

# Ecological and Sanitary Problems of Kazan Province Industrial Development in the XIXth and Early XXth Centuries

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## Abstract

The article is aimed at the research of ecological and sanitary problems of Kazan province industrial development in the XIXth and early XXth centuries. The historical and ecological research approach applied in the work allows to come to a totally new level of studying Kazan province industrial development; it essentially expands existing ideas of the industrial development impact on the environment in the historical past. In the article there have been revealed and analyzed major features of emergence, development and solutions of sanitary ecological problems in Kazan province which arose due to the industrial development in the XIXth and early XXth centuries. The materials of the article can be used to draw up training courses on National and regional history, specialized courses on local history and historical and ecological subject.

**Keywords:** ecological and sanitary problems, ecological crisis, industrial development, Kazan province

## 1. Introduction

The development of civilization that is accompanied with aggravated contradictions between nature and increasing economic requirements of a society sets forth new tasks for historical science; they are connected with the search and analysis of regularities in the relationship between humankind and environment (Worster, 1993). It caused the emergence of a new branch of historical knowledge—environmental history in the 70s of the XXth century. Among the guidelines which have been developed within this discipline, one of the most actual is the environmental history of industrial development that investigates the origins of modern problems involved by economic growth in the context of its impact on natural systems (McNeill, 2008).

A number of objective difficulties, first of all the abundance of various climatic zones and various types of environmental management make historical and ecological researches of the territory of the Russian Federation rather complicated. The Republic of Tatarstan, one of the most economically developed subjects of Russia, can serve an example of the unique region that differs both by its natural originality, and economic structure. Dynamic economic growth of modern Tatarstan within a long period led to the formation of the whole complex of ecological problems, many of which originate in the previous historical periods (Kalimullin, 2011).

The XIXth century was a crucial period in the history of Russia and its many regions; it is marked by the transition from handicraft and manufactory to factory production (Ashton, 1948; Solov'ova, 1990). At this time there appeared first large enterprises and there were formed basic branches of industry that predetermined the subsequent character of civilization and environment relationship in Kazan province that later became the territorial basis for the formation of the Tatar Autonomous Soviet Socialist Republic borders (since 1990—the Republic of Tatarstan) during the Soviet period. Industrial development involved urbanization processes that were responsible for the growth of inhabited districts (Bairoch, 1986), and, therefore, transformation of natural landscape, establishment of the demographic order peculiar to modern society.

In this regard the study and perception of the experience of Kazan province industrial development in the XIXth and early XXth centuries is the most important condition to understand and solve the majority of Tatarstan modern ecological problems.

## 2. Historical Review

The research of various aspects of environment and humankind economic activity gained its greatest reflection in *historiography of foreign countries* who were the first to face ecological crises. Whereas such processes as the

industrial revolution, urbanization, large-scale factory industry development have a general historical character and identify a number of global regularities, works of foreign researchers often contain valuable approaches and materials that allow, by means of the comparative analysis, to reveal the range of problems concerning human and environment interaction, including the territory of Kazan province.

In foreign historiography the researches of D. G. Clapham (Clapham, 1926; 1928), T. S. Ashton (Ashton, 1948), A. L. Dunham (Dunham, 1955), etc. devoted to the industrial revolution are regarded as classical works. In the works of these authors there are stated chronological frameworks of industrial revolution in the countries of Western Europe (1760-1840); there are given indicators of basic industrial branches growth in Great Britain, France and Germany. All this allows to get the idea of industrial development rates both in the Russian Empire and Kazan province in comparison with chronologically identical periods in the history of leading world powers. The considerable part of researches is devoted to the history of some industrial branches on the continent of Europe. The works of L. Haber (Haber, 1969), E. Homburg, A. S. Travis, H. G. Shröter (The Chemical, 1998), etc. are of great interest as they describe various stages of chemical production development in Europe of the XIXth century.

At the turn of the XXth-XXIst centuries there were appeared researches which elaborated methodological bases of historical and ecological approach in domestic historiography, they comprehensively described ecological history of certain Russian regions. So, the impact of the mining industry on Ural ecology is considered in Alekseev and Gavrilov's works (2005); ecological problems of Ob-Irtysh North economic development are studied by Gololobov (2009). Kalimullin's (2005, 2006, 2011) researches have become the first complex works devoted to ecological history of Middle Volga in the second half of the XXth century.

