

Baseline survey of artisanal and small-scale mining and Teaching seminars for small scale miners in Kyrgyz Republic 2003

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Contents

Summary	4
Recommendations of small-scale miners after teaching seminars in Eki-Naryn and Bishkek	7
Introduction	8
History of gold mining in Kyrgyz Republic	10
Field investigations	11
Suggestions of improvement.....	12
Socio-economic investigations	13
Legislation	14
Health issues	16
Suggestions to reduce health problems	17
Environmental problems	18
Gold market considerations	19
Teaching seminars in Eki-Naryn and Bishkek	20
Eki-Naryn	20
Bishkek	20
Problems faced by small-scale miners and ways to solve them	23
Problems	23
Ways to solve problems	23
Videoconference on distance learning courses for small-scale miners. Bishkek, October 14, 2003.	24
Agenda.....	24
Six small-scale miners presented some of their problems.	24
Salkyn Niyazova, small-scale miner, Sary-jaz area, Issyk-Kul oblast.....	24
Abdykadyr Abdrahmanov, small-scale miner, At-Bashy area, Naryn oblast.....	24
Nurlan Orozbaev, small-scale miner, Naryn oblast.	25
Bakas Gaparov, small-scale miner, Soh area, Batken oblast.....	25
Farhad Satimov, small-scale miner, Chatkal area, Jalal-Abad oblast.....	25
Usenbek Chophonov, geologist, small-scale miner, Naryn oblast.....	26

Accra, Ghana	27
University of Alberta	27
World Bank, Washington, USA	27

List of participants	28
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Summary

1. In 1994 World Bank published a Review of the Mining Sector in Kyrgyz Republic. This was followed up by an other investigation in last quarter of 2000, which was published in September 2002. During the autumn 2002 World Bank decided to conduct a baseline survey of artisanal and small-scale mining in Kyrgyz Republic and to produce distance learning courses on this topic. Trust funds from the Danish Ministry of Foreign Affairs financed this survey. It was carried out by a consultant from the Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark. GEUS subcontracted part of the work to Community Business Forum (CBF), an NGO enterprise based in Bishkek. During the course of this Study, many discussions were conducted with government officials, private companies, and members of civil society (see list in Annex 1).
2. Small-scale mining has been carried out in the Kyrgyz Republic since ancient times. During the Soviet period small scale mining took place in organised legal co-operatives in the 1930's and 1940's. After the Second World War the number of small-scale miners decreased to almost nil. After the collapse of the Soviet Union thousands of Kyrgyz lost their jobs in towns as well as in the countryside. One of the few opportunities was to go to the mountains and seek gold. That was literally done by thousands of people. There is no efficient registration of small-scale miners, so it is difficult to assess how many miners there are. Based on our study and interviews with local officials a conservative estimate will be more than 5500 small-scale miners and the number are increasing every year.
3. The laws and regulations for small-scale miners are contradictory and conflicting information about the content and conditions of the Regulation for small-scale miners are frequent. Even officials in high positions do not know the rules. Local authorities throughout the country know very little about the regulations and appear to be indifferent the small-scale miners. Placer gold small-scale mining is allowed, but hard rock mining is forbidden. According to the law, all gold mined by small-scale miners should be sold to legalised gold receipt desks. However, there are no such desks in the Kyrgyz Republic. It is therefore not possible for any small-scale miner to sell their product legally.
4. Two types of small-scale mining are carried out. Hard rock and placer gold mining. The latter is most widespread whereas the former being slightly more difficult appears to be more profitable. There is a wide range of how much gold each small-scale miner recover per year. A large group of small-scale miners recovers less than 60 grams per year, but there are many miners who recover between 60 and 200 gram per year. In some areas gold nuggets up to 130 gram are recovered. Nuggets fetch very high prices on the world market (two to three times' normal gold price). However, small-scale miners finding gold nuggets in Kyrgyz Republic only get per gram gold price. It is suggested that an outlet for gold nuggets be established. Small-scale miners sometimes find platinum and reportedly also osmium. In most cases no gold dealers will buy platinum or osmium. World market price for platinum is 20 USD per gram and for osmium around 75 USD per gram compared with the current gold price of 11.5 USD per gram. It would thus be an extra income if the small-scale miners could sell these precious metals.
5. Gold recovered by small-scale miners is sold to illegal gold dealers. Some are Kyrgyz, many are from Uzbekistan and few are from China. The Chinese dealers often buy gold through an intermediary. In order to control the gold market the Kyrgyz government asked the government owned gold mining company Kyrgyzaltyn to establish offices to buy gold from small-scale miners. Kyrgyzaltyn established two offices one in Naryn and another in Chatkal areas. These offices started early 2002 but were closed down after about one year because only few small-scale miners would sell gold to them. The price offered by Kyrgyzaltyn was too low and the distance to travel for the small-scale miners to the shops was too long. The price offered by the illegal gold dealers varies consid-

erably from district to district and from villages to district centres. The most quoted price is between 300 and 430 som pr. gram (7 to 10 USD). In remote areas prices as low as 250 som are reported. Only few gold buyers pay more than 430 som per gram. One of the advantages for small-scale miners to sell gold to illegal gold dealers is that dealers come and buy at the mining sites. They furthermore often supply necessary equipment and possibly also mercury to the small-scale miners. This save the small-scale miners long travel times to buy these items.

6. Small-scale gold mining is a major source of income in some areas and an additional income in others. In Batken area the average working period by small-scale miners is 4 to 5 months per year. In Chatkal a large group of miners work between 1 and 3 months whereas another large group work 10 to 12 months per year. In Naryn the majority of miners work 4 to 6 months, but many also work the year around. An estimated 5500 small-scale miners work in the investigated areas.
7. With very few exceptions small-scale mining is only carried out by men.
8. Only a very small proportion of small-scale miners have a certificate or patent to carry out their small scale mining. The price for a certificate is 30 som (0.75 USD) per year although there is some confusion as to the exact figure. Almost all small-scale miners are very interested in having their work legalised by obtaining a license. It is apparently often difficult for them to get a license. Many local district administrations do not support small-scale mining and are reluctant or do not know how to issue licenses. A license for a small-scale miner would stop the necessity for him to bribe local police, which reportedly often is required.
9. A larger part of small-scale miners in Batken, Naryn and Chatkal areas are very interested in uniting into larger groups of 15 to 20 people provided they could get the necessary equipment. It will require funding to purchase this equipment and the present estimate from the small-scale miners is that they would need access to bulldozers and excavators and then on the order of 7.000 USD to buy pumps, sluices, proper clothing etc.
10. A majority of the small-scale miners have expressed strong interest for training programs. They need on site training on how to increase the recovery of gold, and also classroom training on health hazards and gaining basic knowledge of geology. They also find it very useful to receive literature describing new techniques. A future project should comprise training of a number of local experts who then could teach the small scale miners throughout the country.
11. There are considerable health hazards for the small-scale miners, but most of these can be avoided by inexpensive means. Crushing gold-bearing quartz-veins yields quartz dust, which, if inhaled, can give silicosis. Masks, which can be bought from the military for 50 som (just over one dollar), can protect the miners against dust. Many miners and gold dealers use nitric acid to recover gold. This process develops exceedingly toxic fumes of nitrogen dioxide. If inhaled, even in very small quantities, it disturbs the immune system of the lungs, gives lung oedema and may cause death. This can be avoided by carrying out the process in open air only away from inhabited areas. A handout describing the health problems by using nitric acid and how to use the method properly has been made. The Swiss Red Cross is presently distributing the handout to village nurses in Naryn oblast. No means for distributing these handouts to other parts of Kyrgyz Republic have been found yet.
12. Small-scale miners working in hard rock and placer deposits often dig tunnels up to 50 m long. Roof and walls are not supported and frequently cave in resulting in injuries, which sometimes are fatal. Timber is expensive in Kyrgyz Republic and not readily available, so other means of supporting material must be used. Experts from Institute of Physics and Mechanics of Rocks based in Bishkek will hopefully find solutions to this problem.
13. Mercury is used by more than 50 % of the small-scale miners and most of the gold dealers to recover gold by the so-called amalgamation process. Mercury is highly toxic and give permanent brain damage and possibly even death. During amalgamation mercury evaporates and enters the atmosphere. From there it enters the drainage

