**What are the reasons for the pollution of the Ilek river and how to solve this issue?**

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Global Perspectives and Project Work

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 **Abstract**

This article examines the main causes of pollution of the transboundary river Ilek, which is one of the tributaries of the Urals, and proposals for improving the territory. Today, the river is one of the main water resources in the Aktobe region, if no action is taken to solve the problem, it is fraught with consequences. As part of the study of the problem, information was collected using the interview method. According to the results of the study, the main sources of pollution of the river are household and chemical waste. And so, the answer to the main question is that the river is polluted due to waste left by people during the rest period, as well as waste from factories.

**key words:** household and chemical waste, sources of pollution , tributaries of the Urals, waste from factories

**Абстракт**

В статье рассматриваются основные причины загрязнения трансграничной реки

Илек, которая является одним из притоков Урала,и предложения по благоустройству территории. Сегодня река является одним из основных водных ресурсов в Актюбинской области,и если не предпринять никаких действий для решения проблемы, это чревато

последствиями.В рамках исследования проблемы сбор информации проводился методом интервью. Согласно результатам исследования, основными источниками загрязнения реки являются бытовые и химические отходы. Итак, ответ на главный вопрос является то ,что  река загрязнена бытовыми отходами, оставленными людьми в периодотдыха ,а так же заводскими отходами.

**ключевые слова:** трансграничная река , бытовык и химические отходы , заводские химические отходы

**Абстракт**

Мақалада Жайық салаларының бірі болып табылатын трансшекаралық Илек өзенінің ластануының негізгі себептері және аумақты жақсарту бойынша ұсыныстар қарастырылған. Бүгінде өзен Ақтөбе облысының негізгі су ресурстарының бірі болып табылады және  егер мәселені шешу үшін ешқандай шара қолданылмаса, ол өзге мәселелерге алып келуі мүмкін. Мәселені зерттеу уақытында  ақпарат жинау үрдісі сұхбат әдісі арқылы жүзеге асырылды. Зерттеу нәтижелері бойынша өзенді ластайтын негізгі көздер тұрмыстық және химиялық қалдықтар болып табылады. Сонымен, негізгі сұрақтың жауабы мынада: өзен демалу кезеңінде адамдар қалдырған қалдықтармен, сондай-ақ зауыттардың қалдықтарымен ластанған.

**кілт сөздер:** трансшекаралық Илек өзені **,** су ресурсы , тұрмыстық және химиялық қалдықтар , зауыт қалдықтары.

**Introduction**

Nowadays, the Ilek is known as the steppe river in the southern end of the Ural Mountains. The position of the Ilek River now, is deplorable, which consequently affects the deterioration of the state of the Ural River and the Caspian Sea. According to Kazhydromet data (2019) , In the Ilek River, which is located in the Aktobe region, the concentration level of waste, including hexavalent chromium, exceeded 10-12 times(Salkova, 2019) .

This issue negatively affects the social life of the residents who , live near the Ilek River. As far as it is known, according to Mamyrbayev (2019), the Doctor of Medical Sciences, Professor, Academician , river water is used for irrigation of vegetables and fruits in suburban districts, which in turn endangers the lives of residents of the settlement around the Ilek River. This situation led to the problem like the translocation mechanism of the penetration of chemical elements into crop products, which in turn shows the entry of elements into the body of humans and animals(as cited in Times,2019).As the consequence, some diseases threaten people's lives.

Naturally, the government and public organizations continue to look for ways to solve the main source of the river's pollution problem. However, research is unsuccessful and needs to be done hard work to clean up and research the river . As the deputy head of the Department of Ecology in Aktobe region Kozhikov  (2019) added,that every year they provide the Ministry of the Energy with information that, certain actions must be taken to solve this problem, as the concentration of water becomes more and more poisoned.(Salkova, 2019)  Nevertheless, until today, there is no positive change in this environment.

