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The history and future of the forest industry of Irkutsk province

Abstract: Multiple global changes are impacting Russia today. Economic transformations in Russia have prompted the establishment of new relations in economic, institutional and ecological spheres, including within the Forest Industry. This paper focuses on the Forest sector in Irkutsk province and beyond, examining the basic problems related to the transformation of the forest industry of Irkutsk province, and the major factors and conditions influencing dynamics of institutional structure transformation. A brief historical digression and the analysis of institutional structures are also presented.

Key words: Irkutsk, forest industry, institutional structure, institutional changes, global changes, ownership, legislature, taxes

Introduction

"The abundant forest resources of Russia have global value, both economic, and ecological. They are a source of lumber for Russia and all the world, they are a symbol of the wild nature untouched, and play a crucial role in stabilization of the global climate."
(S. Nilsson, International Institution for Applied Systems Analysis, Austria)

Forest comprises about 45% of Russia's territory. The area of woodlands is 886.5 million hectares, of which 763.5 million hectares are covered by forests. In con-

trast, the United States has 296.0 and 209.6 ha of woodlands and forest, Canada has 453.3 and 247.2 ha, Sweden 28.0 and 24.4 ha, and Finland 23.4 and 20.1 million ha respectively. The total stocks of wood in Russia are about 81.6×10^9 m^3, exceeding wood stocks of the USA, Canada, Sweden and Finland combined (63.4×10^9 m^3). The annual increase of wood volume in Russia is 822×10^6 m^3.

The forestry sector is one of the leading branches of the national economy of Russia. The formation of the forestry sector began prior to the reign of Tsar Peter the I (1672–1725), but it was during his reign that the major principles and norms for forest management were established. During the reign of Tsar Pavel the I (1796–1801) fees for cutting trees in state woods were first approved, and the first Forest charter appeared. In 1918 the forests of Irkutsk province were nationalized and were designated for use by communities, communes, artels, labor associations and land users. A formal Forest Code was introduced in 1923 and was in force until 1977. The main difference between the Russian Forest code and the regulations of countries with developed market economies was that, although the pattern of forest ownership was observed, forest use was regulated by the state, and owners did not have full rights to use or protect natural wealth[1].

In this paper we describe the Forest sector institutions in Russia, and more specifically in Irkutsk province. We provide a detailed analysis of problems that the forest sector faces, including problems related to institutional transformation and ecological sustainability. We first briefly describe the history and functioning of the forestry branch to provide perspective.

History of the Forest Industry in Russia and Irkutsk Province

Wood has been an important source of trade for Russia for hundreds of years, both within Russia and internationally. Russian exports of forest products are insignificant compared to the wood stocks available. The opportunities for harvesting timber in Russia considerably surpass the needs of Europe through increased access to more of the forest and the use of modern technologies. For many centuries, Irkutsk province has been a source of logs, soft resin, wood materials, and since the 1700s, of industrial materials. These forests also have related uses such as hunting, cultural-recreational activities, research, and the use of non-industrial forest products.

The first large-scale cuttings of Siberian forests were noted in the annals of the "Prikaz" Department in the early 1700s. Wood harvested near Irkutsk was used for the construction of ships by order of Tsar Peter the I. An accounting of the timberlands has been conducted continually since then by various departments. An Admiralty board was responsible for the accounting until 1798, when

1 E.Y. Krasnova, R.B. Bobrov, N.F. Kobel'kov. The Forest Legislature of Russia: Review. Inform. – Moscow: VNIIClesresurs, 1993

the Forest department (Ministry of State property) assumed responsibility. In 1894, the Forest affairs of the Agriculture Ministry was established by combining the Forest Department, Forest Wardens Corps, Special Forest Committee, Forest Protection Committee, Permanent Commission for the Forestry, Control Experimental Station, and the Entomology Bureau[2]. In 1912, the Department of Agriculture and the State property of Irkutsk province and Zabaikalskaya (Transbaikalian) oblast' (area), was organized to manage debt-ridden clauses, lands, forests and the land arrangements of peasants.

In 1918 the Forest department was reorganized into the Central Governance of Forests of People's Commissariat of Agriculture (CGFPCA). Several reorganizations resulted in a Forest Department within the Land Administration by July 1922. In October 1925, the Irkutsk branch of Sibkrajleszag (Irleszag), was created as a forest harvesting section. In 1929 the branch was transformed into lespromkhozes (the state forest funds, the forest industry) and lestranskhozes (forests of Ministry of Railways), and timber enterprises were established. In March 1932, the Administration of Forests of the local value was created (East-Siberian region). By 1947 forestries included: 13 state timber enterprises of Minlesprom (Ministry of the Forest Industry) of the USSR, 37 district forestries of Administration of the forests of the local value, 7 lestranskhozes of the Ministry of Railways of the USSR (Irkutsktransles trust), 3 gorzelenkhozes (city green farms) of Ministry of the municipal service of RSFSR, sovkhozes (state farms)[3].

