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# A FOREST POLITICAL STUDY ON PROTECTION FORESTS OF GERMANY, AUSTRIA AND JAPAN<sup>1</sup>

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## I. INTRODUCTION

Almost all nations originally started their forest management activities under the same leading motivation—wood production. However, the time period when forests were only “wood producers” is over. A shift in the importance of forest functions, from the original function of wood production to the increasingly important environmental, recreational and protection functions has been seen. Multiple-use forest management<sup>13),26)</sup> has become an essential part of the forest system. The performance of multiple functions, including the substantially important function of protection, has also received a great deal of attention in international forestry. Against the background of raised living standards, protection and conservation have become part of the social development of the industrialized countries. Due to the rapid social and economic development of these countries, the importance of forests has assumed entirely new dimensions. Forests have gained relevance for non-commercial purposes, such as public health, noise avoidance, and enhancement of the natural environment<sup>89)</sup>.

Protection forests are an inseparable part of forest management in the mountainous forests. Geological, climatic and socio-economic factors play an influential role in the most active and fragile formations of high mountainous protection forests. Increasing pressure from human and livestock populations weaken the situation even more. The extensive utilization of mountainous catchment-areas in the past decades and the complex of problems concerning torrent and avalanche regulation have gone through a considerable change<sup>89)</sup>. The clearing and unsuited cultivation of steep slopes in the high elevations demanded the afforestation and re-establishment of these areas. The primary importance of protection forests lies in the protection of human settlements and of infrastructure through torrent control works in steep mountain areas.

Protection has become a common trend transferring from national states to the global arena, which also implies internationalization with an emphasis on country comparison. Commitments on the international level are binding for the

national governments and affect their forest policies, especially with respect to protection.

There is a missing tradition in comparative analysis in the forest science. The reason for this missing tradition may lie in the existence of differences between countries, such as different cultures, different natural conditions, different languages, and different historical development.

HELLSTRÖM<sup>50)</sup> wrote in her paper presented at the XX. IUFRO World Congress in Tampere :

*Owing to the increasingly international character of forestry issues, forestry debates and forest policies in any country can no longer be considered to be caused by internal processes within the country, but various countries form a system where debates and policies increasingly interact with each other. Thus, in addition to more traditional endogenous comparisons, increasing emphasis should be placed on exogenous comparisons.*

### **A. The Studys Aim**

A long tradition in forest management would also seem to imply a long tradition in the protection forests. It seems, that somehow the idea has existed for a long time, but the realized policy is short. The protection forest system was chosen as a study object because of its significance in conservational forest policy and current forest legislation. Protection is either directly or indirectly related to most forests. The importance of conservation has lately been highlighted in the world community in connection with the global environmental protection. Protection forests are from the traditional, historical point of view the most important conservational aspect of forest law. Other conservational activities undertaken through nature conservation law and water law are a newer trend.

The goal of this paper is to explain and interpret variations in the development of the forest policies from the standpoint of protection forest systems in Germany, Austria, and Japan. It aims to catalogue and describe the differences and similarities of forest history, forest policy and forest legislation regarding protection forests in the three countries. It focuses on the interpretation of significant historical and present outcomes. The report concentrates on the analysis of the protection system after forest law. It aims to lay a theoretical foundation for following research projects in the field of international protection forest policy. The analysis starts from the second half of the 19th century, with the foundation of the first forest laws in Germany and Austria. However, the focus is on short and middle term examinations of the last decades.

### **B. Theoretical Foundation and Questions**

The results of the proposed publication will provide information for understanding why protection forest systems develop differently. The conceptual

basis, the theoretical foundation and questions at issue are revealed in following enumeration.

1. The necessity for conserving forests is common to most of the people on the earth. The "classical" areas of water source conservation, soil erosion control, avalanche and rockfall prevention and its object, the "protection forests", are still as active and relevant as they were a hundred years ago, in the Alps with the torrents, as well as in Japan with its landslides. Protection forests are the most classical system of protection and conservation in forestry. However, in the two hundred year development of forest history, the idea and the significance of conserving and protecting forests in former times is different from today. Protection forests changed in content and value. How did the protection forest system develop through this time of change in Germany, Austria and Japan?
2. Protection forests are one element of forest policy, and they are a focus of increasing importance. How does the protection forest system fit into the general forest system, forest policy and forest legislation?
3. The forest law provides the foundation for economic and protective activities in the forests. The forest law in each of the three countries was analyzed with the criteria: Which main topics are considered in the forest laws? How are the ideas combined in the forest policy? What role do the protection forests play in the forest law and how are they integrated in the forest law? What are the advantages and the disadvantages of each system?
4. Against the backdrop of expanding consciousness about environmental issues in the 1970s and 1980s, increasing protection forest activities are postulated for the future. This is based on the facts that in recent years, protection programs in the mountainous forests have become very important and that a great number of forest projects are being carried out at the moment. Protection forests seem to be a matter of recent consciousness and significance.
5. Which instruments does every country use to strengthen the protection forest system? How is protection forest improvement and reorganization realized? Are there any new tendencies in the protection forest systems?

This study can be regarded as a descriptive reflection of background information on subjects concerning the historical, legal and administrative development of protection forests.

## **II. MATERIAL, METHOD AND COUNTRY DESCRIPTION**

The comparison is an attractive research field. It is interesting to identify the similarities and differences among countries, with an aim to understand, explain and interpret historical developments.

To start an internationally orientated research, the individual researcher has

to overcome cultural hegemony and ethnocentrism. The researchers choice of countries is not determined totally by the problem: often, irrational reasons for the researchers decision are given. RAGIN<sup>96)</sup> asked himself in his book, *The Comparative Method*, “*When can ... nations legitimately be compared?*”. Differences in the historical, cultural, and social development must limit the expectations for results strived for in the comparative process.

The comparison description is one possibility to make the coherence transparent. Creativity in the comparative research process can appear, if contrasting dimensions of evidence are pointed out. Although the risk of some slight repetition of well-known facts exists, the chance was undertaken to compare three countries in which the protection forest policy plays an important role.

### A. The Technical Term, Protection Forests

When starting a comparative research process between different countries, the difficulty of defining terminology can create confusion<sup>54)</sup>. Existing definitions are difficult and often ideologically charged.

Protection was discovered to be the most important key word in the protection and conservation terminology. As a result of the assignment of words and phrases to their appropriate concepts, it was decided to compare the German and Austrian protection forest system, “*Schutzwald*”, with the Japanese protection forest system, “*Hoanrin*”. This decision was also strengthened by the fact that protection forests were historically the first conservation policy activities in the forests.

Unfortunately, there is no international agreement on the exact requirements for declaring a protection forest as a “protection forest”. As ECKMÜLLER<sup>29)</sup> stated, there are differences in the definition of protection forests between Germany and Austria. Even in the same country, in Germany, protection forest categories are defined differently<sup>12),106),87)</sup>.

The following definitions concerning protection forests are acknowledged on an international level and have been stated by international organizations such as the International Union for Conservation of Nature and the International Union of Forestry Research Organizations or by international conventions and conferences and were summarized by SCHUCK *et al.*<sup>99)</sup>.

*“These forests are usually managed carefully to serve a specific purpose of protection. Purposes can vary and need to be defined precisely. The forest in mountainous areas differs from forest in lowlands by its contribution to the protection against natural forces such as torrents and avalanches in the alpine region<sup>44)</sup>. These forests are usually located at the timber line or on steep slopes in all elevations and are dedicated to serve specific purposes e. g. to prevent soil erosion and to protect villages and roads. In Austrian terminology they are located on ecologically unstable sites and preserved by carefully applied management measures<sup>80)</sup>. In the state of Bavaria (Ger-*

many) and in Switzerland they represent forests which protect against natural forces<sup>44)</sup>. These can also be forests in lowlands along rivers protecting against floods or along roads and highways to reduce noise emissions. In Austrian Forest Law such forests are called "Ban Forest".

The JAPAN FORESTRY FOUNDATION<sup>56)</sup> defines *hoanrin* as protection forests.

## B. Material and Implementation

Documents and material on the history of forest policy, protection forests and forest conservation work were written sources, including 1. historical documents, 2. books, 3. statistics, 4. information and written notes of forest experts and 5. laws, regulations and decrees, which make up the first part of the analysis.

In the second stage, the current forest laws of each country were analyzed from the viewpoint of protection forests. Not only the details about protection forests were included, but also other criteria of concern were mentioned.

In the last part, interviewees were selected in the governmental hierarchy of the investigated countries, from the plane of the ministry down to the plane of the district forest offices, to gain information on the state, the regional and the local level regarding the current state of protection forests and forest conservation work aspects. The interview process was characterized by 1. questions and answers, 2. discussions and 3. presentations by experts.

All this information was slightly modified in order to achieve comparability between the countries. The initial idea of this research process is outlined in the flowchart of figure 1.

## C. The Country Description of Germany, Austria and Japan

Germany, Austria and Japan were analyzed from the above mentioned viewpoints. In all three countries, forests play an important role; however, the economic importance of forestry for the gross-national product is not so great. In Germany, only the southern part was included in the analysis, because only in this area exists a major relevance of protection forests. For example, in *Bayern*, 8% of the forests are protection forests, while in the alpine area it changes to 60% of the area, which indicates the regional component. The importance of protection forests is also high in Austria, where 20% of the forest land is designated as protection forest. The reason Austria was chosen as a research subject is because it serves as an example for many other countries in the areas of torrent and avalanche regulation. Japan was chosen because of the importance of the protection forests in the forest planning system. 36% of the forests are designated as protection forest. Japan celebrated in 1997 the 100 year anniversary of the foundation of the protection forest system, which points out its importance and immediate concern.

The history of Germany and Austria, as well as Japan, has always been closely connected to the forests. The three countries were selected because of

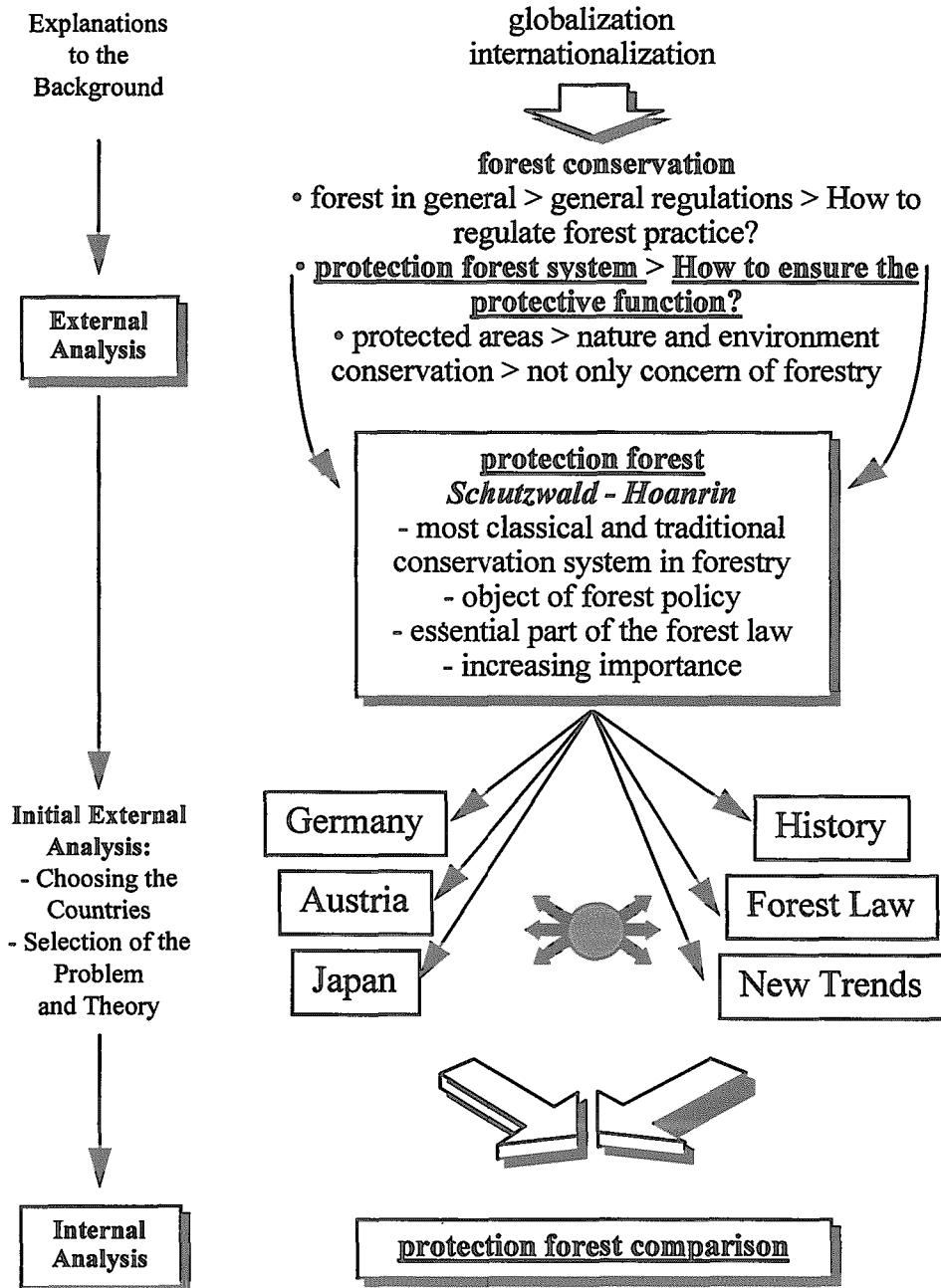


Fig. 1. From the external analysis to the internal



their mountainous character with lower range mountainous and alpine forests and the forest policy orientated to maintain forests (Table 1).

**Table 1.** Comparison of general country and forest data

Germany	Austria	Japan
<b>Location :</b> Central Europe, bordering the Baltic Sea and the North Sea, between the Netherlands and Poland, south of Denmark	<b>Location :</b> Central Europe, north of Italy	<b>Location :</b> Eastern Asia, island chain between the North Pacific Ocean and the Sea of Japan, east of the Korean Peninsula
<b>Geographic coordinates :</b> 51 00 N, 9 00 E	<b>Geographic coordinates :</b> 47 20 N, 13 20 E	<b>Geographic coordinates :</b> 36 00 N, 138 00 E
<b>Area :</b> total area : 356,910 sq km land area : 349,520 sq km	<b>Area :</b> total area : 83,850 sq km land area : 82,730 sq km	<b>Area :</b> total area : 377,835 sq km land area : 374,744 sq km
<b>Climate :</b> temperate and marine; cool, cloudy, wet winters and summers; occasional warm, tropical foehn wind; high relative humidity	<b>Climate :</b> temperate; continental, cloudy; cold winters with frequent rain in lowlands and snow in mountains; cool summers with occasional showers	<b>Climate :</b> varies from tropical in south to cool temperate in north
<b>Terrain :</b> lowlands in north, uplands in center, Alps in the south of <i>Bayern</i> lowest point : -2 m highest point : 2,962 m	<b>Terrain :</b> in the west and south mostly mountains (Alps); along the eastern and northern margins mostly flat or gently sloping lowest point : 115 m highest point : 3,797 m	<b>Terrain :</b> mostly rugged and mountainous lowest point : -4 m highest point : 3,776 m
<b>Land use :</b> arable land : 34% permanent crops : 1% meadows and pastures : 16% forest and woodland : 30% other : 19%	<b>Land use :</b> arable land : 17% permanent crops : 1% meadows and pastures : 24% forest and woodland : 39% other : 19%	<b>Land use :</b> arable land : 13% permanent crops : 1% meadows and pastures : 1% forest and woodland : 67% other : 18%
<b>Forest:</b> total : 10,490,000 ha forest as percent of land area : 30% forest per capita : 0.13 ha	<b>Forest:</b> total : 3,877,000 ha forest as percent of land area : 47% forest per capita : 0.5 ha	<b>Forest:</b> total : 24,158,000 ha forest as percent of land area : 67% forest per capita : 0.2 ha
<b>Protection forest area :</b> Germany : 702,920 ha (6.9%) <i>Bayern</i> : 202,000 ha (8%) <i>Baden-Württemberg</i> : 255,000 ha (≅16%)	<b>Protection forest area :</b> 741,000 ha (19.1%)	<b>Protection forest area :</b> 9,125,021 ha (36.1%)

Source : FAO FORESTRY DATABASE 1997, LATIMER CLARKE CORPORATION 1997, THE CENTRAL INTELLIGENCE AGENCY 1996, UN-ECE/FAO FOREST RESOURCE ASSESSMENT 1990, WORLD CONSERVATION MONITORING CENTRE 1996

### a. Germany

Germany is located in Central Europe, bordering the Baltic Sea and the North Sea, between the Netherlands and Poland, south of Denmark, as figure 2 shows.

The Federal Republic of Germany contains 10,800,000 ha stocked forest area, 30 percent forest land, and is one of the most heavily wooded states in Europe<sup>94</sup>. The distribution of forests differs from the north to the south. In the north, the forest percentage is less than the statistical forest percentage, while the south of Germany is rich in forests. Forests in protected areas after forest law can be classified in five categories as the following table 2 shows.

Two states, *Baden-Württemberg* (area : 35,751 km<sup>2</sup>, population : 10,000,000) and *Bayern* (area : 70,553 km<sup>2</sup>, population : 11,600,000) were analyzed separately,

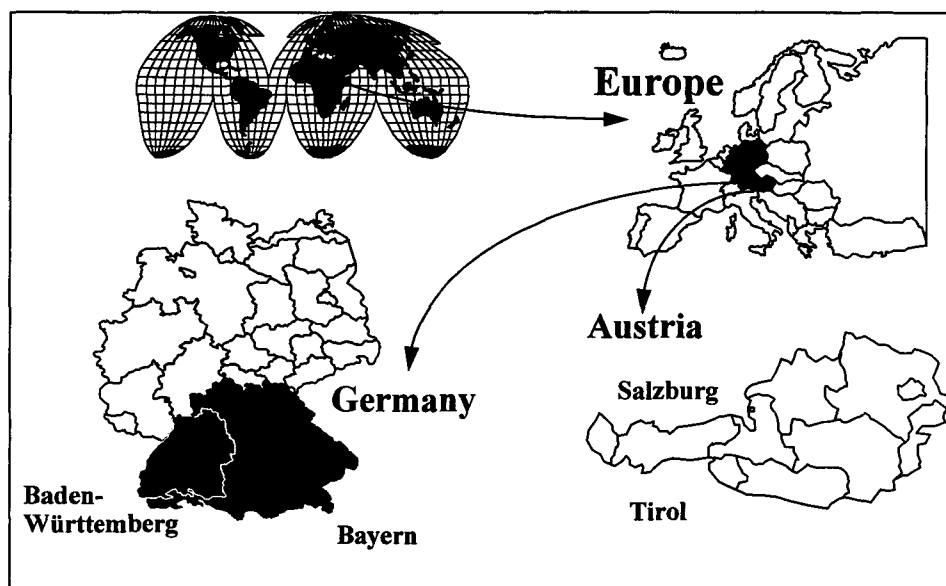


Fig. 2. Location of the investigated states and provinces in Germany and Austria

Table 2. Forests in protected areas after forest law in Germany

Type of area	Area (ha)	Percentage of the forest area
Natural forest reserves	44,649	0.4
Protected forest areas	17,300	0.2
Protection forests	702,920	6.9
Protected areas for biotope- and species diversity	53,614	0.5
Recreation forests with legal binding	215,213	2.0
<b>Total</b>	<b>1,033,696</b>	<b>10.0</b>

Source : BUNDESMINISTERIUM FÜR ERNÄHRUNG, LANDWIRTSCHAFT UND FORSTEN 1994

with a special focus on *Bayern*. *Bayern*, with 2,530,000 ha forestland, has the largest forest area of the Federal Republic of Germany<sup>11)</sup>. The forests in the high mountains of *Bayern* have always been of importance for the human settlement in the Alpine region. They protect settlements and communication systems against avalanches, rock falls and landslides, supply timber as a valuable raw material and preserve and create stable and functional mountain forests. From 250,000 ha forest land in the Alps of *Bayern*, 147,000 ha are designated as protection forests according to the state forest law of *Bayern*.

*Baden-Württemberg* is one of the federal states with the highest proportion of forest land. 38% of the land area is covered by forests. Due to its historically severe forest management, in *Baden-Württemberg* there were no protection forests designated before the first forest law (1975). However, since the last amendment of the forest law in 1995, a fundamental change in the protection forest policy has taken place (Table 3).

**Table 3.** Forests in protected areas after forest law in the states of *Baden-Württemberg* and *Bayern*

Type of area	<i>Baden-Württemberg</i>	<i>Bayern</i>
	Forest area (ha)	Forest area (ha)
Natural forest reserves	11,352	5,862
Protection forests	223,528*	202,000
Protected areas for biotope- and species diversity	12,000	
Recreation forests with legal binding	8,410	47,600
<b>Total</b>	<b>255,290</b>	<b>255,462</b>

Source : BUNDESMINISTERIUM FÜR ERNÄHRUNG, LANDWIRTSCHAFT UND FORSTEN 1994

Note : \* these data include the soil protection forests in *Baden-Württemberg* after forest law

## b. Austria

Austria is a nation of East-Central Europe with a total land area of 82,730 km<sup>2</sup>. As a country in the center of Europe, it is subject to many influences from the north, west, south and east.

The vegetation in the Alps, and especially the forest cover, is determined by the climate, the soil conditions and the altitude. Besides these natural conditions, human influences have also played an important role in the tree species distribution and mixture. Slopes with the best conditions for housing and agricultural activities have often been deforested. In the Alpine foothills, the forests have been replaced to a great extent by arable land, especially on the northern edge of the Alps with predominantly grassland<sup>2)</sup>. Farming is practiced up to about 1,500 m. Slopes under shady and cool conditions have kept their original tree species under almost the same cover. The alpine forests consist mainly of conifers, such as spruce, larch, Austrian pine and Arolla pine. A tree belt was formerly running almost up to 2,200 m, consisting of conifer forests, giving way

above this to alpine pasture. The alpine pasture, above the tree line, is favored by farmers as additional farmland.

