

ANALYSES ON UNDERLYING CAUSES BEHIND LAND-USE / LAND-COVER CHANGES

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RESEARCH FRAMEWORK

Within the Amur River basin, various human activities have affected natural resources, which resulted in degradation of resources and land use change. In Russian part of the basin, land use change has not been significant issue in recent years. Large area of the basin is still covered with forest, but the degradation of the forest resources is major problem both for environmental conservation and sustainable supply of timber. In Chinese part of the basin, farmland has been rapidly developed and major causes for land use change. Considering these situations, group 5 focuses the research activity on degradation of forest resources in Russian basin, and farmland development and management in Sanjiang Plain.

Concerning degradation of forest resources in Russian basin, we set our research area on southern part of Khabarovsk Krai. Framework of research activities are as shown Fig.1.

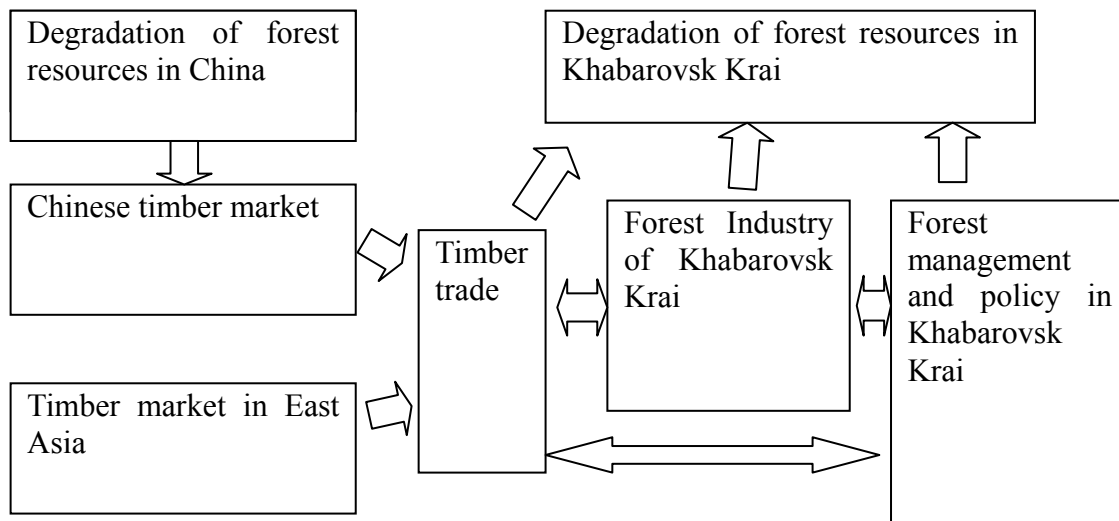


Fig 1 Conceptual Framework of Russian Forest Study

Based on this framework, we conducted following research activities.

- 1) Trend of degradation of forest resources in Khabarovsk Krai and identify its underlying causes.
- 2) Trend of forest policy, management and industry in Khabarovsk Krai.
- 3) Trend of Chinese timber demand and its impact on Russian forest development.

Concerning farm development in Sanjiang plain, we focus our study on paddy fields development as it considered having large impact on water use. Followings are our research Target.

- 1) Paddy field and water facility development in Sanjiang Plain.
- 2) Current state of individual paddy farmer in state farm

RESULT OF THE STUDY

A. Russian forest study

1. Degradation of Russian forest and its underlying causes

Trend of forest resources of southern part of Khabarovsk Krai was analyzed. Although the area of forest has been almost stable, the age structure and composition of species has been degraded. Major causes for the degradation of forest are considered to be the fire, followed by logging activities.