In 1947, all of the forest-related entities within all ministries and departments were combined within the Minleskhoz (Ministry of Forestry) of RSFSR, under the Ministry of Agriculture. In the early 1960s, the Irkutsk Governance of the Forest industry Forestry of Irkutsk Sovnarkhoz (Council of National Economy) was organized. In 1989, policies were put in place to move responsibility for forest management from the forest industry to the Forest Committee of the Ministry of Ecology[4]. In 1992, the Forest Committee was reorganized into the Federal Service of the Forestry of Russia, within the Ministry of Forestry. In the region, the Irkutsk Governance of Forestry was transformed into Irkutsk Forestry Territorial Production Incorporation in 1988, and into the Irkutsk Governance of Forests in 1993.

The Institutional Structure of the Forest Industry and its Transformation

Russia is in the midst of significant changes throughout society, including the economic and institutional spheres. The ongoing economic transformations have

[2] R.V. Bobrov. Who manages the Forests of Russia//Lesnaya gazeta. August 19, 1995.
[3] the same, p. 62.
[4] The Decision of Ministerial Council of RSFSR dated January 17, 1991, No 26 «About improvement of forest management».

also affected the Forest Industry, providing both opportunities and difficulties for the development of regional policy. Formal study of forest industry functioning, development and institutional transformation has only occurred in the last several decades and has been introduced by pioneers such as D. North, R. Kouze, D. Byukenen, and others. Understanding these issues is important because the forest industry affects the economic and social condition of much of the population of Russia. Institutional changes and regulation of the forest industry directly impact the economic prosperity and quality of life of many citizens.

The transformations happening in the Forest industry are frequently spontaneous and inconsistent. National and regional economic and social policy reforms significantly influences institutional transformation, and the reform of policies affecting the forest industry often outpaces the rate that institutional structures can respond. Therefore, additional study and coordination of institutional transformation is needed to effectively and efficiently respond to policy development in multiple spheres within the region. In this paper we examine the institutions that make up the forest industry and their transformations. For our purposes, institutions are considered to be a set of behavior rules, customs and norms, (both political and economic) of society. In modern societies, these are formally stated in legislative and executive decisions, and are implemented (and enforced) by governmental organizations. However, institutions can also be the established mechanisms of coordination of political and economic decision-making processes, such as elections or markets. Modern economic science defines "institution" as "a steady complex of mutual roles and relationships, and behavioral features of social and economic agents."[5] These institutional realities all impact the forest industry (Fig. 1). The suggested scheme of Institutional changes in the Forest Industry for the further evaluation of their effectiveness is presented in Figure 2.