The forests can be divided into various types of forest management<sup>32)</sup>, such as production forest, protection forest with productive yield and protection forest without productive yield, which is also a forest inventory classification. The Austrian forest area is almost completely privately owned (79.6%), while the public forest makes up one fifth (20.4%) of the ownership<sup>33),23)</sup>. Because of this, the private owners have a great responsibility for safeguarding all forest functions.

Consequently, from the mountainous natural condition, large parts of the mountainous forest territory can be affected by torrents and avalanches. The importance of protection forests became significant not only for the people and their property, communications and cultural assets, but also for tourism, which would be endangered considerably by an increasing number of disasters caused by avalanches and mudflows.

Two of the provinces, *Tirol* and *Salzburg*, were analyzed regarding protection forests. *Tirol* is a province dominated by mountains and mountain-dwellers. It has an area of 12,648 km<sup>2</sup>, and a population of 586,139 inhabitants. The province of *Salzburg*, with its size of 7,154 km<sup>2</sup>, in former times had an economy based on salt production and utilization. Nowadays it gives, with its 441,842 inhabitants, the profile of a tourism-orientated province. *Tirol* is a high-mountain forest province, which is characterized by one third agricultural area (including alpine green land and pasture), one third forest and one third unproductive land area. In 270 of the 279 municipalities, the settlement areas and the transport installations are endangered by 627 torrents and 1,110 avalanche risk areas<sup>17)</sup>.

Besides *Tirol* and *Kärnten*, *Salzburg* is also a high-mountain province. 57% of the province area is in altitude higher than 1,200 m. Within the past 100 years, the population increased threefold. Abundance of water, and a gentle landscape with high mountain character, give this province the image of a pasture and grazing land. Forestry was historically important, which can be deduced by the forest area of 44%, which corresponds to the Austrian average. Mining was also an important economic sector, especially the saltworks. After the Second World War and the subsequent economic development, tourism became a very important branch of industry<sup>17)</sup>.

### c. Japan

Japan is an island nation located in Eastern Asia. The country stretches as an island chain between 20° South and 46° North, bound by the North Pacific Ocean, the Sea of Japan, and the Korean peninsula (Figure 3).

Japan has a total land area of 374,744 km<sup>2</sup> and a population of 125,506,492 as of July 1995, which corresponds to 335 inhabitants per km<sup>2</sup>.

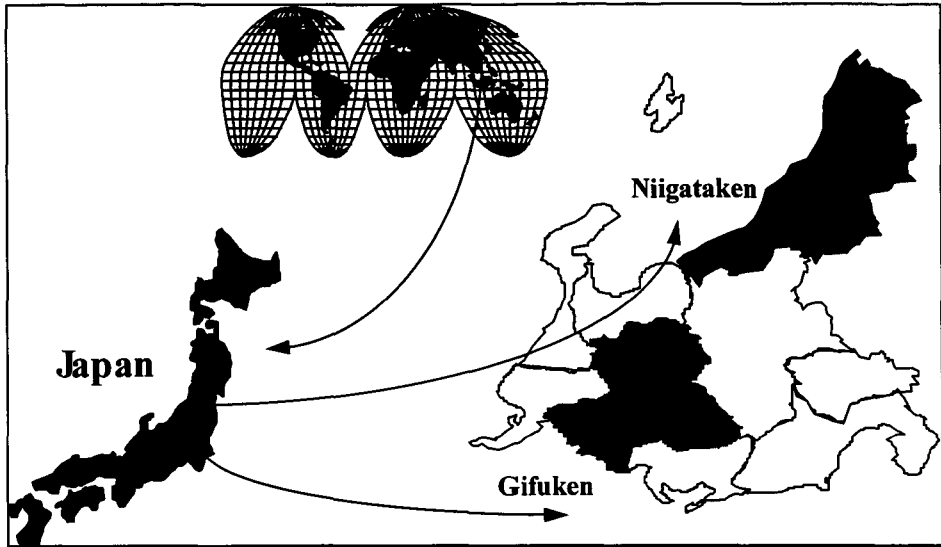


Fig. 3. Location of the investigated prefectures in Japan

The Japanese archipelago is covered with mountains and mostly rugged. Approximately 80 percent of the country is mountainous. The water courses in Japan include all types of rivers and torrents. The rivers are short, originate in the mountains and flow fast through the deep valleys. From season to season the water volume can increase in a short time period and during prolonged periods of rain floods frequently occur. Important water irrigation work was fulfilled after the Second World War to supply the domestic water demand and for the production of hydroelectricity<sup>90</sup>. Plains in Japan are small and few and are scattered throughout the country. These plains are surrounded by gentle slopes, used for urban development, housing areas, upland fields, orchards and rice cultivation.

Under natural conditions, disasters caused by nature are abundant, including floods, high winds, and heavy snowfall, and are related to socio-economic conditions. The land-use development is reduced only to a limited space, in which the population density is high, thus increasing the potential for disasters.

The JAPAN FAO ASSOCIATION<sup>55</sup>) characterized Japanese forests as follows :

- "(1) Japan, with its forest rate of 67%, is regarded as one of the most forest abundant countries in the world.*
- (2) The per capita forest area is just about 0.2 ha, which is only a quarter of the world average (0.8 ha).*
- (3) Existence of about 10 million ha of man-made forests, that share more than 40% of total forest area, is unique in the world."*

The JAPAN FAO ASSOCIATION<sup>55</sup>) wrote further :

*"... At present approximately over 9 million ha, one third of total forest*

*area, are kept as protection forests."*

The improvement of the variety of forest functions, such as for water supply and security of the living environment, and the improvement of forest productivity processes are main concerns of the current forest policy.

By the mid 50s, the post-war reconstruction in Japan was completed and the conditions for high economic growth were laid down. Urbanization progressed rapidly. Between 1950 and 1970, the population proportion in cities escalated from 38 to 72 percent<sup>73)</sup>. Changes in forests, forestry and wood industries over the past 30 years are characterized<sup>37)</sup> by a sharply increasing wood demand, an excessive cutting period during and after the war, and income differences between the forestry sector and the secondary, tertiary and fourth economic sectors. The primary problem during this 30 year period has been the stagnant forestry production. A declining self-sufficiency of wood has resulted in increasing wood imports. Forest profitability worsened due to the stagnant wood price as a result of increased wood imports and rising management costs. Depopulation of villages in upstream areas and aging and shrinkage of the forestry labor pool continued<sup>37)</sup>. All these effects have led to inadequate caretaking of the forests. However, it is worth noting that Japan still maintains rich forests, and the life of the Japanese people has been closely related to forestry since olden times<sup>38)</sup>.

### III. SHORT HISTORY OF FOREST POLICY, PROTECTION FOREST AND FOREST CONSERVATION WORK

#### A. Forest Policy in Germany — History of Protection Forest Policy and Legislation in South-Germany

The origin of Early German forestry history can be perceived in hunting management<sup>78)</sup>. Bans of the 12th and 13th centuries prohibited forest clearings in the interest of hunting and the protection of game. In the High Middle Ages, Southern Germany was a center of mining, saltworks and metallurgy and maintained a flourishing trade with many parts of central and eastern Europe<sup>47),78),4)</sup>. In the later Middle Ages, in addition to the hunting motivation, the fear of timber shortage was characteristic. This fear was the impetus for a forest management with restrictions on the consumption of wood and the prohibition of cutting trees<sup>45)</sup>.

A glance back through history shows us that the idea of protection forests was born in the last century. In the German literature, protection forests were mentioned for the first time in 1821, in the "Encyclopedia of the Forest" by HUNDESHAGEN<sup>30)</sup>. The development of protection forest legislation in Germany was carried out from the second half of the 19th century<sup>14)</sup>, as a consequence of the privatization process.

The general idea of protection forests in Europe is based on the old Roman legal maxim "*Utere tuo ne alterum noceas*"<sup>102)</sup>, which means that one should not

use one's property in such a way as to injure other parties. This principle, not only significant for private forests, was directive for all forests, but the burden of the state forests was already supported by society for the purpose of protecting the interests of the community. TROUP<sup>102)</sup> also mentioned, "... where the welfare of the general community is affected, restrictions should be placed on the rights of the few", which means that the forest owner had to take on the burden and cost for the welfare of society. These restrictions on private ownership seem to be very important for an understanding of the problematic nature of protection forests. This, in addition to the multiple functions of forests in the mountainous regions, makes characterization and evaluation difficult. However, in countries incorporating mountainous regions, the existence of protection forests is of unquestionable importance.

South Germany was the leader in forest regulation, and protection forest activity started here, as well. In *Baden*, two temporary forest laws (1821 and 1831) with minimal regulations were striking for their management of private forests. An extensive forest law was established in 1854, which proved valuable for over one century.

*Baden* was one of the states with a fairly high measure of strict state control over private forests through forest law<sup>46)</sup>. It is interesting to mention that the term protection forest was not mentioned, because severe state control extended to all forests without exception. Clear felling and reforestation within a given time were directed by the state for the management of private forests. Land change from cleared forest area into agricultural area was only allowed with permission. Additional silvicultural restrictions, including minimum rotations for different species, and correct density of stands, as obtained by thinning, were ordered. In case of mismanagement the cost had to be carried by the owner or a fee was assessed on the owner<sup>102)</sup>.

Clearing and cutting required a plenary license from the forest administration<sup>30)</sup>. Regeneration of utilized areas had to be put into practice as soon as possible. The duty of the forest police was to examine the regeneration process.

Like the former state of *Baden*, the state of *Württemberg* also did not mention the protection forests in the forest police law of 1879. However, there were two types of forests designated as local forests, which were important to prevent danger, especially against landslides and soil erosion. Another forest type fulfilled its function against wind damage to neighboring stands, especially coniferous stands. In such designated forests, clear cutting was only possible with the permission of the forest office. A monetary compensation was not paid for the loss of productivity. In *Württemberg*, these protective forests were mainly located on the mountain slopes of the Swabian Alb. In cases of violations against the regulations of the forest law, a fine was imposed or people were taken into custody. The forest police law of 1879 was amended in 1902 with no fundamental changes in the articles concerning these protective forests.

At this time, all other German states had only general forest police regulations<sup>30)</sup>. In the 19th century in *Baden* and *Württemberg* a moderation or a temporary suspension of the former severe forest supervision of the private forests characterized management, but it never reached the degree of non-governmental influence as there was in *Preußen*, where liberal principles were dominant<sup>28)</sup>.

In *Bayern*, in the forest order of 1616, the riparian protection forests were mentioned, but other protective regulations were not designated. The introduction of the forest code of 1842 and 1846 established the standards for the forest law of 1852 in *Bayern*. After the codes of 1842 and 1846 clear cutting was forbidden. Under special allowance of the forest police and the water authority (there existed already a bipartition), cutting was allowed. However, the technical term, protection forests, wasn't used. Both drafts had included wind protection, shoreline protection and mountainous forests in their concept. The importance of forests for water resource management was emphasized. The importance of forests for the environment was mentioned, with assertions that the dying of vineyards and orchards was related to a decline of forests<sup>30)</sup>.

Following these efforts of the government, the first forest law of 28 March 1852 was established. It was one of the first forest laws in Germany and was as important as the forest laws of *Baden* (1854) and the forest law of Austria (1852). Indeed, although the principle of economic freedom was guaranteed, it also included several regulations of the forest police on all the forests, in addition to specialized restrictions on the private forests. This forest law included, for the first time, the definition of protection forests<sup>14),30)</sup>. The law prohibited clearing and clear cutting without exception in the protection forests. It provided for the selective cutting method and a method of age class forest management. However, an administrative process of determination of the protection status was not fixed by the law. It was a matter for the forest owner to estimate, whether his forest had a protective significance or not. This point of thinking illustrates the liberal standpoint of the government in *Bayern*<sup>30)</sup>. In case of the appearance of difficulties, jurisdiction determined afterwards if the importance of protection was existent. As can be seen, the question of whether a forest was a protection forest or not, was not finally definite. The clearing of protective forests was on principle out of the question. However, the forest law in *Bayern* was the only one which followed this ban with punitive consequences. In justified cases, the legislature allowed for the possibility of breaking this strict principle. However, the clearing of huge areas was a seldom seen phenomena.

In 1874/75, a series of floods in *Tirol* and *Bayern* occurred. Because of these natural catastrophes, a more strict execution of the regulations in force was demanded. In the following years, 1881, 1888, 1889, and 1894, the topic of protection forests was discussed in the representative assembly. A protection forest register was called for to ensure the existence of protection forests. The amendment of the original forest law in 1896 left the basic characteristics of the former



forest law untouched. However, the new forest law included conditional clear-cut permission and the forest owner could also apply for an absolute and valid forest police decision to determine the forest's status as a protection forest. In cases of violation against the regulation, the forest owner faced financial penalties, which depended on the weight of the contravention<sup>30</sup>. This forest law lasted over one hundred years.

## **B. Forest Policy, including Protection Forest Policy and Torrent Control Policy in Austria**

Historically in Austria, besides timber production, grazing and the removal of forest litter or branchwood were common.

The most important change was the introduction of the forest law in 1852. The former regulations became superfluous with the introduction of this new law. This forest law, however, demanded a stricter enforcement of the legal regulations and the introduction of a new forest organization. The monarchy of Austria-Hungary had originally had a land area of 300,000 km<sup>2</sup> with a forest area of 9,700,000 ha. After the First World War, the land area decreased to 28.8% (86,400 km<sup>2</sup>) of its original and the forest area was reduced substantially to 39.4%. The number of provinces shrunk from 15 to 9.

Due to the large area of mountainous forests, protection forests became of special importance in Austria. The forest law of 1852, with subsequent amendments in 1873 and 1878, recognized two protective categories, ban forests and protection forests, to protect property and persons against external dangers such as avalanches, landslides, and rockfalls.

The forest technical department was founded in 1849, separate from the mining industry. It was the first time that Austrian forestry was independent. A few years later, the department of forestry was transferred to the Ministry of Finance and afterwards, in 1872, it was passed to the Ministry of Agriculture, which itself was founded in 1867.

Two flood catastrophes (16–20 September 1882, 27 October 1882) affected Austria severely<sup>1),17),71)</sup>. As result of the heavy destruction, the government put a commission into action to examine the reasons for the catastrophes, to investigate the amount of destruction and to improve future planning. The results of the commission were that a rigorous and immediate regulation of torrents and rivers utilizing a uniform plan was necessary, and that parallel forest measures were necessary for drainage and stabilization of the soils in the mountains.

The parliament of *Tirol* decided to put the Empire Law of 13 March 1883 in action for the financial support of torrent control. Following this, torrent control was carried out by the central and provincial governments in cooperation<sup>17),43)</sup>.

The oldest protection forest legislation in Europe, which was however restricted to the ban against clearing, existed in France, with the "9 Floreal XI

Law” of 1803. After this legislation of 26 April 1803 and the Code Forestier of 1827, the clearing of forests in mountainous areas was forbidden<sup>30)</sup>. However, this ban could be extended to all forests by administrative declaration. Additionally, other special legislation was passed, such as that for the stabilization of mountain soil and for controlling torrents by afforestation and other measures. As a result of floods in southern France in 1856, the French government passed the first law on reforestation in mountainous areas in 1860, bringing about extended reforestation activity during the following years.

After the 1882 catastrophe in Austria, specialists were sent to France, to investigate the success of more than two decades of experience in the recultivation of mountainous landscapes<sup>71),72)</sup>. After short-term study excursions, specialists were sent for a longer term to France.

At the time of study exchange activities from Austria to France, the legal foundation for the initial stages of Austrian torrent control service was developed. A draft, “Regarding the prevention of heavy floods by torrent”, passed the parliament on 17 April 1883. Many elements of the torrent control law of France were included in this draft; however, the point which differed the most was the organizational structure. While in the French law the costs for torrent control were carried without exception by the central government, article 9 of the Austrian draft put the responsibility on the provinces, districts, municipalities and other interested parties. After several discussions, emperor FRANZ JOSEPH put the “Law regarding the prevention of heavy floods by torrent” of 30 June 1884 into force<sup>1),17)</sup>.

The Austrian government decided, similar to the French, to put the section under the supervision of the forest administration and not under the hydraulic engineering administration. In the instructions of the torrent control section, it was suggested to use finances as efficiently as possible.

Through the decree of the Ministry of Agriculture of 5 June 1884, the service for torrent control was founded. However, the differences between the service of torrent control and the forest administration soon appeared. It was only a matter of time before the administrative bodies separated from each other. In 1903, the process of separation was started internally in the ministry, which was followed in 1911 by the official separation of both administrative bodies. For twenty-seven years, the forest administration and the torrent control service had a common stand, which can be explained as being a result of historical development. When in 1884 the torrent control service was established, the torrent control workers and forest specialists were trained by the forest administration, but the unification in the training was unsatisfactory. It was common for the officers to work a few years in the torrent control service and afterwards be transferred to the forest administration.

In 1914, 30 years after the installment of the torrent control service, the sections increased to a total of 15 in comparison with the original two. By the

beginning of World War I, it should be pointed out, the first period in the development of torrent control had ended successfully. The following period of the war caused a reduction in activity.

After the end of the World War I and the breakdown of the *Donau* Monarchy, the land area of Austria shrank to 30% of the former Austrian Empire. This, of course, also resulted in the reduction of personnel and of the number of torrent control sections<sup>71),72)</sup>. Throughout periods of economic misery, inflation, the lack of credit, and the absence of specialists, activities were reduced. The floods of 1920 and 1921 made it necessary to transfer engineers to catastrophe areas. Personnel problems, as well as financial problems in the forest sector were greatly responsible for the reduction of activity. The war periods, the time of inflation and world economic crisis can be described as the worst time in the history of torrent control. The economic crisis forced Austria to austerity.

By the constitutional amendment of 1925, the forest administration was transferred from the central government to the provinces, while the torrent control service still was left under the supervision of the central government.

With the union of Austria to the German *Reich*, the organizational structure changed again. Besides the torrent control service, also the forest administration and the Austrian Federal Forests came under the supervision of the forest minister of the German *Reich*. The period of the 40s and the question of the existence of the service was the deepest crisis in the now over hundred year history of torrent and avalanche control.

On 1 January 1947, the torrent control service came back to the forest administration. After the separation from the water authority, the external problems were solved, but internal problems still existed. In the post-war period, discussions often flared up concerning the transfer of the torrent control service from the direct supervision of the central government to indirect supervision, resulting in an increased competence for the provinces. But the Ministry of Agriculture and Forestry did not agree to these proposals from the provinces. It referred to results and common arguments, such as that the struggle against erosion worldwide is centrally organized. Only a central organization can ensure that after a catastrophe specialists as well as machines can be transferred from one province to another. Also, practical situations have shown that engineers who were working in different provinces under different conditions, were more flexible and multi-functional. The heated discussions about provincial influence seemed to be an endless story in the last half of this century.

## **C. Forest Policy in Japan**

### **a. Protection Forest Policy in Japan**

The cultivation of rice — in the past and present an important foundation in the society of Japan — requires the protection of valley areas. It is a principle staple crop and was introduced to Japan in the *Yayoi* period 2,000 years ago<sup>73)</sup>.

For the cultivation of paddy fields it was necessary to undertake water management and irrigation work. Since the 7th century there had been various orders to prohibit and restrict forest exploitation, which can be interpreted as having an equivalent role to the present-day protection forests<sup>38)</sup>. In the Middle Ages there already existed forests with protective functions for water and landscape. The increase of population and industrial areas affected the utilization of forests. It was learned that silviculture measures had an important effect on water conservation and flood control. In the *Edo* Period (1600-1868), cutting trees in upstream mountains was regulated. The prohibitions and restrictions of that time were the foundation for the development of the modern idea of “protection forests” and “national parks”. Water source conservation forests, erosion control forests, landslide prevention forests and wind prevention forests still remain and fulfill their functions today. The idea of developing specific forests, which were similar to today's protection forests, can be ascertained back to this period. In this time the forests were mainly managed by small villages. At the end of this period those communities had collapsed and the forests were no longer well managed.

In the *Meiji* Era (1869-1912), the government determined or clarified the ownership of the forests in the villages which had broken up. The situation was influenced by the struggle between the interests of the villages and the interests of the national government, which wanted to enlarge the national forest area. The destruction of the village communities also led to the devastation of the enclosed community forests. The loss of the property rights regarding forests increased the disinterest in forests. Protection forest problems occurred after the *Meiji* restoration with the result of devastations, while the forest owners and farmers felled their own forests recklessly, which was perfectly contrary to the idea of sustained yield. Forests were extensively cut, creating huge “forest deserts”. Under the prevailing conditions, the necessity of designating protection forests was substantial. In national forest areas, forests were designated as “felling prohibition forests” and “scenic forests”. These two groups laid the foundation for prospective protection forests.

After a period of natural disasters (1887-1897), three important laws were enacted. It was clear that the preservation of forests was an urgent need. Japanese experience of low-water and high-water management led to the “Three laws of water control”.

- the “River Law” (1896) was discussed in the Japanese Diet and established in the same year,
- the “Erosion Control Law” (1897) was enacted and
- also in the same year the “Forest Law” was established, including the creation of protection forests<sup>51),53)</sup>.

In protection areas of the national forests, forest utilization was forbidden with the purpose of protection of the soil. However, national purchase of forests

from non-national forest owners for protective purpose was not possible. The official beginning of the Japanese protection forest policy can be definitely fixed in 1897. In this time period, 12 different kind of protection forests were already defined. In these forests, in the interests of public welfare, the following activities were prohibited: reclamation at the cost of forestland; removal of soil, rocks, grass, plants, bogwood and tree roots; and open feeding of cattle. Also in Japan, during wartime the financial budget of the national government was restricted. As a result of this, there were no investments for forest conservation or forest improvement.