Understanding of Kazan province industrial development experience and ways of factory enterprises organization here began in *regional historiography* in the 50s of the XIXth century. Thus, for example, in 1854, a year prior to the opening of Krestovnikov's factory, there was published Kittary's (1875) article "The project of stearine plant in Kazan"; it was followed by a number of analytical works devoted to industrial development. Valuable statistical data and their analysis can be found in the work "Turnovers of industry and trade in Kazan" by Krestovnikov (1870)—the owner of stearine soap factory. As for pre-revolutionary editions there should be singled out the collection "Materials for the Research of Crafts of Kazan Province population" (Materials, 1861), the work of V.N.Kosolapov devoted to domestic industries in the region (1901).

In the late 20s-30s at the period of Stalin's industrialization of the USSR, there were published a number of works devoted to the history of some industries in the Tatar Republic; Zalkind's (1930) and Trusfus's researches were of special interest. However, the history of Kazan industry was studied extensively from the middle of the XXth century: it was the time when the largest enterprises of Kazan and the region celebrated their foundation anniversaries; there were published works about their history. In 1950 there was published A. S. Klyucheich's research "History of Kazan fat-processing factory named after M. N. Vakhitov (1855-1945)" (Klyucheich, 1950), in 1960 N. G. Anisimov's monograph "The Kazan flax processing factory: 100 years" (about I. I. Alafuzov's former plant) was issued (Anisimov, 1960); they were followed by publications of Kashin, Volkov and Pashkovsky (1965). Ideological orientation of literature of this period is well-known. At the same time, the intention to represent the contrast between workers' position before the revolution of 1917 and after it forces authors to pay attention to ecological, sanitation, and health care issues.

The history of natural landscape transformation in Kazan province, mainly reservoirs of Kazan, is presented quite extensively. The first works containing data about Kazan reservoirs history appeared at the beginning of the XIXth century: it is possible to refer to I. O. Langel's research "A short medico-physical and topographical review of the city of Kazan and the province of it" (Langel, 1817), Lentovsky (1831), Yakovkin', Dunayev's (1833) and Claus's (1839) articles.

"Materials for geography and statistics of Russia collected by general-staff officers" prepared by M. Laptev (Laptev, 1861) contain valuable data about Kazan province ecology, flora and fauna. Besides, N. Varpakhovsky's (1884) biological researches are also of great interest.

In the Soviet years Sementovsky and Vorobyov (1940) published works on geology and geography of the Tatar republic, in which they specified many important aspects of Tatarstan historical ecology, transformation of Kazan province landscape in the historical past. In the 1980s there was issued an integrated research on the history of Kazan lakes, "Kazan lakes: historical review" by Mingazova and Kotov (1989).

Among researches considering ecology of the studied region as a factor that impacts population health, birth rate, and mortality, first of all, there should be noted a number of works devoted to the characteristic of drinking water sources. At different times such researches were conducted by Glinsky (1874), Bogdanov (1882), Kupidonov (1890), Kazanski (1904), etc. In parallel there was a discussion about the best way of water supply system

arrangement in Kazan. In the second half of the XIXth century there appeared complex researches on a wider range of factors influencing inhabitants' health, e.g. the article "To the Question of Health Promotion in Kazan" by Zhukovsky (1879). In modern historiography the issues of sanitary and ecological conditions in Kazan and Kazan settlements in the XIXth and early XXth centuries in terms of history have been investigated by Stepanova and Vishlenkova (2005), Salnikova and Malysheva (2008).

Thus, in foreign, domestic and regional historiography there have been specified various aspects of human and nature interaction on the territory of the studied region in the XIXth and early XXth centuries. However at present there are no complex researches devoted to industrial development of Kazan province, development of sanitary organization, nature protection legislation, urbanization processes. The insufficient study of the specified subject, on the one hand, and its relevance on the other hand, allow to make it a subject of independent dissertation research.

### 3. Methodological Framework

In the course of the research there was used *legislation and regulations* presented by such documents as, for example, Town provision of 1870 and 1892, the Industry Charter, and the Construction charter (The highest, 1870; The highest, 1892; Charter, 1879; Charter, 1902) that regulated the placement of industrial enterprises in the city and outside the city limits, work safety and other important aspects of factory industry development. Circular letters, orders and explanations of the Ruling Senate and the Ministry of Home Affairs that were published in case of conflict situations connected with the implementation of the Russian legislation on the territory of Kazan and Kazan province also belong to the sources of legislative and standard character.

*Materials of public authorities and city self-government's office-work* promote the understanding of their daily practice, policy in the sphere of industrial development, population movement and improvement of a sanitary and hygienic situation in the city. This category of sources includes reports published typographically and reports of the City council, factory inspectors, protocols of the City Council meetings (Report, 1887; Journals, 1896; Kazan, 1886), etc. The considerable part of office work documentation is kept in the National archive of the Republic of Tatarstan (NA RT) in the funds of the Kazan City general and six-public Council (No. 114) that existed since the late XVIIIth century up to 1871, Kazan town council (No. 98), Kazan provincial board (No. 2). Materials of the funds mentioned above reflect the whole range of municipal economy problems connected with the improvement, ecology, activities aimed at the improvement of enterprises sanitary condition.