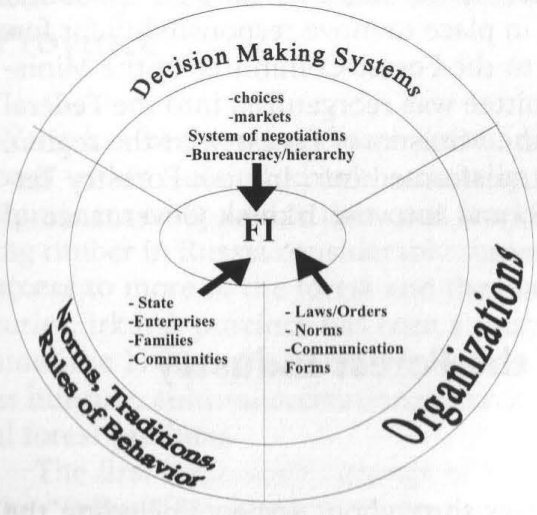
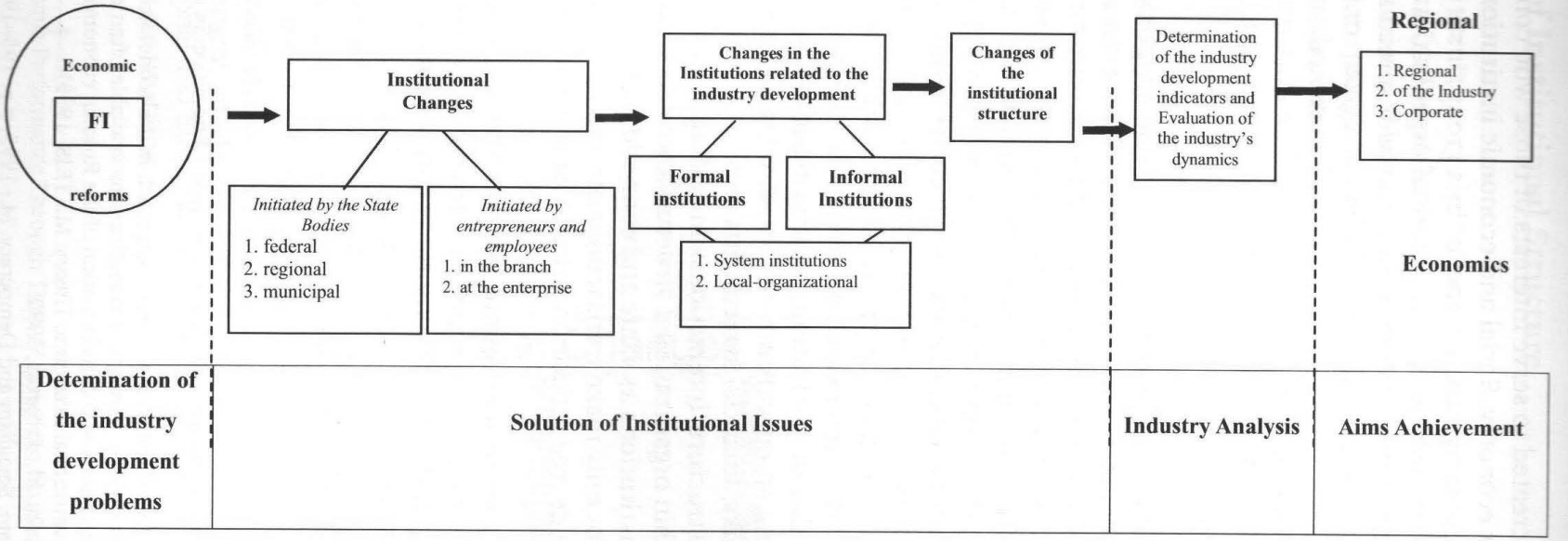


Fig. 1. Institutional spheres that impact the forest industry

Jack Knight[6] thinks that "institutions are the set of rules, structuring public mutual relations in a specific way, the knowledge of which should be known to all members of a certain community." Institutions include formal rules and informal restrictions, such as the conventional norms of behavior, the agreements made, internal restrictions of activity, and the certain characteristics of compulsion to perform these and/or the others. Formal

[5] V. Grebenschikov. Associacii na proideniy temy. – Economicheskaya nauka sovremenoy Rossii, 1998, No. 1.

[6] Knight J. Institutions and Social Conflict. Cambridge: Cambridge University Press, 1992.



FI: Forest industry

Fig. 2. Institutional Transformation of the Forest Industry

institutions are often created to serve interests of those who control institutional changes in the market economy. Social and economic institutions arise when individual habits are adopted by a society and/or by a group. Institutionalists define institutions not in the narrow sense of the formal organizations, but in a wider context of socially predetermined behavior as "the widespread and constant way of thinking or acting, which is implanted in habits of a group or in customs of the people."[7] Institutions can be considered to be public capital, which can vary by depreciation and new investments.

Types of Institutions

To provide background for our discussion, we provide a typology of institutions depending on their functional role in an economy.[8] Such a classification includes two types of institutions: system *(or external)* and locally-organizational *(internal)*.

System institutions are institutions determining a type of an economic order, i.e. dominating type of an economic system. These institutions establish key rules of economic activities; therefore they include not only purely economic rules and norms, but political and ethical norms also, which are required for the effective functioning of an economic system. An example of system institutions are institutions specifying and protecting property rights, making economic decisions, and changing the norms of economic ethics, etc.[9] The *system forming* institutions may include all varieties of institutions arising during development of market economy and providing an opportunity for functioning of institutions of the upper order, such as banks, financial system, etc.

Institutions that structure interactions, including transactions in the open market and those within organizational structures are called *locally-organizational*. These include such institutions as share and commodity exchanges, banks and financial firms. They not only make transactions among various economic entities possible, but to some degree reduce uncertainty and risk and reduce transaction costs.

These two basic types of institutions support the two primary keys to successful market economics: private property and freedom to make contracts.[10] The process of formalizing and standardizing these fundamental economic activities is called institutionalization.

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7 Hamilton W. Institution. In: Seligman E. Johnson A. (eds.) Encyclopedia of the Social Sciences. Vol. 8. 1932, p.84.

