

Ecological Problems of Construction of a Mountain Ski Resort in Kok-Zhailau Hollow

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The city of Almaty is the leader by the level of atmospheric pollution in Kazakhstan.

Auto-transport became the main source of pollution in the recent years (more than 90% of the total emissions volume).

The main stationary sources of pollution are heat and electricity power stations and burning stoves from private houses.

From three sides, the city is surrounded by mountains, and wind activity is weak, therefore, often, there is a lack of wind, fogs and surface inversions, which impede dispersion of particles in the air. This contributes to accumulation of pollutants in the surface layer of the air.

Oxygen content in the air decreases. For example, according to “Kazgidromet” data, in the 50s, oxygen content in the air was 21%, and now it is only 17%.

According to observation results, in September 2013, index of atmospheric pollution (IZA5) was 10.5 (which is a high level of pollution). Average concentration of formaldehyde was 3.3 times higher than the maximum permissible concentration (MPC), nitrogen dioxide – 2.9 times higher than the MPC. Maximum one-time concentration of nitrogen dioxide was 4.7 higher than the MPC, carbon monoxide – 1.6 higher than the MPC.¹

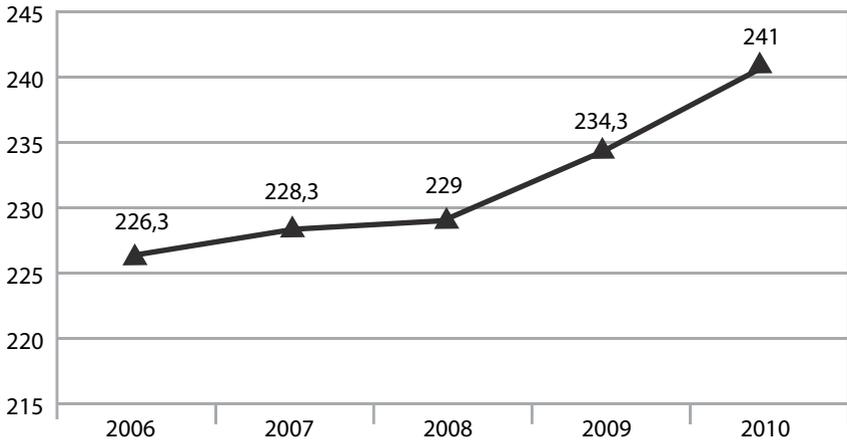
For the last 10 years, sickness rate in Almaty increased on 50%. For the number of cases of **respiratory, endocrine, and vascular system illnesses, malignant neoplasms, bronchial asthma among children, the city takes the first place in the republic**. The figure below illustrates dynamics of cancer cases in Almaty for the period from 2006 to 2010 (number of cases per 100,000 people).

The ecological situation in the city is mitigated by green vegetation and the mountain ridge located nearby.

Sanitary and hygienic functions of the green vegetation include:

¹ <http://www.eco.gov.kz/new2012/activity-of-state-authority/information-about-the-environmental-situation-in-the-regions-of-kazakhstan/ecobul/>.

Dynamics of cancer cases in Almaty for the period from 2006 to 2010 (number of cases per 100,000 people)



maintaining oxygen balance in the air, decreasing dust particles and gasses pollution in the air, protection from wind, phytoncide action, decreasing noise level, improving radiation patterns. Besides, the vegetation influences heat patterns and air humidity, greenhouse gas emissions in the higher layers of atmosphere.

Some references indicate that an average tree produces oxygen enough for three people. Also according to some statistics, one hectare of deciduous trees absorbs up to 100 tons of dust per year.

The most active providers of oxygen are poplars. 1 hectare of poplar trees emits 40 times more oxygen into atmosphere than 1 hectare of fir trees. At the present time in Almaty, there is a trend of turning mature trees into bushes by cutting them down almost down to the roots. For example, a 45-year-old tree with a gigantic branch crown which offers shade, produces massive amounts of oxygen, provides a nesting place for birds would be turned into a two- or three-meter stump with one-meter-long branches trimmed in a shape of a sphere. Such method of “maintenance” brings to a minimum the benefits of the trees survived after massive tree cuts in the city.