The policy of protection forests was not developed or improved at this time. The Second World War period did not show any progress or driving force in the management of protection forests. In the years of war, the protection forest area increased only by 20,000 ha, and during this time severe natural disasters took place. The increasing need for wood for reconstructing destroyed areas resulted in denuded areas. The urgent problem of this time was how to afforest these regions successfully. Forest owners were released from the cost of afforestation, if they declared themselves willing to designate their forests as protection forests.

As in other countries, World War II inflicted serious primary and secondary damages on Japan. Loss of territories, denuded areas, devastated forests and demand for wood influenced the management of forests, especially the management of protection forests. Reconstruction was the main purpose of the postwar period. After the Second World War, the current forest law was enacted in 1951, with the protection forest system continuously incorporated after the purport of the former forest law<sup>59</sup>). In response to active deforestation activities, after World War II reforestation was conducted extensively resulting in many man-made forests. A great number of these forests originated from afforestations of Japanese cedar and Japanese cypress. The biggest task was to develop afforestation and forest conservation projects. Innovations of the third forest law in 1951 were :

(1) Protection facilities districts (Forest Law, Art. 41-48) and (2) the extension of protection forest classes (Forest Law, Art. 28).

The classification of protection forests increased from 12 to 17 groups. The first 3 classes of protection forests (water source conservation forest, soil erosion control forest, landslide prevention forest) were directly concerned with land conservation and were under the control of the national government, while the purview of non-national forests in the classes 4-17 fell within the responsibility of the prefectural governor.

Long-lasting measures for soil-preservation and flood-prevention were urgent. Subsequently, these ideas were ratified in the "Temporary measures law for the maintenance of protection forests" in 1954. This law aimed for the promotion of the protection forest system. The enactment of this law was of great importance, and it was a turning point in the development of the protection

forest system.

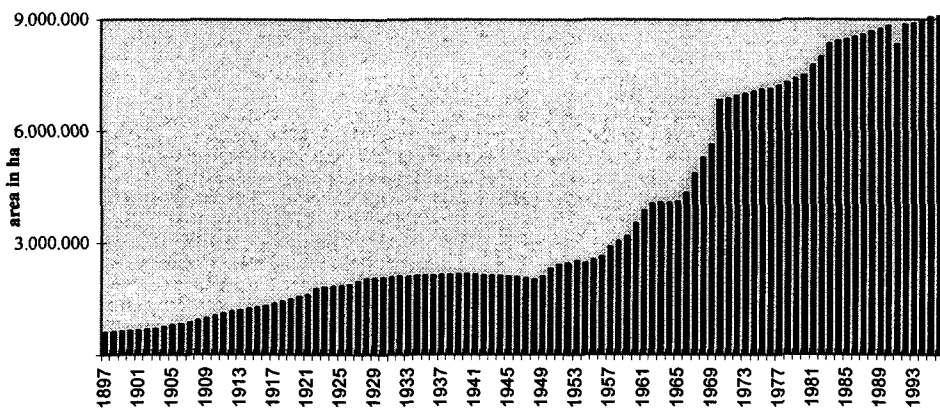
In the first phase of this plan principles were listed as :

- regulation for the designation and release of protection forests,
- management principles in designated forests,
- necessary technical measures in protection forests and
- governmental measures for purchase or compensation of loss in the designated areas.

The law was temporary, because it was fundamentally based on the forest law. The first plan lasted for 10 years. The purpose of this law was to consolidate the protection forests immediately for prevention against disasters. The increase of the protection forest area can be traced back to newly designated protection forests on one side and the purchase of non-national protection forest area on the other side.

In 1963, the first temporary period plan of the maintenance of protection forests ended, but the designation of protection forests was still needed. A parliamentary decision changed the temporary law with regard to the content and prolonged the period for another ten years. The second plan was established in 1964 with the main purpose of protecting water resources. The plan was carried out with an enormous increase of water source conservation forests. As the curve in figure 4 shows, the growth of protection forests was substantial in the fifties and sixties. The reasons for this development can be found in the economic growth of Japan, and the increasing demand for water, for which the protection of forests was essential. In addition, there were few restrictions imposed on forest owners who were willing to let their forests be designated as protection forests.

In 1974, the temporary law was amended. The prolongation of the plan (it



Source: FORESTRY AGENCY 1997

Fig. 4. The development of protection forest area in Japan

was the third plan) was decided by the Ministry of Agriculture, Forestry and Fisheries in harmonization with the Central Council for Forestry. The protection forest area increased enormously. It was the first time that recreation forests were established in the protection forest system, and in the following time period this class had a significant increase. However, the nominal increase of protection forest area actually is due to the effect of overlapping: recreation forests are mainly overlapping with the soil erosion control forests. An additional purpose of the third phase was to protect water resources and to conserve the environment of urban areas.

The fourth plan (1984–1993) had no significant changes and can be summarized as an improvement of forest management in various protection forest types.

The fifth phase (1994–2003) of the “Plan for the maintenance of protection forests” focused especially on forests for watershed and recreation improvement.

### **b. The Development of Forest Conservation Work in Japan**

The preservation of land and the protection of human lives and goods against landslide disasters is the main purpose of the forest conservation work policy in Japan. Disasters occur frequently due to the natural conditions in Japan and endanger human life. The density of the Japanese population per unit area under cultivation is the highest in the world, because over two-thirds of Japan is occupied by mountainous terrain, and alluvial plains occupy only 13 percent<sup>73</sup>. To stabilize and improve the living conditions is a concern of forest conservation work policy.

Toward the end of the *Edo* period, many areas in Japan suffered from floods caused by the overexploitation of forests. The reorganization of damaged forests continued to be an issue of the *Meiji* period. Especially, technology and know-how from the Netherlands, for example, from the Dutch engineer JOHANNIS DE RIJKE, was introduced to Japan, for hydraulic engineering and forest conservation work<sup>38),53)</sup>. This management aimed to control the largest rivers in Japan. Again, in 1881–1885, disasters occurred and the criticism of the low-water system increased. A change-over from low water works to high water works was indispensable. Whenever great floods occurred, the government policy became eager, and more aggressive, in response to criticism and the state of distress of the population. In 1911, the first period of “Hydraulic engineering work” started, which lasted 18 years. It was prolonged in 1937 for another twelve years.

One of the most important laws was the “Forest and water conservation urgent countermeasures law” in 1960. This was the starting point for a new long-term forest conservation work policy. From this time on, the “Five-year plan(s) of forest conservation work” were totally or partial amended. The extension of land use and the demand for water led to continuous long term management for the maintenance of national wealth.

In accordance with the plans, comprehensive measures against forest disasters were carried out. Primary equipment of soil conservation facilities and the planting of buffer forests were the main objects of these measures.

The forest conservation works are under the direct control of the government. The prohibition or restriction of a certain activity is, for example, to induce developers to construct various disaster prevention installations, such as flood control dams, sedimentation basins, and retarding basins, etc., as countermeasures against possible damage from development activities including the building of houses and golf links etc. on mountainous lands, as well as the prohibition of the collection of earth and sand at endangered sites. The legal foundation for recent projects are based on three laws: the forest law, the landslide prevention law and the above mentioned forest and water conservation urgent countermeasures law.

#### **IV. THE CURRENT FOREST LAW AND LEGAL ASPECTS OF PROTECTION FORESTS**

##### **A. The Federal Forest Law of Germany**

The German forest law came into force on 8 May 1975<sup>15)</sup>. It focused on the maintenance of forests and promotion of forestry and functioned as a federal skeleton law. Germany's forest legislation extends between the federal and the state level. Delineated by the basic law, federal government and state government can join the same legal sphere. The combination of the federal forest law with the state forest law makes it possible to meet the demands of society. The state regulations follow the principles and the preconditions of the federal consecutively, but additional criteria are also included. The federal forest law is not only from the legal binding but also from the content, relatively complex<sup>48)</sup>.

The first chapter of the forest law deals with general provisions, such as the purpose of the law, the definition of forests, the different kind of forest ownerships and the forest estate. The second chapter includes skeleton regulations, which are defined in more detail in the state forest laws. Article 6, for example, delineates the purpose and the principle of forest basic planning and the securing of forest functions. In areas where the protective and recreative function of forests is important, forests are designated for this purpose, with some exceptions made with consideration for economic interests. Therefore, the establishment of forest basic plans became important (article 7). Separate articles are dedicated to forest conservation (article 9), afforestation (article 10) and the management of forests (article 11).

Only one article (12) is dealing directly with the topic of protection forests, which shows that the federal government recognizes the local and regional importance of this issue. After the forest law of the Federal Republic of Germany of 1975, forests can be designated as protection forests<sup>15)</sup>



“(1) ..., if it is necessary for the prevention of danger, enormous disadvantages or enormous bother for the general public, ... ”

The designation of protection forests is especially then necessary, if protection against pollution harmful strain on the environment, erosion by water and wind, and harmful discharge of precipitation and avalanche become urgent. The same article points out that clear cutting or felling that causes a similar effect as a clear cut in the protection forest requires permission by the higher authority declared in state law. The permission can be conferred under special conditions, the details of which are left up to the states. After the state forest law and additional regulations, the forest owner can be obliged, ..., *to refrain from or to enforce measures in the protection forests.*”

Similar protection rules already were existent before 1975 in some states. Only in the former state of *Baden* did regulation regarding protection forests not exist, because clear cutting was already generally restricted or required special permission<sup>48)</sup>. Protection forests are of local and regional importance in the Federal Republic of Germany. The state of *Berlin*, for example, designated all its forests as protection forests. Contrarily, the state of *Niedersachsen* has not designated protection forests. In the justification of the federal forest law it was formulated that it does not seem advisable to designate protection forests or to order special management limitations and restrictions generally, because of the differing geographical aspects of the various areas<sup>48)</sup>. However, against the background of increasing consciousness concerning the environment, in areas such as improvement of the local and regional climate, or emissions filtration, the movement for designation of protection forests in all the states is significant.

Article 5 of the federal forest law requires the states to pay adequate compensation to the forest owner for any additional expenses or justifiable losses of revenue. The argument supporting this article was founded on the idea that a constitutional state has to cover legal limitations and restrictions, when it is in the public interest guaranteed by the constitution. The forest law therefore included limitations on personal property written in the Basic Law (article 14), with the content that property is bound by law for the general interest<sup>25)</sup>. The law itself determines that these limitations should be compensated, as article 35 (1) of the state forest law of *Baden-Württemberg* defines<sup>48)</sup>. In order to successfully master the difficult process of structural adjustment, forestry still requires a broad base of support. Special programs promote forest production methods, compatible with the requirements of environmental protection and maintenance of the countryside. The fact that the federal forest law is a skeleton law means that the responsibility for promotion is transferred to the states. The federal government promotes measures financially by the “Joint task for the improvement of agricultural structures and coastal protection”.

Regarding the protection and conservation of forests no more detailed explanations were given, instead leaving it to the state forest laws of *Baden-*

*Württemberg* and *Bayern*. Within the bounds of the federal forest law, the states have decided individual rules, taking into account the historic experience, regional needs and political possibilities, which are, however, often not easy to follow.

It can be summarized that the forest legislation in Germany developed in the territorial states. In addition, each state draws up its own interpretations of the law to develop and realize programs under local conditions, which influences the management and protection of state forests.

#### **a. The Forest Law of *Bayern***

The outline of *Bayern's* modern forest policy was formulated in the forest law of 1 January 1975<sup>8),106)</sup>, which was established before the federal forest law was enacted. Article 1 of *Bayern's* forest law clearly lays down the principle of preserving forests. The purpose of the forest law is:

1. to preserve the forest area and increase it if necessary,
2. to maintain the site-adapted forest conditions or to restore them,
3. to ensure the protective capacity of the forests and increase it,
4. to secure the production and supply of wood and other natural resources through a sustained forest management,
5. to make recreation in forests possible for the population and to improve the conditions for recreation forests,
6. to support and promote the forest owner in the realization of these purposes, and
7. to balance the interests of the society and the forest owner.

The second part of the forest law can be divided into three sections: securing of forest functions, conservation and management of forests and additional regulations regarding the management of national and publicly-owned forests. Especially, the section regarding conservation and management of forests deals with protection forests as an important part.

To secure the forest functions, a variety of planning procedures are necessary. Under the general principle of forest planning, forest function plans (article 6) should be drawn up. Together with other planning spheres, such as the agriculture sector, the foundation for land use planning is laid down. The forest function planning is an essential part of the regional planning process<sup>10)</sup> and obligatory after forest law. The maps which are drawn up are specialized maps, necessary for land-use planning, but not legally binding.

Conservation and management of forests is in the federal forest law, as well as in the state forest laws, an important chapter. *Bayern* follows the federal law much more closely here than does *Baden-Württemberg*. In article 9 of the forest law it is clearly underlined that activities which hinder or destroy the productivity of forests are forbidden. The clearing of forests in favor of other land use requires permission, which can be given conditionally. The permission is refused

in the case of protection forests, ban forests, recreation forests and natural forest reserves. Permission can only be given in protection forests, if no negative effects for the protective function of the forests are feared, and in recreation forests, when the recreative function is not impaired. In ban forests permission can be given, if it is guaranteed in the planning that a new forest will be established, which borders the ban forest and which is in its function almost the same as the forests cleared.

Protection forests (article 10) are forests

1. in high mountains of the Alps and the highlands,
2. on sites which are in danger of karst, or highly endangered by erosion, or
3. which serve to protect against danger by avalanches, rockfalls, landslides, floods, inundations, soil ablations, or river bank damage<sup>8),106)</sup>.

Protection forests can also be forests which protect other neighboring forest stands against storms. The primary task of protection forests in *Bayern* seems to be the protection of target areas, such as settlements and traffic lines. The subject of water is not directly connected to a protection forest class, although half of the water in *Oberbayern* originates in the mountainous forests.

Protection forests after law are included in a protection forest register. 202,000 ha forests are officially designated in *Bayern* as protection forests. In any case clear cutting needs permission, which must be refused if the protective function will no longer be ensured.

Article 11 designates another protective forest category, the ban forests<sup>2</sup>. In densely populated areas and sparsely stocked zones, forests have an extraordinary effect on climate, water management and air quality. These forests can be designated as strictly enclosed forests (ban forests) especially for protection against emissions. Clear cutting and clearing is forbidden and a special permission must always be refused. This forest type is aimed particularly toward the protection against pollution. Herewith, *Bayern* created a modern technical term for forests used for environmental protection. The ban forest is a protective forest category which creates a confusion in the use of technical terms. Between the states in Germany and Austria the use of one and the same technical term is different. This fact shows impressively the negative impact which state sovereignty can have<sup>48)</sup>.

Under extreme forest site conditions, where the normal production process is restricted, compensations will be paid to the forest owners to ensure sustainable forest management. In the case of admission to the protection forest register or an official protection forest declaration, the state of *Bayern* pays the private and

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<sup>2</sup>in German, *Bannwald*, similar to the meaning of strictly enclosed forests. ATTENTION! The technical terms of ban forest in *Baden-Württemberg*, *Bayern* and Austria are defined differently. In *Baden-Württemberg* ban forests are natural forest reserves, in *Bayern* ban forests are for protection against emissions, and in Austria ban forests are highly protected, enclosed forests.

the publicly-owned forest owners subsidies. The forest owner receives this compensation payment only if special management methods are ordered which incur additional expenses. In *Bayern*, the local authorities are responsible for payment if the relevance is local, while in superregional matters the state is responsible (article 24).

In cases of violations against provisions of the law, penalties are listed, especially with regard to clearing or clear cutting in protection forests without permission and mismanagement in protection forests.

Especially for protection forests, there exists a program for restoration in case of damage, which will be explained in more detail in Chapter 5.

#### **b. The New State Forest Law in *Baden-Württemberg***

The three former states of *Baden*, *Württemberg-Baden* and *Württemberg-Hohenzollern* were unified on 25 April 1952 and renamed *Baden-Württemberg*. Because of the old, strongly entrenched and reliable traditions, it took a long time to establish a new forest law for the whole state.

Forestry legislation in *Baden-Württemberg* can be referred back to the forest law of *Baden* (1854). The new state forest law, which became effective on April 1, 1976<sup>27),83)</sup>, meant a complete reform of forestry in the state. It dealt with the relationship between forest owners, society, and the national economy, and is geared to the economic, protective and recreative functions of the forest. The most important objective of the new law was to preserve the advantages of the state. Forest land can only be cleared or converted to other uses if the state forest administration agrees. Forest land can not be used for other land-use purposes if the ecological or recreational aspects are endangered. The forest administration can demand either afforestation of other suitable land in the proximity of heavily populated areas, or dedicate compensation payment for forest preservation, to counteract detrimental effects of clearing forest land or using land for other purposes.

In 1995, the forest law of *Baden-Württemberg* was amended<sup>87)</sup>. The new state forest law delineates detailed directions regarding various issues and made use of the legislative freedom which was given by the federal forest law.

In chapter 2, the principle regarding basic forest planning and forest conservation is formulated. Forest basic plans are drawn up for part or all of the state area (article 7). These plans are important as special development plans and take the ongoing process of state development into consideration. The foundation for forest basic planning includes the forest functions after forest function mapping, the forest biotopes after forest biotope mapping, and the forest sites after forest site mapping (article 7). Additional forest development purposes can be declared by other types of planning. The outline of how to secure the forest functions (article 8) and the conservation of forests (article 9) is formulated along the same lines as the federal forest law. The maintenance of the forest area is

the most important management aim, and the conversion of forest land to other land-use is regulated and bound to certain conditions (article 9, 10, 11). The third chapter of the state forest law deals with the conservation and management of forests. This chapter is divided into two sections: section one — management of the forests, and section two — protected forest areas. The forest owner has the duty to manage his forest following the principle of sustainable forest management (article 13). Article 14 deals with management on the basis of conservation.

Forest management guidelines include the important restriction of clear cutting (article 15). It is not allowed

1. to damage and harm the soil and the soil fertility,
2. to affect the water supply negatively, or
3. to affect the protective and recreative function negatively by clear cutting.

From the historical point of view, it was difficult in *Baden-Württemberg* to balance many conflicting experiences, opinions and interests. In the former state of *Baden*, permission to clear cut was required in all cases, while the former state of *Württemberg*, only in the protection forests was permission necessary<sup>48</sup>). In other German states, permission for clear cutting was always necessary in the protection forests, and sometimes required in recreation forests, as well.

In the current state forest law, clear cutting on an area of more than one hectare, demands permission from the district forest office. The permission for clear cutting can be refused if the forest owner has neglected the obligation for afforestation repeatedly or if he can't guarantee that there will be no harm as formulated in article 15. Clear cutting permission can be given if it meets the conditions that the utilization take place in different time intervals, and that a specified forest technical cutting method which follows certain preconditions is used. Clear fellings of un-matured stands, such as coniferous stands less than 50 years and broadleaf stands less than 70 years old, are not allowed.

The legal obligation for reforestation is given in article 17. Forest areas which are not currently covered with forest, or which are incompletely stocked, have to be afforested within a time period of three years. The reforestation has to be carried out under natural regeneration, planting, or seed. The obligation for afforestation includes the duty to tend, protect, and, if necessary, also to replant the plantations and natural regenerations.

Protection forests are discussed in chapter 3 of the forest law<sup>87</sup>). This chapter follows as an intellectual consequence of the chapter of general forest management. In the second part of chapter 3, regarding protected forest areas, various kinds of protection forests and forest reserves are described in detail. Protected forest areas are

\* Protection forests (article 29)

1. Soil protection forests (article 30)
2. Biotope protection forests (article 30a)
3. Protection forests against harmful strain on the environment (article

31)

- \* Protected forest areas (article 32)
  - Ban forests
  - Forest preserves
- \* Recreation forests
- \* Preserves (animal) in forests

Soil protection forests as defined by the law are forests on sites of previous deforestation, on which the urgent danger of slides or an irreversible erosion of the soil cover will remain. These forests reduce or prevent damages to the landscape. Soil protection forests are<sup>81)</sup>:

1. forests on steep slopes with an inclination of more than 30° (58% gradient)
2. forests at highly exposed locations at narrow ridges and sites which have a tendency to rockfall, and
3. forests at slopes with an inclination less than 30°, which are in danger of erosion and slip. This includes the soil erosion by sand shifting soils, extreme block slopes with the loss of fine soil, and slipping in clay stone areas.

Soil protection forests are forest stands which consist of tree species which are site-suited, and have good root development<sup>81)</sup>. Permanent stocking and natural regeneration processes are favored. Clear cutting can be permitted, if there is no negative effect to the site expected. If cutting is permitted, it should not reach an area more than 1.0 ha, and logging and skidding operations have to be carried out under soil protective methods. Unstocked or incompletely stocked areas have to be afforested within a time period of one year<sup>82)</sup>.

The newest class of protection forests is the biotope protection forest class. This type was developed when biotope criteria and natural conservation aspects in forests became important and the impact of natural and environmental conservation aspects increased in the forest sector.

Biotope protection forests (article 30a) are forests which serve for the protection and maintenance of endangered forest ecosystems, as well as providing living space for endangered plants and animals<sup>87)</sup>.

Biotope protection forests are investigated and designated by the forest biotope mapping. Biotope protection forests have to be declared by the forest administration.

The amendment of the forest law was a good opportunity to respond to the new environmental tendency. The state of *Baden-Württemberg* exhibits its conservation aims in the forests with the designation of this protection forest class. However, *Baden-Württemberg* is the only state in the Federal Republic of Germany which declared this officially.

The protection forests against harmful strain on the environment in *Baden-Württemberg* play a subordinate part and are only mentioned here.

Also, in *Baden-Württemberg* a certain category of protected areas can be differentiated from the protection forests after the articles 30, 30a and 31 in the

state forest code. Article 32 of this law distinguishes the protected forest areas, which include the ban forests and forest preserves (Table 4). This category represents strictly protected forests which only cover a small area.