Previously, I did not pay attention to the fundamental changes in this area, since I rarely visited this area. However, in the summer of 2020, I visited the reservoir and I saw a decrease in the water level, which in turn alerted me and my parents. I also noticed an unnatural color and the smell of water, I realized that this was a sign of a global problem in the future. In my view, the existing situation brings with it an inevitable and insoluble number of problems, which in turn can harm the future generation and nature. That is why the sources of pollution should be investigated immediately, as well as ways to get rid of this dilemma. The well-being of the environment is under the responsibility of humanity.

**CONTEXT**

According to the National report on the state of the environment and the use of natural resources (2016), pollution of the Ilek became one of the main local problems because this pollution dates back to 1964 and remains unchanged. Also, the Committee for Water Resources of the Ministry of Agriculture of the Republic of Kazakhstan (2019) claims “The Ilek River remains the most polluted water body in the basin (as cited in Times). The content of bromine and chromium in the river is due to the influence of the sludge storage ponds of the former Alga Chemical Plant and JSC "AZHS" through the groundwater.”

Kursiv’s (2019) article pointed out the fact that the main reason for the pollution of the Ilek is the factories which pointed waste into the river, that is why the concentration of the hexavalent chromium is increased very fast (as cited in Kursiv, 2019). Nowadays, The Ilek has a pollution index of 13.7, which corresponded to the 7th class of water quality and had been characterized as "extremely dirty water”( National report, 2016).

Therefore, as the head of the laboratory and analytical control department of the Ecology Department in the Aktobe region, Talzhanova(2019)  claims, the amount of the chromium in the river is controlled by the observation posts and the results are unstable (as cited in Kursiv,2019).Thus, Talzhanova(2019) added, that this global and very hard work needs to be researched immediately. Besides, it is also poisoned with bromine. Talzhanova(2019) also emphasized that, by the research of 2017, the maximum permissible concentration( MPC) of the bromine in the water increased enormously until 143. One of the main reasons is the same, discharge of the wastewater into the river(as cited in Kursiv ,2019)

As the consequence, the River turned into unnatural сolor and spreads across the neighboring country - Russia. According to the Minister of Natural Resources, Environment and Property Relations of the Orenburg Region Samburov(2020), the river water near the Akbulak village is brown and this situation endangered the villages of Ilek and Tamar-Utkul. Color changes from orange to green and compels to conduct a laboratory test nearly to Kazakhstan. Considering that the Ilek is the cross-border river, this issue enormously affects Kazakhstan and Russia.

 Poisoning of the water with chemical carcinogens is becoming the source of social problems such as the spread of diseases. According to industrial toxicologist Mamyrbayev(2019), poisoning with hexavalent chromium is the source of diseases like anemia, chronic bronchitis, contact dermatoses, and so on (as cited in Times, 2019). He added bromine has a huge impact on the male’s and female’s reproductive system which leads to the mutation and distraction of the sex glands. The main evidence of this statement is the experiment where has been found out that, the reproductive system of the experimental rats who were injected with combined bromine had been weakened. (Times,2019).

These issues also lead to the lower river level. For example, in autumn 2019, the residents of the villages across the river left without water supply (as cited in Azzatyq,  2019). To solve this problem, it was decided to use groundwater as an alternative to river water. However, this dilemma was solved, it gave rise to a new problem -the distraction of the water exchange. As the local eco-activist and representative of the regional public association "Taza Bulak" Arman Bektenov(2019)  emphasized, if the voids formed as the result of using groundwater will not be filled, it significantly decreases the level of the Ural-Caspian basin and will not change this situation(as cited in Azzatyq,2019). It shows, that the way of tackling this problem was a thoughtless one.

Despite the current situation, people do not despair and believe in its cleansing. At least generalists confirm the possibility of getting rid of waste in the water. According to the head of the department of ecology in the Aktobe region Imankulov(2019), the experiment of the reagent method with the help of sulfates iron had been confirmed as an effective method. He also added, that in 2017 it was found that the only way to get rid of chemical waste is to dump historical waste(as cited in Baige, 2019). But, no further action was provided to resolve this dilemma and it makes you think about the position of the river for today.

