

УДК 69.059.22

## **The Estimation of the State of Objects in the Settlements of Evenki and Taimyr Autonomous Districts**

**Vladimir I. Kirko,  
Lyudmila M. Fatkulina-Yaskova\*, Vasily V. Zaharuta**  
*Siberian Federal University  
79 Svobodny, Krasnoyarsk, 660041 Russia<sup>1</sup>*

Received 20.05.2012, received in revised form 29.08.2012, accepted 30.08.2012

---

*In this paper we present goals, objectives and results of the project "Development of the mechanisms of involvement of indigenous people into innovative socioeconomic processes with participation of a federal educational organization" for year 2010. The basic research methods and the results of analysis of the technical state of buildings in the northern settlements Essey and Nosok are given. The analysis of the traditional nomadic dwelling places and the present northern settlement accommodations is carried out and presented. Degradation and defects of existing buildings are described in details. The analysis of the current state of construction of the new objects in the northern settlements is presented.*

*Keywords: Evenkiya and Taimyr, estimation of technical condition, development of the modern northern settlement model*

---

### **Introduction**

The northern territories play a great role in the national economy. The basic resource and productive potential of the mining operations is concentrated in the region. At the same time their industrial development plays a negative role in the traditional nature management of the indigenous peoples who, to the great extent depend on the state of environment.

The situation with the dwelling places and traditional economic activity of the indigenous peoples (low living standard, loss of language and traditions, etc.) requires active participation of business and science in order to contribute

to the innovation-based social and economic development of the territories.

One of the most important priorities of the Russian Federation state policy is innovative economy, which requires creation of the proper support infrastructure that may provide favorable environment for the formation of the effective industry, application of knowledge and realization and development of the high technologies.

In previous research papers (Verhovets et al., 2010, pp. 1-5; Kirko, 2011, pp. 86-97) the usage of such an effective instrument as business incubator which staff consists of the representatives of the university, the territorial

---

\* Corresponding author E-mail address: lyudmila-fatkulina1989@mail.ru

<sup>1</sup> © Siberian Federal University. All rights reserved

administration, financial industrial groups and enterprises, who function within the territories, was suggested for the development of the territorial social economics. This is realization of the innovation and development business model, called “the triple spiral”, which was suggested by G. Itskevich (Itskovits, 2010).

In this case, the university as an autonomous institution with its scientific technical potential along with the authorities of different levels, science and industry are capable of complex participation in the territorial development through the structure of the business incubator.

Creation of the business incubator can contribute both to economic and sociocultural development of the region. Its realization can provide high living standards, competitiveness of industry and preservation of cultural heritage of the indigenous minorities (Kirko, 2011, pp. 1127-1131).

### **Goals and objectives of the research**

Since 2010 Siberian Federal University (SFU) has been carrying on a project “Development of the mechanisms of involvement of indigenous people into innovative socioeconomic processes with participation of a federal educational organization (by the example of SFU)” thanks to the financial support of the Federal special-purpose programme “Academic and teaching staff of innovative Russia” (code 2010 – 1.2.1- 102 -115) and the fund of the scientific and scientific technical activities support of the Krasnoyarsk region.

A the project has been aimed at the creation of the complex development conditions of the northern territories, protection of the primordial habitat of the small ethnic communities and their traditional economic activities in the north of the Krasnoyarsk region.

The aim, mentioned above determines goals and objectives of the research.

The aim of the research is to develop a complex model of the northern settlement in the dwelling places of the indigenous peoples with their traditional crafts.

In order to bring it into life there are several tasks to be solved:

1. To study the constructions and living spaces of the northern settlements;
2. To carry out the study of architectural design of the settlements;
3. To work out the model of architectural design of the modern northern settlement;
4. To work out heat-and-power engineering support of the modern northern settlement;
5. To modernize medical service in the Extreme North conditions;
6. To work out an innovative industrial model aimed at provision of the settlements with self-sufficient industry of complete local processing of products, trade of the traditional objects of art, tourism, etc.

### **Research methods**

The basic methods that were used are the following:

- The method of planning of the training expert seminars organized by SFU, Krasnoyarsk State Agrarian University and Medical Academy where participated the members of the public authorities, the local administration and the settlement dwellers;
- The method of interview and public poll opinion of the dwellers;
- The method of the visual inspection of buildings;
- The analysis of socioeconomic state of the settlements and their industrial potential.