**Table 4.** Forests in the state of *Baden-Württemberg* 1995

Forest classification		Area (ha)	in % of the forest area
Forest area in <i>Baden-Württemberg</i> *		1,372,214	100.0
State forest		325,900	23.7
Federal forest		9,267	0.7
Publicly-owned forest		527,630	38.5
Private forest		509,417	37.1
Protection and recreation forest**		1,025,251	74.4
Protection forest	Water conservation forest (after forest function mapping)	440,648	32.0
	Water conservation forest (after water law)	232,565	16.9
	Soil protection forest (after forest law)	223,098	16.2
	Climate forest	28,583	2.1
	Anti-pollution forest	86,746	6.3
	Noise and view shielding forest	4,545	0.3
Protected forest areas	Ban forest	3,401	0.2
	Forest preserves	12,880	0.9
	Sum	16,281	1.1
Recreation	after forest function mapping	386,171	28.0
	after forest law	10,673	0.8

Source: MINISTERIUM FÜR ERNÄHRUNG, LANDWIRTSCHAFT, UMWELT UND FORSTEN 1996

Notes: \*data of July 1993, \*\* data of December 1995

The state promotes forestry within the framework of the "Joint task for the improvement of agricultural structures and coastal protection", the agriculture and state culture law and within the scope of the obligations after regulations of the European Union. As far as it is necessary to secure the forest functions, the state can promote further measures.

In *Baden-Württemberg*, no special programs for the reorganization of protection forests exist, as they do in *Bayern* or *Austria*. Financial subsidies are paid through the "*Ausgleichszulage WALD*", which became an important source of financial aid for the forest owner<sup>84</sup>. The payment, "*Ausgleichszulage WALD*", is a subsidy for natural geographically disadvantaged regions. It is only paid for private forests. If areas are designated as soil protection forests, an additional soil protection bonus of DM 30 per hectare will be paid. Further, in *Baden-Württemberg* a grant for biotope improvement intervention can be ordered. Subsidies are paid for special management measures, but there is no financial aid for technical consolidation work. For 163,000 ha, DM 16,400,000 was paid in 1995

which is equivalent to DM 100 per hectare in disadvantaged areas.

### c. Other Legal Aspects

Water conservation forests are neither mentioned and designated after the federal forest law, nor by the state forest laws. However, forests do exist in water conservation reserves, designated by the water legislation.

Water conservation reserves, which are only connected to forestry indirectly, are mentioned in article 19 of the federal water supply law<sup>88)</sup>, in article 24 of the state water law of *Baden-Württemberg*, and in article 34 of the state water law in *Bayern*<sup>89)</sup>. Only these articles consider forestry itself. Other articles are more or less water management oriented. As regards public welfare, water protection reserves are significant for the water supply, for the protection of water resources against adverse effects, for the accumulation of groundwater and for the prevention of harmful flow off of rain water and the resulting erosion of soil<sup>9)</sup>. In water conservation reserves certain activities can be forbidden or restricted. In the case of restriction of agriculture and forest management, the owner may be compensated by the state government.

Water conservation reserves are designated by the lower water authority. Tables 5 and 6 point out that forest areas are only one part of the land use in the water conservation reserves. The main areas concerned are agricultural lands, which face severe restrictions in their management for the purpose of water resource conservation.

Forestry is generally not supported financially by the water authority. Money may be given, if a written application is made. If the curb zone is located

**Table 5.** Other formally designated forest areas

Type of area	<i>Baden-Württemberg</i>		<i>Bayern</i>	
	Total area (ha)	Forest area (ha)	Total area (ha)	Forest area (ha)
Water conservation reserve	564,600	224,352	215,000	90,300
Wildlife protection area			12,311	8,000
Road protection forest				32,739
<b>Total</b>	<b>564,600</b>	<b>224,352</b>	<b>217,311</b>	<b>131,039</b>

Source: BUNDESMINISTERIUM FÜR ERNÄHRUNG, LANDWIRTSCHAFT UND FORSTEN 1994

**Table 6.** Water conservation reserve after water law in Baden-Württemberg

	Water conservation reserve (ha)	therefrom		
		Forest (ha)	Open fields (ha)	Settlement (ha)
Total area	564,576 (100%)	208,653 (37%)	326,115 (58%)	29,807 (5%)
Highly protected zones	52,187 (100%)	23,804 (46%)	27,888 (53%)	494 (1%)

Source: LANDESANSTALT FÜR UMWELTSCHUTZ BADEN-WÜRTTEMBERG 1992



in the forests, the area is automatically a water protection forest. These areas are designated by the water authority and not by the forest administration; the water authority represents the interests of the forest administration. However, the forest administration or the forest owner, as holder of the property rights, can submit their arguments for the decision making process. Compensation payments are paid by the state<sup>86),103)</sup>. In principle subsidies are paid for the land owner, whose management methods are then restricted. The statutes mainly affect the agriculture sector. The budget for compensation changes from year to year and depends on the number of applications. Financial help which is proven to be necessary, is guaranteed.

### **B. Austrian Legislation Related to Forests — The Federal Forest Law**

The Austrian forest law of 3 July 1975<sup>12),69),74)</sup> defines forests as tree stocked areas, which fulfill the forest functions, including the productive, the protective, the recreative or the welfare function. Under the general provisions section, the forest law devotes an article (2) to forests in high-elevation areas and wind protection forests.

The aim of the forest land-use planning is the description and the future planning of forest conditions for the whole land area of Austria or part of it (article 6). To fulfill this aim, it is necessary to maintain the forest conditions so that they fulfill the productive, protective, recreative or welfare functions. Especially in areas with concentrations of housing and working areas, as well as infrastructure installments and facilities, the distribution of forests is important for the realization of these elementary functions. In addition, forests are significant in areas where protection against floods, avalanches, wind and protection of water resources are crucial.

In the forest land-use plans (article 8), the current state, the development, and new trends of the forest resources of a planning unit are described, drawn up in maps, and adjusted to the real conditions. Areas of forest land-use planning are general forest planning, forest development planning, and risk area planning.

The forest development plan concerns the whole federal area and consists of many partial plans. The partial plans are drawn up by the heads of the provinces. Therefore, these plans extend to all or part of the provincial area. These plans consist of a description in text and map. The partial plans and any adjustment to the current state of development require approval by the Minister of Agriculture and Forestry. Before the approval, the head of the province must declare its land-use planning intentions, and after the submission of the agreement by the federal minister, the head of the province has to inform the district government offices about the results. The plan then has to be made available to the general public.

The federal minister is responsible for the risk area plan, with consultation of and advice from the torrent and avalanche control offices. In these plans,

areas that are endangered by torrents and avalanches are described. The determination of the hazard levels, as well as the description of these zones, for which special management is ordered or which should be kept open for protective measures, are important parts of this work. The draft of the risk area plan has to be transmitted to the mayor of the municipality, who then displays it for four weeks for the general public. The draft of the plan will then be proofed by a commission to verify its accuracy and, if necessary, it will be adjusted. The commission is represented by the Federal Minister for Agriculture and Forestry as chair, a representative of the section for torrent and avalanche control, a representative of the province government and a representative of the concerned municipality. The minister himself has to approve the final draft of the plan. Copies of the accepted plans have to be submitted by the section of torrent and avalanche control to the province and district government offices.

The forest owner has to reforest clear-cut areas within the time limits set by forest management guidelines. Afforestation is considered to have been successfully carried out if the necessary activities are completed within three years. On site conditions which normally regenerate under natural seeding or stool shooting, the tree replacement should take place in a period of eight years. If natural regeneration does not succeed, the reforestation has to be carried out actively. Case by case, the process can sometimes be extended, if no danger to the forest site is expected and the reason for exceeding of the time limit is justified. In some cases, where initial replanting fails, additional replanting must be continued until the area has regenerated.

The devastation of forests (article 16) and clearing (article 17) are forbidden. The use of forest land for purposes other than the cultivation of forests is generally forbidden. Clearing can be permitted by the forest administration in charge, if the public interests for the use of the ground predominate over the interest of its use as forestland. Public interests, as defined by law, are interests for national defense, railways, air traffic, public road traffic, post- and telecommunications, water construction, the energy industry, or the improvement of the agrarian structure. The permission for clearing can be set with conditions, such as limitation in the time period in which the clearing should take place, restriction of the use to the applied purpose of the area, and provision of measures which compensate the negative effects of clearing. When replacement planting is not guaranteed, the applicant for clearing has to pay a lump sum which is equivalent to the costs which he would have to pay to reforest the cleared land. This money functions as income for the federal government to promote the afforestation of land; this income should be used relatively close to the cleared forest area. In the case of clearing of forest land for national defense purposes, the Minister of Agriculture and Forestry is responsible, while in all other cases the district government authorities are authorized.

In the chapter on the conservation of forestry and sustainability, particular

forests are given special designations. This includes the articles on protection forests and ban forests. Protection forests (article 21) are forests on sites which are endangered by wind, water and force of gravity, and which need special treatment for the protection of the soil, the forest cover and reforestations.

Other protection forests are

- forests on sand and humus drift soils,
- forests which are in danger to develop as karst and heavily erosion endangered,
- forests on rocky, shallow or jagged sites, where reforestation is very difficult,
- forests on slopes, where dangerous slip off might occur,
- vegetation cover on the treeline of forests, and
- forests which border on the treeline.

The forest owner of a protection forest has to manage his forests in a manner suited to the site conditions, so that stable, site-oriented vegetation cover with good structure is guaranteed. Protection forests can be designated under official declaration, but they also can be designated without an official declaration, due to the natural conditions and after general definition by the forest law. The owner of protection forests is obligated to improve or prevent damages in his forest, if the costs for this are covered by the returns from the felling in the protection forests. The Minister for Agriculture and Forestry has to determine silvicultural management methods and forestry utilization in designated protection forests. He can order the permission of felling, the time period for reforestation and the felling age. If there is a good reason to doubt if a forest or part of it is protection forest, the forest administration can decide it after petition by the forest owner. The declaration procedure (article 23) also can be initiated *ex officio*<sup>3</sup> if negative effects are expected. If the preconditions for the qualification as protection forests are given, the administration has to announce this.

The protection forest discussion in Austria is often a matter of protection against torrents, avalanches and erosion. Threatened areas are not only housing and economic areas, but also agricultural and forest lands, as well as infrastructure and tourist facilities. The importance of protection forests varies regionally. In western Austria, the protection forests in the higher mountains are important, while in eastern Austria, such as in the provinces of *Burgenland* and *Niederösterreich*, the wind break function is more important.

Austrian forests can be divided into three main categories according to the forest inventory: productive forests, protection forests with commercial yield which are partly exploitable, and protection forests without commercial yield in risk areas not exploitable at all, as listed in table 7.

Due to the ecological and economic conditions, on 12% of the forest area in Austria no wood production in the forests is possible<sup>24),100)</sup>, which corresponds to the classification of protection forest without yield. Besides this, there exist

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<sup>3</sup>by official declaration

**Table 7.** Protection forest distribution in each province

Province	1 Forest area (ha)	2 Protection forest total (ha * )	3 Protection forest with yield (ha * * )	4 Protection forest without yield (ha * * * )
<i>Burgenland</i>	127,000	0	0	0
<i>Kärnten</i>	572,000	88,000 (15.3%)	38,000 (6.6%)	50,000 (8.7%)
<i>Niederösterreich and Wien</i>	748,000	41,000 (5.4%)	23,000 (3.0%)	18,000 (2.3%)
<i>Oberösterreich</i>	487,000	65,000 (13.3%)	28,000 (5.7%)	37,000 (7.5%)
<i>Salzburg</i>	356,000	115,000 (32.3%)	39,000 (10.9%)	76,000 (21.3%)
<i>Steiermark</i>	989,000	162,000 (16.3%)	66,000 (6.6%)	96,000 (9.7%)
<i>Tirol</i>	500,000	231,000 (46.2%)	81,000 (16.2%)	150,000 (30.0%)
<i>Vorarlberg</i>	90,000	38,000 (42.2%)	11,000 (12.2%)	27,000 (30.0%)
<b>Austria</b>	<b>3,878,000</b>	<b>741,000 (19.1%)</b>	<b>286,000 (7.3%)</b>	<b>455,000 (11.7%)</b>

Source : BUNDESMINISTERIUM FÜR LAND- UND FORSTWIRTSCHAFT 1995

Note : \*, \*\*, \*\*\* percentage of 1

forests which are important for the protection of soil and stands due to exposed site conditions, but in which wood utilization and cutting can be carried out carefully. Those forests are protection forests with yield. The predominant protection forest area is not profitable. The tree growth is too slow, the wood quality is too poor, and the costs for afforestations are too high, so that most of the stands are separated from the productive forests. The forest inventory of 1961/70 distinguished 380,000 ha protection forests with yield and 390,000 ha protection forests without yield. The Austrian forest inventory of 1986/1990 designates 741,000 ha protection forests. The conditions in the protection forests changed substantially; 286,000 ha were investigated as protection forests with yield; however, 455,000 were surveyed as protection forests without yield. Until recently, data were only investigated for economically interesting forest areas and for forests in good condition. With the start of the new inventory period, the protection forests without yield were also included in the inventory. Alarmingly, the result of the inventory was that the conditions, even in the protection forests with yield, had worsened, due to the overaging of the stands, impeded regeneration, and harsh natural conditions.

Unfavorable age structure, degradation, and changes in the tree species distribution are the main reasons for the problems in the Austrian protection forests. Due to the process of destabilization, the condition of these forests, especially of high-mountain forests is severe. The Austrian forest inventory supplies evidence of the unsatisfactory conditions in the protection forests. Almost one fourth of the protection forest is in the process of degradation and one third is lacking good canopy cover.

The heads of the provinces draw up a forest development plan or adjust an already existing forest development plan for protection forest areas, if it is

necessary to secure the protection forest reorganization measures (article 24). Reorganization measures include the reforestation of insufficiently regenerated areas and the treatment and tending of accessible areas.

These forest development plans have to comprise a map showing the current state of the forest conditions, the forest ownership and other legally binding relations, and the measures to be taken, the time schedule, and the costs for the reorganization.

After order by the forest administration, the forest owner has to carry out felling of overaged stands for the purpose of natural regeneration. The administration can either give permission or entirely prohibit felling. Wind protection plantings have to be treated in such a way that the protective function is guaranteed and any felling needs permission from the administration. The reduction of the vegetation cover at the treeline which has protective importance is prohibited. The state legislature can be authorized by additional legal activities to guarantee the protective effect of the vegetation cover (article 25).

Ban forests (article 27) are an important protective category in the Austrian forest law. Forests which serve to guard against danger to human life, housing areas and cultivated ground, as well as forests which provide for the public welfare, can be designated as ban forests. Ban forest purposes are protection against avalanches, rockfall, soil erosion, snow accumulation, floods, wind and similar dangers, repulsion of dangers caused by emissions, conservation of health, recreation, conservation of water resources, securing of the use of infrastructure and energy related installments, and protection of installations for the national defense. In ban forests the administration can prohibit or order special silviculture treatment, dictate, restrict and forbid certain felling and logging methods, restrict or abrogate the right for utilization, restrict the use of logging facilities, dictate (locally and by time) and order that the forest owner tolerate certain protective facilities.

The forest owners have the right for compensation payment (article 31) if, due to the ban declaration, disadvantages will result. The costs for the executed actions have to be carried by the beneficiary, if the forest owner is not bound by other regulations of the law. In case of restrictions so severe that normal forest management is no longer ensured, the forest owner can apply, instead of compensation payments, for the commutation of the forest. The amount of compensation can be set after application by the appropriate administrative body.

Compared to Germany, Austria is a country that includes more articles regarding the natural conditions, such as protection against torrent and avalanche (article 98-103). If it is necessary to curb the danger of torrents and avalanches, the forest authority can order silvicultural management in the catchment areas (article 100), after consultation with the section of torrent and avalanche control office in catchment areas, including the use of site-suited seeds and seedling. In this case the forest owner must not be required to accept consider-

able additional costs. Fellings in the subalpine forest areas require permission or are totally prohibited. In the case of deterioration of a catchment area, the forest owner must improve the conditions, unless it is already designated as a working field under the definition of torrent control law and the water law.

The service for torrent and avalanche control is under the direct supervision of the Federal Minister for Agriculture and Forestry. The forest administration and the service for torrent and control avalanche control cooperate in planned activities for the public interest. Each municipality, through which territory a torrent flows, has the duty to control the torrent and its lateral water stretches at least once per year, especially in the spring when the snow is melting.

After article 141 of the forest law, the federal republic promotes forestry in the interest of the public. The aims and objectives of the promotion of forestry are the conservation and improvement of the protective, recreative and welfare functions, as well as the enhancement of the economic function, as far as it concerns the structure of the forest enterprise, the productivity of forestry for securing the wood supply and the strengthening of the competitive capacities.

Objects of the promotion are forests of the high-elevations in the zone from 500 m below and extending to the natural treeline, measures for securing the protection forests, measures for promotion of the recreative effect in forests, measures for the improvement of the forest structure, investments for the extension and improvement of forest logging installations and rationalization of the forest work, measures for the promotion of marketing, for education and consultation in questions of forestry, for forest protection, and for the reorganization of damaged forests. The promotion budget can be a maximum of 60% federal subsidies for the total project costs, but the amount is not fixed generally.

### **C. The Current Forest Law in Japan**

The purpose of the forest law in Japan is to promote sustained yield, to increase productivity of forests, to invest in land conservation and to develop the national economy<sup>59),60)</sup>.

The Minister of Agriculture, Forestry and Fisheries sets up basic forest plans and long-term forecasting, gives considerations to the state of protection facilities, and makes 15-year nation wide forest plans every five years. In the nation-wide forest plans items are stipulated, such as reorganization of forests, cutting, reforestation, thinning and tending, forest management, forest roads, forest land conservation and protection facilities<sup>61),62)</sup>. Especially, the nation-wide forest plan gives attention to conservation of the environment and maintaining and improving the elementary functions of forests. Section plans of the nation-wide forest plans include the forest improvement plans (every five years), which reorganize the forests by projects. These projects include measures such as thinning, tending, and road construction. Modifications of both plans, the nation-wide forest plan and the forest improvement plan, can be undertaken in

case of necessity. However, the modifications can only be made after consultation with the Central Forest Council, in cooperation with the administrative bodies and the prefectural governors. Set up or modified plans have to be made publicly available, and the responsible administrative bodies and prefectural governors have to be notified. Under the supervision of the prefecture, in accordance with the nation-wide forest plans, every five years, ten-year regional forest plans are set up<sup>61)</sup>. In the regional forest plan, the issues regarding the targeted forests are determined: the locations, the volume to be cut, the cutting age, the method of cutting, the afforestation, the species of planted type, the thinning and tending, the improvement of forest roads, the rationalization of forest management, and the cooperation in the consolidation of forest management, the forest land conservation and protection facilities, such as reorganization of protection forests. Regional forest plans are adapted and modified to the current conditions.

Topography and natural conditions of private forests are considered in the municipal forest improvement plans. These plans endeavor to improve the forests through such methods as thinning and tending. Municipal forest improvement plans stand in close connection to the regional forest plan. Basic items are similar to those of the regional forest plans, such as the forest improvement by thinning and tending, the promotion of consolidation of forest management, the training and retention of persons who engage in forestry, the promotion of rationalization in the forest management, improvement of the forest road network, the promotion of the utilization of forest products, and standardization regarding thinning and tending. Municipal forest improvement plans must conform to regional forest plans; in case of divergence, the municipal forest improvement plans should be changed and adjusted to meet the regional forest plan. In case the thinning and tending do not meet the expectations of the municipal forest improvement plan, the forest owner may be directly advised by the chief of the forest improvement municipalities, until he improves the conditions.

Cutting standing trees from private forests, which are part of a regional forest plan, must follow procedures provided in ministerial ordinances. Cutting has to be announced to the prefectural governor beforehand. In the announcement, information concerning the locations of forests, areas to be cut, method of cutting, and cutting age is required. Exemptions are guaranteed, if other conditions are important and covered by articles of the same law. Activities which change the quality of the land or actions of great consequence to natural conditions, such as digging earth, stones or roots, require permission. Exemptions are guaranteed, if cutting is done by the province or local public entities, in case of necessary emergency situations, or in case of projects which are in the public interest and which reduce harm to forest land. Development which is planned on forest land where the potential of disasters through soil erosion, landslides, or

floods is high, requires permission before implementation.

### a. Legal Aspects of Protection Forests

The forest law of 1951 has one important chapter, regarding protection facilities, which is divided into two parts, protection forests and protection facility districts, which compose the core of the forest law.

The ministry of agriculture, forestry and fisheries may designate forests as protection forests to achieve the purposes of water conservation, defense work against soil erosion and landslides, prevention of danger against avalanches and rockslides, and preservation of scenic beauty and public health (Table 8).

In the case of national forests the ministry is responsible, in the case of private and communal forests (non-national forests) in the protection classes 1-3 the national government is responsible, and in the classes 4-17 the prefectural governors are responsible (Table 9).

Overlapping of different protection forest types and functions is usually not common, except in one case: recreation forests. Through the overlapping effect with watershed and soil erosion control, in which forest conservation work can be carried out, even in recreation forests, forest conservation work is possible.

Just as forests can be designated as protection forests, they also can be reclassified when protection reasons have vanished.

