Pine nut collection facilities in oil and gas development areas

G B Dugarova
Sochava Institute of Geography SB RAS, Russia, Irkutsk

E-mail: geldugarova@gmail.com

Abstract. The total area under the Siberian stone pine forests in Russia is 39.5 million hectares, 57.2% of which are in Eastern Siberia, including 17.5% in Irkutsk region. However, human economic activities lead to a permanent reduction in the area of Siberian stone pine forests. For example, many Siberian cities emerged in places where Siberian stone pines once flourished. Mass fires are cause enormous damage to pine nut gathering. Exploration and development of the Kovykta gas and condensate field also led to the reduction in the area of Siberian stone pine forests and in yields. In this article we have presented the retrospective analysis of pine nut business to identify its features and significance for the area, to determine the possibility of its revival. The authors provided the analysis of pine nut business on example of Zhigalovskii fir farm (FF) in Irkutsk region. It has been found that pine seeds harvesting was inefficient during the Soviet time although there were a lot of activities for the organization of pine nut business. We believe that despite the existing problems, pine nut business has the necessary prerequisites for development and great demand. Pine nut business is considered as an alternative to illegal logging. Based on that experience the prospects for development of local economy are considered

1. Introduction
The Russian Federation Government Decree of 2009 “On the Climate Doctrine of the Russian Federation” provides for the protection and improvement in quality of forests and support of traditional spheres of activity as a kind of resource-saving technologies. In Russia, the laws concerning the protection of rights of indigenous peoples are focused on preservation and maintenance of traditional nature management. However, the economic bases are rarely considered, on the contrary, an important role of traditional land-use methods in preserving the culture and identity of indigenous peoples is emphasized, thus justifying the need for support from the government or extractive industry companies, operating in these areas [1].

In the meantime, possessing conspicuous wealth, Siberian regions do not make the best use of the renewable bio-resource potential. Current trends bear the risks of repetition by Siberian stone pine (cedar) the fate of Lebanon cedar, which was wiped out and has survived only in the Tannurin National Park. The Chinese experience of reafforestation of Korean pine stands, for which purpose at the present time the Chinese make bulk purchase of nuts in the Far East, might be useful for Russia, although the last years China reduces its domestic timber harvesting by exporting raw logs from Russia including Irkutsk region. The researchers estimate that level of illegal logging varies from 20 to 100% in Russian regions that lead to negative environmental, social, and economic consequences [2]. Oil and gas development also has a negative impact on forests.
Specialists in processing of non-timber forest products in Eastern Siberia note that the most effective way to increase the income of population and to create temporary and permanent employment in forest villages is to use non-timber forest products (from Appeal of the Meeting of the Krasnoyarsk Partnership for the Use of NTFPs (KP NPL) and Seminar “Cooperation between regions for implementation of a comprehensive Program of the use of non-timber forest products and for eco-tourism” (April 28-30, 2002, Abaza, Republic of Khakassia) to the Heads of executive and legislative bodies of Krasnoyarsk krai, the Republic of Khakassia, and the Republic of Tyva. Available http://www.baikal.eastsib.ru/bbsiberia/hakasia/doc/obrash.doc).

It is expected that with a well-organized work on gathering and processing, the cost of non-timber forest products may exceed the cost of timber harvested in the same area, although the amount of research in this sphere is very limited due to the large share of the informal economy both in the forest sector [2-4], and in the traditional nature management of indigenous peoples [5].

Kovykta gas and condensate field (KGKF) is the largest in Russia. It is located in Zhigalovskii district of Irkutsk region. Its development has both positive and negative impact on the nature and economic. The negative effect is due to the fact that KGKF is located in the forests of group I (the pine-nuts-business zone). There is the question of the legality using of these forests still.

Therefore, in this article we have presented the retrospective analysis of pine nut business to identify its features and significance for the area, to determine the possibility of its revival. First of all, it is necessary to explain what is pine nut business?

2. Research object
Siberian stone pine (lat. *Pinus sibirica*), also known in Russia as Siberian cedar, is considered a widespread tree in the Asian part of Russia. It is common in the northeast of the European part of the country, the Urals, Siberia and the Far East.