In the process of the research there were considered the funds of profile departments accountable to Kazan provincial board, City Council or the Ministry of Home Affairs of the Russian Empire. The Medical municipal council existing from 1797 to 1865 executed the control over a sanitary and ecological situation. The NA RT Fund No. 376 contains protocols of the Municipal council, its annual reports where problems of sanitary and ecological character were in the focus of attention. Supervision of industrial enterprises activities was exercised by Kazan factory inspector (fund No. 1153) and Kazan provincial factory affairs presence (No. 793). The funds of these two establishments contain numerous protocols of plants and factories surveys which were often caused by owners' negligence of sanitary (ecological) standards.

*Statistical sources and reference editions* contain data on population birth rate, mortality, number of industrial enterprises, development of health system and sanitary control in Kazan and Kazan province. This group of sources is represented by editions prepared by Provincial statistical committee and medical institutions (Vinogradov, 1892), and numerous guide books (Dubrovin, 1890; Kazansky, 1889). The fund of the NA RT Kazan provincial statistical committee (No. 359) contains valuable statistical data that include statistical materials on disease incidence, birth rate, mortality of the population, forest exploitation, fluctuation of various species number, development scales, Kazan plants and factories turnover.

Various aspects of the provincial city everyday life, including actual sanitary and ecological problems of Kazan province were reflected in periodicals of the studied period—first of all, in newspapers issued in Kazan—"Kazan Telegraph", "Kazan Provincial Sheets", "Kazan Exchange Leaf", etc. Besides newspapers, such periodicals as the magazine "Zavolzhye Ant", "Scientific Notes of Imperial Kazan University", "Notes of Kazan Economic Society", "The diary of Doctors' Society at Kazan University" contain valuable data.

Chronological framework of the research covers the XIXth and early XXth centuries, the transition period from handicraft and manufactory to factory production. This transition was accompanied with the change of human's impact on the environment that led to the range of ecological problems peculiar to the first stages of industrial development.

The territorial framework covers the territory of Kazan province, and first of all Kazan—the largest industrial city

in the province. Within the studied period Kazan province was one of the most economically developed regions of Middle Volga; in this connection the anthropogenous impact on the environment was the most intensive here (Smith, 2003, 2005).

#### 4. Results

At the beginning of the XIXth century industrial enterprises of Kazan province were numerous but their output was low and the number of workers was small; so, in 1815 there were 87 tanning “plants” in Kazan. Thus “plants” were located near the provincial capital: the vast majority of them were on the territory of Kazan, others were rather evenly distributed in districts. Handicraft enterprises and manufactories were situated mainly at the Kazanka river and Kaban Lake which was used for waste utilization. A significant amount of small enterprises located on the limited territory, involved a high level of industrial pollution in zones of industrial production in the first decades of the XIXth century (Trusfus, 1928).

The middle of the XIXth century was the period of enterprises consolidation in Kazan province. At this period the number of small tanning and soap-producing “plants” is considerably reduced, and large factory enterprises are established instead. The processes of enterprises integration involved increased ecological damage caused by a separate enterprise.

Thus, for example, the foundation of Krestovnikov brothers’ stearine soap factory in close proximity to Kaban Lake dramatically worsened the ecological condition of this reservoir in 1855 (Kluhevich, 1950, 1957). Wasted waters obtained as the result of processing and washing of raw animal materials containing particles of fat, stearine, and oleic acid were removed by a run-off ditch directly into the lake at the end of the 1850s and early 60s. Such method of industrial wastes elimination led to a low quality of lake water, mass death of fish in the place of a run-off ditch confluence.

According to contemporaries, textile, tanning and flax spinning factories of I. I. Alafuzov were notorious for their density and insanitary conditions (Anisimov, 1960). In Arkhangelsk and Berry settlements, near Alafuzov’s enterprises, the banks of the Kazanka river were filled up with worked out tanbark, waste of tanning and glue production. “Rotten water” that was applied in tanning production and consisted of decaying “animal remains”, was quite often poured out directly on city streets. Soaking of skins, their washing after tanning and liming with toxic mineral reagents took place in the Kazanka river.