A peculiarity of the project activities lies in the fact, that they were carried out with



a



b

Fig. 1. The photographs of Essey (a) and Nosok (b) settlements

the participation of the lecturers, aspirants and students of different specialties – culture experts, architect engineers, builders, engineers-physicists and experts in the field of agricultural products processing, health workers and experts in industrial management.

*The settlements under investigation were:*

- The settlement Essey (Fig. 1a) – a local dwelling place with the population of 600 Yakuts who are occupied in fishing and hunting. It is situated within the Polar circle in the basin of the Kotuy river in the north of Evenkiya Autonomous District (the Krasnoyarsk region) on the shore of the big freshwater lake of the same name. It is situated in an intermountain trough and has an oval shape. The lake's shore is greatly embayed. Its surface area is 238 km<sup>2</sup>.
- Nosok settlement (Fig. 2b) is a local dwelling place of mainly Nenetsy occupied with fishing and hunting as well. 1200 people are registered and about half of them live in tundra and nomadize. It is situated within the Polar circle in Taimyr Dolgano-Nenets autonomous district of the Krasnoyarsk region on the bank of Ushakov branch in the mouth of the Yenisei river.

The project seminars, questionnaire poll and interviews with the dwellers revealed that ecologically safe accommodations in the settlements and the ones for nomadic reindeer breeders and fishers are in a strong need of improvement of the life standards of the people (Kirko, 2011, pp. 1127-1131).

In this paper we present the results of the analysis of the technical state of the buildings in the settlements of Taimyr Dolgano-Nenets and Evenkiya autonomous districts of the Krasnoyarsk region. The models of the dwelling houses and settlement, based on the interview of the dwellers, are created.

#### **The analysis of the traditional nomadic dwelling place**

Any northern dwelling place is different from the modern one because it have never had comfort conditions for living, but regardless of its numerous drawbacks it remains an indispensable shelter, protecting from bad weather and cold nights in the severe northern climate.

Practically in any settlement where the dwellers are occupied with traditional activities they have a reindeer-skin tent and balok which are so necessary in tundra. The exterior of such a dwelling place of different ethnos is the same, the interior, however, has a number of differences.

*a**b*

Fig. 2. Photos of the traditional tent (Nosok, 2011)

For instance, the dwellers of Nosok settlement prefer to cover their nomadic dwelling place with reindeer skin even in summer, but in Essey tarpaulin covers are used.

In figure 2 the photographs of a typical tent are presented. 25 to 50 smooth wooden poles from 5 up to 7 meters long which point the lower ends are used for its construction. Their upper ends are placed onto 2 base poles that are tied at their ends with the leather belts. In winter a chimney of a cast-iron moveable wood stove is put through the hole between the poles.

In winter a cone, formed by the poles is covered with a double layer of reindeer skins called nyuks. 2 nyuks of thin dry skins are placed onto the cone with its fur inward and 2 nyuks with the fur outward. Up to 15 skins are needed for sewing every nyuk. In summer one layer of tarpaulin cover is used.

Nyuks are placed onto the cone in such a way that the chimney hole should be wide enough for the day light to penetrate into the interior. During the hours of darkness the kerosene lamp is being lit.

In winter inside the tent the planed painted floor boards are placed onto ground to the left and right of the stove. Behind the stove there is a sacred pole called symsi, behind which there is a table for products and men's things – wood-working tools, lasso, etc.

The place behind the pole is thought to be sacred. There is also a little dining table there. In the centre of the summer tent the fire is lit. A metal rod with a hook for cauldron is placed at the height of 1.5 meters onto symsi and 2 horizontal poles are tied to 2 entrance poles.

The difficulties of putting the tent up in blizzard led to the fact that some dwellers started to use the so-called baloks as winter nomadic dwelling places, transported over tundra in an assembled, ready to use form (Fig. 3).

The first baloks started to appear in 1930s. And the construction of balok was borrowed from the Dolgans. Nowadays this construction can be met all over the settlements of Evenkiya and Taimyr autonomous districts.

Balok is a rectangular closed sleigh having a frame covered with reindeer skins or tarpaulin. Its entrance is oriented southeast. In the room the cast-iron moveable wood stove is placed for heating and there is a stove bench for the night.