National economic value of Siberian stone pine forests is determined not only by their wood reserves, but mainly by high environment protection properties and unique potential of their multilateral use. Siberian stone pine is the only representative of the Siberian taiga, seeds of which are of food and flavoring value. In prehistoric times, pine nuts were the primary food: both bread and butter for the peoples who inhabited Siberia. Many Asian peoples considered Siberian stone pine tree to be sacred, worshiped it and strongly guarded it.

Depending on site conditions, seeding of Siberian stone pine starts at the age of 30-80 years. Siberian pine nuts have excellent taste and vitamin properties. In the laboratories of the Tomsk University it has been proved that kernels of pine seeds contain a complex of vitamins that favor the growth of human body, strengthen the skin and are beneficial for the blood composition. During the processing of pine nuts it is possible to obtain 22% of oil, 19% of seed residues, and 52% of husk and cracked grains [6].

Until the present, pine seeds were used as a delicacy and primarily in the confectionery industry. Seed residues (a high quality food product) have been used in the production of halva and confectionery products.

Siberian pine nut kernels can be used to get high quality cedar oil, and cream containing two times more fats than cow creams and used for medicinal purposes (for the treatment of nervous disorders, kidney diseases, tuberculosis, lung diseases, etc.). In its edibility and taste characteristics, cedar oil is highly competitive with the best kinds of vegetable oils, including olive oil. The fat content in pine seeds ranges from 50 to 80% of the kernel weight, and is significantly higher than in seeds of most oil plants. In the late 19th century a relatively large plant for the production of cedar oil was built in Ulan-Ude, and later in Irkutsk and in the settlement of Krasnyi Yar (Zabaikalskii krai). However, in the Soviet era this production was closed down because of the high production cost of oil and insufficient yield of Siberian pine nuts. To make pine nuts a suitable raw material for fats-and-oils industry, it was necessary to reduce their production cost by half [6].

Siberian stone pine resin (oleoresin) is another type of raw material, which is possible to obtain in Siberian stone pine forests. Siberian pine oleoresin was used to produce cedar balm for optical
industry and microtechnology, immersion oil for microscopy, abietic acid, glycerol esters and plasticizers, and other valuable ingredients. During the Soviet period there were attempts to direct the pine nut business to the nation-wide planned course. However, a lot of mistakes were made in this regard.

In 1948-1952, the Ministry of Forestry of the USSR realized consolidation of forest raw-material bases for logging operators. As a result, all the best Siberian stone pine stands were included in the raw-material bases. Logging of Siberian stone pine began to increase rapidly, and in most cases it was carried out in the areas where historically pine nut commercial gathering was in common practice. Logging operations developed primarily those Siberian stone pine forests that were more accessible in terms of transport. In 1953, the government issued a decree on the allocation and conservation of pine nut production zones [7]. However, allocation of these zones occurred without establishing their boundaries at site, which led to felling of the most valuable Siberian stone pine stands [8]. Therefore, the pine nut production zones mainly included low-yielding Siberian stone pine forests located in remote, hardly accessible areas, as well as discontiguous massifs of Siberian stone pine stands. All this had a negative impact on the organization of the pine nut business and its profitability. Pine seeds harvesting became inefficient.

3. Result and discussion
During these years, 11 trusts were established with the view of the best use of Siberian stone pine forests. However, seven of them were stricken off almost immediately due to unprofitability. Such one-sided commercial units, aimed only at production of nuts, were unviable. All-year-round employment of workers and rhythmic work throughout a year also were not provided. Trusts survived only in four regions (Irkutsk region, Buryatia, Khabarovsk krai and Primorsky Krai). The largest association was in Irkutsk region, namely, Irkutsk Trust, which consisted of 20 fir farms (so-called “koopzveropromkhоз”, further KZPKh, i.e. a co-operative commercial-hunting farm). One of the largest KZPKhs in Irkutsk region was Zhigalovskii KZPKh, organized in 1959, and located 400 km from Irkutsk and 270 km from the nearest railway station. By the example of the Zhigalovskii KZPKh the paper considers the development of the Siberian stone pine nut business in Irkutsk region as this example is typical of the entire Siberian region.