The Minister of Forestry, Agriculture and Fishery has to consult the coastal manager concerning designation of forests in coastal conservation areas, and the

**Table 8.** The classification of protection forests in Japan

Protection forest type	Purpose
1. Water source conservation forest	Control of water management, control of flood and draught
2. Soil erosion control forest	Control of soil erosion
3. Landslide prevention forest	Protect housing, farmland and road facilities from unstable slope earth
4. Sand shift control forest	Prevent shifting sand
5. Windbreak forest	Reduce wind speed and keep housing areas and farmland safe behind a protection shelter
6. Flood control forest	Reduce damage by river flooding
7. Sea splash damage control forest	Reduce sea salt or tidal wave damage
8. Drought prevention forest	Protect local water sources and prevent irrigation reservoir from drought
9. Snowbreak forest	Protect railroads and roads from snowstorm
10. Fog control forest	Protect farmland from the fog drift
11. Avalanche prevention forest	Prevent avalanches from starting and flowing,
12. Rockfall prevention forest	Prevent rockfall
13. Fire prevention forest	Prevent fire spread
14. Fish breeding forest	Protect fish habitat and breeding zones
15. Navigation landmark forest	Landmarks for navigation
16. Public health forest	Provide citizens with recreational places, conserve air quality and prevent noise
17. Landscape conservation forest	Protect sites in places of scenic and historic interest and importance

Source : JAPAN SOIL AND WATER CONSERVATION ASSOCIATION 1994



**Table 9.** Classification of protection forests in distribution to national and non-national forests in Japan

Type of protection forests	National forests (ha)	Non-national forests (ha)	Total (ha)	Percentage (%)
Water source conservation forest	3,197,727	3,005,369	6,203,096	68.0
Soil erosion control forest	766,719	1,259,379	2,026,098	22.2
Landslide prevention forest	13,210	33,942	47,152	0.5
Intermediate sum of the first three type of protection forests	3,977,656	4,298,690	8,276,346	90.7
Sand shift control forest	3,995	12,238	16,233	0.2
Windbreak forest	23,062	32,376	55,438	0.6
Flood control forest	91	638	729	
Sea splash damage control forest	5,235	8,028	13,263	0.2
Drought prevention forest	16,329	26,398	42,727	0.5
Snowbreak forest	-	7	7	-
Fog control forest*	8,742	46,807	55,549	0.6
Avalanche prevention forest	4,620	14,455	19,075	0.2
Rock fall prevention forest	437	1,334	1,771	
Fire prevention forest**	0	405	405	
Fish breeding forest	6,758	21,936	28,694	0.3
Navigation landmark forest	749	344	1,093	
Public health forest	284,971	301,729	586,700	6.4
Landscape conservation forest	12,468	14,523	26,991	0.3
Intermediate sum protection forest type 4-17	367,457	481,218	848,675	9.3
Total sum	<b>4,345,113</b>	<b>4,779,908</b>	<b>9,125,021</b>	<b>100</b>
Percentage (%)	47.6	52.4	100	
Percentage of total area of forests***	17.2	18.9	36.1	
Percentage of total land area****	11.5	12.6	24.1	

Source : JAPAN SOIL AND WATER CONSERVATION ASSOCIATION 1997

Notes : \* exist only in Hokkaido, \*\* exist only in non-national forests, \*\*\* forest land area 25,212,000 ha, \*\*\*\* national land area 37,771,000 ha

general director of the environment agency concerning designation of forests for public health and scenic beauty. In the case of national forests the ministry is competent, while in the case of private and communal forests the prefectural governors are responsible<sup>36</sup>). Just as forests can be designated as protection forests, they also can be released, where designation reasons have vanished. Applicants, who wish to hand in a petition for designation or release of protection forests, may be chiefs of local public entities or persons who have direct interests in the designation or release. These petitions can be handed in to the Minister of Agriculture, Forestry and Fisheries according to procedures stipulated in ministerial ordinances. Private citizens who intend to petition for designation and release of protection forests must do so via prefectural governors who oversee the locations of the concerned forests. Prefectural governors themselves must forward applications along with written opinions to the Minister of Agriculture, Forestry and Fisheries.

In designated protection forests it is generally forbidden to change the land formation, by means such as cutting standing trees and bamboo, or digging earth,

stones or roots<sup>59)</sup>.

In cases where failure of the designated protection forests' purposes is foreseen, it is possible and necessary to change the required management conditions. Local public entities and private persons may apply to the minister to change the management plan in the forests. Generally, cutting trees in protection forests or the change of land formation such as cutting standing bamboo, damaging standing trees, pasturing domestic animals, or collecting weeds, fallen leaves, and fallen branches beneath trees, or digging up earth, rocks, or roots, requires permission by prefectural governors<sup>59)</sup>, except for cutting by persons who are obliged to do so by laws and measures, and cutting as urgently needed in case of fire, damage from wind and water, and other emergencies.

While it is generally allowed to cut standing trees and use timber out of the protection forests, the forest owners still have a responsibility to afforest the cut areas. They have to plant trees according to the prescribed planting methods, times and tree species as specified in the forest management guidelines of the protection forests<sup>59)</sup>. A designation of forest as protection forest often results in financial loss and loss of the personal rights of the owner. This loss must be compensated by the prefecture.

Prefectural governors may order management measures, such as the discontinuation of cutting, to persons who have violated the limitations on protection forests, and may also order the said persons to take necessary actions to afforest the land where the said cutting took place, with specified times, methods, and types of trees. In designated protection forests, markings must be installed, which visibly define the forest as the protection forest. The forest owner has to accept these markings. Violations against provisions by the forest owners may be penalized by the prefectural governor. Protection forests are included in a protection forest register. The Minister of Agriculture, Forestry and Fisheries and prefectural governors work out proper forest management in protection forests, based on the laws and governmental provisions to ensure that they function properly at all times.

## **b. Other Legal Aspects**

Forest conservation policy in Japan was driven forward during the postwar period<sup>67),68),36)</sup>. Especially, the year of 1954 was important for the development of the conservation system<sup>68)</sup>. Long lasting measures for soil-preservation and flood-prevention were urgently ratified in the "Temporary measures law for the maintenance of protection forests". This law aimed to create ten-year "Plan(s) for the maintenance of protection forest". The enactment of this law was of importance and it was the turning point in the recent development of the protection forest system. The purpose of this law was to consolidate the protection forests immediately for prevention against disasters.

Protection forest policy in Japan is closely related to forest conservation

policy, as witnessed by another important law, the "Forest and water conservation urgent countermeasures law" of 1960. This was the starting point for a new long-term forest conservation policy. From this time on "Five-year plan(s) for forest conservation work", were totally or partially amended<sup>64),65)</sup>. The extension of land use and the demand for water led to continuous, long term management for national wealth<sup>66)</sup>. In the early seventies, the situation in Japan was characterized by economic growth and land utilization. The national income increased rapidly. The expanding economy enriched the national savings and resulted in extension of protective facilities. In the plans of the five year projects, comprehensive measures against forest disasters were carried out. Forest conservation projects are executed by the regional forestry office or the prefectural government under the control of the Forestry Agency. Protection facility activities can only be fulfilled in the first seven protection forest classes.

The protection forest policy is supported and assisted by forest conservation projects. The project work is a technical and technical-biological support to protect people's lives and property from harm of frequent, severe mountain disasters.

Forest conservation work is carried out by the central government, as well as by the prefectural governments. This work is conducted at private forest areas by the local prefectural bodies. In national forests, the central government is in charge. Additionally, the central government can be in charge if the projects are too big, if a necessity for advanced technology exists, or if the requirements can't be met by the prefecture. General consensus of the forest conservation projects conforms with the idea of protection forests and aims for water source conservation, disaster prevention and provision of recreation areas.

The Forestry Agency carries out forest conservation work in the following six categories:

1. Maintenance of devastated forests and torrents,
2. creation of disaster prevention forests for sand shift, sea splash damage and avalanche control,
3. forest conservation for improvement and enhancement of protection forests,
4. execution of landslide prevention projects,
5. establishment of disaster precaution and alarm systems, and
6. promotion of forest road systems for an effective protection forest management.

The increase of protection forests can be traced back to newly designated protection forests and the purchase of non-national protected forest areas. The prolongation and extension of the forest conservation plans have been decided for several different time periods, with the aim of protecting water resources, disaster prevention and maintenance of recreation forests.

Both the "Temporary measures law for the maintenance of protection forests" and the "Forest and water conservation urgent countermeasures law" are

important for the protection forest policy in Japan. They are still in existence and programs and plans are continuously extended.

As the comparison table 10 shows, in Japan, various types of protection forests are classified<sup>57),58),67)</sup>. It can be pointed out that Japan defines the number of designated forests after forest law more clearly than do Germany and Austria. Table 11 summarizes shortly the regulations after the current forest regulation.

## V. CURRENT PROTECTION FOREST RESTORATION AND NEW TRENDS

### A. Protection Forest Restoration in *Bayern*

Results of investigations in *Bayern* show that various problems in the protection forests exist, such as a vitality crisis in the mountainous areas, including the topic of "new forest disease" and a local overaging of forests. The concern about the protection forests is comparable to forests in general, but protection forest management is more difficult due to the unfavorable natural conditions and forest owner distribution. Because of this, the program for the restoration of protection forests was established in 1986.

#### a. The Program for the Restoration of Protection Forests

The restoration program for the protection of forests<sup>7)</sup> was established by the state government of *Bayern* to influence private management activities in the mountainous forests and to support the forest owner with technical assistance and financial subsidies. Until the establishment of this program, no specific forest conservation projects were carried out. However, special measures similar to present-day activities did exist, but they were part of the general forest management. Forest conservation work and planting were not designated as special protective activities. Historically, restoration of forests was also carried out by the water authority.

In 1986 the program<sup>4</sup> started, because of the unsatisfactory condition of the protection forests in the Alps of *Bayern*. At the beginning of the 1980s, the forest conditions became worse, due to the impact of different burdens, such as burdens by mistakes in the forest management, burdens by game browsing, and burdens by contaminants. The state parliament in *Bayern* also considered the problems of mountain districts. As a result of this development, the restoration of protection forests was started. A project team of 7 members, put in charge under direct supervision of the Ministry of Agriculture and Forestry, collected information for three years about the *status quo*<sup>5</sup> of protection forests. The working group pointed out the problem areas and made proposals about how to improve the conditions.

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<sup>4</sup>program not valuable for the protection forests in the northern parts of *Bayern*

<sup>5</sup>present state

**Table 10.** Comparison table of various aspects: establishment, protection forest area, and protection forest types

Germany		Austria	Japan
Bayern	Baden-Württemberg		
current forest law established 1975	current forest law established 1976	current forest law established 1975	current forest law established 1951
<u>current protection forest area</u> 202,000 ha protection forests (= 8% of the forest area) of which 147,000 ha are in the Alpine forests	<u>current protection forest area</u> 223,098 ha soil conservation forests after forest law (16.2% of the forest area)	<u>current protection forest area</u> 741,049 ha protection forests (19.1% of the forest area)	<u>current protection forest area</u> 9,125,021 ha (36% of the forest area)
204,497 ha ban forest (a modern technical term for environment protection)	525 ha protection forests against harmful strain on the environment 7-8% biotope protection forests (exact data are not available) 232,565 ha water conservation forests after water law (16.9% of the forest area)	19,591 ha ban forest (highly protected forest category)	
<u>protection forest types</u>	<u>protection forest types</u>	<u>protection forest types</u>	<u>protection forest types</u>
1. in high mountains of the Alps and the highlands	1. Soil protection forests (§ 30)	Protection forests (§ 21) are forests, which sites are endangered by the ablation through wind, water and force of gravity and which need a special treatment for the protection of the soil, the forest cover and the reforestation.	1. water source conservation forest
2. on sites which are in danger of karst or high endangered by erosion	2. Protection forests against harmful strain on the environment (§ 31)	Further protection forests are	2. soil erosion control forest
3. which serve to protect against danger by avalanche, rock fall, landslide, floods, inundation, soil ablation so on, or bank protection.	3. Biotope protection forests (§ 30a) since 1995	- forests on sand- and humus drift soils	3. landslide prevention forest
Further forests, which protect other neighboring forest stands against storm.		- forests which are in danger of developing as karst and heavily erosion endangered	4. sand shift control forest
		- forests on rocky, shallow or jagged sites, when the reforestation is only possible under hard conditions	5. windbreak forest
		- forests on slopes, where dangerous slip off might occur	6. flood control prevention forest
		- vegetation cover on the treeline of forests	7. sea splash damage control forest
		- forests, which border on the treeline	8. drought prevention forest
			9. snowbreak forest
			10. fog control forest
			11. avalanche prevention forest
			12. rockfall prevention forest
			13. fire prevention forest
			14. fish breeding forest
			15. navigation landmark forest
			16. public health forest
			17. landscape conservation forest

**Table 11.** Comparison table of the regulations by the current forest legislation

Germany		Austria	Japan
Bayern	Baden-Württemberg		
<p>Every action, which hinders or destroys the productivity of forests is forbidden. Clearing needs permission. The permission can be given conditionally. Fundamentally the permission is refused in the case of protection forests, ban forests, recreation forests and natural forest reserves. Permission can be given in a protection forest, as long as there are no negative effects for the protective function of the forest feared. In ban forests the permission can be given, if it is ensured that a new forest will be established which borders the ban forest and which is in its function almost similar to the forests cleared in planning or might develop to an equally valuable forest.</p> <p>No regulations in the case of the ban forests. In densely settled areas this category is important. Clear cutting and clearing is forbidden and any permission must be refused.</p>	<p>1. Soil protection forests Clear cutting in the protection forests needs permission by the forest office. Permanent stocking and natural regeneration processes are favored. If clear cutting is allowed, it should not reach an area more than 1.0 ha. Logging and skidding operations have to be carried out using soil protective methods. Un-stocked or incompletely stocked areas have to be afforested within a time period of one a year.</p> <p>2. Biotope protection forests Protection of endangered forest stands; however, no specific regulations as management guidelines are given.</p> <p>3. Protection forests against harmful strain on the environment (§ 31) It is forbidden to carry out drainage, which affects the water supply negatively, to fertilize forest stands, to use chemical pesticide, to store substances which endanger the water resources or to fill or to remove soil.</p>	<p>Forest management suited to the site conditions and a site-oriented vegetation cover with good structure. Protection forest management has to be carried out, if the costs for this are borne by the returns from the felling in the protection forests. The Minister for Agriculture and Forestry can order the felling, the time period for reforestation and the age of the felling.</p>	<p>Generally, cutting trees in protection forests or the change of land formation such as by cutting standing bamboo, damaging standing trees, pasturing domestic animals, collecting weeds, fallen leaves, and fallen branches beneath trees, digging up earth, rocks, and roots, needs permission from the prefectural governors.</p> <p>Where it is still allowed to cut standing trees and use timber out of the protection forests, the forest owners do have responsibility to afforest the cut areas. They have to plant trees according to the prescribed planting methods, times and tree species as specified in forest managing guidelines of the protection forests.</p>

The results of the inventory concluded that 10% of the protection forests in the *Allgäu* in South-West *Bayern* and the Alps of *Bayern* could no longer fulfill the protective functions, and the problem areas increased year by year.

The program was installed for 20 years, as figure 5 shows. With the establishment of the program, the restoration by forest conservation work and planting started. Technical experience and knowledge was adopted from Switzerland and Austria. Switzerland was in many aspects the model for working in the protection forests, because it developed good techniques and created methods for afforestations in high elevation forests. *Bayern* developed and performed a program according to the state requirements.

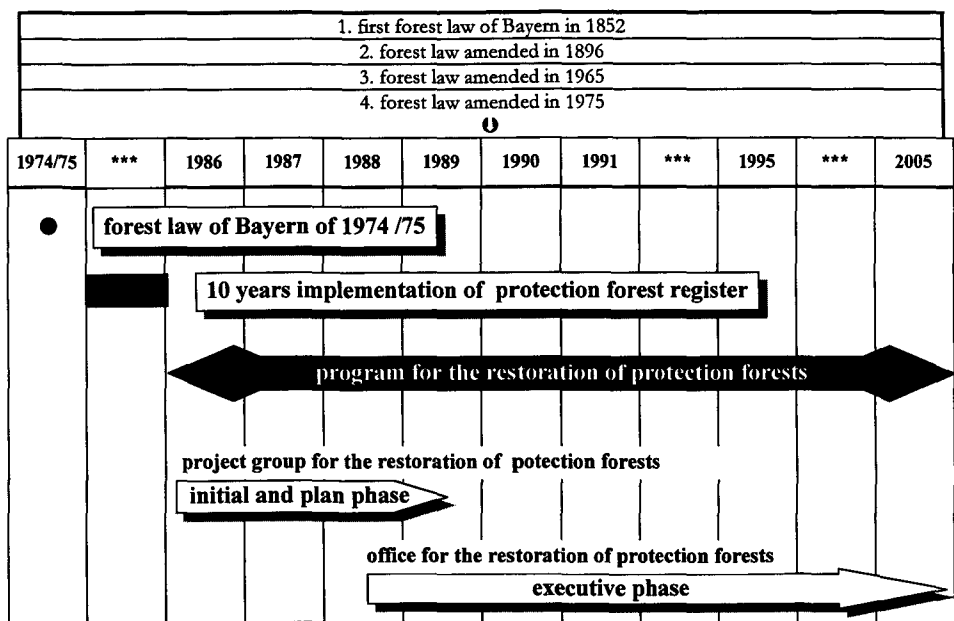


Fig. 5. The program for the restoration of protection forests in *Bayern*

As a result of the first analysis, restoration areas and restoration districts were designated, which became the planning units for this program. In 1989, three offices for the restoration of protection forests were established, which were developed from the initial project. They functioned as an information center for the district forest offices to give help, subsidies, and advice, and as a control center for the higher level forest administration to control the work of the district forest offices. The protection forest restoration offices develop special planting methods for the protection forests, plan construction works, and train foresters for the district forest offices. After the establishment of the program, subsequently the control of the district forest offices became necessary. The initial planning of protection forest restoration was partially revised and improvement

became necessary.

The offices for the restoration of protection forests make supreme efforts to guarantee the functions of the protection forests, aim to solve problems, and designate new reorganization areas. The offices stand under the direct supervision of the higher level forest administration in *München*.

The program for the restoration of protection forests is a special program and applies to all forest owners. The private forest owners have to tolerate necessary measures if someone owns forest especially designated for social welfare. In 1974, the law called for providing a protection forest register and mapping for the whole of *Bayern* within 10 years. After the mapping was completed, forests were effectively designated as protection forests. Only in the officially designated protection forests can forest conservation work be carried out. The protection forest mapping and the forest function mapping are not the same, but are partially congruent.

Various maps are used as planning instruments to determine the conditions of the forest and protection forests, such as maps for the forest management planning, the forest function planning, the protection forest planning, the planning for the restoration of protection forests, and the slope stability planning.

The protection forest maps are displayed in the district administration office and the forest administration office.

In the beginning of the restoration program, the necessity of both technical and biological support was pointed out. Once a year the designated restoration areas are investigated and necessary measures are taken. 10-12% of the protection forests of *Bayern* are restoration areas, which are in need of active consolidation (Figure 6).

From the viewpoint of the district forest offices, the biological methods, such as planting in groups, planting with pot-plants, use of seeds and seedlings from site-suited stands, natural regeneration, and bio-engineering are preferred. Constructions are only undertaken if housing areas are acutely endangered. Additional technical measures are executed by the forest administration with the purpose of stabilizing the snow, using wooden constructions. Temporary forest conservation work should last for 30 years, until the forests can recover naturally. Permanent constructions are carried out by using steel, and this work is chiefly done by the water authority.

The restoration program for protection forests is a mid-term planning activity. The planning is coordinated with the higher level forest administration. The fulfillment of the measures lies within the responsibility of the district forest offices. For the *Allgäu* region, two experts are working for several district forest offices, especially in planning details, coordination, logistics, and control. Only a small part of the restoration districts and the restoration areas is located in the state forests. It is therefore necessary to coordinate the planning with all forest owners.



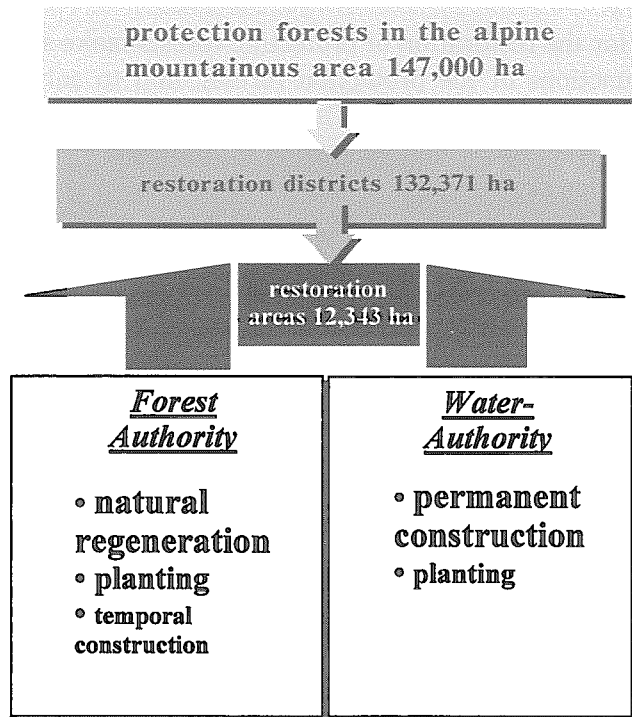


Fig. 6. Relation between protection forests and restoration areas

Financial promotion in protection forests can be related to measures such as tending subsidies, or can be due to the fact that a forest is designated as a protection forest and officially assigned to the protection forest register. Financial support in the protection forests is guaranteed, because it is in the interest for the social welfare. The unit area benefiting from promotion must be described in detail in a map. Therefore, the protection forests are marked exactly in the protection forest maps or in aerial photographs. Subsidies are paid in the protection forests up to DM 60 per hectare. In addition, there is a financial subsidy for afforestation, which is usually 50% higher in the protection forests and a grant for road construction in protection forests, of which 80% is paid by the district forest office and 20% by the residential forest owner. The costs are covered by a fund of the Ministry of Agriculture and Forestry in *Bayern*, which was created strictly for the purpose of the restoration of protection forests. Unfortunately, there are still costs that can not be covered by this fund, which the owners have to pay themselves.