According to Dialog.KZ web-portal, in 2010, more than 18 thousands of hundred-year poplars and elms were cut down. In return, the city authorities supposedly planted 24 thousand saplings. But the young trees will need dozens of years to reach the “projected capacity.”

As reported by the information agency Kazakhstan Today, ecologists suspect that the recent hurricanes in Almaty could be caused by the tree

cuts in the city and the suburban woodland belt. The trees played a role of a protection shield, which would dissipate gusts of wind. The ecologists also do not exclude the idea that decreasing number of trees in the city contributes to contrast temperatures in the air which cause vortex currents and strong winds. Thus, ecological situation in Almaty in the present time turns out to be quite depressing.

Research about influence of environmental pollution on sickness and death rate in Almaty conducted by the Kazakhstan Institute of Mineral Materials in the 90s, showed that life expectancy significantly depends on the level of pollution. And the zones with the highest life expectancy were noticed in the areas near large green zones or those laying closer to the mountains: Koktube, botanical garden, parks, Baum grove.

In a large extent, atmospheric air in the city becomes cleaner with the help of a mountain-valley circulating wind. At night, it blows from the mountains covered with glaciers, during the day – in the reverse direction. When flowing down from the glaciers, the air passes forest areas of the mountains and the foothills, where it gets enriched by oxygen and phytoncides, and its humidity increases. During the reverse movement, the polluted city air elevates up till the glaciers. Along its movement, most of the suspended polluting particles settle down in the green zone, its gasses pollution also decreases.

Factors which **decrease** effectiveness of purification of the air in the city are, first of all, building up the foothills and mountain zone, and also ill-conceived construction development within the city limits which blocks the natural air movement in horizontal direction.

In the soviet times, it was allowed to build summer houses (dachas) in the foothills. An obligatory condition for that was a limited height of the summer homes, and also planting the plot with fruit trees and plants. In these conditions, negative influence of the buildings was insignificant and was expressed in emissions from few vehicles and from burning stoves at some of the dachas in winter time.

In the post-soviet period, an intensive building up of the mountain and foothill zones began. Many-storied mansions were built in Chimbulak, Butakovskoe holloe, Kamenskoe Plateau, Kimasar hollow, Gorniy Gigant, Yubileyniy village, Bolshoi Almatinskiy canyon, and others. The construction development was conducted even in Ile-Alatau National Park.

The construction development required clear-cutting, elimination of vegetation, taking down of hills, construction of roads and infrastructure. And often, the construction waste was thrown away into hollows and river beds, littering and polluting water and soil. As a result, the green zone significantly decreased which affected the oxygen balance in the air, and the extent of purification of polluted air from dust and gasses reduced. Vast area



of construction developments and many-storey buildings affected the heat and wind patterns not only in the mountain and foothill zones, but also in the city. Besides, number of auto-vehicles in these zones boosted which in its turn increased the amount of emissions. Even visual observations show that the polluted air spreads higher and higher into the mountains, reaching Kok-Zhailau and Medeo. Thus, any construction development in the mountain areas adjacent to the city not only decreases favorable influence of the mountains, but becomes an additional source of air pollution in the city.

At the present time, a project of construction of a new international mountain ski resort “Kokzhailau” with a total length of ski tracks of more than 50 km is being developed. The resort is proposed to be built on the territory between Bolshaya and Malaya Almatinka Rivers. Projected area of the resort is 2,865 square hectares.² The project involves construction of passenger cable ways, hotels, restaurants, malls, and golf fields, and also building of infrastructure – auto road, parking lots, electrical and water supply systems. According to the Minister of Industry and New Technologies, Asset Issekeshiev, construction of the mountain ski resort on Kok-Zhailau will allow creation of up to 100 thousand workplaces.