system where it is transformed to an even more toxic compound methylated mercury. The mercury finally enters the food chain. All over the world amalgamation has caused extensive pollution of the environment and major health problems. The retort, a simple and inexpensive device, recycles the mercury and thus saves money for small-scale miners and protects environment and health. This can be made out of ordinary water-pipes available in Bishkek for less than 20 USD per retort, However, use of mercury is prohibited in Kyrgyz Republic and it is not allowed to produce or use the retort. It is strongly recommended to change the law and allow use of mercury. Governments in South America, Africa and Southeast Asia have tried to stop amalgamation by prohibiting use of mercury, but without any success. The Kyrgyz Minister of Health suggested to establish round table talks with the World Bank and the appropriate ministries in order to try and modify the law so amalgamation will be legalised.

14. Small-scale mining causes degradation of land surface. The problem in hard rock mining is minor. Placer gold mining results in many small holes and tunnels dug in the riverbanks. Most of these features will be eroded away by next flooding of the rivers. Any remaining features are fairly minor, especially compared with the large piles of rusty machinery left on the river banks from large scale placer gold mining carried out during Soviet time.
15. There are considerable frictions between hard rock small-scale miners and state owned company Kyrgyzaltyn. Small-scale miners working near Solton-sary and Makmal mines have been chased away, sometimes using pretty ruthless by security guards with dogs. Small-scale miners mine small gold-bearing quartz-veins, which never will be profitable for Kyrgyzaltyn. It should be possible for Kyrgyzaltyn and small-scale miners to work peacefully side by side. Small-scale miners have suggested that they could mine the waste dumps from the Kyrgyzaltyn mines without interfering with the ongoing industrial mining operations. These suggestions make sense; unfortunately Kyrgyzaltyn has rejected the suggestion.

Recommendations of small-scale miners after teaching seminars in Eki-Naryn and Bishkek

October 9 a teaching seminar was held in the village of Eki-Naryn in central Kyrgyz Republic with 27 small-scale miners participating. October 14 and 15 a teaching seminar was held in Bishkek for 12 small scale miners from different parts of the country. In the Bishkek seminar participants from relevant ministries also participated. For further details see chapter on Teaching Seminars. This chapter is a brief outline of the recommendations from the small-scale miners and other participants of the teaching seminars.

Negotiations with the Kyrgyz government on the following issues should be initiated. The Kyrgyz law on natural resources comprising the regulations on individual small-scale miners should be modified. Some of the many issues in the law, which need to be changed, are the following. Hard rock small-scale mining should be legalised. The monopoly of the state owned company Kyrgyzaltyn of buying gold including gold nuggets should be lifted, and licensed gold dealers should be allowed to operate throughout the country. Certificate for small-scale miners should not cost more than 30 som (~0.7 USD).

If and when the Regulations on individual small-scale miners are changed then local authorities throughout the country should be prompted to support small-scale miners in their wish to get registered. Local authorities should also be encouraged to keep closer track on small-scale miners e.g. by registering accidents and casualties during their mining operations. The local authorities should realise that: Small-scale gold mining provides jobs in remote mountain villages and thus reduces migration of able-bodied people to urban areas.

Government owned Kyrgysaltyn should be encouraged to let small-scale miners work near their operating mines and possibly even working on waste dumps from the mining operations.

Round table discussions with the Ministry of Health and other relevant ministries should be carried out in order to modify the present laws and regulations forbidding use of mercury and nitric acid. At the same token measures should be taken to assure that small-scale miners and gold dealers are taught how to use nitric acid and mercury in a way which reduces the health risks and the risk of impact on the environment. If and when these laws and regulations have been modified then a campaign among small-scale miners should be carried out to advocate the use of retorts, which recycle mercury used during gold extraction.

Training of small-scale miners is a very important issue. Presently everybody without a job may go out and start small-scale mining. It does take some skill and a good deal of education in order to maximise the recovery of gold and other precious metals such as platinum. It is recommended to carry out training courses for small-scale miners in all regions of Kyrgyz Republic where small-scale mining takes place. The training courses should be on site with a combination of practical instruction on how to recover gold and class room teaching in health risks and basic knowledge of geology so the small-scale miners can recognise the valuable minerals and metals they recover from their activities.

Introduction

In 1993 World Bank carried out an investigation of mining in Kyrgyz Republic. This was followed up by an other investigation in last quarter of 2000, which was published in September 2002. During the autumn 2002 World Bank decided to conduct a baseline survey of artisanal and small-scale mining in Kyrgyz Republic and to produce distance learning courses on this topic. Trust funds from the Danish Ministry of Foreign Affairs financed this survey. It was carried out by a consultant from the Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark. GEUS subcontracted part of the work to Community Business Forum (CBF), an NGO enterprise based in Bishkek.

Small-scale mining in this report is defined as mining carried out by a small group of people generally less than five using no mechanical equipment. In this definition it is synonymous with artisanal mining. Throughout this report the term small-scale mining will be used. Small-scale mining has been carried out in Kyrgyz Republic for several thousand years. During the early days of the Soviet Union that is in the 1930's and 1940's small-scale mining was carried out by large organised groups. After the Second World War the number of small-scale miners decreased considerably. The communist system provided jobs for everybody, and it was thus not necessary to resort to small-scale mining.