8 it is necessary to note, that there is no a uniform approach in the economic theory to characterize a functional role of institutions. Variants of classifications available often are mutually exclusive (V. Gutnik. Market institutions and transformation of the Russian economy // МЭМО. 1995. No. 7. A. Shastitko. Neoinstitutional Economic Theory. M.: TEIS, 1999).

9 M. Weber. Selected works. M.: Progress, 1990.

10 I. Shumpeter. Capitalism, Socialism and Democracy. M.: 1995. p.p. 195–197.

Components of Institutional Structure

The institutional structure of the Forestry sector has a number of components. 1) property rights (the legal basis to use property at one's own discretion), 2) Investment institutions (banks, insurance companies, funds, etc.), 3) Legislature (laws, decisions, decrees), 4) Organizational structure of the forestry sector and the specific enterprises, 5) Informational and professional support (i.e., the provision of information about activities and prospects for development within the industry, 6) Legal institutions that provide the development, implementation and enforcement of legal documents, 7) Institutions providing professional training and education to the industry, and 8) informal institutions that facilitate cooperation and establish the norms of behavior.

The term "institutional agreement" refers to a certain set of behavioral rules, which manage the behavior under the concrete conditions in a specific field of activity. "Institutional structure", as defined by D. North[11], is the whole set of "institutional agreements" in an economy, including organizations, legislation, customs and ideology. In this paper we focus on "institutional change," which can affect specific institutions, institutional agreements or institutional structure (Fig. 3).

Institutional structure determines the economic structure of a region and it particularly affects the efficiency of the Forest branch. The degree of institutional system development, its flexibility and ability to react to evolutionary changes considerably determines the development of an economy. In the Forest branch, it can create favorable conditions for the formation of new enterprises. This structure can be relatively static or dynamic, depending on specific historic-political conditions. Institutional structure is often determined by the comparative efficiency among alternative ways of coordinating economic activities at the time of institutional structure formation. Therefore, institutional changes should be analyzed within the framework of the whole institutional structure, considering issues of property, investments, cultural norms, legislation, the management of the Forest industry, professional and information support and other institutions.

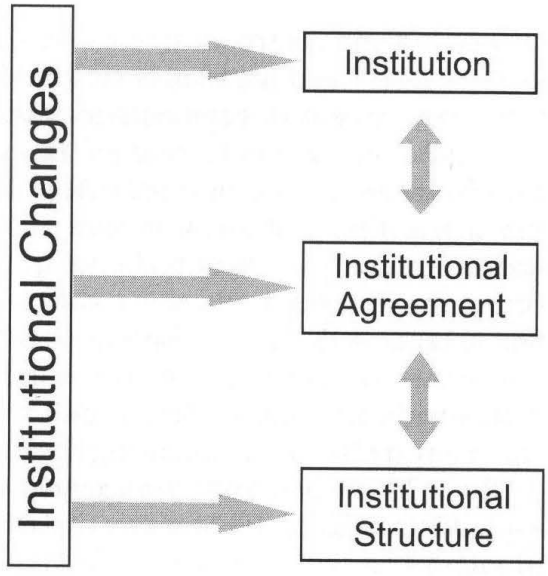

Fig. 3. Interrelation among basic institutional concepts

[11] North D.C. Economic Performance Through Time // American Economic Review. 1994. 84.3: 359–367.

In a market economy, institutions evolve as the result of a metacompetition, i.e. competition among institutions. In this competition, institutions are selected depending on their ability to cover the greatest number of interactions at the lowest cost. A set of interacting economic institutional entities, which make economic decisions under institutional conditions, is an economic system. Various economic systems differ not by kinds of economic activities nor economic processes (e.g., production, consumption, investment), but by the character of their economic institutions and their impact on economic decision-making.[12]

There are three ways that institutions are controlled: formal rules, informal restrictions and enforcement of these rules and restrictions.[13] Reform of institutions is a complex process, requiring significant investments of money, intellect and time. Although rapid institutional transformations may be possible through political and/or legal decisions, in practice such changes are slow, especially in the Russian environment. The informal restrictions related to customs, traditions and codes of behavior are extremely powerful in Russian society, and they are very resistant to conscious reform. The primary agent of institutional change is an entrepreneur, either political or economic. This recognition was not common historically, with the understanding of institutions based more on a "rules of the game" concept than on the players.