² <https://docs.google.com/open?id=0BzXhutyNABDrSWRsNUIteUx1bGM>.

The press and Internet actively discuss this project. From the side of tourists, mountain lovers, and the city residents, the project found very negative responses. And only public officials insist on its implementation. And their arguments are often based on the following presuppositions:

“In Kok-Zhailau hollow, according to experts, - said the head of the tourism department, Bakhytzhan Zhulamanov, - average duration of skiing season is 7 months.” According to B.Zhulamanov, Kok-Zhailau is visited by a maximum of 100 people per day in winter, and 500 – in summer. Construction of the resort will allow increasing this number in several times.

“Thanks to this project, we will pull out tourism for the whole country, like Alps pulled out in Switzerland... This is, indeed, a strategic object, which has a state importance,” – said Akhan Bizhanov, chairman of the Committee of Social and Cultural Development. “Examples of Austria and Switzerland show that mountain tourism is capable to generate up to 10% of GDP of a country... We are talking about leaving the raw material dependency of the economy and diversification of the economy – from industrial enterprises to ecological services,” – he said.

These statements sound very doubtful.

First of all, total amount of precipitation at the altitude of 2,300-2,500 m is a little more than 800 mm (0.8 m) per year, and the depth of the snow cover on the plateau does not exceed 1.5 m. Stable snow cover is established not earlier than in mid November and continues only till March, and at the latitude of 2,500-3,000 – till April, i.e. average duration of skiing season does not exceed 4-5 months.

At the present time, Kok-Zhailau is visited by more than 500 people per day during weekends, and in winter the number of visitors is not less than in summer. During week-days, Kok-Zhailau is visited by up to one hundred people. During off-season, the number of tourists is a little smaller. But it should be noticed that we are talking about a territory of a national park, and allowed recreational pressure is limited.

Territory of Kazakhstan is 2 million 724.9 thousand square km, Zailiisky Alatau which lays almost perfectly along a latitude line, occupies 14 thousand square km (length – about 280 km and width is 40-60 km), or 0.5% of the territory of the republic. Ile-Alatau National Park, founded in 1996, has a territory of about 200 thousand hectares (2,000 square km) – 14% of the territory of Zailiisky Alatau. Forests in Kazakhstan occupy only 5.5%.

In Switzerland, mountains occupy almost two thirds of the territory of the country – 41,284 square km. About 25% of the territory of Switzerland is covered by forests. In Austria, which territory is 83,871 sq.km, 70% is occupied by mountains.

Territory of Zailiisky Alatau is almost 3 times less than the mountain

territory of Switzerland. Alps and Zailiisky Alatau differ by geo-morphological conditions.

Alps relief is characterized by long and wide intermountain valleys, plateaus, terraces, long and wide slopes. Basically, almost all mountain ski resorts are located in these valleys. They are located at the altitude of 1,400-1,800 m. Mountain ski tracks are laid at the altitudes from 1,400 to 3,600 m stretching from 100 to 350 km (at the most famous and fashionable mountain resort St.Moritz). By complexity of the tracks, the resorts are oriented on mountain skiers of all levels. Snow line is 2,700-3,000 m which provides year-round skiing. All resorts are equipped with flatland ski tracks, snowboards, and other winter sports. Main popularity of the resort comes from the surrounding nature, highest level of service, excellently prepared slopes and lift systems, absolutely pure and transparent air. Many resorts in Switzerland prohibit auto-traffic.

Not a single resort in Switzerland or in Austria is located near large cities, especially in their recreational zones. And this is explained not so much by an influence of the resorts on ecology of the cities, but by a negative influence of the cities on ecological conditions of the resorts. Essentially, the resorts are located in special resort villages with all necessary infrastructures.