After the collapse of the Soviet Union many of the people of Kyrgyz Republic were suddenly left without jobs. In the countryside the collective farms ceased working. In the smaller and bigger towns factories closed down. Apart from limited often horse-powered agriculture and cattle breeding very few jobs remained. One of the few opportunities for the population was to go to the mountains and seek gold. That was literally done by thousands of people, but legislation has not made life easy for them. On the contrary the set of laws for small-scale miners and the ignorance of the local authorities has forced the small-scale miners to carry out their work illegally. It is presently not even possible for small-scale miners to sell their gold anywhere in the Kyrgyz Republic to legal gold buyers. Small-scale gold mining should be supported by the Kyrgyz Government and local authorities, since it provides jobs in remote mountain villages and thus reduces migration of able-bodied people to urban areas. Gold was the main target for the small-scale miners, but limited small-scale mining of coal in the vicinity of existing coalmines took place. This report describes exclusively small-scale mining for gold.

The World Bank consultant initiated the study during his first visit to Kyrgyz Republic from late May to mid June 2003. During the initial in country visit the consultant liaised closely with relevant government officials, private groups, civil society, academics, and the Bank's resident mission (see list of people met in Annex 1). This was followed by field visits to selected small-scale mining in Naryn and Chatkal areas of central and western Kyrgyz Republic (see map Fig. 1).

During the months July and August CBF visited three major small-scale mining areas and asked 350 small-scale miners a series of questions. Part of the questions was technical and part of the questions socio-economic. CBF also questioned officials and gold dealers in the same areas. A detailed description of the results of these investigations is seen in Annex 2.

Follow up was made during a second visit from late September to mid October 2003. During this mission several small-scale mining sites were visited in Sary-Jaz and Naryn areas of eastern and central Kyrgyz Republic (see Annex 3 for details on technical investigations). A one-day teaching seminar was held in the village of Eki-Naryn 9 October. During the field visits to Sary-Jaz, Naryn and Chatkal areas small-scale miners were invited to participate in a two day teaching seminar in Bishkek to be held 14 and 15 October. The

invited small-scale miners were also invited to participate in a distant learning course in the World Bank office in Bishkek.

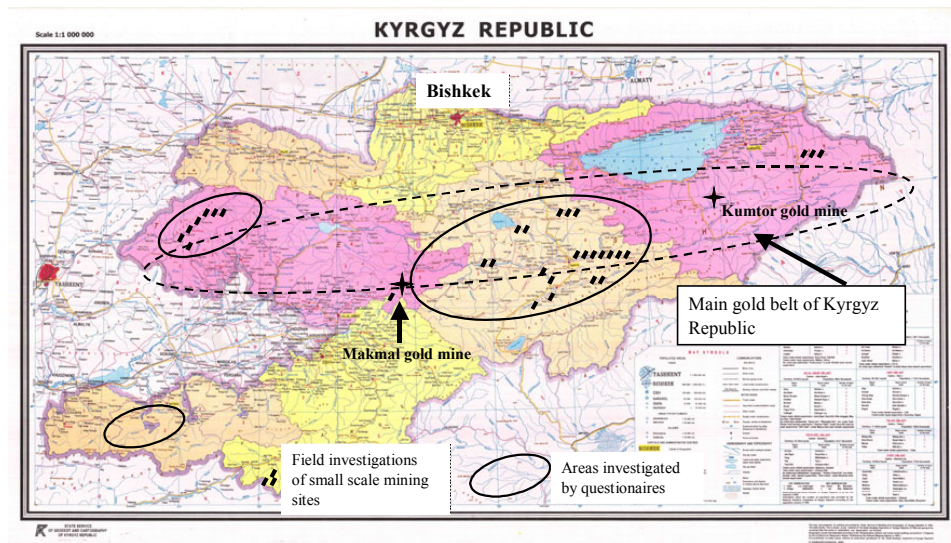


Figure 1. Map of Kyrgyz Republic showing areas of field investigations and areas investigated by questionnaires

History of gold mining in Kyrgyz Republic

Gold mining in Kyrgyz Republic has a long story. The earliest records show that placer mining took place in the second millennium BC in the lower parts of the Chatkal river. Chinese sources show that placer gold mining took place 751 AD in the mountains around Fergana valley. Arabic manuscripts from 10th and 11th century tell that gold was mined in Krakhanid State (present Kyrgyzstan), mainly in Fergana valley.

The techniques used were standard placer mining techniques. Amalgamation already took place in ancient times as testified by finds of vessels in which miners kept the mercury as described in sources from 943 A. D. Sheepskin was also used in those days. The Greek myth of Jason fetching the golden skin refers to the sheep skin method. A sheepskin is placed in a fast running stream; gold particles tumbling down through the stream get caught in the sheepskin. After some time the sheepskin is dried and either burned or the gold is shaken out of the skin. This method is used even today in remote areas such as Sary-jaz! Sometimes old rugs are used instead of sheepskin.

During the Soviet period small scale mining was carried by state organisations such as "Sredazolotorazvedka". By the end of 1930's the total number of legal gold miners amounted to 2000 people. At that time small-scale miners were organised into co-operatives from 40 and more members, but at each placer gold deposits they have been working in smaller brigades from 3-5 people, which was convenient for small-scale mining activities. The most advantageous managed to mine 1 gram of gold per day. Gold washing was carried out in wooden washing drums and in wooden sluices without any mechanical support. Amalgamation to recover gold from concentrate was widely used. "Sredazolotorazvedka" purchased the gold mined by small-scale miners. After the second World War small scale mining decreased.

Field investigations

Small-scale mining takes place in most part of the Kyrgyz Republic. The present study was concentrated in the areas shown on Fig. 1. In the West is Chatkal area, in the central part Naryn area in South Batken area and in the extreme east the Sary-Jaz area. In Chatkal and Naryn areas thousands of small-scale miners work. In Sary-jaz small-scale mining has started within the last couple of years (Fig. 2 and 3). There are less than 100 small-scale miners, but the number is rapidly increasing. In the Batken area small-scale mining is also fairly new, but there are already several hundred small-scale miners.



Figure 2. *En route to Sary-Jaz*



Figure 3. *Small scale miner in Sary-Jaz*

During the consultant's two missions the Chatkal, Naryn and Sary-jaz areas of western, central and eastern Kyrgyz Republic were visited. Through local contacts established by CBF appropriate small scale mining sites were chosen for visits. In Chatkal meetings were held with local officials. They were very interested in the WB project and would support it as far as resources allowed. They estimated about 2000 active small-scale miners in the Chatkal area, of which 92 are registered. A certificate costs 30 som (0.70 USD) for one year. We were told us that the state owned gold mining company Kyrgyzaltyn has suggested to the government that a patent should cost 130 som per month. This higher fee for a certificate would discourage artisanal miners from registering with the government and inhibit further programs to provide them with assistance.