The budget of the program for the restoration of protection forests is estimated for about 20 years for a total of DM<sup>6</sup> 480,000,000, on average DM 20,000,000

<sup>6</sup>Deutsche Mark = German currency

-25,000,000 per year<sup>7)</sup>. The private forests are supported to 100% by the state government, and the community forests are supported too, with a self-financing proportion of 10-20%.

A view into the future can be evinced and summarized by the fact that the conditions depend on the political decision making process and on the hunting problem. Success in the restoration of protection forest only can be reached if the cloven-hoofed game species can be reduced to an ecological carrying level<sup>7),9),70)</sup>. Opposing interests still exist between the forest, hunting and policy advocates.

Protection forests and the management of these stands are a matter of local activity. The natural dynamic of the forests has to be taken into consideration. In the future, it is imperative that the differentiation of age classes and the regeneration be secured. Activities have to be carried out using the principle of "Biological Automation".

In Germany, the forest administration works in cooperation with the water authority. From the historical point of view, the water authority started with the restoration of mountain forests. In the beginning, the forest administration badly neglected the work in high mountains. The initial activities and suggestions for the improvement of the mountain forest conditions were developed by the water authority. Nowadays, in *Bayern*, the forest administration is responsible for biological measures, while the water authority's work is more concerned with technical solutions in problem areas.

Both administrative bodies work on the same area simultaneously, but separately. Usually the forest administration is working in the forest area, while the water authority is working in high-elevation areas or torrents. The protection of settlements and traffic lines is common to the protection forests in Europe, and where there is such need, protection activities are carried out.

The water authority in *Bayern* was once part of the Ministry of Interior, but in 1993, it became a department of the Ministry of State Development and Environment. The water authority is assigned to the ministry as a specific administrative body. On the local level, 24 district water resource offices exist. Four of them are in the high mountainous areas. One district water resource office represents three political counties. The budget of a district water resource office is DM 20,000,000 per year, so the four mountainous district water resource offices have a budget of DM 80,000,000 for a time period of 10 years.

Between the water authority and the forest administration there is generally no overlapping of spheres of responsibility. The water authority is bound to the water law, and the forest administration to the forest law. The water authority has its own equipment and material and works independently from other authorities. The authority carries out complex and difficult work in the forests, such as torrent and avalanche control<sup>7),9)</sup>.

**b. The State of Protection Forests in south *Bayern***

The consciousness about protection forest problems in the higher mountains exists, but the engagement in those areas is not emphasized enough. Lately, the danger potential is increasing, resulting in an increasing interest in this problem. Decisions are often politically and financially led, which is not conducive to good decision making. For successful decision making it is essential to examine all aspects. In the present situation, protection forest management is somewhat reactionary and a type of “catastrophe management”.

There are 17 alpine district forest offices located in south *Bayern* (Figure 7) in which protection forests represent from nearly to more than 50% of the total forest area in each district (Figure 8).

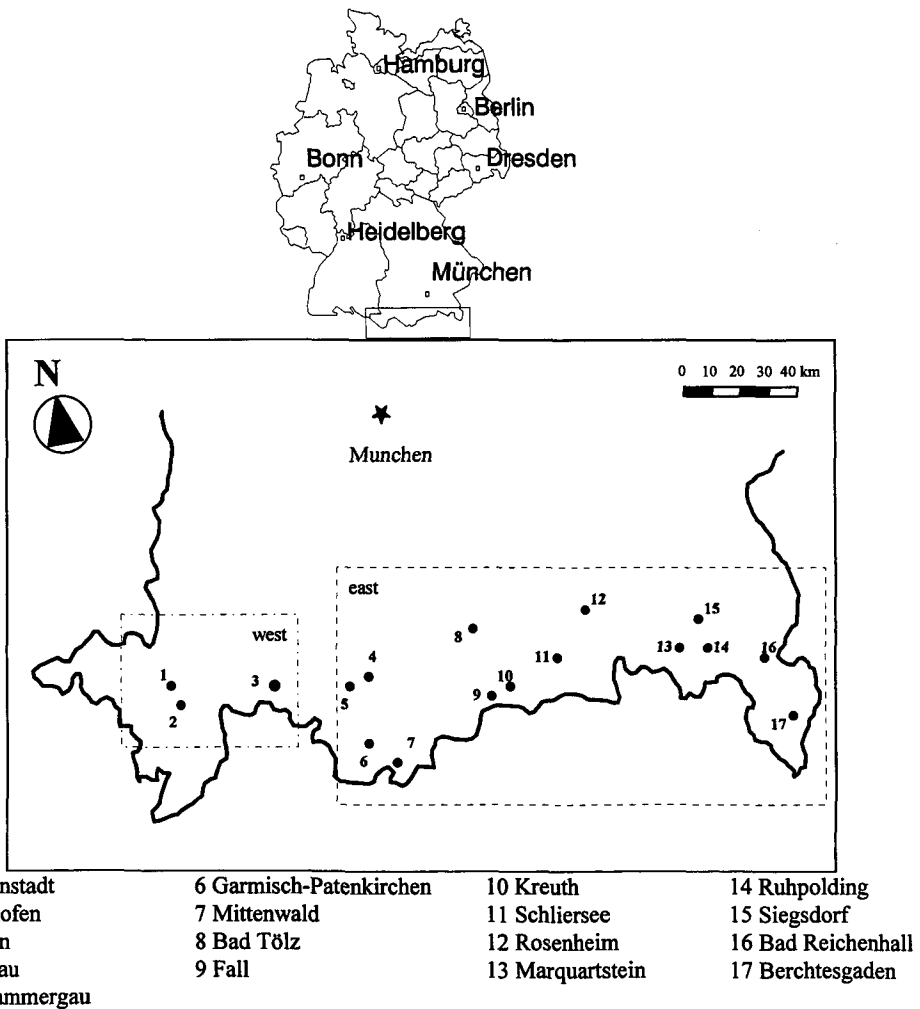
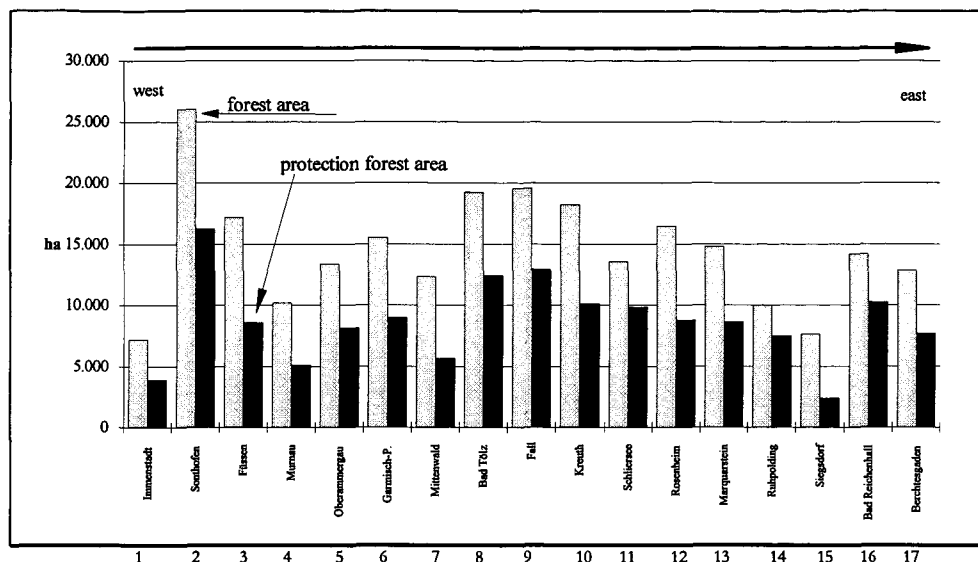


Fig. 7. Location of Alpine district forest offices in *Bayern*



Source. FUNKTIONSTELLE SCHUTZWALDSANIERUNG OST 1995

Fig. 8. Protection forest area in the district forest offices of the Alpine region in *Bayern*

The *Allgäu* (west *Bayern*) is, compared to other mountainous regions of the Alps, relatively less forested<sup>49</sup>. Forests are limited to protection forest sites. Small-sized forest holdings are typical for the region of the *Allgäu*, where only 30% of the land area is forest. A separation of forest area and grazing area resulted in an attractive landscape. Pasture here is not a problem for forestry. In the district forest office of *Sonthofen*, 63% of the forests are designated as protection forests. This rate increases locally to 80-100% protection forests in some subalpine areas. In the western part of south *Bayern*, tourism is of formative influence and very important for the regional development.

In the district forest offices of *Reichenhall* and *Berchtesgaden* in eastern *Bayern*, almost 50% of the forests are important for protection, and sometimes, depending on the region, increasing to 80-90%.

Roads, railways and housing areas are the most important facilities to protect. In a highly mobile society transportation infrastructure is essential, and as they are typically utilized in winter as well as in summer, they need to be permanently passable.

With an average age of 115 years, the protection forest stands are overaged. The age distribution clearly indicates that almost 18% of the protection forests are older than 160 years, 36% older than 140 years and 60% older than 100 years. The young tree age classes are obviously under represented.

Afforestation in mountain regions is more difficult than in lower land areas. The success of afforestations in the sensitive ecosystem of protection forests

demands knowledge in silviculture<sup>93</sup>), such as specialized methods for cultivation and planting<sup>41),98</sup>). To protect the new plantings against various types of snow movement, it is necessary to install temporal protective measures, such as stakes, ties, terraces, three-cornered supports, or snow rakes after establishment of young tree stands, and it is important to impose appropriate methods for tending of the stands. The tree growth is very slow in the high-elevations and the overall development thus proceeds slowly as well, because of the extreme climatic conditions, as SCHÖNBERGER *et al.*<sup>98</sup>) points out.

The state program for the restoration of protection forests shows compliance with its declared policy. This program was established to improve the conditions of the mountainous forests. PLATTNER<sup>95</sup>) titled his contribution with the expression, "*Prevention is better than the cure*", and points out the importance of consequent work in the subalpine areas. It also shows that the public influence on the forest policy and management has become much stronger<sup>91</sup>). Protection forests problems are concentrated on a limited area, with limited possibilities, in a limited time period. The number and the impact of burdens are higher than in other forest types. The slightest weakness can cause catastrophes. Through the offices of restoration of protection forests, data will be collected continuously. These data will then be analyzed and new scientific and practical knowledge will be developed.

## **B. Protection Forest Amelioration in Austria — The Province of Salzburg**

Two third of the land area in Austria is mountainous. Over the whole of Austria, 1,771 communities, which is 74 percent of all communities, are afflicted by more than 10,000 torrents and nearly 5,000 avalanche areas.

Austria is a federal republic with a strongly developed sense of federalism. The forest service in Austria is under indirect influence by the federal government. Its service works in the interest of the public and executes the federal forest law; however, the administration is under provincial control. The jurisdiction is distributed to the provinces. The federal government is, for example, competent in the question of forestry and avalanche and torrent control, while on the other hand, competence in forest planning, land use planning and nature conservation planning lies with the province administration.

To counteract and obviate the dangers caused by improper land-use, technical and biological measures were established. After Article 102 of the Austrian Constitution, the service of avalanche and torrent control was designated as a specific service in the forest administration. The Austrian torrent and avalanche control service, a division of the Federal Ministry of Agriculture and Forestry, invests year after year in risk area planning and technical, as well as biological, forest conservation projects<sup>24</sup>). The torrent and avalanche control service is an integrated part of the forest administration, and separated from the water authority.

The legal foundation for the torrent and avalanche control service is in the forest law, the torrent control law, the law for hydraulic engineering work and the water law. The risk area planning is the most important instrument for this service.

Austria's uniqueness with regard to the protection forests is the relation between the forest administration and the service of torrent and avalanche control.

The service for torrent and avalanche control is responsible for the restoration of forests in short terms (5-10 years), quickly and safely. Historically, time was not such an important influencing factor, but that has changed nowadays. The short-term activities have become important, which justifies the existence of the torrent and avalanche control service. The demand for hard material intensive constructions is high, because quick and safe protection is desired, which also demands a high financial budget. The torrent and avalanche control service should be more forest orientated, but the forest oriented share is only 10%, while 90% is technical oriented. The trend leads, however, from highly localized constructions, to an intensification of work in the overall area. In contrast, the forest administration focuses its work on long-term restoration (25-40 years), softer, and more on the basis of vegetation improvement. The forest administration is working personnel intensive. Both administrative services are important and they complement one another.

20% of the Austrian protection forests are affected by decay. The improvement by restoration programs had become a priority item in Austria, because it was seen that woods and trees build an important foundation in national and international welfare<sup>34)</sup>.

Protection forests are forests that have to be protected in the interest for human life, and they are forests that save their own site conditions through the self-regeneration process. In addition to the protection forests, ban forests are designated, which also serve for settlement and traffic line protection. The idea of the ban forests is from the principle good, but it was not successfully designated in the past, because of its requirement that the beneficiary had to pay the compensation. Therefore, in Austria there exist only a few ban forests. Theoretically, 15% of the forests are potential ban forests, but as the reality shows, only 0.5% are so designated. The necessity is not politically realized and supported.

Because of decreasing health conditions in the protection forests, the Ministry for Agriculture and Forestry set up a focus in the forest policy for the improvement of protection forests within the frame of a province protection forest amelioration plan in coordination with the province forest administration and the service for torrent and avalanche control. After this decision, all forest function areas with a middle and a high priority in protection function were investigated<sup>20)</sup>. In cooperation with both administrative services, the circumfer-

ence and the urgency of necessary improvement work was laid down in the districts. It was the first time that a federal survey of protection areas with high protection effects for settlement areas and important infrastructure was developed. To stabilize the protection of the forest areas for settlement and infrastructure, within a period of 10 years, 161,277 hectare protection forests need urgent restoration<sup>20),22)</sup>.

21% of all protection forest areas need immediate restoration, especially in the province of *Tirol*, followed by the provinces of *Kärnten* and *Salzburg*. The forest improvement of these areas is indispensable and urgent for the safety of settlement areas and infrastructure.

On the foundation of the forest development plan, provincial protection forest amelioration plans were developed, the concept for which was decided in 1991 and completed in 1993. This concept belongs to the provincial forest administration under indirect federal governmental influence. The provincial protection forest amelioration plan serves to provide detailed information about the protection forests that are in need of restoration. In these plans two planning types, that from the forest administration (in three categories — unnecessary, necessary, and urgently necessary) and that from the service for torrent and avalanche control, are overlaid.

Areas which are covered under both planning concepts are urgently promoted.

The forest conservation work after the Second World War was exclusively oriented to the protection of housing estates. In an effort to enhance economic development, the activities were extended to infrastructure and tourist facilities in remote areas. Increasing pressure by tourism subsequently had an increasing impact on Austrian protection and mountain forests.

Where demand for non-wood benefits is high, however, income from forestry is poor because of disadvantageous locations, and because financial incentives and compensation payments for non-wood benefits become important<sup>97)</sup>. The promotion of restoration of protection forests can be carried out on two levels as described in table 12.

1. Financial promotion by the forest administration according to the forest law of 1975:

Every forest owner has the duty to undertake activities for the securing and the stabilization of his forest stands, if the cost of these measures can be covered by the revenues gained by the utilizations in the protection forests. However, recently low returns from the fellings in the protection forests point out the necessity for financial promotion. Protection forest activities can be promoted, following the plan for the promotion of forestry. Forest conservation projects have been promoted since 1972, especially afforestations in subalpine forest areas. Subsidies of 64% by federal, 19% by province, and 17% by interested parties were paid for biological measures in 1993. Especially, promotion for afforestations in

**Table 12.** Protection forest restoration promotion by forest administration and torrent and avalanche service in Austria

Province	Promotion by forest administration			Promotion by torrent and avalanche control service (catastrophe fund)		
	Name	Number	Area (ha)	ATS*	Number	Area (ha)
<i>Burgenland</i>	-	-	-	1	527	5,800,000
<i>Kärnten</i>	29	2,946	131,100,000	26	1,685	92,269,000
<i>Niederösterreich</i>	26	661	12,100,000	35	410	176,724,000
<i>Oberösterreich</i>	7	39	3,600,000	27	1,876	598,600,000
<i>Salzburg</i>	90	4,521	138,500,000	13	1,351	242,250,000
<i>Steiermark</i>	17	1,188	16,200,000	60	2,308	100,259,000
<i>Tirol</i>	142	31,202	835,600,000	116	21,937	1,518,730,000
<i>Vorarlberg</i>	13	498	57,100,000	4	380	75,000,000
<i>Wien</i>	-	-	-	-	-	-
<b>Total</b>	<b>324</b>	<b>41,055</b>	<b>1,194,300,000</b>	<b>282</b>	<b>30,474</b>	<b>2,809,632,000</b>

Source : BUNDESMINISTERIUM FÜR LAND- UND FORSTWIRTSCHAFT 1993

Notes : \*Austrian Shilling = currency of Austria

mountain areas and protection forests is favored by the government<sup>18),19)</sup>. Projects which were already given promotion grants the year before, have a good chance to be promoted continuously.

2. Financial promotion by the torrent and avalanche control service by catastrophe fund:

The promotion of the protection forests by the catastrophe fund mainly includes the reorganization of forests which suffer from heavy losses in the catchment areas of torrents and avalanches. The legal foundation is given by the law for hydraulic engineering projects. The administrator of this financial means is the service for torrent and avalanche control, which is commissioned by the ministry, under the title of the above mentioned fund. The work is executed by the torrent and avalanche control service in cooperation with the forest administration. Projects have been carried out since 1988. The catastrophe fund is supported by every Austrian citizen. 2.49% of the Austrian tax income is used to provide money for the catastrophe fund.

To meet the requirements for a protection forest amelioration project<sup>20)</sup>, the existence of a torrent and/or avalanche control area, a protection forest area with poor forest conditions, settlements or traffic lines which have to be protected, and a responsible political administration, such as municipality, are important.

*Salzburg* is a mountainous province in Austria. Historically, *Salzburg* was economically very important due to the saltworks. The salt gave both the city and the province, where salt has been mined for centuries, the name *Salzburg*. In addition to the saltworks, firewood was also harvested, resulting in overutilized forest stands, and clearcuttings in high dimensions were carried out through the whole country.



In *Salzburg*, the national forest share is high (42%) compared to the whole country (15%). Although regulations in the protection forest management do exist, historic rights, such as wood utilization rights (firewood), cow grazing rights (pasture), and forest litter utilization rights still exist.

The hunting practice is valuable for *Salzburg*, as well as other provinces and countries. Like in Germany, hunting is a symbol of status, power and money in Austria, and looks back to a long history. For this reason, a great deal of game stocking was important to meet the expectations of the hunting lobby, and has resulted in various problems for the forests.

Protection forests are often located in areas ranging from 1400–1500 m up to the timberline and areas of higher subalpine forests. These high mountain forests are often unprofitable and therefore, forest management on the basis of wood production is no longer feasible there.

*Salzburg* developed in the years after 1945 along with the other provinces into a focal point for international tourism. In winter, as well as in summer time, tourism is economically so important that activities such as hiking, alpinism and skiing indirectly influence the forest management. Protective issues can't fall short in light of the high expectations for tourism.

For the province of *Salzburg* the forest inventory of 1986/90 indicates 354,820 hectare forests. The share of protection forests is 32% of the forest area and can be subdivided into 38,574 hectare protection forests with yield, which make up 11% of the forest area, and 75,564 hectare protection forests without yield, which make up 21% of the forest area.

Due to the declining density of high mountain forest stands, in the last years the protective benefits have been reduced. A number of forest stands can no longer fulfill the protective significance. Because of this development, the province protection forest amelioration plan was established. This plan gives an overview of which areas need urgent restoration. In the second half of 1991 investigations were carried out in all districts of the province. These investigations were based on a decree of the federal government, that each province should draw up a province protection forest amelioration plan. According to the revised version of the draft and decree of the Federal Ministry of Agriculture and Forestry, the forest administration, as well as the service for torrent and avalanche control, should also draw up a concept for the restoration of protection forests. Through the coordination and adjustment between both administrative services, the forest administration and the service for torrent and avalanche control designated important restoration zones. Protection forest management in *Salzburg* is promoted by the budget for forestry promotion and by the catastrophe fund.

The settings of priorities for each planning service results in a common urgent planning decision. Urgent projects are those in areas with a great need of protection, and measures should be started immediately or at least within 10 years. The money of the catastrophe fund will be distributed following deter-

mined priority. Urgency is evaluated by the process that the plan of the province forest administration and the plan of the torrent and avalanche control service will be overlaid, as explained above. This planning decision resulted for *Salzburg* in the designation of 64,000 hectare forests as needing urgent restoration.

Detailed plans have to be presented for each project, and restoration will be subdivided in planning units. When the planning of a project is carried out, and the positive decision of the land owner is submitted — agreement with the planned measures —, the project will be approved by a commission of the ministry. This commission includes a representative of the ministry, a representative of the province, a section director of the torrent and avalanche control service of the province, and a representative of the interested party (private land owner, municipality). After the financing is clarified (70% by federal, 20% by province, 10% by interested party) the contribution by federal government will be enacted, and the project starts.

### **C. Protection Forest Activities in Japan — The Prefecture Gifu**

The Japanese archipelago is covered with mountains and mostly rugged. The water courses in Japan include all types of rivers and torrents. The rivers are short, originate in the mountains and flow fast through the deep valleys. From season to season the water volume can increase in a short time period and during prolonged periods of rain, floods occur frequently. Natural and socio-cultural conditions in Japan are severe, with soil instability, steep forest areas, a high rainfall amount, a lot of soil slips and additional problems in the land use planning. These preconditions justify the existence of the protection forest and erosion control system.

Important water irrigation work was carried out after the Second World War to supply the domestic water demand and to produce hydro-electricity. The land-use development is reduced to a limited space in which the population density is high. Transportation facilities, housing areas, and recreational facilities are in danger. In Japan, nationwide, over 30% of the forests are designated as protection forests. However, a regional importance of protection forests is also visible, as table 13 shows.