The main purpose of this review was to reveal the reasons for the existing problem on the Ilek River within the past few years and find solutions for them which leads to stability over the river. This is significant because the resulting situation on the edge of the river touches on an environmental problem and its consequences resulting in imminent problems such as the spread of diseases, decreasing river level, and so on. There has been much researches and discussion for further actions to solve this kind of issue. More researches and laboratory testing is used for understanding this dilemma, but the researchers could not come to the final result concerning this issue. It shows that this question needs a lot of effort for stability around the river.

 **Methodology**

I used certain methods to conduct a comprehensive study that includes various goals. First of all, to identify the cause of the pollution of the Ilek River, I started collecting primary and secondary sources of information which for providing the main reasons for the pollution of the Ilek. At the stage of collecting information, I used the CRAAP methodology, according to which, evaluating the material under certain criteria, I selected the most valuable sources of information. Initially, to collect general information and define some terms, I used resources from the Internet, which also had valuable materials about the current situation. The resources from the Internet consisted of certain local media where ecologists and specialists of this activity were interviewed and the exact results of ongoing research at the government level. Paying attention to the statistics, you can see the deplorable state of the river, which in turn is a problem at the regional level that affects all residents of the city. In this case, the primary method was used to determine the general opinion of city residents in relation to the river.

To collect primary information, I chose the interview. According to Masudur and Ornov (2013), with the help of scheduled interviews, detailed information can be collected so that the problem can be analyzed correctly. The interview also provides an opportunity to successfully evaluate or analyze such abstract factors as attitudes, feelings, opinions, etc., Hence, it represents a certain value in this study for the following reasons:

* Direct contact during interviews means that data can be checked for accuracy and timeliness as it is collected.
* According to the CFR(2017) , interviewers are more able to ask clarifying questions, explore additional information, and come back to key questions later in the interview to form a deep understanding of the answer.
* CFR(2017) also states , that  detailed interviews can potentially be so informative and very valuable findings  can be drawn quickly.
* Researchers need fewer participants to get useful and relevant ideas.

My interview consisted of 5 main questions related to my topic and expanding it. The people I interviewed were representatives of three different volunteer organizations that focus on important and pressing issues in our region. All these people are residents of the city of Aktobe. Each interview lasted about 45-50 minutes. Representatives of the main volunteer organizations such as Taza Ozen, Aktobe Dyshi  and Save the Aktobe Rivers were selected for interviews. They were selected because they have extensive experience with the work carried out to recover natural resources, and are aware of this topic much more than residents of the city. As I predicted, all the answers on this topic were described in more detail, because this topic is very relevant and serious, requiring special attention. The choice of the interview method was the most optimal for me since I was able to get answers to my questions on this topic, as well as secondary informational data allowing me to answer my researched question.

The only drawback for me was the inability to get information from more competent specialists who could provide a more in-depth opinion about this situation. Unfortunately, I could not get the opportunity to contact them. It is also worth noting that, according to the CFR(2017) , another advantage of the interview is the face to face meeting which allows judging the non-verbal behavior of the respondent. Unfortunately, my interview was online and I was not able to specifically notice these aspects.

**Results**

The use of secondary resources allowed me to identify important points regarding my research work. Taking into account the use of primary resources, it also made it possible to obtain valuable information. Although  I interviewed representatives of different volunteer groups, it was possible to note different, but at the same time, similar points of view on this problem. The respondents gave expected answers to my questions, offered various ideas that would help solve the problem and their point of view on this matter.

All transcripts based on interviews are in the appendix. There are the highlights of the interviews:

* The first question was about what prompted the respondents to make the decision to volunteer to clean up the river. Two of them answered that the environment was in very poor condition and was polluted with household waste. And the last respondent answered that he was afraid for a future without water.
* Regarding the main sources of pollution of the river, everyone answered that it was influenced by anthropogenic factors, which, in turn, include the release of garbage into the river, its pollution with both household and chemical wastes.
* In terms of the consequences of river pollution, one of the  respondents  replied that the river could become critically polluted like in countries such as India and Indonesia , while the rest of the interviewed people   answered that it would lead to the problems with health and water supplies.
* When asked whether it is possible to prevent this problem, everyone answered that there is always an opportunity to clean the coast , but not sure about the cleansing of the river itself

As I mentioned earlier, this study is based on an investigation of the main causes of pollution of the Ilek River and ways of solving the problem. Due to the existing series of factors , the river is very polluted these days. All of the respondents answered to the question “How can you assess the current situation with the Ilek  River at the moment?” (Appendix A) that today the position of the river is acutely critical .