Two types of small-scale mining are carried out in Kyrgyz Republic, hard rock mining and placer gold mining. A detailed technical description is provided in Annex 3. Hard rock mining where gold-bearing quartz veins are mined by digging tunnels into the mountains is apparently the most profitable. The tunnels sometimes collapse resulting in severe, sometimes fatal accidents. The miners collect only rock chips with visible gold. These chips are carried back to the villages and crushed. After crushing the heavy minerals and gold are separated by gravitation. The crushing produce quartz dust which may cause silicosis. The concentrate is the frequently treated with boiling nitric acid. This is done in small confined yards often with plenty of children playing nearby. This process yields very pure gold. Boiling nitric acid reacting with heavy minerals produce exceedingly toxic fumes of nitrogen dioxide which even in trace amounts disturb the immune system of the lungs, give lung oedema and may cause death. For further details see chapter on health.

Placer gold mining takes place in recent and sub-recent river gravel. Holes a couple of meters in diameter and a couple of meters deep are dug into the riverbanks (Fig. 3). Sometimes, as seen in Chatkal tunnels are dug into unconsolidated gravel in order to trace gold-bearing strata. The tunnels often cave in. Injuries are frequent. The gold-bearing gravel is

sieved and the coarse grained gold is recovered in a sluice (Fig. 4). In some areas the small-scale miners add a copper plate coated by mercury at the end of the sluice in order to catch finer grained gold. Instead of the mercury coated copper plate many small-scale miners use amalgamation. They add mercury to the heavy mineral concentrate from the sluice. Gold is dissolved in the mercury. The miners subsequently burn off the mercury and the gold is recovered. This is a very toxic process. One miner told that he used a mask to protect himself against the mercury vapour. This will save him during the process of amalgamation, but his wife, children and him will gradually be poisoned when the mercury enters the drainage system. For further details see chapter on health.



Figure 4. *Small scale miner digging into loose gravel*



Figure 5. *Sieve and sluice*

Suggestions of improvement

Several means of improving the recovery of gold and reduction of health hazards and impact on the environment were discussed with the small-scale miners at the mining sites and during the training courses held in Naryn and Bishkek.

- Hard rock miners should crush all mined rock chips at the mining site and not only go for chips with visible gold. Thereby they would recover more gold and carry less weight home.
- They should wear dust masks during crushing. Dust masks can be bought from the military for 50 som (1.1 USD).
- Acid treatment should be carried out in open fields away from villages and with no children playing around nearby.
- Placer gold miners can probably increase their recovery by 30 to 40%. Investigation carried out by Kyrgyz geologists showed that 30 to 40% of the gold in many placer deposits occur as gold dust. This fine-grained gold will be flushed out of sluices back into the rivers. By using more sieves, proper gold pans and probably amalgamation they should be able to recover a good deal of the fine-grained gold. Amalgamation can be done quite safely by using a retort. This is an inexpensive device recommended by UNIDO. It is constructed by non galvanised ordinary water pipes. The retort recycles the mercury whereby the small-scale miners does not harm the environment and saves money on mercury.

Socio-economic investigations

During the months of July and August 350 questionnaires were given to small-scale miners, 27 to gold buyers and 26 to local authorities in three areas. Batken in South, Naryn in central and Chatkal in East Kyrgyzstan. This chapter provides a summary of the results. A detailed account is seen in Annex 2.

On the whole, about 5500 people are working in the surveyed gold mining areas. Hard rock deposits are considered the most economically profitable, but most miners work in placer deposits.

Mining period varies from one province to the next. Most of the gold mining in Naryn oblast is carried out about 6-7 months in a year during the warm seasons, but many do work the whole year. In Chatkal and Batken climatic conditions allow people to mine the whole year.

The amount of gold recovered by each miner varies considerably. The majority of the miners recover less than 60 gram of gold per year. A fairly large group recover up to 200 gram per year and only very few recover more than 200 gram.

The price of gold varies considerably from one part of the country to the next and with the distance from the district centres. Most miners get 300 to 400 som per gram (9 to 10 USD).

A large proportion of miners use mercury and nitric acids. Very few of them are aware of the dangers involved by using these chemicals.

Other serious health risks are injuries and casualties from caving in of tunnels dug in hard rock and river gravel.

Local administration does not pay much attention to the accidents happening in small-scale mining, neither do they do much to encourage the small scale miners to obtain licence or patent.

Small-scale gold mining is generally unhealthy because feet and hands are always in cold mountain water. Measures to reduce climate conditioned risk:

- Buying special clothes to protect hands and feet of small-scale miners from cold water.
- They do use rubber boots, but they are often full of holes.
- Buying warm, waterproof tents.
- Support establishment of co-operatives, which will be able to obtain loans, invest them (buying technical equipment, tractors, excavators, etc.) and mine more gold. But, imperfection of taxation system will not give real steps to develop larger mining co-operatives.
- Developments of a better health care system in the remote areas.
- Problems of village youth
- According to many sociologists youth poverty is becoming a significant and increasing problem. Youth unemployment in villages raises many worries, as unemployed youth is socially isolated, they often become drug-users and get involved in crime. At present more than 20 thousand young people do not study or work and remain dependent on their relatives.

Legislation

There are several laws and regulations concerning small-scale miners. They are partly contradictory and they need to be modified. The account below is by no means comprehensive. This is partly due to the fact that we received quite contradictory information from different parties involved.

The legislative act, regulating the use of natural resources and small-scale gold mining is the *Law on natural resources of the Kyrgyz Republic* enacted in 1997.

It was supplemented by the *Regulation of the order of licensing of use of natural resources*, approved by the Resolution of the Government of the Kyrgyz Republic of 14.06.2000 No. 338.

Law on Precious Stones and Precious Metals of Kyrgyz Republic; Land Code of KR; Taxation Code; Temporary Regulation (#224) on Small-scale Gold Mining of Kyrgyz Republic of 10/05/2001 and few other standard acts, regulating mining, production and safe keeping issues of precious stones.

In 2001 Resolution of 10.05.2001 No. 224 of the Government of the Kyrgyz Republic approved *Temporary Regulation on individual small-scale gold mining on the territory of the Kyrgyz Republic*. In accordance with this Regulation individual small scale gold mining was legalised but with many restrictions such as:

- Small-scale mining may be carried out using mechanical equipment, but not exceeding 50 horsepower.
- Sluice capacity must not exceed 1 cubic meter per hour.
- Tunnelling is prohibited.
- Small-scale mining must not cause destruction of the landscape.
- Small-scale mining must only be carried out in placer deposits. Hard rock small-scale mining is prohibited.
- Use of any chemicals such as cyaniding and amalgamation is prohibited.
- The small-scale miners must take safety measures.
- Gold recovered must only be sold to gold receipt desks legalised by the Government.

A simplified order of registration (certificate) of small-scale gold miners in village committees was introduced for a very symbolic price of 30 som (0.70 USD) per year. However, recent inquiries at the Prime Ministers office revealed that in addition to the 30 som per year, 100 som (2.5 USD) should be paid per month to local administration. However, according to the Temporary Regulations: A small-scale miner who properly maintain main conditions of mining and selling gold, foreseen by the above Regulation, then duration of the Certificate on small-scale mining would be prolonged by all means and without any payments!