The Issue of the Ownership

Ownership and control of forested lands is fundamental to the functioning of the forestry sector, and the legal basis for this control has changed throughout Russian history. A system of payments to private land owners for timber cutting rights was established in the 17 century. Even before the Revolution of 1917, the public became increasingly concerned that private owners were not adequately protecting the sustainability of forest resources for use by future generations. The idea of nationalization of forests had widespread support among the intelligentsia long before the Revolution. In the spring of 1917 all the forests of Siberia and Russia finally became the State property[14], to be managed by the Central Administration of Forests. The main duty of the Administration was to continuously satisfy the nation-wide demands for forest resources and to provide for the continuous recovery of forests by strictly following basic legally-mandated forest management rules.

By 1930 the practical management of state forests was carried out by the forest industry and of the Ministry of Railways. The cutting of timber was regulated

12 Educational materials of an international seminar "Economic Education: Content and Strategies for High School Instruction, the Russian-American Center for Economic Education, and the National Council on Economic Education, New York, USA (Economics America)", June 6–13, 1993. – Novosibirsk.

13 D. North. Institutions, Institutional Changes and Economy Functioning . pp. 17, 26, 137.

14 The forest had been declared officially as the weal of the whole people by the Land Decree (November 8, 1917), but only in April and May, 1917 this news had been declared in masses (Declaration of the Council of Peoples Commissars of April 5, 1918, meeting of the forest managers and forest technicians, April 28 May 2, 1917.

only by needs of the lumberers, and, as a rule, cutting was done in the best forest stands[15]. This situation was significantly improved by the formation of the Ministry of Forestry of the USSR and the Forestry Administration of Irkutsk province. At this time, forest resource bases (sites for harvesting) were established, which were allocated among lumberers, and limits for the wood production were set by Gosplan (State Planning Committee). Regulatory and monitoring functions were distributed among bodies of the Ministry of Forestry. By 1948 the first forest resources bases adjoining the Trans Siberian Railway had appeared, and by 1980 forest resources bases were allocated to 202 enterprises under 22 Ministries, with a total exploitation stock of 2.016×10^9 cubic meters, including 1.721×10^9 cubic meters of coniferous species. Leskhozes (Timber enterprises), were engaged in cuttings of the main usage till 1993.

When the Forest legislation of the Russian Federation was introduced and after the transition to the market-based economy, new forms of management were required. There is a need for strong independent owners. Financial-credit, non-price and legislative support of the forest industry entrepreneurship is required. There is a need for the components of institutional structure to become well-developed for the forestry sector, including reform of the organizational structure, information provision for the industry and personnel training, to develop a successful and sustainable forestry industry.

The Legislation

Prior to the 17th century, there was no comprehensive forest legislation in Russia[16]. Under Peter the 1st, the first forest legislation was enacted to ensure a supply of high quality wood as building material for ships. Ship wood became the most important commodity good in Russia, and coastal forest reserves came under the supervision of the State. By 1766 the general boundaries of the lands of Russia had been established, and forest legislation expanded to not only satisfy the fleet's needs, but also to provide income from forests. In 1798 the first specific guidelines for practical forestry in Russia were published[17]. These instructions not only provided for the protection of the forests, but also for the production of wood and forest recovery procedures. In 1799, Pavel the Ist decreed how payments for timber cutting in the state forests were to be established, and this approach has been used with only minor changes until the present.

On November 11, 1802, the "Code of Forest Statutes" (The Forest Code) was approved, and was incorporated into the Code of Laws of the Russian Empire in 1832. By 1913 the Forest Code had undergone significant changes and applied to all the territories of Russia, including the Irkutsk province. The Code consisted of six major parts: 1) saving and protecting of the forests, 2) regulations for State

[15] Forest and Forestry of Irkutsk region. L.N. Vaschuk and others. Irkutsk, 1997, pp. 144–145.

[16] Краснова Е.Ю., Бобров Р.В. Кобельков Н.Ф. Лесное законодательство России: Обзорн. Информ. – М.: ВНИИЦлесресурс, 1993

[17] Бобров Р.В. Об управлении лесами Отечества (исторический обзор): Обзорн. Информ. – М.: ВНИИЦлесресурс Госкомлеса СССР, 1990. –стр.28.

forests, 3) regulations for State forests that are not directly supervised by the forest department, 4) regulations for privately owned forests, 5) regulations for non-timber uses of the forest and disputes resolutions, and 6) enforcement of the Forest Code.