The temporary dwelling places of the type above are used by nomadic northerners. There are some other traditional dwelling places such as so-called holomo (Fig. 4).

Holomo is Yakuts' traditional dwelling place used nowadays as a large kitchen in summer. The structure is based on a frame of logs and is made of crossing poles covered with birch bark.



Fig. 3. Winter nomadic dwelling place (balok)



*a*



*b*

Fig. 4. Photos of holomo

It is of rectangular or hexagonal shape but there are also octagonal ones. The most common one is hexagonal. In the centre of the dwelling place, bearing upright is the set with an upper frame for fastening the covering structure.

Such a kitchen is often made of logs or squared beams. Recently they have started putting up the supporting frame made of wooden uprights and making the covering structure of heat insulated panels.

The building culture is saved by the dwellers not in all the northern settlements, many of which have a dominating town planning design – the straight streets and the modern buildings. This leads to the disappearance of the national ethnic patrimony and the northern folk culture.

The settlements' dwellers, however, maintain traditions and try to save what was left after their

relatives and ancestors. For instance, in Essey there is holomo almost in every court and it is used not only for cooking and sleeping, but it is the most important cultural historical heritage of Essey's Yakuts.

It is necessary to note that no modern technologies, equipment and materials have been used for the construction of tent, holomo and balok. The research revealed that when using modern materials a tent would be 10 times lighter and not 700 kg. It would be assembled several times faster and its construction would be improved.

#### **The analysis of the contemporary northern settlement accommodations**

When the settlements were built, wood was the only suitable and available construction



Fig. 5. Photos of the typical houses in Essey (a) and Nosok (b)

material. Nowadays regardless of a great choice of building materials log and beam remain the main elements when building any objects. There was an operating wood processing plant on Dickson that supplied timber to every northern coastal settlement, including Nosok.

At present it doesn't operate and all the timber is transported by the Yenisei river during a short shipping season.

The timber is supplied to Essey by a winter road over a frozen river and because of the lack of money it is bartered from dwellers for deer carcasses. The timber price reaches up to 35000 rubles per cubic metre.

Severe climate, permafrost, difficulties with supply and high prices of the materials and equipment transportation make difficulties for object construction and maintenance. The unemployment prevents the dwellers from taking mortgage credits.

Moreover, the situation is more difficult because of the absence of professional construction workers. Self-built objects quickly become unfit for use and the quality of the bearing structures becomes worse, what leads to the objects destruction.

In Fig. 5 photos of the typical houses in northern settlements are presented.

Till the present time in self-built houses so-called "gorodki" structure (Fig. 6) is used as the foundation of houses. It leaves a ventilation gap between the ground and house's floor and solves the problem of the ground defrosting.

The whole structure is made of short wooden bars, placed layer by layer over each other, with a perpendicular orientation of bars in adjacent layers. The bars are fastened together with nails or cramps.

A peculiarity of Essey is that like many decades before, stem families build their houses near each other. Parents die and their children occupy their houses.

After many years, the bearing structures of the houses become worse and it is dangerous to live in them. Some families don't dare to demolish their deceased parents' houses, regarding it to be a great sin. The house is left intact until it burns or goes to ruins. There are plenty of such houses in the settlement. This leads to the settlement rearrangement according to the ethical norms.

In Fig. 7 there is presented a photo of new and deserted houses in Essey.

In such a case, the street and settlement structure as a whole is impossible to improve in the nearest future. There are two ways out –



Fig. 6. Photo of the “gorodki” structure



Fig. 7. A photo of the new and deserted houses in Essey

either to build a new settlement in another area or to demolish old houses that prevent building the new ones.

In the last case the problem is not solved, because the houses that were built to replace the older ones were burnt by the local dwellers. That demonstrated inadmissibility to violate the national traditions and beliefs.

In this situation it is necessary to find the way to building new accommodations that would both meet all the construction norms requirements and take into account the national traditions.

#### **The analysis of degradation and defects of the existing buildings**

While the first estimation of the state of the objects, it is possible to make a comparison of the housing stock in the settlements Essey and Nosok.

In Nosok there are no objects that have been repaired for the last 5 – 10 years. In Essey the dwellers repair their houses by themselves.