The Temporary Regulation contradicts the *Law on Mineral Resources* and it is expected to be valid until adoption of amendments into the Law.

Unfortunately, the Temporary Regulation does not allow for the settling of conflicts:

- Parcels for small-scale gold mining are not being reserved by a governmental licensing body, and a new license can be issued to them, and small-scale gold miners will be thrown away from the site of their business.
- The Regulation does not regulate legal relationships between small-scale gold miners, using one and the same object for gold mining.
- The Regulation does not legalise work of buyers of gold and assigns to sell placer gold to Governmental State Gold Receipt Desks run by Kyrgyzaltyn.

A later *Law on Mineral Resources of Kyrgyz Republic* (with amendments and changes signed by the President Akaev in 04/02/2002) is the main legislative act regulating issues on use of minerals, including individual gold mining. It is not clear how this law treat the problems for small-scale miners.

By Enactment #882 issued by the Kyrgyz Government on 26th of December 2002 small-scale mining in placer gold deposits is enlisted as type of enterprise undertaken by individuals on patent basis.

A committee on Income under the Ministry of Finances of Kyrgyz Republic was to set amount of payment for a patent (certificate), considering income of small-scale miner got from gold mining. Also there was to be taken into account deductions, which were made from income earned according to Taxation Code. But as monitoring of small-scale gold mining, which was organised in 2003 by "Avista" Company on the TACIS Program, this patent system has not been implemented in areas where small-scale miners work.

Considering 3-year experience of practising Temporary regulation it is necessary to make amendments and changes to its new edition, and also to introduce lower taxes for small-scale mining on legal basis.

1. To exclude that point saying that Kyrgyzaltyn has a monopoly right in opening gold receipt desks, so any juridical person, who has enough funds, could open gold receipt desk registering it.
2. To legalise small-scale mining in small hard rock deposits, and waste dumps left by large-scale enterprises, which are not of interest for big mining enterprises and are not included to the State Balance.
3. Small-scale miners should be allowed to use chemicals such as nitric acid and re-torts provided they have passed a training course on how to handle these methods without risking their health and damaging the environment.
4. Taxes and other dues should be paid by gold receipt desks; their rates should be minimum, allowing gold receipt desks to set prices that are close to black market prices.
5. Another suggestion is that foreign tourists could practice small-scale mining. It would be an attractive type of tourism as seen in several other countries e.g. Finland.

Health issues

The baseline study has revealed a number of serious health problems for small-scale miners described in detail in Annex 3.

1. During hard rock and placer gold mining tunnels are often dug into mountains or banks of the rivers. These tunnels are often up to 50 meter long and in some areas there are networks of tunnels. Neither roof nor walls are supported in the tunnels. The lack of support result in frequent caving in whereby the miners have injuries, which are sometimes fatal.
2. Crushing of gold bearing quartz-veins yield dust of quartz, which may result in silicosis.
3. Acid treatment is a process where boiling nitric acid dissolves sulphides in heavy sand from the sluices, yielding a very pure concentrate of gold. It is mostly carried out in small confined yards. The process produce exceedingly toxic fumes of nitrogen dioxide, which even in trace amounts, disturb the immune system of the lungs, give lung oedema and may cause death.
4. Mercury is used by many small-scale miners for amalgamation. This method was used in the 1940's during the Soviet period, and today more than 60 % of the placer gold miners use mercury. The method is used to recover very fine-grained gold from concentrates from hard rock as well as placer gold mining. During the process the mercury evaporates and is lost to the environment. Some of it may enter directly into the lungs of the small-scale miners. The remaining mercury end up in the drainage system where it enters the food chain either as metallic mercury or as the even more toxic methylated mercury. Poisoning by metallic and methylated mercury may result in irreversible damage of the nervous system, kidney problems and brain damage, tunnel vision, permanent muscular tremors. Some of the symptoms are blue gums, impairment of hearing, speech and gait, problems with the immune defence system and erithism, often phycho-pathological.



Figure 6. *Toxic fumes of nitrogen oxides*

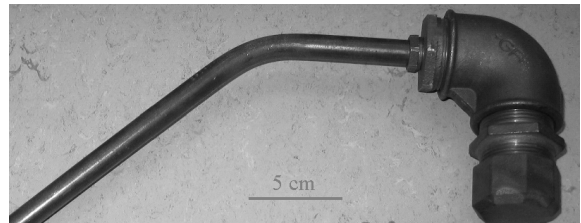


Figure 7. *Retort for recycling of mercury in amalgamation*

Suggestions to reduce health problems

1. Experts in rock mechanics from the Institute of Physics and Mechanics of rocks based in Bishkek will hopefully provide inexpensive solutions to support roof and walls in the tunnels.
2. The Kyrgyz military sell dust-preventing masks for 50 som (~1.1 USD). These masks give sufficient protection against the quartz dust. Furthermore the small-scale miners should be instructed not to crush rocks when children are around.
3. The risk of serious health problems caused by nitrogen dioxide during acid treatment can fairly easily be reduced significantly. If the process is carried out in open field a few hundred meters from the villages with no children and other people standing by and the person carrying out the process take care that the wind is blowing away from him then there will be virtually be no problems. Swiss Red Cross has an extensive network of village nurses in Naryn oblast. The Red Cross will use this network for distribution of handouts describing the dangers and the way out when using nitric acid and also how to prevent silicosis during crushing rocks. Swiss Red Cross is presently distributing these handouts. Mr. Mitalip M. Mamytov, Minister of Health will also try to help to distribute the information on the dangers of using nitric acid and how to use it safely to other parts of Kyrgyz Republic.
4. Use of mercury in the Kyrgyz Republic is strictly prohibited. Nevertheless do many small-scale miners in most parts of the country use it. Many governments in South America, Africa and East Asia have prohibited the use of mercury for amalgamation. None of these governments have been successful. Small-scale miners still go on using mercury, because it is their only way out of poverty. The number of small-scale miners all over the World using mercury is increasing every year. World Bank and United Nations Industrial Organisation (UNIDO) have a number of projects aimed at reducing the health hazards and environmental impact of amalgamation. A very simple solution is introduction of a retort. This is an inexpensive devise made of ordinary non-galvanised water pipes, which are available in most parts of the World. A detailed technical description of the retort is presented in Annex 3. The retort recycles more than 90% of the mercury used for amalgamation. This has two obvious advantages for the small-scale miners and for society. The small-scale miners save money on buying mercury and they do not harm the environment. The retort can be produced in Bishkek at a price of less than 20 USD. However, it is forbidden according to Kyrgyz law to produce devices, which are meant to be used when working with mercury. We had a meeting with Mitalip M. Mamytov, Minister of Health. He asked us to find out according to which law it is forbidden to produce retorts. When that was established he suggested World Bank and the appropriate ministries made round table discussions and try to find a way to legalise amalgamation for small-scale miners. Chris Lovelace was informed and would go ahead as soon as he received a detailed description from the consultant and task manager.