The people interviewed claimed that in addition to pollution with domestic waste, the river is also polluted with chemical carcinogens such as hexavalent chromium and boron compounds originating from the Alga chemical plant. The representative of the “Spasem reki” volunteer group Leonidovich claims that  the main source of hexavalent chromium is the same Alga chemical plant, which has not been operating for about 15 years. But despite this, there are sludge beds where there is a large accumulation of this type of chemical compounds. These sludge sites are located near the Ilek River. The river located on these sludge sites takes on a yellow-brown color. (Appendix C). The words of an eyewitness are confirmed by the statement of the Minister of Natural Resources of Russia , Samburski (2018)  , who asserts that as a result of the examination of the Ilek River in the Akbulak village, it turned out that the color of the river is unnatural(as cited in Echo,2018).

Also, there are suspicions that the current situation in the river may lead to health problems. According to volunteers, the chemical elements  can affect the DNA of people, as these elements are radioactive and dangerous to humans. It is also worth noting that dry chromium compounds produce changes in the pulmonary system.(Appendix C) .Indeed, in recent years, according to лthe Head of the Aktobe medical center of the WKSMU(West-Kazakhstan State Medical University) named after Ospanova , Gordysheva (2018)  , lung cancer is in the first place in the region detected about 200 cases per year(as cited in Gizatulina,2018).

Because of this problem, a number of actions were proposed to help alleviate the aggravated situation. One of them was suggested by the representative of the volunteer organization "Taza Ozen". He explained that due to the occurrence of dams and bridges on the Ilek, the river began to fill with reeds, which then turns into sapropel. Sapropel is in great demand. product in agriculture and river cleaning will win both commercially and ecologically. It can be concluded that this idea, in turn, is the most advantageous solution(Appendix A).

 **Conclusion**

If considering the causes of the pollution based on the position of the River, it is worth noting that according to the National Report on the State of the Environment(2016), the main source of pollution of the river is the ongoing discharge of wastewater from local plants such as Aktobe Chromium Compounds Plant (ACCP), Aktobe Ferroalloy Plant (AFP), Alga Chemical Plant named after Kirov (Alga) . Of course, this will negatively affect the residents of the city of Aktobe and not only, since the river is transboundary and is one of the tributaries of the Urals. First of all, this problem can affect different types of life, such as social, environmental and political. And also threatens the spread of diseases that endanger the inhabitants of the river. If we manage to save the river, this will allow the city to treat water more carefully and in turn contributes to the preservation of the ecological situation and climatic conditions in the region.

Paying attention to the results of my research based on interviews, several problems of the river were identified and some solutions with the consequences that threaten us in cases of ignoring this problem. Speaking about the consequences, we were also able to note a number of problems that may arise in the coming years. This, in turn, is the dehydration of the entire region, climate change and the development of cancer.

It was revealed that the river is currently polluted with household waste and chemical carcinogens including chromium and bromine compounds. And even if it is possible to get rid of household waste in the river and on the coast, cleaning the river bottom requires the help of local authorities and ecologists, namely hydrologists. An idea was also proposed that cleaning the river from the sapropel contained in it can contribute to the benefits in commercial and environmental terms.

At the very beginning of my research, I assumed that my chosen method, namely the interview, would give me an opportunity to reveal the basic information regarding my topic. And so, I was able to get quite satisfactory answers in connection with the conducted conversations. Surprisingly, my opinion which I adhered to at the very beginning coincided with the results of my interview, which in turn is proof that this topic is really relevant.