In spite of the high ecological requirements to the mountain ski resorts in Alps, the ecosystem there is already damaged and there are any ecological problems. Those are forest cuts, destruction of natural landscapes, intensification of erosion processes, damage to animal habitats, excessive water and energy consumption, air and water body's pollution.

President of the Union for International Cancer Control (UICC), Franco Cavalli, in one of his interviews stated that auto-transport in mountain areas causes terrible ecological consequences not only for the environment, but also for humans, and leads to massive cancer incidences.

Talking about a direct relation of the level of cancer incidence from the environmental conditions, the expert indicated that relief features in combination with the level of pollution can create hotbeds of cancer morbidity. He drew an example of one of the regions of environmentally clean Switzerland, where the level of cancer incidence increased in consequence of increase of a number of auto-vehicles.

“In Switzerland, there is one region which used to have the lowest indicator of lung cancer incidence. 30 years ago, a highway was built there to connect the center of Switzerland with the peripheries. This is an enclosed area surrounded by mountains. Situation with air pollution because of the highway construction is much worse right now than 10 years ago. 30 years after the road was built, this region became a leader by the level of lung cancer incidence,” – informed F.Cavalli.

Compare to Alps, orography and morphological features of Zailiisky Alatau mountains are less favorable for construction of mountain ski resorts. From the main mountain range, predominantly in meridian direction, ridges of a secondary degree are branching out and separate the main river basins. All river valleys in the upper parts are through valleys (троговые долины), in the lower parts, they turn into wide hollows and, in some places, gorges with kilometer-long cliffy walls. There are no wide intermountain, the Alps-like valleys in the vicinities of Almaty.

In no extent, Kok-Zhailau can claim to be compared to them, neither by the size, nor by the skiing conditions. Snow line of Zailiisky Alatau is located at 3,400-3,700 m which allows year-round skiing only on the glaciers

Thus, a comparison of natural conditions of Kazakhstan and Switzerland for development of mountain skiing is not in favor of Kazakhstan. Also, nature in our country is treated not at a high level. This is illustrated by the example of Chimbulak, where the mountain ski tracks are represented by eroded slopes which are lacking of soil and vegetation. Besides, in many spots, one can see random waste dump sites. During construction of mansions on Chimbulak, some of the construction waste was dumped from steep slopes directly into Malaya Almatinka River basin.

In many publications devoted to construction of a mountain ski resort on Kok-Zhailau, they consider different aspects: economy, ecology, society, sport. These aspects demonstrate groundlessness of this project.

Let us take a closer look at the ecological aspect of the project. Assurance of its supporters that the nature will not suffer during the construction does not stand up to any criticism. The ecological system has been forming for millions of years and any intrusion onto this system will disturb the established balance.

Impact on the environment during implementation of the project will take place during construction stage, as well as during operation of the site.

Construction stage foresees construction of roads, communications, buildings, platforms, lifts, mountain ski tracks, avalanche protection belts, and other facilities. During construction, road and building equipment will be used.

The main impact on atmospheric air will be made during ground works during construction of roads, ski tracks, and other facilities, and also during operation of auto-vehicles. Excavation works on the area of 100 square meters will produce dozens of tons of dust emissions per year, plus similar amount of dust being blew off from the surface of earth mounds. Operation of only one bulldozer produces more than 3 tons of carbon monoxide per year, nitrogen oxide – more than 300 kg per year, formaldehyde – up to 200 kg per year. A single vehicle working on diesel fuel emits more than a ton of polluting substances per year, including sulfur dioxide, nitrogen oxides, volatile organic

compounds, carbon monoxide, dust particles. Taking into account the scale of the construction, in actuality, many tons of contaminants can be expected to emit into atmosphere at this stage. Together with that, it can be expected that the dust and gas emissions will reach Maly Almatinsky and Bolshoi Almatinsky Canyons, spreading down to the city and up to the glaciers along the canyons.