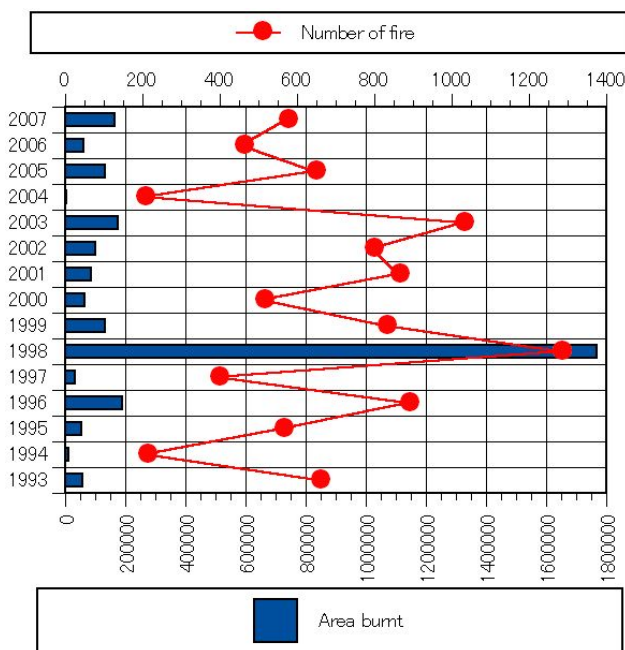


Fig 2 Number of forest fire and area burnt

Fig 2 showed trend of forest fire in Khabarovsk Krai. Both number and area burnt fluctuate, and annual average area of burnt was 235,000 ha and had serious impact on forest resources. It is acknowledged that large scale catastrophic fire occurred once in about two decades, and recently in 1998 nearly two million ha of forest was burnt.

Most of the forest fire was caused by human activities. Unattended fire by local people and visitors, and open burning by farmers are major causes. Budget cut and frequent reorganization of forest fire fighting organization has been negative impact on early detection and extinguish fire.

Logging activities in Khabarovsk Krai will be divided into three periods - Period I; 1950-1960's when timber production began to increase, Period II; 1970-1980's when timber production remained high level, Period III; after 1990's when timber production dropped then recovered oriented by export. Active harvest was carried out in the area along Trans-Siberian railroad and big rivers in Period I. Then it moves to the area along BAM railroad in Period II, and to adjacent area to export port and Chinese boarder in Period III. (Fig 3)