The Forest Code of RSFSR was implemented in August, 1923. This Code recognized local value forests (LVF), which are smaller forests outside of large forest blocks. These included former country public and settlers' wood plots, forests that were part of a household ownership (e.g., farms), and other forests that belonged to rural communities prior to nationalization, and that had no nation-wide value. LVFs were managed by raiispolkoms (district executive committees). In 1947 the Ministry of the Forestry of USSR was founded, and given responsibility for all the forest fund of the country, including all forested land and the forestry staff. The Forest Code was revised again in 1978, and it remained in force until the disintegration of the USSR. In 1996 the State Duma enacted the "Forest Code of the Russian Federation," in which the forest fund of the former USSR became the property of the Russian Federation. The current Forest Code of the Russian Federation was implemented on January 1, 2007[18]. However, the legal basis for forestry in Russia remains complicated and confused. It is difficult for the forest industry to conform to the forestry laws and regulations because they sometimes conflict with land, water and environment protection legislation.

The Labor Staff Issue and Educational Programs

Another important issue for the Forest industry is the shortage of professional staff. In Russia, the prestige of this profession has declined dramatically and people enter the profession either because of a lack of other opportunities, or because they are given the job by family members. There are very few experts with a high-profile education, and it is likely that Russia will have to import expertise from outside the country in the near future. Qualified process engineers, mechanics, economists, and marketing specialists, all with the knowledge of the methodology of decision making for effective management and scheduling, are in great demand by the forest industry enterprises in the region.

The Modern Role of the State (Government), Private Business, Individuals

Under current law, the Russian government has delegated the management of all the forests to the regional level, and the role of the State in the Forestry branch has significantly decreased. The role of the federal governments is to develop the Forest code, regulate trade in forest products to encourage investments, and these tasks are mostly complete. However, there are so many governmental organizations in Russia with jurisdiction over the forest industry that it is not clear

[18] http://www.consultant.ru/popular/newwood/#art4992

who is responsible for what. For example, there is a specialized division of the Ministry of Agriculture, a Federal Agency of the Forestry, a Department of the Forest industry in the Ministry of Industry and Trade, the Development Council of a the Timber Industry Complex under the first vice-premier supervision, etc.

The Strategic development of the Forest industry cannot be advanced without deep and qualitative changes in the structure of its enterprises and the institutions of the forestry sector. These changes should be based on scientific research using modern economic-mathematical methods. We recommend focus on the following topics for Irkutsk region:

1) the sustainable management, rational forest usage and forest resources reproduction;
2) following the principles of economic safety, and balancing the interests of all the stakeholders in the market;
3) redistribution of wood raw material flows from the foreign market onto the domestic market, and developing more wood processing capacity within the province;
4) increasing the investment appeal of the forested territories;
5) resolving the barriers to lumber industry complex (LIC) infrastructure development.

The completion of the Forest plan of Irkutsk province is of a special importance. This plan, according to the requirements of the Forest Code of the Russian Federation, should contain characteristics of the forest fund, social and economic estimations, and the major ways to use, secure and to protect the forest, and estimating the economic benefits resulting from forest development activities. The presence of a large forest resource base in Irkutsk province has allowed development of a number of large wood processing, pulp and paper and timber-chemical enterprises. Their ultimate success depends on the improvement of economic conditions both globally and in Russia, creating a business climate favorable for investments, including foreign investments, and the implementation of environmentally friendly technologies so that products can compete in the global marketplace. An encouraging sign is that the forest industry sector has received investments measured in billions of euros over the last several years.

The Current State of the Irkutsk Forest Industry

The forest resources of Irkutsk province are capable of providing thousands of jobs for the citizens of the country and supplying raw material to many industries of the national economy. The industry can help promote the overall industrial development of the country, support the creation of new manufacturing enterprises, improve quality of life, and take a leadership position in supplying world markets of forest products.

However, the development of the modern Russian Forest industry is at a critical stage. Experts predict that if Russian LIC companies do not improve harvesting efficiency and modernize major production cycles in the next 10–15 years, then

many large national timber processing companies will fail, and the existing industrial enterprises will be bought by foreign companies to meet raw material demand in other parts of the world. The main opportunity to increase the economic efficiency of the wood processing industry of Russia is to integrate harvesting and processing enterprises, which will decrease of transaction costs, encourage innovations, concentrate and diversify resources and streamline operations. The development of a complete, rational and ecologically safe plan to develop and use the natural, industrial-financial, ecological and social capital of Irkutsk province is a top priority.

The Ecological Importance of the Forests of the Irkutsk Province

Forests not only provide wood and economic benefit for society, but they also provide critical ecosystem services. The forests of the Irkutsk region are of global importance for the sequestration of carbon (Vaschuk and Shvidenko 2006). Furthermore, the forests in the province contribute to the water quality of world-renown lake Baikal and its watershed, filtering water and contributing to stable water levels. The forests also protect soils on slopes from erosion. Forests can also significantly neutralize the impact of emissions from industrial enterprises. The vast forests of the province are rich in biodiversity, and they attract recreationists from all over the world to enjoy the pristine beauty of the region. However, changes in climate and land use have the potential to negatively affect the forest ecosystems of the province.