However, I was not able to get supporting evidence in the form of water analyzes and photo reports. In the future, I will try to use other methods as well, to create a complete answer to my question. For example, I could get a water analysis, go and make some photos  with my own hands in this area. These actions could for the most part improve the quality of my work and draw people's attention to this issue . I hope that in my future work, I will be able to take into account these aspects accompanying the solution of this problem.

**References**

Azzatyq(2019, June 26). *Как умирает Урал: проблемы реки и их решения.* <https://rus.azattyq.org/a/kazakhstan-ural-river-ecology-problem/30291626.html>

CFR(2017). *In-Depth Interviews: Data Collection Advantages and Disadvantages.*<https://www.cfrinc.net/cfrblog/in-depth-interviewing>

Echo of Kazakhstan (2020, May 6). *Russian ecologists investigate the reason for the unnatural color of the Ilek River*. <https://ehonews.kz/rossijskie-ekologi-vyyasnyayut-prichinu-neestestvennogo-tsveta-reki-ilek/>

Gizatulina, I. G. (2008, December 5). *More than 7 thousand people suffer from cancer in the region*. <https://diapazon.kz/news/86330-v-oblasti-bolshe-7-tysyach-chelovek-boleyut-rakom>

Masudur ,R., & Ornov ,C.B.(2013). *Advantage and disadvantage of interview.*<https://thebusinesscommunication.com/advantage-and-disadvantage-of-interview/>

National report on the state of the environment and the use of natural resources.(2016 )

<http://newecodoklad.ecogosfond.kz/2016/aktyubinskaya-oblast/>

Salkova,N.(2019).*Environmentalists are sounding the alarm: the level of hexavalent chromium in the Aktobe region is 10-12 times exceeded.*  <https://kursiv.kz/news/obschestvo/2019-01/ekologi-byut-trevogu-v-reke-aktyubinskoy-oblasti-prevyshen-uroven>

 Times (May, 2019). *Илек отравлен от Алги до Урала*

<https://timeskz.kz/53806-ilek-otravlen-ot-algi-do-urala.html>

Wikipedia.(2020). *Ilek (river).* [https://en.wikipedia.org/wiki/Ilek\_(river)](https://en.wikipedia.org/wiki/Ilek_%28river%29)

Yatsko,S.(2018).*Ilek needs to be saved. If the river dies, the reservoir will also disappear.* <https://diapazon.kz/news/81533-ilek-nuzhno-spasat-esli-pogibnet-reka-ischeznet-i-vodohranilishche>

 **Appendix A**

**Transcript of an interview 1**

**A:** So let's get started. Good afternoon, I am a student of NIS PMD Aktobe, Shinbaeva Aruzhan. I would like to interview you as representative of a volunteer organization “Taza Ozen” about the deplorable situation of the Ilek River. Could you answer a couple of my questions?

**I:** Aruzhan ,Good afternoon(…). Of course you can. I will answer all your questions if I have the competence and possibility to answer your questions.

**A:** What prompted you to implement this type of volunteer organization?

**I:** Many years ago we came to one place. It is 70 km from Aktobyunsk. There are such waterfalls on the Ibita river. It is near Grigorievka. We had a good rest there and it was clean and comfortable. Ibita is a tributary of the Urals. The next year, mountains of bottles and mountains of garbage formed on this place.(..) Including, there was a large amount of plastic and food leftovers. We felt unpleasant, and we began to clean this area. After this situation, I raised the issue of creating a volunteer organization (…),which in turn will allow you to start with yourself and urge people not to pollute nature.

**A:** My next question is, How is your workflow done?

**I:** (..), So the process of work is as follows. In the beginning, we find the most popular places of rest and, accordingly, we examine them, check how polluted there is.

Then, through social networks, we organize a collection. After people gather, we provide everything necessary for cleaning the areas. We also interact with government organizations (…),that provide us with transport for taking garbage from the coast. If we meet people on vacation, we conduct preventive talks to maintain cleanliness around these places.