Environmental problems

Two environmental problems have been encountered during this mission. Release of mercury to the environment and destruction of the land surface as a result of diggings.

Mercury is released to the environment by small-scale miners by two processes. Mercury coated copper plates are sometimes placed at the end of the sluices in order to catch small gold grains. The river water flushes constantly over the mercury coating and small amounts of mercury will be washed into the stream. A much more dramatic mercury impact is, however, caused by amalgamation. This process releases large amounts of mercury directly into the atmosphere and from there it enters the drainage system and the food chain.

Amalgamation was also used in the Soviet period. At that time it was legal and much mercury was washed into the streams and is now partly buried under sand and clay as so-called metallic hot spots. With renewed activity of placer gold mining digging sand and gravel in and around these hot spots will reactivate the mercury which will start travelling in the drainage system. It is fairly easy to reduce the impact on the environment of amalgamation by using the retort as described in the health section and in Annex 3.

The other environmental problem encountered is land destruction during digging of holes and tunnels into mountains and riverbanks. In the Chatkal region many holes in the riverbanks have indeed been observed. However many of these diggings will be wiped out by the next flooding of the river. Any remaining features are minor compared to much larger holes and large piles of rusty equipment from large scale industrial placer gold mining carried out during the Soviet period. It is obviously difficult to persuade the present small-scale miners to reclaim the ground where they work when they look at the ground next to their area and see mass destruction of the land surface by previous mining activity.

Gold market considerations

The government owned company Kyrgyzaltyn has complete monopoly on buying gold in the Kyrgyz Republic. The company runs several gold mines in the country. After collapse of the Soviet Union small-scale gold mining increased and the amount of gold produced without government control likewise. The gold produced by small-scale miners was sold to illegal gold buyers. In order to gain control of the gold produced by small-scale miners the Kyrgyz government asked Kyrgyzaltyn to establish gold receiving desks where the small-scale miners could trade in their gold. Kyrgyzaltyn subsequently established two shops one in Naryn and one in Chatkal, two areas where thousands of small-scale miners were active.

The shops were not a success and were closed down within one year. There were two reasons for the failure. One reason, according to the small-scale mines, was that the price offered from Kyrgyzaltyn was too low. Another reason is related to the distance to the gold shop. With only two shops in the whole country it is a long travel for small-scale miners to get to the shops. Illegal gold buyers offered to buy gold at the mining site, they often also supplied necessary equipment for small-scale miners, possibly also mercury used by many small-scale miners.

The present situation is then: Kyrgyzaltyn has still monopoly to buy gold, but a law obedient small-scale miner has no legal place where to go and sell his gold! His only way out is to sell to illegal gold buyers.

The price offered by the illegal gold dealers depends on the distance from district centres. In Naryn, district centre of Naryn oblast the price for gold is 430 som (~10 USD) per gram. In the village Eki-Naryn a one and a half-hours drive from Naryn the price of gold has decreased to 300 to 350 som (7 to 8 USD). Most illegal gold buyers are from Uzbekistan, others are Kyrgyz and few are Chinese.

Gold nuggets are frequently found in streams of the Kyrgyz Republic. The largest found so far weighed 130 gram! It is estimated that the number of gold nuggets recovered per year larger than ~4 gram exceeds several hundred. Gold nuggets yield much higher price on the World market than their weight would suggest. The price depends on size and beauty. A quick survey on the Internet revealed that gold nuggets fetch from 50 Percent of the normal gold price to 3 times the normal gold price. Gold nuggets are used for jewellery and are collector's item. Unfortunately do small-scale miners not get better pay for nuggets. Nuggets sold to Kyrgyz dealers are apparently melted, but gold sold to Uzbek dealers are sold as nuggets at high price to buyers in Tashkent.

In some parts of Naryn oblast of central Kyrgyz Republic small-scale miners often find grains of platinum and osmium in the sluices. Platinum fetch presently a price of about 20 USD per gram and osmium a price of 75 USD on the World market, compared with 11.5 USD per gram on the World market for gold. One gold dealer in Naryn would buy platinum, but only at the same price as gold, whereas no gold dealer would buy osmium mainly because they cannot identify the metal.

Teaching seminars in Eki-Naryn and Bishkek

Eki-Naryn

During the first mission in May-June the village of Eki-Naryn was visited. This village has about 150 households and is largely dependent on placer gold mining. It was thus decided to arrange a teaching seminar in that village in October. It took place 9 October in one of the classrooms of the local school. Twenty-seven small-scale miners mostly from the village, but also some from a nearby village and a single miner from the Balykty-Suu area west of Naryn. One of the small-scale miners is a geologist who has started a small placer gold mining enterprise with a little group of men. Other participants in the teaching seminar were CBF contacts from Naryn who could be teachers in possible future programs.

The seminar lasted from 10 in the morning to 16 in the afternoon and comprised detailed description of technical and health problems as well as the results of socio-economic investigation carried out by CBF. Group working in two rounds with the titles: *Problems for small-scale miners* and *Suggested ways to solve these issues*.

There was a very lively discussion and exchange of ideas. The main problems listed in random order encountered during the first round of group work were:

- Problems in obtaining patent (certificate)
- Lack of knowledge on safety measures
- Lack of proper clothing
- High transportation costs for some small-scale miners from village to mining site
- Fluctuating gold prices
- Lack of basic knowledge of geology
- Health problems

The second round of group work unravelled the following ways in random order to improve their work as small-scale miners:

- More interest and support from local administration
- Easy access to obtain a certificate
- Handouts explaining different mining techniques
- Training courses lasting one to two weeks comprising on site technical instruction
- Fixed price on gold
- Better medical service in the villages
- Financial support as microcredits for purchase of technical equipment.

Bishkek

A two-day Training workshop was held in Kyrgyzaltin Hotel 14 and 15 October with small-scale miners from all four investigated areas.

The agenda was along the same lines as the workshop held in Eki-Naryn, but with additional presentations from local experts in Bishkek on safety measures and on legislative problems (see sections on health issues and legislation).

There was a very lively discussion and exchange of ideas among the small-scale miners from different part of the country. The small-scale miner finding platinum and osmium in the

Naryn explained the other small-scale miners how these metals looked. Discussions as to which types of sluices were the best were also carried out.

The small-scale miners also carried out-group work dealing with more specific ideas as to how much financial support they need and for which purposes. They also discussed which types of training would be of importance for them. The results are shown in the tables below.