The Management and Protection of Irkutsk Forests

In 2005 a task force of stakeholders in the forestry sector in Irkutsk submitted a report that included 13 major recommendations for development of the LIC of the Irkutsk province, to improve efficiency and revenues of forest enterprises in the region[19]. Stakeholders included representatives of the Administration of Irkutsk province, the Irkutsk Customs department, the Department of Internal Affairs (forest militia), the heads of forest harvesting and exporting companies, forest industry researchers, union representatives of lumberers and forest exporters of Irkutsk province, the Commercial and Industrial Chamber of the East Siberia, the Forestry Agency. These recommendations are planned to be used for the preparation of the Concept of Development of the LIC of the Irkutsk Province till 2015. The task group has paid special attention to the projecting and construction of the hauling roads, especially of all-year-round roads sponsored by the fed-

[19] According to Pavel Korolev, the head of Irkutsk regional innovative-service center of the Timber industry complex, www.teleinform.ru

eral budget and by LIC enterprises themselves through interest free credits. The specialists noted that a special attention has to be paid to the training of working and engineering personnel. It was offered to create innovative-implementing and educational centers, on the basis of institutions of higher education, which would train specialists for the Lumber Complex and improve the knowledge of the management, specialists, and workers. According to the experts of the Forest Industry, there is a need for interest free credits to purchase new equipment for the deep processing of the lumber and of the waste products. There is a need to adopt statutes about the transfer of forest fund lands for renting on a competitive basis with an obligation to invest into the complex processing of the wood. The members of the task group suggested to implement exchange technologies in the market of the timber and Pulp and Paper Complex products, which will allow to create an organized, transparent, and controllable timber market in Irkutsk province. According to the specialists, Irkutsk region administration should actively defend interests of the LIC in the Government of Russian Federation. A Task Fund for the LIC Development, in an amount of 10–15 mln. roubles, had been suggested to be formed, to implement those recommendations. This fund would finance innovation projects, training centers for workers and implementation of new internet technologies in the LIC's enterprises.[20] Perhaps the most important of these is the recommendation to develop wood processing industries to greatly increase the value of exports, compared to the export of round wood.

Lake Baikal is a world-class natural resource, and it is protected by a water-protecting zone of the lake Baikal in which major cuttings are forbidden, to strengthen the protective functions of the forests. The total area of the lands of the forest fund in the coastal protective strip is 4.4 million hectares, of which 3.7 million hectares are under the supervision of the Federal Service of the Forestry of Russia.

The Potential Effects of Global Changes on the Forests of the Irkutsk Region

Global climate and land use changes are having multiple effects on forests worldwide. Climate change is expected to affect productivity, species range distributions and natural disturbance regimes in the Irkutsk region. Land use and timber harvest regimes are also changing in the Irkutsk region, with some previously uncut areas now experiencing harvest. Together, these components of global change will undoubtedly affect the composition and spatial distribution of forests, which will in turn affect the ability of the forests of Irkutsk to retain carbon and maintain biodiversity.

Mean temperatures within the province have risen significantly over the past 40 years, while precipitation has been essentially unchanged (Vaschuk and Shv-

[20] http://www.irkutsk.irbp.ru/news/14/08/2006/948/

idenko 2006). Global Circulation Models (GCMs) do not completely agree on future trends for the province (IPCC 2007), but they suggest that mean temperature may increase by as much as 5°C and precipitation will increase by about 20% by the end of the century. Warmer temperatures and increasing precipitation may increase the potential productivity of tree species. However, because tree species have unique physiological and ecological adaptations to environmental conditions, these changes may alter competitive relationships among species and affect population abundance, forest composition, and may shift species range limits. The incidence and severity of fires is likely to increase. A moderation of the winters may allow insect pests to become more widespread. Concurrently, the frontier of timber harvest activity is pushing into previously uncut areas.