**A:** How can you assess the current situation with the Ilek river at the moment?

**I:** That is, it is necessary to separate these variants of the reason. I can only assess the current situation only in terms of (.....) the pollution of the coast, here, with household waste. That is, eating plastic, plastic bottles, and ... glass. This poses a danger to walking barefoot. This also requires cleaning. It is worth recalling that in 2017 there were floods that flooded some houses at the GMZ and at the confluence of the Kargaly and Ilek rivers ... These floods were caused by anthropogenic factors. One of the reasons is a change in hydrology, which has changed as a result of the expansion of the river channels that the authorities carried out to eliminate floods. I am not a competent specialist. There is a situation connected with hydrology itself. In addition ,due to the fact that there were hydraulic structures such as dams and bridges on the Ilek, the flow of the river decreased and the bottom began to overgrow with reeds. This can lead to stratification of plants and the bottom of the river is filled with them. River springs are fed with silt and the water level decreases. We do not deal with this problem, as they require large investments. We need special machines for pumping out sludge, that is, sapropel. Generally, on a commercial basis, sapropel can be sold as an alternative to manure, which in turn is required for agriculture. The proceeds from sales can justify the price of using special machines, which can be one solution used to clean up the river profitably.

**A:** In your opinion, what can be the result of neglect of the river?

**I:** Every year, in the spring, the water level rises and debris near the coast also gets into the water, which can lead to a difficult ecological situation like in Indonesia and India. In particular, in countries where tons of garbage float in the river. Now tough measures must be taken to maintain cleanliness. I propose an idea to ban picnics, which in turn will be included in the environmental code.

**A:** And my final question, do you think there is a possibility of rehabilitating the polluted parts of the river?

**I:** The opportunity is always there. You can always remove the garbage. If you combine the efforts of interest groups, you can systematically clean up everything. But everything depends on the regulatory framework. If there is no punishment for pollution, this will continue. Drawing on the experience of foreign countries, it is necessary to strengthen the implementation of fines.

**A:** Thank you for your answers. It was a pleasure to talk with you. I wish you success in your work. We will also try to contribute to the restoration of natural resources in the future. Good day to you.

**I:** And thank you for showing attention to such acute problems. You can also organize the cleaning of contaminated areas and outskirts. Many students and children participated in our organization. We are doing all this for our future. If you do not engage in this activity now, in the future they will respond.

**Appendix B**

**Transcript of an interview 2**

**A:** So let's get started. Good afternoon, I am a student of NIS PMD Aktobe, Shinbaeva Aruzhan. I would like to interview you as representative of a volunteer organization “Taza Ozen” about the deplorable situation of the Ilek River. Could you answer a couple of my questions?

**I:** Good afternoon. Yes, of course.

**A:** What prompted you to implement this type of volunteer organization?

**I:** Well, I have been volunteering for a long time. I only changed my direction. In May 2019, due to the acute situation with the destruction of the green massif, this situation served as an impetus for me to take action and assemble a team.

**A:** My next question is, How is your workflow done?

**I:** At the moment, the "seven rivers" project has been stopped and is at the stage of adjustment. According to pollution, actions are being taken to collect thermal banks and clean up the channel within the framework of the "Taza Kazakhstan" project. Unfortunately, there are no other actions so far and work is not carried out at the state level. There are a lot of questions and a bunch of proposals sent to the akimat to allocate a budget for the restoration and maintenance of rivers.

**А:** How can you assess the current situation with the river at the moment?

**I:** The situation in terms of pollution and the amount of water is critical.

**A:** Can residents of the city contribute somehow to solving this environmental problem?

**I:** Residents of the city can change the situation by almost 70 percent. Firstly, do not leave behind mountains of garbage and hope that someone will clean up. Unfortunately, while relaxing in nature, people themselves throw garbage into the river. By water, this is possible with active participation in cleaning springs and raids to drain sewage as well as take part in raids on illegal dams. This is all possible, with the active participation of the population who are not indifferent to this situation.

**A:** Thank you for your answers. It was a pleasure to talk with you. I wish you success in your work. We will also try to contribute to the restoration of natural resources in the future. Good day to you.