Table 1. *List of facilities, technical equipment and other things needed by small-scale miners (estimated for group of 7 people)*

Sl.No.	Category	Amount (in som)
1.0	Outfit and other facilities	
1.1	Working clothes	
1.1.1	Rubber boots	
	- short ones	1750
	- long ones	2800
1.1.2	Rubber gloves	500
1.1.3	Gloves	200
1.1.4	Set of robes and footwear	2800
1.1.5	Jacket and warm pants	21000
1.1.6	Water proof cape	9800
1.1.7	Sleeping bag	1500
1.1.8	Helmet	1750
1.1.9	Protective spectacles	700
1.1.10	Dusk mask	300
	Total	43100 (1045 USD)
1.2	Facilities	
1.2.1	Tent	
	- four-bed (2 p.)	12000
1.2.2	Gas-cooker	4000
1.2.3	Camp-bed	3000
1.2.4	Thermos	800
1.2.5	Miner's lanterns (2 pieces)	4000
1.2.6	Lamps	2500
1.2.7	Dishes (plates, glasses, etc.) for 7 person	2000
1.2.8	Items for everyday use and food (100 som/day = 1 person) for 3 days	42000
	Total	70300 (1702 USD)
1.3	Instruments	
1.3.1	Motor pump	12000
1.3.2	Small mechanical instruments (3 sets)	4000
	Total	16000 (387 USD)
1.4	Technical equipment	
1.4.1	Bulldozer (rent)	2500 USD
1.4.2	Excavator (rent)	3500 USD
	Total	6000 USD

Table 2. *Training requested by small-scale miners*

2.0	Training
2.1	Legislature
2.1.1	Law on Mineral Resources
2.1.2	Law on Precious Stones and Precious Metals
2.1.3	Land Code
2.1.4	Taxation Code
2.1.5	Temporary regulation on individual gold mining on the territory of KR
2.2	Geology
2.2.1	Structure of placer gold deposits, types of placer gold deposits
2.2.2	Methods of exploration and definition of average gold concentration in sands
2.2.3	Estimate of gold resources in deposit
2.2.4	Testing methods of exploring excavations
2.2.5	Methods of gold mining
2.2.6	Equipment used for washing
2.3	Safety measures
2.3.1	Instructions on maintenance of geological exploration works in placer gold deposits
2.3.2	Rules of labour protection and safety measures in mining placer gold deposits
2.4	Healthcare issues
2.4.1	Mercury and nitric acid use
2.4.2	Preventive measures of catarrhal and rheumatic diseases
2.5	Ecology
2.5.1	Harmfulness of mercury and other chemicals for the environment
2.5.2	Land recultivation

Problems faced by small-scale miners and ways to solve them

Problems

1. Imperfection of existing laws: Law on Mineral Resources, Law on Precious Stones and Precious Metals, Temporary Regulation on Small-Scale Mining in KR.
2. Lack of technical equipment to mine gold deposits
3. Lack of knowledge on safety measures in mining.
4. Lack of sources where small-scale miners could get financial support.
5. Lack of opportunity to sell gold legally and for fair price
6. Small-scale miners work in hard-rock deposits illegally
7. Lack of any social guarantees for small-scale miners

Ways to solve problems

1. to make amendments and changes to legislature:
 - on regulating and allowing small-scale miners work on licensed territories;
 - on creation of market for gold nuggets;
 - on opening of gold receipt desks and shops by juridical persons and individuals where small-scale miners could make orders for necessary products and equipment;
 - on legalisation of small-scale mining in hard-rock gold deposits;
2. to form small co-operatives (Associations) from small-scale miners, and provide them loans and grants through international organisations and development programs;
3. to organise different awareness programs for small-scale miners (training workshops, posters, mass media, booklets, leaflets, etc.) through Community and Business Forum (CBF)

Videoconference on distance learning courses for small-scale miners. Bishkek, October 14, 2003.

Agenda

World Bank Washington, USA:
Welcome and introductory remarks.

Biskek, Kyrgyz Republic:

Vladimir Zubkov, Deputy Director, State Geological Agency of the Kyrgyz Republic: Small scale mining in the Kyrgyz Republic.

Peter Appel, Geological Survey of Denmark and Greenland:

Field investigations of small-scale miners techniques and health problems in the Kyrgyz Republic.

Cholpon Dyikanova, Community Business Forum:

Socio-economic assessment of small-scale miners communities in the Kyrgyz Republic.

Usenbek Choponov, geologist, small-scale miner, Eki-Naryn, Naryn oblast: Report on the outcome of the Training workshop in Eki-Naryn 9 October 2003.

Six small-scale miners presented some of their problems.

Salkyn Niyazova, small-scale miner, Sary-jaz area, Issyk-Kul oblast

I come from Sary-jaz area, which is 200 km from Issyk-Kul oblast centre. I have three children, and I am unemployed. And so, I had to find income source to feed my children. My husband is unemployed too. He is breeding the cattle and also helps me to mine gold to satisfy our everyday needs. In our mining area there are three more women mining placer gold in Sary-jaz river. I hope that this videoconference will be very useful for small-scale miners and officials to understand each other. Thank CBF for organising workshop, which was very useful for us. And it will be very good if the World Bank will provide financial support and training courses for small-scale miners like me. Thank you very much.

Abdykadyr Abdrahmanov, small-scale miner, At-Bashy area, Naryn oblast.

I come from At-Bashy. I wash gold in Balyktysuu River. The village where I live is 50 km from the place where we mine. Here in Bishkek it is warm, but there we have snow. We work the whole year. We work in placer gold deposit, and sometimes we find nuggets. There are 8 people in my brigade Last year one of our small-scale miners found a nugget weighing 43 grams. Peter Appel told us that nuggets are expensive. We did not know it. We sell nuggets at the same price as alluvial gold. In At-Bashy we also mine platinum and osmium, but we don't know where we should sell these metals, because there is no market in Kyrgyzstan. Peter Appel promised when he'll be back to Denmark he will find buyers for platinum, osmium and nuggets. We request WB to help us providing grants for stimulation of small-scale mining. We could get working clothes and technical equipment. Thank you.

Nurlan Orozbaev, small-scale miner, Naryn oblast.

Me, Nurlan Orozbaev, is from Eki Naryn village, Naryn oblast. Our village is high up in the mountain 70 km from Naryn. Climate is very harsh, and winter season lasts 7-8 months. Under our climatic conditions wheat doesn't grow, and there are no jobs in the village. From 150-170 households in our village about 70% mine gold. This is their main income. Work is very hard, and we work the whole year. We have lots of problems; we don't have warm working clothes. One of the most acute problems is maintenance of safety measures in tunnelling. We work in placer and hard rock gold deposits. Some tunnels are up to 20 meters in length. It is difficult to tell about an accident when my eldest brother died in tunnel after a rock fall. We don't have materials to support walls in tunnels. On behalf of people living in my village I ask World Bank to help to acquire materials for supporting walls in tunnels, technical equipment for tunnelling and organise training on safety measures. It would be very good to organise such training in villages so more small-scale miners could participate. Thank you very much for inviting me.

Bakas Gaparov, small-scale miner, Soh area, Batken oblast

I come from Batken oblast, very remote region, which is densely populated. There is not enough irrigated land for people. Village households have been allocated the smallest land shares in Kyrgyz Republic (0.01 hectare per a person), and we can not survive on income from our land. In my village 95% of people are unemployed, and 87% of them live in poverty.