According to the inspection results is possible to divide all the housing stock in Nosok to the categories according to the technical state:



Fig. 8. A photo of beam structural decay under the influence of atmospheric precipitation



Fig.9. A photo of curvature, loss of the roof structure stability and damage to the roof coat

- the houses with the possibility of accidents comprise 45% of the stock. Those are houses built in the 50s and 70s of the last century. It is dangerous to live in them. The extent of wear is from 50 up to 60 %.
- 35% of the stock has limited condition for life. These are the houses that were built in the 80s. The extent of wear is from 30 up to 40%.
- 16% barely meets the requirements of standards and have the rate of extent of 30%.
- The buildings with good living conditions and new uncompleted construction objects comprise 2% of the stock.

The basic revealed defects and damages are:

- complete soakage of the foundation and floor structures; dampness of the cellar because of the hydro isolation failure, foundation decay and bad ventilation

conditions. The latter leads to the decay of wood (Fig. 8) and curvature of a house (Fig. 9).

- 50% and more wear of the bearing and filler structures which state is regarded to be dangerous for living;
- The used timber doesn't meet the requirements of the existing norms, heat engineering standards characteristics, sanitary-epidemiological and fire-prevention requirements;
- The living areas of the most accommodations don't correspond to the requirements;
- The used building technologies don't meet the heat engineering and sound proofing requirements.
  - o Recommendations that can be given in this case are the following:
- To build new houses in Nosok that substitute those which are in irreparable





Fig. 10. The photograph of the damage of wall covering

state and limit people's access to such objects;

- To repair, strengthen or replace the structures which are in limited functional condition, to rebuild the bearing structures and to improve the heat engineering characteristics of the filler structure;
- The building of the new houses or their reconstruction has to be performed by the professional organizations according to the performance requirements.

In Essey the main revealed defects is the damage of roof and wall covering (Fig. 10), as well as filler structure damage and slight curvature of the roof framing. Logs and beams, the houses were built of require partial replacement, reinforcement or heat insulation.

Significant infringement of standards when building the objects was not revealed. On the whole, the condition of all the houses can be estimated as functional.

#### **The analysis of the current construction state in the northern settlements**

Time-frames of an object erection is the main factor taken into account in the process of construction works in the northern settlements. That is why when choosing the construction

technology and materials the special preference is given to the materials using which it is possible to build the house in the short period time and which doesn't require a great number of workers and heavy machinery – frame panel technology and SIP-panel technology (Internet resource: [www.hotwell.ru](http://www.hotwell.ru)). In Figure 11 house erection with the help of frame panel technology is presented .

A comparatively low price, high erection rate, good thermal insulation and sound-proof characteristics are the advantages of the technology. The use of the modern highly effective protective liquids allows increasing the frame panel house's "life". Moreover, thanks to the structure features, the general overhaul can be made part by part.

Modern finishing materials can give the house any exterior. Absence of limitations in forms of houses and high erection rate (10 to 30 days) have become the most sufficient advantages of the technology.

6 semi-detached houses were built in Nosok. And they plan to built more than ten houses at the expenses of the regional budget.

The usage of the foamed polystyrene which emits deadly poisonous gases when burning, and absence of ventilation holes are the main drawbacks. The latter leads to the fact that steam



Fig. 11. Erection of the house in Nosok with the help of frame panel technology



Fig. 12. A house built of beams in Essey

condensate is accumulated inside the houses and results into premature decay of the houses and furniture and increased humidity.

Moreover, the absence of sound-proofing lagging in separation walls results in higher audibility.

Another problem is that the houses are assembled by amateurs. Infringement of standards, defects and mistakes lead to cracks, frost penetration and curvature of the horizontal structures.

For these reasons some regions of the Evenkiya Autonomous district refused to use this technology. For instance, in Essey the new houses are constructed in natural wood (Fig. 12). The dwellers disapprove of the new technologies and prefer to use only some of the modern materials for heat insulation of the houses' filler structure.

When constructing larger objects such as schools, hospitals and kindergartens a metal frame covered with sandwich panels is mounted (Internet resource: [diwall.ru/Sandwich-panels](http://diwall.ru/Sandwich-panels)).

Construction of such objects is carried out by the professional brigades of builders who perform their work professionally.

In Essey in August 2011 a kindergarten was put into operation (Fig. 13) and a school is being built at the moment. During the inspection of all the objects no significant infringements were found.