**I:** We are always glad, you can always contact us. You can also actively participate in volunteer activities because our doors are always open for everyone. We are glad that the younger generation is actively involved in this type of activity.

**Appendix C**

**Transcript of an interview 3**

**A**: So let's get started. Good afternoon, I am a student of NIS PMD Aktobe, Shinbaeva Aruzhan. I would like to interview you as representative of a volunteer organization “ Spasem-reki ” about the deplorable situation of the Ilek River. Could you answer a couple of my questions?

**I:** Hello, yes of course. .

**A:** So, let's get down to the interview, my first question is: what prompted you to implement this type of volunteer organization?

**P:** One of the reasons is the fear of being left without water, primarily the position of the city.

**A:** My next question is, How is your work process carried out? What is the set of actions being taken to remediate contaminated land and rivers?

**I:** At the moment, all work on the rivers has been stopped. The main direction of my particular work was not to clean the rivers, but to terminate the project to widen the channels of the Ilek, Kargala, Butak (.) and several other rivers. The work was related to the project to clear river channels , however, a completely different procedure was carried out. Unfortunately, on the fact of cleaning the river beds, work is not being carried out now, except for our volunteers. This is garbage collection. Now there are no contaminated land plots as such (...), except household garbage. All other work is carried out at the level of document circulation.Since everyone knows that our river is polluted with chromium compounds that come to us from the Alga chemical plant. There is also a second source, it is the Constitutional Purification Station (CPS), which is currently under reconstruction in terms of filtration. At the Alga chemical plant, there is supposed to be created reconstruction of unclean places . The project was stopped, as it was called especially dangerous for the region, due to incompleteness and details were not taken into account.

**A:** As far as I know, the river has been poisoned with hexavalent chromium and bromine compounds, how could this affect the ecosystem and human health in the future?

**I:** The main source of hexavalent chromium is the same Alga chemical plant, which has not been operating for about 15 years. But despite this, there are sludge beds where there is a large accumulation of this type of chemical compounds. These sludge sites are located near the Ilek River. The river located on these sludge sites takes on a yellow-brown color. Firstly, there should be no chemical carcinogens in the river. As a result, almost all living creatures die (...), that is, (..) the flora. A change occurs at the DNA level, since hexavalent chromium is radioactive. Secondly, dry chromium compounds produce changes in the pulmonary system. They penetrate through airborne droplets and cause lung disease. It is also worth noting that over the past 20 years Aktyubinsk began to occupy a leading position in cancer and tuberculosis. In addition, too much and too little bromine in the human body causes thyroid problems.

**A:** How can you assess the current situation with the river at the moment?

**I:** If evaluate it on a 10-point system, then now the river is at level 3. That is (...), the river is in a very terrible state, and in order to restore this all, a lot of efforts must be made not only by volunteers but also by the state.

**A:** What are the consequences of neglecting the river?

**I:** In this case (...), the consequences will be like this. One of the consequences will be the loss of flora and fauna existing in this river. The second consequence, if we take into account the Ilek and Kargaly rivers, is the dehydration of the entire region. In the near future, I think that in 10-15 years, there will be no water at all. Since the main water intakes are located on these rivers. It is also worth noting the lack of a natural humidifier. We are in the steppe region and our air is dry and very dry in places. In the absence of a river, this will negatively affect the climate of the entire region.

**A:** And my final question: do you think there is a possibility of rehabilitating the polluted parts of the river? Is it possible to restore the water level in the rivers?

**I:** If it is possible to neutralize the sources of chromium and bromine compounds, then I think that yes, it is possible. But already here it will not be about the polluted sections of the river, but a completely polluted river, since it has already been proven that the river is completely poisoned. Regarding the restoration of the water level, with proper use and regulation reservoirs, I think the rivers can be restored. Also, if we use overflow platinum, which is used in many countries, it will be easier to solve the problem.

**A:** Thank you for your answers. It was a pleasure to talk with you. I wish you success in your endeavors. We will also try to contribute to the restoration of natural resources in the future. Good evening.

**I:** Thank you, too, Aruzhan for your interest in this problem. I hope for further cooperation.