To be able to fulfill forest conservation projects, the areas have to be designated as protection forest, or it is supposed to become protection forest in the near future (within 5 years). No forest conservation projects are undertaken without subsequent designation as protection forest. However, forests that are designated as protection forests, often do not actually fulfill the fundamental idea of protection forests. In the case of areas where forest conservation projects are planned, the land-use regulations and precautions become much more strict.

In the case of erosion and disaster control in the forests, two different sections are responsible:

1. the section for erosion and torrent improvement so called *sabo* (prevention

**Table 13.** Protection forests in Japan

	A	B	C	D	F	G	H	I
	Prefecture	Forest area (ha)	Protection forest area	% of B	Water (ha)	% of C	Soil (ha)	% of C
1	Hokkaido	5,355,194	1,865,143	35	1,252,011	67	400,200	21
2	Aomori	623,191	249,223	40	180,766	73	40,169	16
3	Iwate	1,151,538	305,109	26	252,822	83	37,771	12
4	Miyagi	414,117	144,052	35	107,415	75	18,320	13
5	Akita	821,933	217,497	26	170,438	78	39,709	18
6	Yamagata	644,302	206,832	32	134,918	65	78,319	38
7	Fukushima	945,199	247,789	26	172,960	70	69,336	28
8	Ibaraki	195,179	29,406	15	23,722	81	3,238	11
9	Tochigi	350,418	161,853	46	124,024	77	38,222	24
10	Gumma	407,883	208,736	51	153,896	74	51,577	25
11	Saitama	125,556	44,824	36	36,727	82	7,722	17
12	Chiba	167,897	16,567	10	12,846	78	856	5
13	Tokyo	80,147	18,206	23	13,798	76	2,132	12
14	Kanagawa	97,192	47,263	49	23,086	49	32,825	69
15	Niigata	785,882	291,845	37	213,830	73	75,562	26
16	Toyama	240,021	146,065	61	67,213	46	79,905	55
17	Ishikawa	277,839	63,095	23	51,571	82	6,407	10
18	Fukui	311,579	136,430	44	116,435	85	6,636	5
19	Yamanashi	347,466	195,808	56	161,445	82	32,831	17
20	Nagano	1,018,539	467,965	46	348,088	74	126,562	27
21	Gifu	848,271	341,628	40	219,060	64	112,807	33
22	Shizuoka	495,265	151,947	31	118,543	78	29,851	20
23	Aichi	223,938	45,918	21	11,773	26	32,433	71
24	Mie	378,723	90,464	24	56,448	62	31,613	35
25	Shiga	204,376	69,855	34	29,599	42	37,440	54
26	Kyoto	346,654	84,742	24	55,922	66	24,840	29
27	Osaka	59,228	14,716	25	8,252	56	5,876	40
28	Hyogo	571,041	159,663	28	125,357	79	26,932	17
29	Nara	284,775	56,686	20	50,935	90	4,127	7
30	Wakayama	363,507	96,424	27	72,600	75	20,993	22
31	Tottori	259,588	135,787	52	117,986	87	9,880	7
32	Shimane	522,808	170,008	33	160,456	94	4,964	3
33	Okayama	486,690	152,834	31	105,838	69	42,647	28
34	Hiroshima	619,909	232,140	37	152,547	66	72,597	31
35	Yamaguchi	435,712	86,988	20	60,394	69	23,134	27
36	Tokushima	312,357	92,288	30	76,866	83	13,511	15
37	Kagawa	89,181	22,097	25	10,808	49	9,636	44
38	Ehime	400,204	113,832	28	71,008	62	41,124	36
39	Kochi	592,211	105,658	18	74,714	71	26,650	25
40	Fukuoka	223,031	87,721	39	69,031	79	16,442	19
41	Saga	108,221	30,967	29	25,799	83	3,819	12
42	Nagasaki	241,103	33,085	14	15,791	48	11,225	34
43	Kumamoto	465,257	123,490	27	110,338	89	12,156	10
44	Oita	450,105	122,512	27	101,150	83	14,662	12
45	Miyazaki	586,996	141,937	24	122,981	87	8,889	6
46	Kagoshima	584,187	89,609	15	73,050	82	5,015	6
47	Okinawa	106,763	16,521	15	5,794	35	588	4
	<b>Japan</b>	<b>24,621,173</b>	<b>7,933,225</b>	<b>32</b>	<b>5,721,051</b>	<b>72</b>	<b>1,792,150</b>	<b>23</b>

Source: OHTA *et al.* 1996

against catastrophes). This work is often carried out on governmental properties.

2. the section for erosion control so called *chisan* (consolidation, improvement of the forest conditions). This work is carried out on estates, which are still in the property of private (forest) owners, but for which the owner gives reluctant consent to the government to undertake the work on his property, for example, for the construction of dams and other forest conservation projects. All the measures are subsidized, half by the national government and half by the prefectural government. The municipalities or the private forest owner are generally not financially responsible. The planning activities and jurisdiction of erosion control and erosion and torrent improvement can be different, although from the original idea the competence is similar.

The idea for forest conservation in Japan is built on three principles :

- the prevention of catastrophes (landslides, rockfall, natural disasters after an earthquake),
- the improvement of water supply (water flows very fast in Japan, due to the high elevation and the short length of the rivers; the capacity to hold water not only depends on quantity, but also on the quality of the forest), and
- the improvement of the environment for human life (lately also in the sense of wildlife management for animals and plants).

Protection forest policy is actively carried out based on the “Five-year plan(s) of forest conservation work”. It may be composed of three plans for the forest conservation projects made for the whole country, the prefecture, and the watershed management area.

*Gifu* is a prefecture with high mountains in the center of Japan, located on *Honshu* island, the main island of Japan. The Japan Alps in the *Hida* region form the landscape of this prefecture, and it has been said that the meadows, valleys, and high peaks of the mountains are similar to the European Alps, although in Europe paddy fields are not existent<sup>63</sup>). *Gifu* is at the edge of the Japanese Alps, and more than 80% of its area is forested. It ranks in the first quarter of the prefectures with the most designated protection forests — ranked tenth — in Japan.

Compared to the nation-wide share of water source conservation forests and soil erosion control forests, in *Gifu*, soil erosion control forests are designated relatively more than the nationwide distribution. Both protection forest classes together have a share of 97% as is documented in table 14. Other protection forest classes are underrepresented or do not exist. For social welfare, the public health forests are of additional importance.

*Gifu*, as well as other prefectures of *Honshu*, belongs to the Japanese Alpine area, where the land-use is concentrated and intensive. The construction of building and housing areas in danger zones is not unusual. Due to the spare dwelling places, the settlement is extended to the edges of the escarpment and

**Table 14.** Classification of protection forests in distribution to national and non-national forests in *Gifu* prefecture in 1994

No.*	Type of protection forests	National forests (ha)	Non-National forests (ha)	Total (ha)	Percentage (%)
1.	Water source conservation forest	96,875	130,895	227,770	62.9
2.	Soil erosion control forest	37,193	86,295	123,488	34.1
3.	Landslide prevention forest	226	6,166	6,392	1.77
8.	Drought prevention forest	-	854	854	0.24
11.	Avalanche prevention forest	88	804	892	0.25
12.	Rock fall prevention forest	25	105	130	0.04
16.	Public health forest	-	2,364	2,364	0.65
Total sum		134,407	227,483	361,890	

Source: FORESTY ADMINISTRATION GIFU 1996

Note: \*ordinal number of protection forest classification after the forest law and the general statistics

construction sites are realized on the debris cone. Bufferzones are missing.

Rockfall prevention forests protect houses, streets and railways against rockfall. Forests which are designated as this protection forest type are mostly ban forests. In ban forests, cutting is not possible. Under these preconditions, rockfall prevention forest can be designated in the soil erosion control forest class. In this group, a forest management with economic benefit from cutting is in the protection forest possible.

Avalanche prevention forests are important areas in Japan, where clear cutting and a large amount of snow are congruent. In the beginning, the designation of this kind of protection forest class was substantial. Due to the rich vegetation cover and the regeneration dynamic in Japan, however, the cleared areas regenerate quickly. A long-term protection forest designation as avalanche protection forest is therefore not obligatory. In Japan, avalanche protection forests can be released after 20–30 years to normal forests, if the regeneration process is successful.

The land-use system and the city-planning do not provide the citizens with enough green areas in the immediate vicinity of settlements. Private gardens and public gardens are few. Therefore, the forests for living environment protection (*seikatsukankyouhozenrin*) were established, and are part of the forest conservation projects. In *Gifu* prefecture, 25 forests for living environment protection exist. This forest type is included in the protection forest class of public health forest (*hoken hoanrin*). Silviculture treatment usually aims at multi-storied mixed forests. However, due to the forest conservation measures in these forests, often plant and tree species which are not suited to the natural site conditions are used. This means that these public health forests are more “forest parks”, than natural forests. These forest sites are frequented by tourists and they are in the immediate vicinity of big cities. The “forest parks” can be maintained by the prefecture, by the municipality belonging to the recreation area, by an certain company established for that purpose or by payment through

the budget of consolidation projects for protection forests. In the case of *Gifu*, the prefecture takes care of the costs for 10 years. To reach these forest parks, a car is necessary. Public traffic facilities often do not exist, or are rare. Many criteria are fulfilled to make the park attractive for utilization, including cleanliness, convenience, and safety. In the case of forests for living environment, protection is well secured, if the forest is within the property of the municipality. In case of non-possession, the municipality can rent the area from the forest owner. The forest areas within easy access for the visitors are tended intensively, while remote areas are less cultivated.

Auto camp areas are a newer trend of recreation in the forests. Many of the auto-camp sites were former public health forests. For the purpose of the auto-camp, this protection forest is released; however, the surrounding forest areas are still kept as public health forests.

## VI. CONCLUSION

The "classical" areas of conservation policy in forestry are the protection forests, which contribute for protection against external forces, such as natural disasters, and to protect water and soil in endangered regions. Protection forests are still as important and relevant as they were a hundred years ago, in Germany and Austria with the torrents and avalanches, as well as in Japan with its landslides. An appropriate international framework regarding forest conservation policy does not exist. Due to the distinct natural and climatic conditions in each country, the forest strategies and activities developed differently.

### A. Protection Forest Policy in History

The past developments in forestry can be characterized by a change from forest exploitation to a policy of modified multiple-use forest management<sup>52)</sup>. Forest legislation has developed out of the indigenously developed views in each country. To regulate tree cutting was one of the original ideas of forest policy activity. The protection forest system is the oldest forest conservation system and played an important role in the forest policy of national, private and publicly-owned forests.

Germany, Austria and Japan can look back to a long history of protection forests. In spite of the long history, the knowledge about protection forests is minimal. However, in Germany and Austria, protection forest statistics do not exist over a long time period, as they do in Japan. Only in the last two decades has the information about protection forests become more plentiful.

The idea of protection forests was born in the last century. Countries such as Germany and Austria, which belong to the alpine mountains, need special regulations for the management of these forests. Protective regulations formed the beginning of forest legislation. The regulations were enforced through

severe police supervision. Control over the private forests was held by the forest police. Protection forests were in the beginning referred to in the sense of regulation against timber exploitation. With the prohibitions of clearing and clear cutting, and the obligations for afforestation, selective cutting or stripe cutting, the purpose for conservation was automatically guaranteed.

The forest legislation in Germany developed in the territorial states. The multiplicity in the state forest laws remained as in centuries before. Although a protection forest system was founded, a consequent, statistical, separated management of protection forests was not documented in Germany. In states of Germany where no special term for protection forests was defined, the general forest management fulfilled almost all protective functions against wind damage, high water and landslides through its special forest treatment. Strict state control over forests made a protection forest system unnecessary, because the severe state control extended to all forests without exception. Protection forests stand in close connection to the general forest management.

Austria is also a federal republic with a strongly developed sense of federalism. A comprehensive and severe forest law laid down the foundation for a protection orientated forest management. However, historically, huge clear cuttings up to the timber line were usual. This intensive use of forest and timber resulted in catastrophes. As a consequence of this, severe forest laws were established to recover the forests and restore the protective effects. Although these forest regulations were instituted, in the middle of the 19th century a large number of catastrophes in South-Germany and Austria occurred, caused by avalanches and torrents<sup>75</sup>).

From the historical point of view, a similar development is evident in Japan. Already in the 17th and 18th centuries, cutting trees in upstream mountains was regulated in Japan. Protection forest problems occurred after the *Meiji*-Restoration with the result of devastations, while the forest owners and farmers felled their own forests recklessly, which completely contradicted the idea of sustained yield. With the foundation of the forest law, protection forests were defined. The supervision in Japan, due to imperial influence and central organization, preserved forest resources in a similar way as in Germany and Austria. The turning point in the protection forest system was the post-war development against the background of economic development. The "Temporary measures law for the maintenance of protection forests" of 1954 was one of the most important developments in the protection forest policy. Secondly, the "Forest and water conservation urgent countermeasures law" of 1960 built an important supplementary support. This was the starting point for a new long-term soil conservation policy. Both plans have to be seen as a set, which work with and complement one another. Protection forest policy is close to the forest conservation policy. For the realization of forest conservation projects, the designation as protection forest was inalienable. This forest conservation work is necessary

for the strengthening of the protection function. It can be argued that Japan's consolidation efforts were initiated because of the extreme natural conditions.

*Bayern* had a protection forest system in early times, but did not use it in practice. Austria was more active due to torrent and avalanche control efforts. Japan historically had an effective protection forest system, which, however, underwent a drastic change in post-war period.

## B. Protection Forest Classification

Protection forests are significant for land protection. Soil protection and avalanche protection are in all countries similarly designated and serve the same purpose. Mainly, soil erosion control forests, and rockfall and avalanche control forests are protection forests for settlements and traffic lines.

The possibility of releasing protection forests was mentioned in the forest law in Japan. This article does not exist in Germany and Austria. From the aspect of a long-term protection this concept is counterproductive, but from the aspect of temporary protection, this aspect can be accepted.

The forest statistics of *Bayern* do not make detailed classifications of the protection forest types. Only a total number of protection forests is displayed. Austria distinguishes between protection forests with yield and protection forests without yield in the statistics, and also makes no detailed classification about protection forest types. It also can be pointed out clearly that the forest laws on one hand describe and paraphrase protection forests, but do not give the protection forest classes' names, as is done in the forest law of Japan.

With its 17 protection forest classes, the protection forest system in Japan is subdivided precisely, showing a great variety of protection forests. Japan treads a different path and responds to its unique landscape. Due to its location and natural features with high mountains and coastlines, it is natural that the number of protection forest classes is higher than those of Germany and Austria. However, it is questionable if it is necessary to differentiate between these various categories in such a detailed manner<sup>107)</sup>. Protection classes at the coastline, soil erosion control forests and landslide prevention forests, or landscape health forests and landscape conservation forests could be grouped together. The differentiation of the manifold classifications is hard to discern. Obviously, just three classes alone make up 90% of the whole protection forest system, and the remaining share of protection forest types is underrepresented.

Sometimes it is not clearly pointed out why one or another protection forest is assigned to one or the other protection forest class. Water source conservation and soil erosion control forests are the main protection forest types in Japan. However, the priority here is to secure water supply and to remove the danger of natural disasters in developed areas. Therefore, soil erosion control and landslide prevention forests are the secondary aims.

Water protection forests are neither in Germany, nor in Austria designated



after forest law as a protection forest. The improvement of water quality and quantity has always been of human interest and also reflects the status of development of a country. Every forest which has a multiple-storied structure, with various tree species of different ages, automatically fulfills a water protective function.

In Japan, however, water source conservation forest is the most important protection forest class. Almost 70% of the protection forests in Japan are so designated. Especially, in the 1960s and 1970s, many water source conservation forests were designated out of concern for the supply of quality drinking water and large quantities of industrial water. The supply of drinking water in 1991 was about 13 times as large as that of 1975<sup>37)</sup>.

The consciousness in the public about good quality water is high. The demand for good water management is higher than ever before. Water shortages in recent years in Japan underlines the importance of stabilizing water flow and maintaining usable water quantity<sup>38)</sup>. In the Forestry White Paper of 1994 from the FORESTRY AGENCY<sup>38)</sup>, it is also mentioned that forests are called "green dams", because they serve for the mitigation of drought and the purification of water. The necessity for a stable water supply for the irrigation of rice paddy agriculture should also be pointed out at this point of the discussion.

Water, an important component of the environment, can be generally classified as surfacewater and groundwater. At present, groundwater in Japan accounts for 30% of the water supply, while surfacewater has a share of 50% and the remaining 20% are, for example, shoreline filtrate. It can be clearly explained that the surrounding forest areas are very important to support good quality for the surfacewater. In Germany, where 70% of the water resources are supplied by groundwater, the situation is different. Water source conservation forests, which are noticed in the late forest statistic of *Baden-Württemberg*, are forest areas designated as water conservation reserves under the water law. This data is only formally taken over by name into the forest statistic. Water conservation reserves were historically named close to the settlement areas, but nowadays, they are preferred in more secluded and remote areas, where they do not hinder the settlement development. Water conservation reserves are also designated within the forests. The regulations often belong to other sectors and they are not of significance to the forest sector, except for clear cutting and clearing, which is, however, already prohibited by the forest law. Water conservation forests are in *Baden-Württemberg*, as well as in *Bayern*, not designated after forest law. All the erosion and avalanche protection forests in *Bayern* could be theoretically designated as water conservation forests.

General trespassing rights into forests do not exist in Japan. Due to the restriction that recreation on the whole forest area is not permitted, it was important in Japan to designate special areas as recreation zones for the general public. The public health forests aim to improve the living standard through

landscape conservation.

In contrast, in Germany and Austria, recreation on the whole forest area is guaranteed by the forest law. Additionally, forests in high-density population areas, close to cities and settlement areas, spas, health resorts, and in recreation areas as well, can be designated after legal decree as recreation forest, if the welfare for the general public requires this. These recreation forest areas have to be designed, created, protected, and well tended.

*Baden-Württemberg* designated biotope protection forests in the amendment of the forest law. The designation of biotope protection forests shows a modern attitude towards biotope management in the forests. After the introduction of this new protection forest class, and after the fulfillment of the forest biotope mapping, approximately 7–8% of the forest area will be designated as biotope protection forests. The introduction of this new protection forest class changed the protection forest system in *Baden-Württemberg* substantially. It will be interesting to find out what influence this development will have for the future and how great the impact will be for the forest ecology and the biodiversity. The regulations were kept liberal for the forest owner. The priority is still the management of the forests, if it is done within the realm of proper forestry.

*Bayern* maintains that there is no need of biotope protection forests, because of a well-balanced forest management, and did not include this idea in its management. Neither have Austria nor Japan included this classification.

### C. Forest Conservation Work

The reasons for torrent and avalanche disasters are always unusually heavy precipitation in the form of rain or snow, or both. Additionally, sensitive soil surfaces which are not able to absorb the amount of water lead in extreme cases to floods and heavy local destruction<sup>40)</sup>, which is significant for Austria as well as for Japan.

Floods historically were in every country the starting point of legal activities in the field of torrent and avalanche control. Through the frequent penetration of civilization into the mountainous forest zones, the danger potential increased<sup>17)</sup>. Thus, the importance of torrent and avalanche control also increased. The coherence between water run-off and the importance of vegetation cover and well-managed forests in the watershed areas was clearly pointed out.

Especially after the Second World War, the settlement and tourism pressure on the landscape was increasing, and areas were developed which had been avoided in former times. Since 1960, many protection works were carried out.

Constructions are mainly used for erosion, avalanche, and rockfall protection forests, while water source conservation is carried out mainly by planting. To carry out forest conservation projects the precondition is that the forests are designated as protection forests; this principle is valuable for Germany and Austria, as well as for Japan.

Due to the large area of mountainous forests, protection forests became of special importance in Austria. In Austria, protection forest policy is closely related to the forest conservation policy, and here Austria is similar to Japan.

Torrent control started under private initiative, but turned out, due to its increasing importance, to be a matter for municipalities, states, prefectures and national or central governments.

The general change in the economic and social-political structure of the last hundred years also influenced the development in the torrent and avalanche control service in Austria. After the foundation and establishment of the torrent control and avalanche service, forest conservation projects started, focusing on the already dangerous and on the developing torrents and avalanches. The projects comprised construction, drainage and afforestation measures in the whole watershed area with the aim of stabilizing the erosion of the flood-plain valley. The torrent control service developed very strongly through more than one hundred years in Austria<sup>71),72)</sup>. The torrent control service in Austria was always a matter of conflict between the forest administration and the water authority. Finally, after an excursus to the water authority, the re-unification of torrent control with the forest administration was decided by the decree that the torrent and avalanche control service should become a section of the forest administration. It was pointed out, however, that there should be constructive cooperation with the water authority. The service of avalanche and torrent control is designated as a special service and is an integrated part of the forest administration, separated from the water authority, and it is a direct administrative body of the ministry. In Austria, the federal government is in questions of avalanche and torrent control competent, while the provincial administration, on the other hand, is competent in questions of forest, land-use and nature conservation. The integration of the service of torrent and avalanche control into the forest administration in Austria is different from Germany and Japan. Austria's specialty regarding the protection forests is this relationship between the forest administration and the service of torrent and avalanche control. The service for torrent and avalanche control is responsible for quick and safe reorganization in short terms (5-10 years). The forest administration focuses its duty on reorganizing forests in longer terms (25-40 years).

For the realization of forest conservation projects in Japan, the designation as protection forest is inalienable. This forest conservation work is necessary for the strengthening of the protective function. The differentiation of the manifold forest conservation projects is hard to discern. The establishment of the ten-year "Plan for the maintenance of protection forests" and the "Five-year plan for forest conservation work" are two important keypoints in the development of the protection forest system.

The difference between erosion control, and erosion and torrent improvement in Japan, is more a differentiation between different authorities and territories.