A relatively organized Siberian stone pine nut production has started with the organization of KZPKhs in Siberia; a good material and technological base was created, regular and seasonal workers were involved, and hunting management planning and other reproduction activities were conducted. In the 1980s, one KZPKh on an average had 8 cars, 7 tractors, 8 motor boats, 4 snowmobiles, 14 horses, 13 deer, 5 radio stations, 138 huts, and 4 commercial bases [9].

In the 1990s, the number of regular employees in the Zhigalovskii KZPKh was 16-17 people, and the managerial staff amounted to 6-7 people. During the commercial period, the KZPKh, as a rule, hired seasonal workers, the number of which was 20-25 times more than the number of regular workers (an average of 500 people per year).

To gather pine seeds 15 thousand seasonal workings were involved annually in Irkutsk region. This figure is quite real, because up to 15 thousand seasonal nutters participated on repeated occasions in the Siberian stone pine nut commercial gathering.

With the establishment of the KZPKh, the areas of Siberian stone pine forests being under development expanded dramatically. Over a decade of working KZPKh area developed cedar forests of Siberia has increased almost 8 times (to 81.9 thousand ha). However, the actual products KZPKh accounted for only 0.37 percent of the biological yield. Thus, strictly speaking, the real production of pine nuts, in the full sense of the word, was not actually created.

This is evidenced by the volume of commercial production and profitability of production. In the KZPKh, more than half of the commodity output was products of industrial wood processing (sawn timber, roundwood, etc.). In the 1990s, the overall production profitability of the KZPKh was 33%, and profitability of the commercial activity amounted to only 9%. The state order accounted for 60-70% of marketable products of the KZPKh [9].
Economic efficiency of fur trapping also appeared to be low due to the high cost of fur production. This is evidenced by cost calculation of commercial furs for 1981 [10].

All this determined a reduction in production and a gradual decrease in the role of Siberian stone pine nut business for Irkutsk region and Siberia in general. This is due to many reasons, namely: low labor productivity and profitability of production, high production costs, poor organization and equipment of labor, lack of industrial infrastructure, etc. While before the 1990s relatively organized harvesting of pine nuts took place, local population and people from other areas were involved, and arrival of workers to the field and their departure were organized, since the beginning of the 1990s it has stopped.

Thus, by the example of the Zhigalovskii KZPKh a typical development of nut industry in Siberia during the Soviet era and its degradation with the beginning of the market economy are observed. In view of the above said, the following negative aspects that have hindered the development of the pine nut business on the whole were noted:

- Low-margin traditional methods of organization, extreme backwardness of the technology of procurement and processing of cones and low labor productivity caused, in addition to high labor expenses, relatively high cost of nuts.
- Attracting hundreds and thousands of seasonal workers, koopzveropromhozes used human labor inefficiently. Harvesting of pine nuts is accomplished mainly manually. It is necessary to perform the following operations: to knock down cones from a tree; to carry cones to places of primary processing; to thresh, sift and winnow nuts; to dry nuts in the sun or in a dryer; to store nuts in places of primary processing; to transport nuts from a forest to a warehouse of an enterprise. All this is descriptive of low labor productivity (on average 20-25 kg of pure nut per person-day).
- A situation, where less profitable massifs were developed and more profitable ones remained undeveloped, was often observed in KZPKhs. All this indicates that harvesting was carried out without economic justification and with poor organization of production.

Concluding on the development of the pine nut business it can be noted that the organization of KZPKhs still contributed to a better development of resources of the Siberian stone pine taiga despite some of their shortcomings.

The total area under the Siberian stone pine forests in Russia is 39.5 million hectares, 57.2% of which are in Eastern Siberia, including 17.5% in Irkutsk region. Of the total area of Siberian stone pine forests more than 9.5 million hectares (24%) were distinguished as nut gathering areas (including 7.2 million hectares (75%) in Eastern Siberia) [11].

However, human economic activities lead to a permanent reduction in the area of Siberian stone pine forests. Mass fires in 1984-1990 in Irkutsk region covered the central and northeastern parts of the region and caused enormous damage to pine nut gathering. Exploration and development of the Kovykta gas and condensate field in the same region also led to the reduction in the area of Siberian stone pine forests and in yields.

