer from sandstorm disasters each year.

Natural disasters: In the upstream area of the Changjiang River, the frequency of droughts and floods has increased dramatically. For example, there used to be a serious drought once every three years in the 1950's. But the frequency of drought increased to once every two years in the 1960s and eight in ten years in the 1970s. There were three flood disasters in this region in 1950s. In the middle and lower reaches of the Changjiang River, the flood has become a very serious threat to the life

and property of the people living along the river. In 1998, a serious flood disaster happened in the middle and lower reaches, taking more than one thousand people's lives.

Loss of Biological Diversity: The loss of forests directly results in the loss of bio-diversity. The Report of Research on China's Bio-diversity (1998) prepared by the National Environmental Protection Agency gives a detailed description of the situation of bio-diversity and the threats facing it. According to the Program Outline of the National Ecological Environment Construction (1998) adopted by the State Council of China, 15% to 20% of China's fauna and flora are currently under threat, while the world average percentage is 10% to 15%.

4. Objective and measures for sustainable development of forest resources

4-1 Objective of forest resources in China

The status quo of China's forestry indicates that forestry development does not meet the requirement for maintaining ecological security and industry use. According to the Blueprint for Ecosystem Development in China, the forest cover is expected to exceed 26 % in the coming 50 years, which requires a net increase of 90.66 million hectares in the forest area. The area of newly established mature plantations will reach 212 million hectares in order to make up for the consumption of more than 10 billion cubic meter of forest resources, and it would take 140 years to achieve this objective at the previous speed. Given this, the Chinese Government has decided to carry out six key forestry development programs to promote the implementation of a strategy for forestr development by leaps and bounds. (The six key forestry development programs are as follow: 1. the key shelter belt construction program in north, northeast and northwest China (three north) and in the lower-middle reaches of the Yangtze River, 2. the Beijing-Tianjin sandstorm-control program, 3. the wildlife conservation and nature preservation development program, 4. the fast-growing and high-yielding timber base construction program in key areas, 5. the natural forest protection program, and 6. the program to turn farmland into forests.) The effort aims to shorten the period needed for rehabilitating and developing forest resources under the conventional mode, take 50 years to complete the ecosystem development objective that would take more than 100 years to achieve under conventional conditions, push China's forestry into a new stage of sustainable development at an early date, keep the country's forest cover at more than 26%, and fundamentally improve the country's ecology and rebuild a beautiful landscape.

4-2 Measures of forestry sustainable development

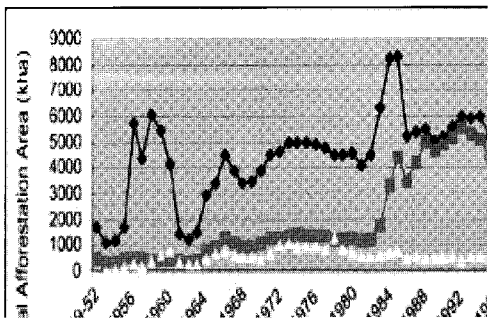
The central government now carries on

the scientific development ideas in every field of society. The sustainable development of forestry demands as a premise great hard work of the government and people.

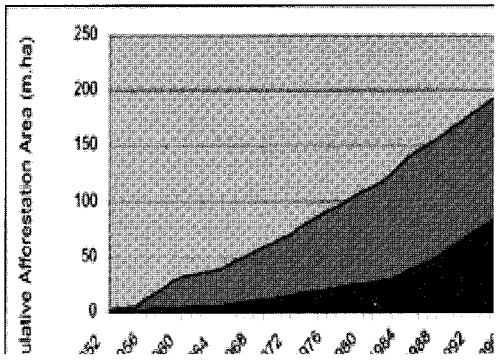
4-2-1 Increase the investment for the afforestation, especially put the center of gravity on the construction of six key forest programs.

As shown in the "statistics bulletin of the six key forestry projects 2003" released by the State Forestry Administration, China's six key forestry projects have produced a total forestation area of 8.2628 million hectares in 2003, a year on year increase of 21.92 percent which accounted for 90.61 percent of the total forestation area in China. Started in 1998, the six key projects have brought about a total of 20.0975 million hectares of forest, at a total investment of 94.67 billion RMB (yuan).

The project of natural forest resources protection saw a smooth progress. The year saw the completion of a forestation area of 688,300 hectares 613,900 hectares of mountain area were newly sealed for forest and another 2,598,000 hectares were put under protection and maintenance. The project of converting farmland to forest and grassland went on smoothly.



〈Fig.3〉 Accumulative afforestation area, 1949-2000Source: SFA (2001b)



〈Fig.4〉 Accumulative afforestation area, 1949-2000 Sources: China forestry statistics, various issues; China forestry yearbook.

A total of 6, 840,900 hectares of forest and 196,900 hectares of grass were planted. The Beijing-Tianjin Sand Source Control Project has produced notable social and ecological effects. In 2003, 275,300 hectares were afforested in the fourth phase of the "three north forest shelter belt program", of which 86.29 percent were for the shelter belt. By the end of the year, an actual area of 1,164,300 hectares of mountains were sealed for forests. 177,300 hectares of mountains were newly sealed. A total of 854 million Yuan were invested.

4-2-2 Promoting Five Historical Transformations of the Forestry Sector

① Shifting emphasis of development from industry to public undertaking.

② Shifting from free use to nongratuitous use of forest ecological values

③ Shifting from devastating forests for arable land to returning farmland to forests.

④ Gradually shifting emphasis from felling natural forests to logging in plantations.

⑤ Shifting from administration by forest departments to management by society.

4-3-3 Systems containing policies and laws should be set up.

The national policy-making department and the main scientific research department must learn the importance of the relation between the sustainable development of forestry and the basic national policy. They should also recognize that forestry is important and indispensable. Under the guarantee of policies and laws, the overall development strategy should be made scientifically.

5. Summary

China covers a very large area, but the total and average amount of forest resources are always relatively scarce., A retrospect of forest history, shows us that when the activities of human beings took place on the earth, the forest resources began to reduce gradually, indicating that the amount of the forest resources have great connection with the activities of human beings. Especially from the foundation of New China, long term out-of-control logging and unsustainable development cause forest resources and the ecological environment to be seriously reduced. However, although Chinese forest resources still face a large number of complicated problems, they have already begun to recover and to come into the right orbit through listing and analysis a series dates. Additionally, the launching of six key forest resources program's and the shifting of strategy will take China into a bright future.

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