From the viewpoint of content of work, both activities are very similar. This is not a question of technical separation, it is a question of separation between the administrations. The erosion and torrent improvement work is carried out more in the lower river ridges, while the erosion control work is covered by the Forestry Agency and working more in the upper parts of the river. In Austria, both administration bodies are combined in one organization. In Japan cooperation is also possible, but for the moment there is little contact between the two sections, which has resulted in the "sectionalism of administrations" and "conflicts of competence".

In the question of torrent control work or forest conservation work, Austria and Japan are more similar than Germany and Japan. This might be reasoned, because of the historical influence, when Japan introduced knowledge from Austria. However, the working fields are also different, because in Japan the focus is more on water and erosion, while in Austria avalanche and erosion protection are important. Another difference is in the fact that torrent control and forest restoration work are done by one and the same service, while in Japan forest conservation work can be carried out by the Forest Agency and by the Ministry of Construction.

The forest conservation in Germany is managed technically by the water authority and biologically by the forest administration. The forest administration is effective over a wide forest area. The main purpose is proper forest management by silvicultural methods of planting and tending, supported by temporal constructions, if necessary. However, the planning is long-term. In opposition, the water authority is working on small working spots, but the action has to be very swift and effective. Constructions are of a permanent character — up to 50 years. In Germany, the forest administration is working in cooperation with the water authority; however, the working fields are separated.

In the beginning of the 1960s the idea of nature-oriented control works was introduced. Parallel to this, integrated improvement projects were started on large areas, which were supposed to serve for torrent and avalanche control. Also in Japan, lately, basic ideas of ecologically sound torrent control engineering exist<sup>79)</sup>. These concepts aim to be ecologically reasonable for coexistence between mankind and nature. Natural torrent control methods in Europe were important models for Japan. In former times only the prevention of catastrophes was important and in the working field of the forest conservation service. Nowadays, it is important to work in harmonization with the surrounding environment. The tendency was first visible in river construction and then developed also in torrent control. Landscape ecology and aesthetics are far-reaching and important aspects for torrent control. Therefore, it is significant to realize that the landscape consists of different components, which stand in close relationship to each other.

#### D. Local and Regional Importance of Protection Forests

Protection forests in Germany are mainly concentrated in the south. The number and the acreage of protection forests there is, compared to the whole federal republic, relatively high. Exceptions are the city states, which designate all the forests as protection forests. However, it should be mentioned that no common strategy regarding protection forests for the whole country is visible, which can be traced back to the historical development of the states. The Federal Republic of Germany has many different state forest laws, which result in a variety of legal aspects. The regional importance of protection forests is obvious, for example in the state of *Bayern*. In the high-mountainous areas the share rises up to 50%; in a few districts, it reaches 80-90% of the forest area.

In western Austria, the protection forests against soil and torrent erosion are of importance in the higher mountains. In eastern Austria, such as in the states of *Burgenland* and *Niederösterreich*, the wind break function is more important. The regional importance is here determined by the function.

A view of the distribution of protection forests in Japan shows that the density is highest in central Japan. The morphology, geology, topography and climatology in these areas result in the high protection density of 40 to more than 50% of the forest land. *Hokkaido*, the northernmost part of Japan, has a 30-40% protection forestry density, which points out a common protection forest density value throughout the land. The southern part, represented by the islands, *Shikoku* and *Kyushu*, although remarkable for its annual heavy rain and floods, is "only" represented by 20-30%. It can be summarized that a high percentage of protection forests is located in some of the prefectures in Japan<sup>107)</sup>, while in other prefectures far fewer protection forests are designated by this protection classification. However, the aspect of regional importance in the protection forest system of Japan, due to its overall distribution over the country, is not as dominant as it is in Germany and Austria.

#### E. Newest Protection Forest Tendencies

Since the early 1970s, a new impetus of environmental and natural awareness was born and the critical considerations also began to influence the field of protection forest policy. In the following decade, Germany and Austria experienced fundamental changes due to the effects of new forest damages. A growing awareness regarding forest problems was observed.

Protection forest ecosystems in Germany and Austria are exposed to many burdens<sup>75)</sup>, such as historical burden (pollarding system, forest litter utilization), natural burden to the forests (climatic burden, such as aridity, wind, heavy rainfall, hail, snow, hard frost, lightning, vermin), wood pasture (grazing), burden by mistakes in the forest management (skidding, logging operations, mistakes in the stand establishment, mistakes in the choice of tree species, lacks in the silvicultural treatment, nutrient deficiency and still existing clear cuttings), forest

road construction, burden by game (debarking by red deer, browsing and rubbing), tourism and burden due to contaminants (hydrocarbons, sulfur dioxide, nitrogen oxides, carbon monoxide, dust). Not all these burdens are relevant to the issue of protection forests in Japan, but a few of them are significant. The installment of programs and plans for the maintenance and protection of forests was one step in this direction. Quantitative statistics, such as protection forest area, number of designated protection forests, and number of forest conservation projects carried out, give no evidence about the quality. Quality determination in the protection forest has become necessary.

In *Bayern*, the restoration program for the protection of forests was established by the state government. This includes the biological as well as the technical measures for the restoration of protection forests. However, there is an illusion about the program that the restoration of forests can be done within 20 years<sup>49),70)</sup>, rectifying the damage which had been done through 100-300 years of faulty thinking. The restoration program for protection forests is a middle-term planning activity, but it will take 30-50 years to improve the conditions in the protection forests.

In Austria, the province protection forest amelioration plans were decided in 1991, which in idea are similar to the program from *Bayern*. These amelioration plans belong to the province administration under indirect federal governmental influence, and they provide detailed information about which protection forests are in need of restoration.

In Japan, the fifth plan of the "Plan for the maintenance of protection forests" and the eighth "Five-year plan for forest conservation work" build the foundation for the new trends in Japan. The newer trend in the protection forest system in Japan is that protection forests should be given more importance as environmental factors, more importance for recreation and more importance for biotope management. Special biotope protection was not realized until now and will be difficult to include in the protection forest system. There is no tendency apparent, that a biotope protection forest class will be established. However, it could be a valuable contribution to integrate biotope items in the water source conservation forests.

In *Baden-Württemberg*, the biotope protection forests, as explained above, are the newest trend in the protection forest policy. This tendency is, however, totally different from the programs of *Bayern* and Austria.

In Germany and Austria, the hunting situation has an important impact on the success of the mountainous forest management, which is under no discussion in Japan. The problem of protection forests in Germany and Austria can be somehow reduced to the problem of hunting ethics, as all the interviewed forest experts stated. Excessive game population has caused damages to the forests. Overbrowsing and debarking, reduced forest growth, limited renaturation and reduced mixture of forest stands are the problem points in the protection forests

of Germany and Austria.

Forest pasture rights date back a long time and often they are unwritten rights, so-called consuetudinary laws, which are even in present time not contestable. These rights were guaranteed in a time when it was difficult to feed the population and every possibility for animal feeding had to be exploited. The replacement of old traditional rights which have existed in some cases for over 200–300 years, is not that easy to realize<sup>33)</sup>.

Although the situation in the German and Austrian protection forests is not so severe on the average, the problems of over-aging and missing renaturation do exist<sup>23)</sup>. The trend in the forest management in Austria is going in the direction of a more ecologically adapted management. The period of clear cuttings and partially one-sided economic-orientated silviculture management should be substituted by the period of regenerative cuttings. In the protection forests in Austria, as well as in *Bayern*, the natural self-regenerating process is missing, while in Japan a highly dynamic regeneration exists. In Japan, the protection forest stands are from the view-point of age-class distribution much younger and therefore not as sensitive as in Germany and Austria. In Japan, forestry practice concentrates on much shorter rotation terms in the production process, than it does in Europe. Proper and sustainable management of the forests is the most important requirement for maintenance.

The conditions of the protection forests in Germany and Austria are endangered due to their extreme natural conditions and the impact of different burdens. Besides the economic difficulties, ecological burdens are also put on the protection forests. In Japan, the problems in the protection forests are more focused on economically unfavorable conditions and the influence of general forestry considerations.

#### **F. *Schutzwald* and *Hoanrin* — Protection Forests?!**

When starting a comparative research process between different countries, a terminological difficulty of definitions can create confusion. Existing definitions are difficult and often ideologically charged. There are many practical problems, which are caused by the definition or the use of technical terms or the dissimilar systems. Especially in international discussions, it is important to know how definitions are used in which context or which subjects correspond to each other<sup>54)</sup>. Unfortunately, there is no international agreement on the exact requirements for protection forests. International comparison and cooperation undergoes many difficulties.

Through the historical development of forest policy maxims, a change in the use of the technical term of protection forests was visible. Changes in values and attitudes regarding protection are reflected by changes in the society.

The protection of forests under forest legislation is not a new phenomenon; it has existed over a long period. While a hundred years ago in the forests the

raw material support for mining, saltworks, metallurgy, and building construction were the focus, the situation changed in the late twentieth century.

Basically, all forests do have protective functions, especially on areas which are important for retaining the soil on a sensitive slope, for protecting against rock fall, for protecting against avalanches, for conserving a water catchment area or for securing biotopes<sup>52)</sup>. Lately, an increasing number of new protective purposes has appeared, such as noise protection, view protection and protection against emissions.

Protection forest is in the international language a technical term with different meanings. Protection forests are defined differently in different countries. Every country developed its own protection forest strategy, which resulted in different systems<sup>108)</sup>.

The terms of protection forest and forest conservation are often not standardized and lead to misunderstandings. For the future it will be important to have objective definitions concerning protection forest and forest conservation on an international level officially stated by international organizations. It is very important to use the appropriate word and phrase for comparison, especially in the case of neutral judgment. The forestry world needs a clear and comprehensible language and a forum to study and reconsider the correct meaning of forestry terms<sup>54)</sup>. It is necessary to provide bibliographical and consultation services about forest terminology and terminological activities and to contribute to the harmonization and integration of existing and future terminological data.

## **G. Closing Conclusions to the Results**

The necessity for conserving forests is common to most people on the earth. Protection became a common trend transferring from national states to the global arena, which also led to internationalization with a feed back on country comparison. Protection and conservation is either directly or indirectly related to most of the forests.

The theoretical foundation and questions of this research project started with following considerations and reflections.

- a) Protection forests are the most classical system of protection and conservation in forestry, designated after forest law. How did the protection forest system develop through history and in times of change?
- b) Why and where are the differences between the protection forests of each investigated country?
- c) The forest law gives the foundation for economic and protective activities in the forests. What role do the protection forests play in the forest law and how are they integrated in the forest law?
- d) Increasing environmental consciousness postulates an increasing protection forest activity and new tendencies in the protection forest system. Which instruments are used to strengthen the protection forest policy?



In the course of the investigation mainly the following developments have occurred.

For Germany it can be pointed out that

1. the protection forest system did not historically play such an important role, although it was founded in 1852 (*Bayern*). Due to severe forest regulations, state autonomy, and multiple-use forestry management, the protection forest system was insignificant.
2. With the foundation of a protection forest system in the federal state in 1975, there was a renaissance of state activities.
3. However, no common strategy regarding protection forests is visible for the whole country.
4. It can be pointed out that a cooperation between the forest administration and the water authority in the forest conservation work exists.
5. Protection forests are those sensitive forests in the mountains which need restoration. These forest ecosystems are subject to many burdens, such as historical burdens, natural burdens to the forests, wood pasture (grazing), burdens by mistakes in the forest management, forest road construction, burdens by game, tourism and burdens due to contaminants.

In addition to the findings for Germany, for Austria the following statements can be made.

6. The protection forest policy is closely related to the forest conservation work policy.
7. The federal government is competent in questions of avalanche and torrent control; on the other side, competence regarding forest, land use and nature conservation planning is in the hands of the province administrations.
8. The service of torrent and avalanche control is an integrated part of the forest administration, which is different from Germany, where it is part of the water authority.

For Japan different results can be pointed out.

9. The protection forest policy was different before and after the Second World War.
10. Although Japans forestry is based on Germany's forestry, in the case of protection forests it is different. The similarity to Austria is closer; however, Japan developed its own system.
11. The local and regional importance of protection forests in Japan is leading to more even distribution over the whole country.
12. Since 1954, a quantitative enlargement of protection forests has been created through the "Temporary measures law for the maintenance of protection forests". The current protection forest area extension is enough.
13. Since 1960, a qualitative improvement through the "Forest and water conservation urgent countermeasures law" has been promoted. There is still need of forest improvement work and qualitative improvement.

14. A major characteristic of the protection forest system in Japan is that through the constellation of central and prefectural government, the management and control becomes complicated. A "sectionalism of administrations" on one and the same protection forest area is visible, and through the influence of different authorities, there exists a complex of different budgets aiming for maintenance and forest conservation work in the protection forests on the same area.
15. Also typical for Japan are the difficulty of development in the steep and unexploitable regions, the temperate monsoon climate with high precipitation and the indispensability of forests for rice paddy agriculture.
16. 17 protection forest classes and 26 erosion control types show a very subtle classification, but the reason for differentiation is often hard to discern.
17. To contribute for the local significance of protection forests, competence should be transferred from the central government to the prefectural government. The execution of projects should be carried out by the prefectural government, but the financial promotion should be secured by the central government. In the case of disaster prevention a central organization is justified.
18. The promotion of protection forests in remote areas, especially in the water source conservation forests is still needed.

Results in general can be summarized as follows

- (1) There is a long protection forest history in each of the three countries; however, comparable knowledge is rare (especially old historical documents and statistics in Germany and Austria).
- (2) The comparability of national protection forest systems is difficult and hard to interpret, because each country developed its own system according to its own need. The technical term, protection forest, varies considerably. Historically, soil erosion, rockfall and avalanche control were the classical categories; however, in the present, other items, such as land use and environmental issues are included, which is distinctive since the 1970s.
- (3) The protection forest classification and extent differ between the countries; however, the interdiction against soil erosion, and disaster prevention are common. Protection forests are not only the subject of high-elevations, but also of moderate site conditions. The water source conservation protection forest type is not clearly defined and in each country mentioned differently.
- (4) There is a tendency that the aesthetic component of forest conservation work in the protection forests is becoming more important.
- (5) Protection forests are of local and regional importance.
- (6) New tendencies in the protection forests are common in all the countries, such as the restoration program for the protection of forests since 1986 in *Bayern*, the biotope protection forests since 1995 in *Baden-Württemberg*, the province protection forest amelioration plan since 1993 in Austria, and the Plan for the

maintenance of protection forests since 1994 in Japan.

(7) Protection forests can also be exploited for economic reasons.

(8) There is a need of terminological clarification of conservation terms with respect to international conservation policy. Protection forests after the forest law, here in the meaning of comparison of *Schutzwald* and *Hoanrin* is not suitable for an international comparison. For an international comparison of protective systems, the framework must be wider.

In chapter 2, figure 1 pointed out the development of the analysis from the external analysis to the internal analysis. Figure 9 goes on from this with the idea of internal analysis to external analysis.

Comparison is a valuable research field for forest policy. The protection forest system is one part of the forest policy, and therefore a comparison of protection forest systems was justified.

Forest management practices are carried out by multiple-use forestry, which is the leading principle in forestry. The protection forest system is a classical and traditional system of forest conservation, and it is a means to an end, not a purpose in itself. Forest management regulations refer to the general forest practices, such as clearing, clear cutting and afforestation. However, the comparison view of just the protection forests is too narrow. Its local and regional aspect is strong and therefore it is not as expressive as expected.

The protection forest system after forest law has to be seen separately from the different protection systems for nature and environmental protection. Following research projects, however, should aspire to an analysis which is wider to include different land-use aspects and various legal aspects.

By all the considerations regarding national interests, international aspects must also be taken into consideration and appropriately integrated into the national regulations. This means that the national regulations and laws are influenced by internationally accepted principles.

The harmonization of the national conservation policies in forests with other countries and the coordination of conservation policies in forests with forest-, land-use and land development policies are of increasing importance. The aim is a strategy to reinforce the conservation policy, including cultural and socio-economic aspects. This idea is founded on the fact that each nation must keep its own national sovereignty, but utilize internationally accepted strategies to provide a conservation network. International comparison and investigations create new ideas and contribute to national transparency.

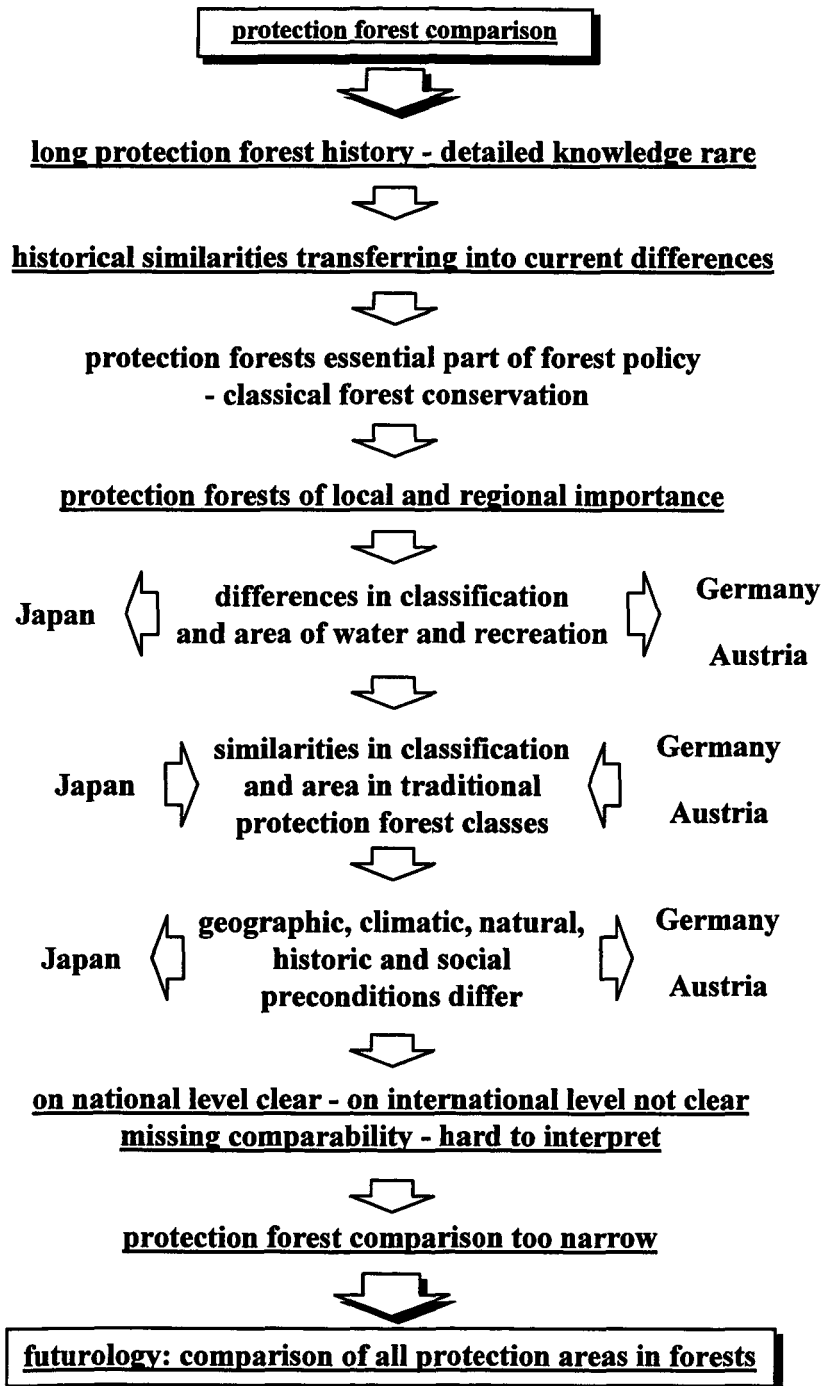


Fig. 9. Main conclusions of the protection forest system comparison

## VII. SUMMARY

In the investigation process of this research, a forest political study on protection forests of Germany, Austria, and Japan was chosen as study object because of its significance in conservational forest policy and its importance in current forest legislation and public welfare interests. Differences and similarities in the field of protection forests of the three case study countries were clarified, while it focused on the interpretation of significant historical and present outcomes. This study can be regarded as a descriptive reflection of background information concerning the development of forest history and forest policy, forest legislation regarding protection forests and current forest policy trends. It aimed to create a foundation for following research projects in the field of international protection forest policy.

The evolution of protection forest policy was examined and the linkages between the protection forest policy and the forest policy programs were investigated. The study was based on the foundation of the forest law and other legal aspects. All three countries can look back to a long history of protection forests. Historical similarities transferred to current differences. Protection forests are an important part of the forest policy; however, the knowledge from the forest political view, as well as from the scientific view regarding this topic is insufficient. Protection forests even now play a kind of exotic role.

It can be reflected clearly, that the technical term, protection forest, is from the view of the linguistic aspect very complex and it can be associated with a multiplicity of terms or meanings. Interpretation and understanding of protection forest matters on the national level is clear, but a dissimilarity in national terminologies make a clear comparison difficult. Unfortunately, there is no international agreement on the exact requirements for declaring a protection forest. There is a need of terminological clarification and discussion with respect to an easier conversion into international conservation policy.

The current state of the protection forests is justified under national view points. Protection forests in former times were different (hunting, saltworks, charcoal, construction wood) from the protection forests of today (land-use planning, protection of targets). Protection forests are, however, in all the countries open for some economic utilization.

There exist differences between the countries regarding the number and the acreage of protection forests. However, erosion control and disaster prevention are the main protective purposes in Germany, Austria and Japan. In all the countries importance is given to the soil protection forests. Regulations of soil protection forests are strict. Water source conservation in the countries is defined differently, and therefore not an essential part of the protection forest system.

Protection forests are part of a system of local or regional importance. The

regional component is stronger than the global aspect.

Protection forest policy also developed positively under the influence of increasing environmental consciousness since the 1970s. New tendencies in protection forests are the restoration program for the protection of forests in *Bayern*, the biotope protection forests in *Baden-Württemberg*, the state protection forest amelioration plan in Austria and the fifth plan for the maintenance of protection forests in Japan.

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