In recent years, in some areas of Siberia and the Far East harvesting and processing of non-timber resources have been actively developing. Wild plants are collected by local population and purchased by small firms or private entrepreneurs. Particularly, harvesting of pine nuts is carried out only by small households. In summer months, up to 40% of the population of forest villages are involved in harvesting of mushrooms, berries and pine nuts. Products of forest industries are in higher demand in the domestic and external markets, which determines the steady increase in purchase prices and stimulate the development of the Siberian stone pine nut production.

A social study of the rural population of Irkutsk region, conducted by us in 2005, showed that cash and in-kind incomes from the informal sector, including the pine nut business, account for a significant share of the total household budget. It provides opportunities for the local population to make purchases of durable goods (furniture, appliances, clothes, etc.). Currently, cash and in-kind payments from the informal sector are not officially recorded, so we can only speculate about its profitability based on the market value of its products (for example, the average price of shelled pine nuts is 280 rub./kg, which is 2-3 times higher than the cost of other kinds of nuts). Thus, the pine nut
production is currently one of the ways to generate additional income for the rural population. However, there are some problems: the absence of regular buyers, high cost of nuts, as well as the fact that incomes are not permanent as they depend on seasonal work, natural conditions, yield, etc.

4. Conclusion
Based on the foregoing, it may be concluded that commercial activities in Siberian stone pine forests can be of great importance in the economic territorial structure. Many researchers claim that complex exploitation of Siberian stone pine forests is more profitable as compared to cutting, but all these authors present very approximate calculations because of the lack of a complete inventory and due to the fact that many resources of Siberian stone pine forests are not exploited or used to the smallest extent [6].

Siberian stone pine forests are being reduced irreversibly and ruthlessly as a result of massive fires and deforestation [6]. The role of the pine nut business in the regional economy can increase with the development of the recreational sector and infrastructure, as well as with the reorientation of companies in this industry for the production of products for the sphere of tourist services (e.g., cones-souvenirs and others).

References
[1] Konstantinov Y 2002 Soviet and Post-Soviet Reindeer-Herding Collectives: Transitional Slogans in Murmansk Region. People and the Land. Pathways to Reform in Post-Soviet Siberia ed. Kasten E (Berlin: Dietrich Reimer Verlag) pp 172–87
[2] Newell J and Vandergrift P 2003 Illegal logging in the Russian Far East and Siberia. International Forestry Review 5(3) 303–6
[3] Newell J 2006 Timber in the Russian Far East and potential transborder conflict Russian Business Power: The Role of Russian Business in Foreign and Security Relations (New York: Routledge) pp 239–59
[4] Olimpieva I, Pachenkov O and Solovyeva Z 2005 Informal Economy of Forest Exploitation (Moscow: MONF) p 17
[5] Donahoe B 2009 The Law as a Source of Environmental Justice Environmental Justice and Sustainability in the Former Soviet Union (Cambridge: The MIT Press) pp 21–46
[6] Permyakov B G 1986 Our Siberian Stone Pine (Irkutsk: Vost.-Sib. kn. Izd.) p 208
[7] Motovilov G P and Shcherbakov N M 1962 Principles of allocation of the pine nut production zones and their organizational-economic division in forest management Organization of Forest Management and Forest Inventory Issue 1 (Krasnoyarsk: Krasnoyarskoe kn. Izd.) pp 5–35
[8] Ozhegov S I 2008 Russian Language Dictionary: Approx. 53000 Words Gen. ed. by prof. L I Skvortsov 24th ed. (Moscow: OOO “Izd. Oniks”) p 1200
[9] Malykh G I 1983 Geography of the Forest Industry of New Development Areas (by the Example of Priangarie) Scientific Report. (Irkutsk) p 170
[10] Stakhrovsky E V, Deryagin V N and Dzhkin V V 1985 Organization of Hunting Industry (Moscow: Agropromizdat) p 159
[11] Kutuzov P K 1955 The Wealth of Siberian Stone Pine Taiga (Krasnoyarsk: Krasnoyarskoe kn. Izd.) p 80