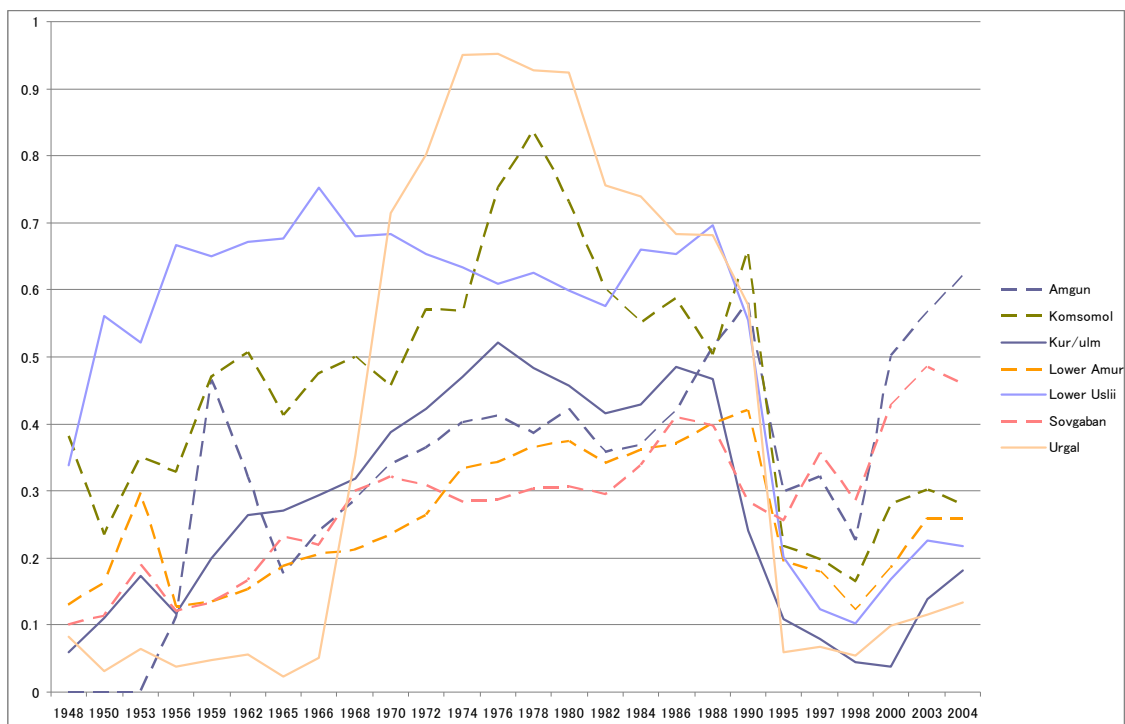


Fig 3 Trend of logging activities by region (m^3/ha)

It could be concluded that timber development area was keep moving to pursue forest with good accesses and rich in resources. It should be also emphasized that these development was unsustainable and degraded forest resources were left after logging activities moved to another area.

2. Trend of forest policy, management and industry

Forest Policy and forest management system was also analyzed. Frequent changes of policy and administrative organization have negative impacts on the management of forest resources.

Followings are fundamental direction of the policy reform under new Forest Code of 2007. Firstly, forest land and resources was kept as federal ownership, and privatization of the ownership was fundamentally not admitted. Secondly, forest administration system was decentralized and most of forest management authority was delegated to local government. Thirdly, forest administration was reorganized to separate by functions. Fourth, governing intervention to forest use was minimized.

Background of above mentioned reform considered to be promotion of competitive forest industry, and administrative reform – downsizing. With reorganization of forest administration system, number of staff of Khabarovsk forest management organization was reduced from 2755 to 921, brought serious disruption to forest management. It is pointed out that control of logging activities become more difficult.

Concerning forest industry, since late 1990's, Khabarovsk Krai has been developed policy to promote large scale integrated forest industry enterprise. Federal government has also become develop same policy, and revision of Forest Code also intended to promote large scale company. With these policy large scale forest industry company has developed. In Khabarovsk Krai, top 6 companies hold 72% of annual allowable cut in the Krai. 4 of 6 companies are under control of foreign or investment company.

Various investment projected launched actively to promote timber processing by the state / local governments but the movements have weakened with the sluggish economy in the background the world economic crisis started with "Lehman shock" in 2008.

3. Chinese forest management and Russian timber trade

On the China part of the Amur River Basin, until the beginning of the 1990a the most accessible forests were overharvested intensively for domestic demands and thus resource depletion progressed rapidly. After the 1990s logging volume decreased significantly overall on the basin but log production was still active on the upper river basin. Since the end of the 1990s resource depletion still progressed due to cumulative over exploitation and thus Natural Forest Protection Policy (NFPP), which brought logging control and forest conservation, was launched in 1998 (Fig 4).

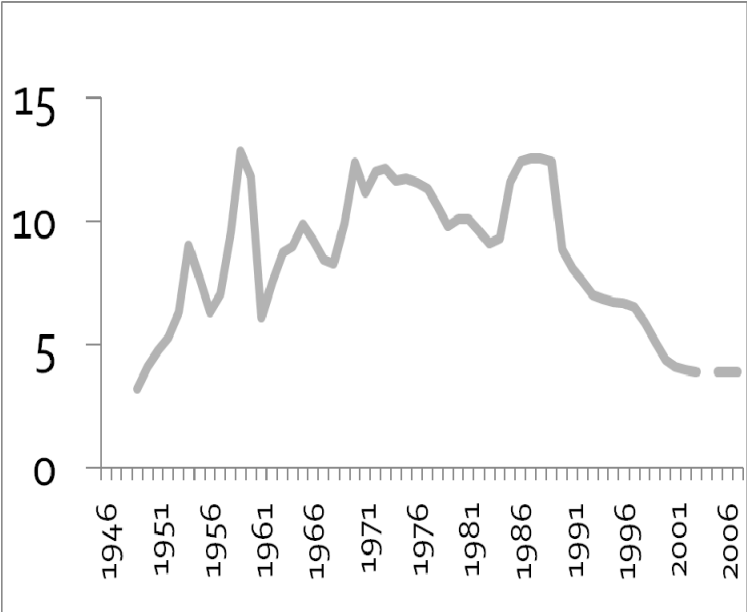


Fig 4 Trend of timber harvest in Heilongjiang Province (million m³)