I have started to mine only last year. In Batken there are about 200-300 small-scale miners. It is small, not so much as in other regions. I think that small-scale gold mining could help us generate income. I am very thankful for being invited to videoconference and training workshop for small-scale miners in Bishkek. I have learnt many theoretical and practical things. When I'll go back home I'll share all knowledge and information gained here. And I hope that in future the World Bank will pay attention to small-scale miners and their problems, and help us with grants and loans.

Farhad Satimov, small-scale miner, Chatkal area, Jalal-Abad oblast

I am small-scale miner from Chatkal. There are working more than 3000 small-scale miners in our area. They are mining placer and hard rock gold deposits. It started in 1995. Our area has the largest number of small-scale miners, who have good skills on mining, and also there is biggest number of gold deposits.

One of acute problems faced by small-scale miners in Chatkal is:

- strong need for social guarantees for small-scale miners, i.e. pensions and other kind of social insurance. Now I am young and I can work all the year round in cold water. But could I work when I get old? It will be very good to establish an Association of Small-scale Miners to support us;
- opening of gold-receipt shop. Until last year we had no problems in selling our gold. Most gold buyers came from neighbouring Uzbekistan. Recently Uzbekistan introduced strict customs control system, and now it's impossible to take gold through the frontier posts. Gold price became very low. I request on behalf of Chatkal small-scale miners to open legal gold receipt shops with special clothes and equipment for small-scale miners. It will be very good if WB could help with it.

Usenbek Choponov, geologist, small-scale miner, Naryn oblast

Small-scale mining has been carried out in Naryn since 1995. The number of small-scale miners is increasing year by year. Presently there are about 2000-2500 small-scale miners in Solton-Sary, At-Bashy, Kichi Naryn. They mine placer and hard-rock gold deposits. The main reason pushing people to mine gold in our very harsh climatic conditions is unemployment and lack of other means of income. So, gold mining helps people to satisfy basic needs of their households.

However, they also face many problems such as:

1. Lack of knowledge in geology makes it difficult to find the right places to wash for gold.
2. Many gold deposits are situated far from the villages where the small-scale miners live such as Kumbel, Solton-Sary, Balyksuu in At-Bashy mining areas. Small-scale miners have to walk 2-3 days to mining areas because car costs expensive.
3. Lack of legal gold receipt desks. The private gold buyers set price for gold themselves sometimes as low as 250-300 som (5 to 6 USD).
4. Lack of knowledge on legislation such as Law on Natural Resources and supporting legislative acts. For example, small-scale miners could not work in licensed areas. Sometimes it appears that many areas with concentration of placer gold deposits suddenly have been rented for pasturing, so the land has new owners, who don't allow small-scale miners to work on their territories.
5. Lack of knowledge on safety measures, which results in many accidents. For example, during 2001-2003 three casualties took place in Naryn oblast.
6. Lack of funds to purchase the necessary working clothes, footwear, sleeping bags, tents, working instruments and so forth. There is also no possibility to mechanise mining by buying a motor-pump, rock breaker, crushers and etc.
7. Due to harsh working conditions many small-scale miners often have health problems. At present about 60-70% of youth involved in small-scale mining have rheumatism, polyarthritis and other catarrhal diseases.
8. Problems creating co-operatives. One of them is that working out business plan costs lots of money.

Possible ways to solve problems

1. To organise training courses on basic geology.
2. To organise field training with participation of geologists with demonstration of advanced technologies applicable for small-scale gold mining.
3. To sell gold to legalised dealers according to World market price.
4. To form co-operatives from 5-10 people with further registration.
5. To have TV and radio programs on small-scale mining issues in Kyrgyz Republic. Dissemination of special brochures about small-scale mining.
6. Local administration should pay more attention to small-scale mining issues.
7. To improve medical service in villages.
8. To provide financial support to small-scale miners. For example, microcrediting from international organisations, development programs etc.

Credits will be used:

- to buy or rent technical equipment (excavators, bulldozers and trucks);
- to register co-operatives, work out business plan, and obtain license;
- to buy working clothes, footwear, tents, instruments and small mechanical equipment (motor-pumps, hammers, etc.)

There is problem in obtaining these credits because most financial institutions require cash guarantees. Usually village people could suggest their houses, which are built from clay bricks. And a house constructed from clay bricks could not be used as collateral security. That's why the only way to solve this problem is leasing, i.e. to get credit in the form of

equipment (excavators, bulldozer, truck) that could be at the same time used as financial security.

Accra, Ghana

Review of outcomes of the workshop on artisanal and small-scale mining in Ghana. Comments from small-scale miners and consultants. Comparing practices of small-scale miners from Ghana and Kyrgyzstan. Ways of solving problems in Ghana.

University of Alberta

Opinions of specialists on ecological impact of small-scale mining. What contacts established between technical and educational institutions of Canada and Kyrgyzstan could be used by small-scale miners.

World Bank, Washington, USA

Summary of the conference outcomes and closing.

List of participants

Valentin Bogdetskiy, Adviser to the Prime Minister of the Kyrgyz Republic.
Azimbek Joloshev, Head of Fuel, Energy and Mining Section of Prime-Ministers Apparatus.
Karybek Ibraev, Expert of Fuel, Energy and Mining Section of Prime-ministers Apparatus.
Vladimir Zubkov, Deputy Director of State Geological Agency.
Gennadiy Potapenko, Principal Specialist of State Geological Agency.
Irina Gorshkova, Head of Ecological Monitoring Department of the Ministry of Ecology and Emergencies.
Rozalia Jenchuraeva, Professor, Institute of Geology of the national Academy of Sciences.
Ilya Mesgin, Senior specialist of the Institute of Geology of the national Academy of Sciences.
Kamchybek Kojogulov, Deputy Director of Institute of Physics and Mechanics of Rocks.
Gani Abdrasilov, Head of Department of State commission on Business Development.
Vitaly Stavinsky, Executive Director of the Kyrgyz Mining Association.
Institute of Geology of the national Academy of Sciences.
Kapalbek Sultanbekov, Senior Research fellow of Besh-Aral State Reserve.
Farhad Satimov, small-scale miner, Chatkal.
Bakas Gaparov, small-scale miner, Batken.
Kochkonbek Raimbekov, small-scale miner, Chatkal.
Rudbek Abdraev, Inspector of Ecology, Naryn.
Usenbek Choponov, small-scale miner, Eki-Naryn.
Nurlan Onaevroz, small-scale miner, Eki-Naryn.
Abdykadyr Abdrakhmanov, small-scale miner, At-Bashy.
Salkyn Niyazova, small-scale miner, Sary-Jaz.
Pavel Busargin, small-scale miner, Sary-Jaz.
Kenneth Arne, Independent consultant on Minerals, Industrial Marketing, fiscal issues.
Peter Appel, Senior Research scientist, Geological Survey of Denmark and Greenland.
Cholpon Dyikanova, Director of Community and Business Forum.