Pollution of glaciers with dust emissions will increase their melting rate which will cause them to shrink down. This process is already taking place and not only because of climate change, but also because of atmospheric air pollution in the city, foothills, and mountains, which spreads up to the glaciers.

In the area of the projected construction, there are many springs, which give rise to creeks, which in their turn flow into Malaya and Bolshaya Almatinka Rivers. Obviously, they will suffer during the construction works. Construction of ski tracks requires flattening the slopes using heavy machinery, which can damage natural spring outlets and creek beds. Springs, creeks, and probably, ground water will be polluted not only with dirt particles and dust emissions, but also with oil product.

The construction will significantly impact the landscape and soil of the hollow. During construction of ski tracks, the primeval landscape will be destroyed. Soil layer is very thin in the mountains, especially on the slopes. It has been formed for thousands of years and can be easily destroyed by the construction. Even now, one can sometimes notice “bold” areas on the slopes which lack of any soil or vegetation. They could be caused by natural (mud slides) or anthropogenic (construction) factors. These areas are not overgrown for many years. A vivid example is Chimbulak. The slopes which used to be covered with deep vegetation, right now have “bold” spots without any soil and grass, in spite of some revegetation works (covering with turf). These spots are already subjected to erosion processes.

Flora of Maly Almatinsky Canyon consists of 811 species of plants, including 17 species listed in the Red Book of Kazakhstan, 11 endemic species. Abundance and diversity of flowers strike one’s imagination. Here, still remaining snowdrops (*Crocus alatavicus*), several species of tulips, including tulip of Ostrovsky (*Ostrowskiana Tulip*), primrose, globe-flower, various medicinal herbs, which used to grow abundantly in the city vicinities, and now they can only be seen in the untouched mountain regions or far enough from the city. Numerous shrubs grow on Kok-Zhailau plateau. The fir trees growing on the slopes are more than 100 years already, and thousands of young trees planted back in soviet time grow in the valley itself.

The territory designated for construction of the resort is a home to numerous animals, birds, and insects. Here one can meet roedeers, wild boars, foxes, ermines, marmots, snowcocks, and others. It is a home for lynx and

snow leopard. Here various species of birds, including birds of prey, build their nests. Number and variety of insects cannot be simply described.

With the construction of the resort facilities, all this diversity will be under a threat of reduction and elimination. A direct influence will be caused by operation of road machinery, forest clear-cutting, removal of soil and vegetation layer, and other corresponding works, i.e. this will cause destruction of a habitat. Indirect influence will come from pollution of air, ground and surface water, noise.

Thus, after completion of the construction works, despite of all measures undertaken to reduce the negative influence on the environment, the ecological balance will be irreversibly damaged.

During exploitation of the resort, the main impact on the environment will come from significant increase of pressure of the ecosystem. Easy access to the mountainous areas will raise the number of visitors many times which will cause reduction of diversity of flora and fauna and increase in number of illegal dumpsters. Already now, this can be observed along the constructed auto- and cable-roads.

It is projected that the resort will be visited by up to 1 million people per year. This means that if every tourist stays at the resort for, at least, one day, there will be about 3,000 people on the resort each day, with the duration of stay of 7 days – about 20,000 people. These people will need to be provided comfortable conditions, food and water. All of this will require significant increase in consumption of electrical energy and water. At the same time, this will generate large amounts of waste – dozens of tons per day, not counting illegal dumpsters and littering. Supplying food and other materials and removing waste will require use of auto-transport which will contribute to atmospheric pollution by the exhausts.

Deterioration of the ecological conditions in the recreational zone will negatively influence the ecological situation of the city itself, and at the same time, polluted air from the city will reach the resort. What can appear before the resort visitors' eyes? From one side – magnificent view on the mountains, from the other side – grayish brown smog over the city, which rises towards the resort by the end of a day. Such view can only cause negative emotions and will hardly promote attraction of tourists.