On the China part, large scale forest fires (LFFs) occurred frequently in the 1970s and many forests burned widely. In the 1990s LFFs decreased but seems to increase in the 2000s. A positive correlation was observed between log production and burned area from the 60s to the mid 80s. LFFs occurred frequently (around 70%) mainly at state forests on the Greater and the Lesser Xing'anling Mountains.

Timber trade volume had decreased remarkably since the fall of the Soviet Union but recovered sharply under the driving force of log export to China after the mid-1990s. Consequently China imported around 20 million cubic meters from Russia in 2007 and the share of Russian logs against total log import in China reached 68 percents.

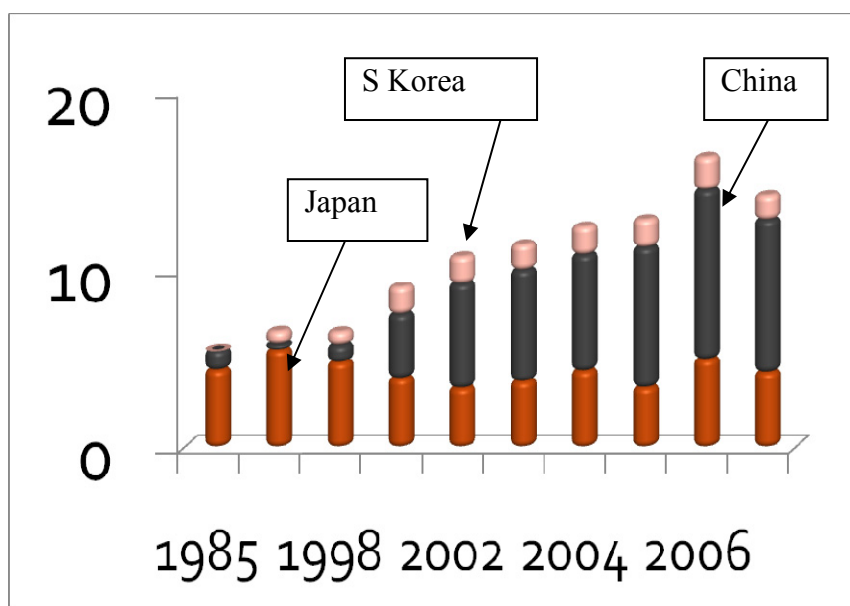


Fig 5 Trend of timber exports from Russian Far East to Northeast Asian Countries (million m³)

During this period, a top importer for Russian timber shifted from Japan to China. (Fig 5) Russian logs exported to China are transported to such a second level timber market as Dalian or wood processing complexes on coastal area such as Guangdong province, and then processed for final products such as building materials, furniture, etc.

These products have been supplied not only for domestic markets but also for foreign markets such as USA, Japan and EU countries.

Sea routes were mainstreams for timber transportation from the ARB to China until the mid-1990s. Thereafter railroad transportation passing through Manzhouli and Suifenhe became main corridors for the trade and the timber trade structure have been changing more diverse and evolved rapidly. Under these backgrounds such internal structural changes as a development of river ports along the main Amur River aiming to import Russian logs to China and the expanding processed timber exports along the land border area, etc. were observed in recent years.

As for Underlying Causes(UCs) brought these changes, the major ones are such supply-demand relationship between Russia and China as still remaining rich forest resource and underdeveloped wood processing industries in the Russia part, China's rapid increase of supply-demand gap mainly due to NFPP under the steady increasing domestic consumption and net export. Recent trade or trade related policies such as the log export tax hike in Russia and providing preferential condition for border trade with the improvement of related infrastructures in China can also be major UCs.