The growth of chemical industry in the province was developed due to the demand of soap and skin producers for tannin substances (Clow, 1952). The most negative impact on the environment was made by Kazan chemical plant of “Ushkov and Co” founded in 1894 (Esieva, 2007; Vinogradov, 2013). It produced sulfuric acid, hydrochloric acid and sulfates (though only the production of sulfuric acid was in fact lawful). Emissions of chlorine hydride and sulfate fog into the atmosphere led to the death of trees around the plant (both fruit, and forest), birds and insects. Flows of wasted waters into the lake between Small and Big Igumnovy settlements actually destroyed flora and reservoir fauna.

Ecological crises caused by industrial enterprises took place in the village of Kukmor located in Mamadyshsky district of Kazan province, where felting factories wasted the river Nurminka and some settlements down it. The situation in nearby villages Kokshan and Bondyuga of Elabuga district in Vyatka province was deplorable because of “Ushkov and Co” chemical plants.

On the whole, the period of the XIXth and early XXth centuries was the time when the society had not yet developed effective mechanisms to reduce ecological damage from industry. In this regard, anthropogenic burden that nature experienced was exacerbating. Industrial development challenged science and state to solve a number of problems essentially new for that time; first of all it was connected with the need to control environment quality and protect human health from negative factors of production.

Krestovnikov brothers’ plant was the first enterprise to draw attention to sanitary and ecological problems. Ecological situation around the enterprise and sanitary conditions inside it were of great concern. Workers were compelled to spend the most part of the day in rooms with high temperature, humidity, and insufficient ventilation, they had to contact constantly with caustic substances. As a result, such work-related diseases as pleurisy, eczema and respiratory catarrh were widespread among them.

At I. I. Alafuzov’s factories insanitary conditions were caused, first of all, by dust content – high content of small wool strands and linen fibers in workshops. It resulted in high degree of workers’ disease incidence - respiratory catarrh, consumption and bronchitis.

Kazan chemical plant of “Ushkov and Co” produced a more significant negative impact on a human’s health. During the release of gases from factory pipes a large number of sulfuric acid evaporations that got to the

atmosphere caused cough, vomiting, headache, “sandpaper” effect in eyes, tightness of the chest of those living in adjacent territories. In Big and Small Igumny settlements, where the plant was situated, the rate of mortality increased (first of all it concerned children); laryngitis and eye diseases sick rate intensified twice as much.

Chronic production of the Association in the village of Kokshan in Elabuga district resulted in some cases in 100% of sick workers. The range of work-related diseases of employees working at chemical production was the widest: chronic dermatitis, allergic rhinitis, catarrhal quinsy, hepatitis, cancer, etc. (Drysdale, 1844; Khasim, 1989). Due to a high turnover of workers at industrial enterprises during the studied period, the population of Kazan province districts that bordered Elabuga also suffered from chemical production of Kokshansky plant.

It should be noted that extreme insanitary conditions and ecological unfriendliness were characteristic features of the chemical industry. Due to the complexity of chemical production, its process and application, sanitary and ecological aspects of chemical productions functioning in the XIXth century were understood and realized to a limited extent by scientists, physicians, officials, and, obviously, industrialists as well (Chemistry, 2000).

It is possible to state that the period of formation and first stages of production development was the most difficult from ecological point of view: the more pernicious the impact of an enterprise on the nature and human health was the more time and efforts were required for medical science to reveal mechanisms of this influence and take reasonable measures to reduce it. The latter, however, represents a natural and inevitable process of which the subsequent history of the studied enterprises testifies; many of these enterprises continue to function at present, producing less effect on human health than in the XIXth and early XXth centuries.

Industrial development of Kazan province in the XIXth and early XXth centuries affected human health, region ecology, it promoted the transformation of its landscape and specific structure, laid the basis of subsequent relationships between nature and civilization.

## 5. Conclusion

Thus, in the XIXth and early XXth centuries there began and came to an end the industrial revolution in leading industries of Kazan province—leather, chemical and soap-producing; the establishment of many large factory enterprises caused serious changes in the sphere of society and nature interaction.

The dynamic growth of Kazan province industry in the studied period became one of the factors that determined the demographic development of city systems, influencing such important indicators as disease, mortality, and birth rate. Excessive concentration of population within city limits in the conditions of total absence or an insufficient level of health systems development, water supply, removal of household waste were the reasons of environment impairment expressed in the pollution of natural reservoirs, air, soil, reduction of forest areas and biological diversity.

The highest level of production negative impact on environment and population health was observed at the first stages of its existence; it was caused by a low level of natural sciences development, low ecological culture. Subsequently, in connection with the development of public mechanisms aimed to decrease negative anthropogenous impact on environment, ecological damage from enterprises it had a steady tendency to reduction.

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