In a recent study, a process-based forest landscape disturbance and succession model (LANDIS-II) was linked to the predictions of the Hadley GCM to study how climate change and an expansion of timber harvest into unexploited areas of the Irkutsk oblast might effect the landscape composition and pattern of forests in the region (Gustafson et al. in press). Increased activity of the Siberian silk moth (*Dendrolimus sibiricus superanse*) was simulated as an indirect effect of a warming climate. The results showed that forest composition (both by species and age classes) was influenced much more strongly by timber harvest and insects than by climate. The results also showed that the effect of insects on forest composition was reduced in the presence of harvesting, because harvests reduce the landscape abundance of older cohorts of host species, which are more likely to be killed by the insects. The response of total above-ground biomass responded most strongly to the harvest treatment. The climate effect was not only insignificant, but it tended to be negative. This was probably caused by the indirect effect of climate on the fire regime. The effect of insects interacted with climate because chronic insect outbreaks favored species that had significantly higher growth rates under a future climate, such as birch and larch. Both the harvest and insect treatments increased forest fragmentation.

These results suggest that the direct effect of climate change in the Irkutsk region will not be as significant as changes in land use (harvesting) and the indirect effects of climate change (insects). Although climate change will have an effect on the species available to support the forest industry in the Irkutsk region, the industry will also affect the forest composition of the forests. The results showed that the future climate alone will tend to increase the abundance of larch at the expense of fir and aspen. But the combination of future climate, increased harvesting and more insect outbreaks is expected to result in an increase in the abundance of birch, aspen and larch at the expense of spruce, fir and cedar. The abundance of the commercially valuable Scots pine is expected to be fairly similar (about 22%) under all future scenarios.

Summary

We draw the following conclusions about the forest industry of Irkutsk province from these findings: 1) transformations happening in the Forest industry are frequently spontaneous and inconsistent, 2) the institutional structures of the industry are in a period of profound change in response to the fundamental changes in the Russian economic system and the globalization of the forest products industry, 3) the forest industry faces a critical shortage of well-trained professionals, 4) global change (including climate) has the potential to change the species composition of Irkutsk forests, which may require changes in management strategies.

We make the following recommendations: 1. There is a need for additional systematization and coordination of the reform's processes of the Forest industry in the region. It is a critical fact that rate of change in policies and legislation in the region outpaces the rate of institutional structure formation. At the same time, economic and social policy, as well as all regional policy under the reforms, significantly influences the orientation and structure of the institutions formed. 2. Close attention should be paid to the development of new institutional structures, because these institutions will be in place for some time, and they should be designed to be flexible so that they can adapt to the rapidly changing conditions likely in the future, 3. There is a need to determine the effectiveness of institutional changes and to measure the institutional changes by applying different methodologies, such as Q-methods, for example[21]. 4. Investments should be made in the training of forest industry professionals, who will provide the necessary leadership to achieve the recommendations of the Irkutsk forest industry task force. 5. Forest managers should be directed to plan for the forest changes to be caused by timber cutting in previously uncut areas and climate change.

References

Bobrov. R.V., 1995, Kto upravlyaet lesami Rossii, *Lesnaya gazeta*, August 19, 1995.

Bobrov R.B., Krasnova E.Y., Kobel'kov N.F., 1993, The Forest Legislature of Russia: Review. Inform. – Moscow: VNIIClesresurs.

Gustafson, E.J., A.Z. Shvidenko, B.R. Sturtevant, R.M. Scheller. In press. Predicting climate change effects on forest biomass and composition in south-central Siberia. Ecological Applications.

Grebenschikov V., 1998, Associacii na proideniy temy. Moscow, Economicheskaya nauka sovremenoy Rossii.

Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.), 2007, IPCC. Climate change 2007: the physical science basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge.

Knight J., 1992, Institutions and Social Conflict. Cambridge, Cambridge University Press.

North D., 1997, Instituty, Instituchionalnye Izmenenia i funcionorovanie economici, Moscow, Nachala.

[21] http://en.wikipedia.org/wiki/Q_methodology, http://www.qmethodology.net/PDF/Q-methodology%20-%20A%20sneak%20preview.pdf

North D.C., 1994, Economic Performance Through Time, American Economic Review, 84.3, pp. 359–367.
North D.C., 1990, Institutions, Institutional Change and Economic Performance, Cambridge, Cambridge University Press.
Vaschuk L.N., 1994, Lesnoi fond Irkutskoy oblasti, Irkutsk, Irkutskya oblastnya tipographia.
Vaschuk L.N., 1997, Lesa i Lesnoe khozyaistvo Irkutskoi oblasti, Irkutsk, Sovietskaya Sibir.
Vaschuk L.N., 2006, Dinamika lesnyih prostranstv Irkutskoi Oblasti, Irkutsk, RA Gorod.
Vaschuk, L.N., Shvidenko A.Z., 2006, Dynamics of forests of the Irkutsk region. Irkutsk Printing House No. 1, Irkutsk, Russia.
Weber M., 1990, Selected works, Moskow, Progress.

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