The stepwise raise for Russia's log export tax announced in 2007 has brought significant impacts on timber trade structures on the basin. The log export volume, especially coniferous logs to China from Russia, has turned to decrease after 2007. As a result the structure switch of trade items from log import to lumber has accelerated. Along the land border area, even on the Russia part, there's move to establish or strengthen wood processing infrastructures.

B. Chinese farming activities

1. Paddy field and water facility development

The first part of our study is collecting information and statistical data regarding rice paddy field development, focusing on irrigation system. As shown in fig 6, paddy field development was become active in mid 1990’s, initiated by state farm.

Area of paddy field of state farm decreased since 1999, and large scale conversion of paddy field to upland farming was carried out. Major reason was natural disasters and down in rice price due to overproduction. With improvement of rice price, paddy field has begun to increase.

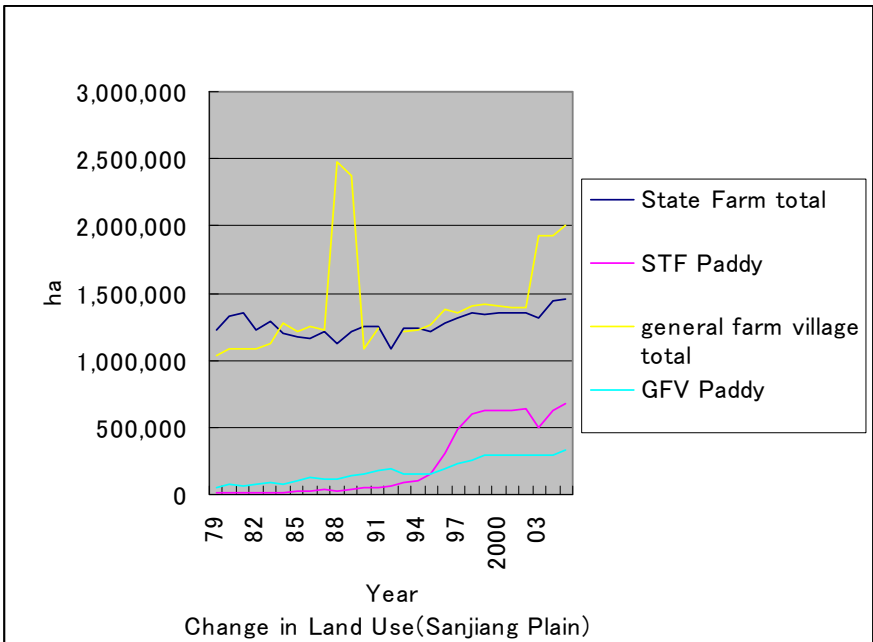


Fig 6 Change in farm land use in Sanjiang Plain

Water facility development was firstly, flood control was the major focus to protect farm lands from flooding. Then the investment move to construct irrigation system. In 2000’s half of investment concerning water facility is use for irrigation. After that drainage and irrigation facility has become focus of investment. In Heilomgjang province, most active investment was carried out in Sanjiang Plain.

Role of government in land improvement and irrigation development was decreased, and national farm has been privatized. Under these conditions, burden for farmers has become heavy.

Major way of irrigation was well as shown in Fig 7. Wells for irrigation is managed by individual farmers.