A checking calculation of the structures to determine the resistance to the heat transfer showed that all the structures meet the requirements on the thermal protection of buildings and are suitable to use in the severe northern climate.



Fig. 13. A kindergarten which was put into operation in Essey in August 2011 by “Spetsstroyontaz” construction firm (Novosibirsk, director I. A. Berestenko)



*a*



*b*

Fig. 14. Photos of cemeteries in Essey (a) and Nosok (b)

### **The analysis of state of the additional infrastructure objects in the northern settlements**

The additional infrastructure objects which are important for the provision of the necessary facilities in the northern settlements are roads, cemeteries and toilets.

In Fig. 14 the photos of cemeteries in Essey (a) and Nosok (b) are presented.

The main feature of the cemeteries in both settlements is that a coffin with the dead body is left on the ground. In Nosok it is covered with a thick tissue.

As can be seen in the photos the graves in the settlements' cemeteries are very

different and this fact may be caused by the differences in ancient national traditions. Essey's Yakuts emphasize their belonging to the Orthodox Church. Their coffins have the form of rectangular holomo (a). Partly intact old graveyards remained there.

The common feature is that near the grave a sledge, a head of deer and other things which were used by the dead people in their lives are placed.

The main disadvantage of the cemeteries is the absence of burial control and breach of the sanitary-hygienic norms, because in Essey the cemetery is located in the vicinity of the only drinking water source. In Nosok the cemeteries



Fig. 15. Some other infrastructure objects of the northern settlements

are located near the residential area and are easily reached by dogs and children due to the absence of fence.

In Fig. 15 some other infrastructure objects of the northern settlements the state of which the authors don't dare to comment are presented.

#### References

S.V. Verhovets, V.I. Kirko, etc., Rol federalnih universitetov v formirovanii regionalnoy innovatsionnoy infrastrukturi (na primere Sibirskogo federalnogo universiteta), Innovatsii, №10 (144), 2010, pp.1-5.;

V.I. Kirko. «The Model of the Regional Innovative Platform of the Autonomic Educational Institution on the Example of the Siberian Federal University» Anna V. Keusch, Journal of Siberian Federal University. Humanities & Social Sciences 1 (2011 4) 86-97;

H. Itskovits. Troynaya spiral. Universiteti – predpriyatia – gosudarstvo. Innovatsii v deystvii, perevod s angliyskogo pod red. A. F. Uvarova, Tomsk, Isdatelstvo Tomskogo gosuniversiteta system upravleniya I radioelektroniki, 2010. 238 p.;

V.I. Kirko. «The Evenkiya Municipal Region of the Krasnoyarsk Krai – an Experimental Field for Business Incubator Creation»/ N.P.Koptseva, A.V. Keusch, // Journal of Siberian Federal University. Humanities & Social Sciences 8 (2011 4) 1127-1131;

Internet resource: [www.hotwell.ru](http://www.hotwell.ru);

Internet resource: [diwall.ru/Sandwich-panels](http://diwall.ru/Sandwich-panels)

The work was carried out under the financial support of the Krasnoyarsk Kray Fund for the Science and Scientific and Technical Activities Support as well as the Federal Special-Purpose Programme “Scientific and Scientific and pedagogical staff of innovative Russia” for 2009 – 2013 years.

## **Оценка состояния объектов поселений**

### **Эвенкии и Таймыра**

**В.И. Кирко,  
Л.М. Фаткулина-Яськова, В.В. Захарюта**  
*Сибирский федеральный университет  
Россия 660041, Красноярск, пр. Свободный, 79*

---

*В статье представлены цели, задачи и результаты работ по проекту «Разработка механизмов вовлечения коренных народов Севера Красноярского края в инновационные социально-экономические процессы с участием федерального образовательного учреждения» на 2010 год. Приведены основные методы исследования и результаты анализа технического состояния зданий в северных поселках Ессей и Носок. Проведены и представлены анализ традиционного кочевого жилья и анализ существующего на данный момент жилья в самом поселке. Подробно описаны разрушения и дефекты существующих строений, и приведен анализ текущего состояния строительства новых объектов в этих поселках.*

*Ключевые слова: Эвенкия и Таймыр, оценка технического состояния, разработка модели современного северного поселка.*

---