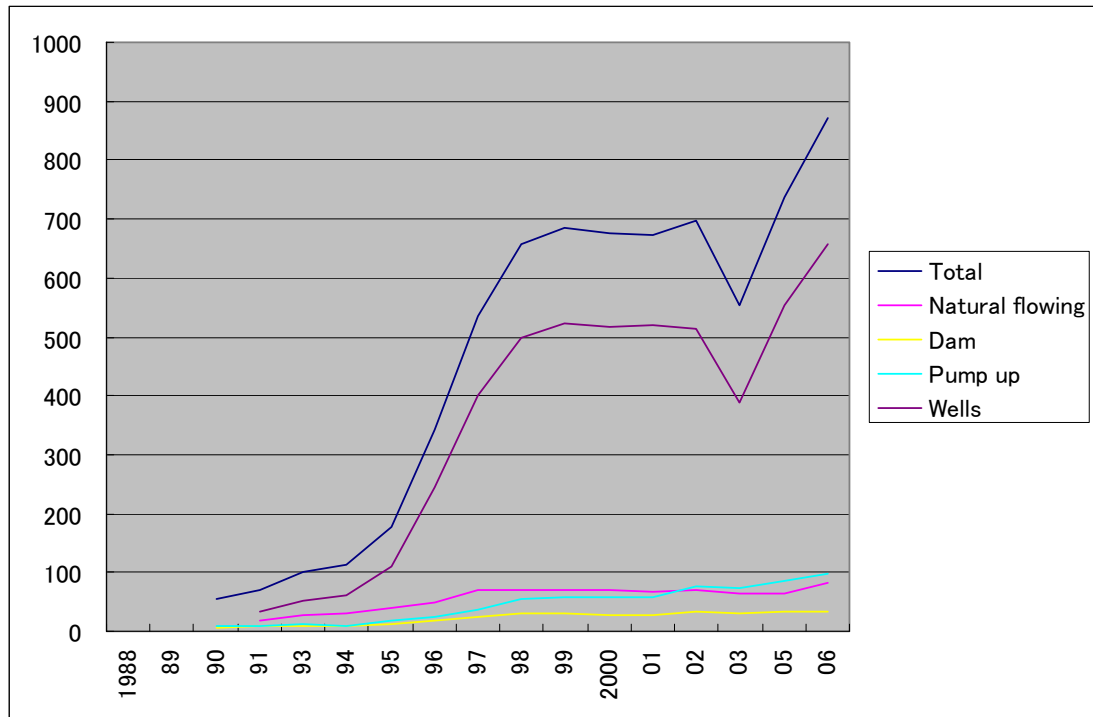


Fig 7 Source of irrigation water (ha) in Heilongjiang Province

2. Individual paddy farm management

We conduct interviews to farm, production group, and “zhigong” farmers (general farm laborers who became farmers) in State Farm X, farmers group No17 in Baoquanking region. We also asked “zhigong” farmers to make book keeping records, to grasp farm management situation.

In this farm, Paddy field development began in 1993 and all the farm land was converted to Paddy field by 1994. Farm development was carried out by farmers group. Cost burden was on individual but they could get loan from state farm. Well digging after 1995 has been operated by individual farmer.

Current issues for paddy field management are as follows. First is lowering of ground water level. They have dug deeper wells to get irrigation water, and currently most of newly dogged wells are depth of 30 m. Second issue was increase of lease rent of paddy field. With privatization, lease rent for paddy field has rapidly increased as paddy fields need various facilities such as drainage system. Lease rent in 2000 was 1890 Yuan/ha, but currently in costs 2890Yuan/ha. Another issue was tight labor market. Most of farmers employ seasonal workers in busy farming seasons. However, with economic development of urban areas, workers move to urban area and labor shortage has become serious issue.

REMANING RESEARCH TOPIC

Remaining research topics which need further study are as follows.

- 1) Time-spatial change of forest fires and forest resource development, and their underlying causes will be analyzed in detail under the corroboration of local related research institutes since our studies were conducted based on limited information.
- 2) Forest policy change and administrative change are still on going and keep continue to research. To find out bridges to sustainable forest management policy formulation.
- 3) More detailed analysis of forest industry in Russian Far East. Especially to evaluate their leased forest management and environmental management system.
- 4) Research on change of timber trade structure of Russian Far East and its effect on forest management and industry will be completed through continuing field survey and resource research since forest related policies in the region are changing so rapidly with uncertainty.
- 5) To find sustainable way of paddy field management. Especially focus on sustainable irrigation system and farm economy.