Artisanal and small-scale gold mining in Mongolia – A contribution to sustainable development?

Study on socio-economic changes in Bornuur soum centre after foundation of XAMO Company

by

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Contents

1. Foreword

Artisanal and small-scale mining (ASM) is a typical occupation and source of income in developing countries all over the world. After the collapse of the former communist system in the time of transformation, since 1989 Mongolia dropped back on a development status of a developing country. Most of the industrial as well as agricultural facilities were closed and thousands of people lost their jobs. Hence more and more people started digging for gold at first by hand later with some easy equipment. But with the increasing quantity of small-scale miners, the massive use of mercury became a serious problem throughout the country. In 2008 the Mongolian Government adopted a new law which had banned the usage of mercury. Consequently all over the country mercury using mills were confiscated and discarded, like in Bornuur soum.

As a result of this new law also in Bornuur soum many people lost their job and source of income. But the people of this soum founded a Non-Governmental Organization (NGO) which represents the local small-scale miners and their matters. The Bornuur Artisanal and Small-Scale Mining Association (BASMA) had started immediately negotiations with the government to protect their rights, legalize their work and to find a solution to continue the small-scale gold mining activities under the existing legal framework. At the end there was the decision to open up a mercury free ore processing plant with the support of the Sustainable Artisanal Mining Project and the Mongolian Government as well. To realize this plan BASMA founded the XAMO Company, which should run the processing plant.

This report tries to show what has changed in Bornuur soum centre with foundation of XAMO Company and the construction of the new mercury free ore processing plant since summer 2008. The main focus is put on socioeconomic changes and those of the people's life in particular. Key-questions to show possible changes and the current appearance of Bornuur are: How does the development of the soum centre look like during the last two years, positive or negative? Do more people have a job and a stable source of income to secure their livelihood? Do the people have a better life now or not? What are the main changes in the local economy? Is small-scale gold mining still by far the main economy sector and the main source of income for most of the people of Bornuur?

To get answers to these questions and to get own impressions of the current situation the author of this report visited Bornuur soum centre twice in October 2010. At the first time most of the expert and standardized interviews were made as well as the mapping of the local businesses. But because of the main harvest time in this region at that time, at some of the service facilities nobody was present, consequently interviews with these people were not possible. As a result of their absence not all of the local businesses could be detected. In total 17 shops and 18 other service facilities could be identified. This report defines as a shop all small or medium size shops as well as supermarkets which sell food or non-food goods (things of daily needs, clothes etc.). A service facility is defined as a business which offers particular services, like that of a restaurant, a hotel, a pharmacy, a gas station, a bank, a hairdresser or a company which produces specific goods. The XAMO Company provides on one hand milling services and produces on the other hand gold concentrate. Therefore XAMO Company is not only a service provider.

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2. Introduction

2.1 The artisanal and small-scale mining gold sector in Mongolia

The artisanal and small-scale mining sector is a worldwide phenomenon in developing countries. However there is no commonly accepted definition of artisanal and small-scale mining until yet. In most of the cases it is a poverty-driven activity which presents a wide spectrum of mining activities ranging in scale, which have a relatively low degree of mechanization, a high degree of labour intensity, only poor occupational and environmental standards, little capital investments and a lack of long-term planning. But ASM is also recognized for its poverty reduction and wealth creating potential in many developing countries all over the world. The ASM is typically located in the rural areas of these countries, where it increases the local purchasing power and the demand for locally-produced goods. It also reduces the rural-urban migration and enables exploitation of deposits which cannot be exploited profitably by the industrial mining companies (HINTON 2005: 1). ASM generates money in rural areas because it creates new jobs and as a consequence a good source of income for many people to secure their livelihood.

According to estimations by the International Labour Organisation (ILO) there were at least 13 million people in 55 countries in 1999 who are working in artisanal and small-scale mining activities and furthermore 80-100 million people who directly or indirectly depend on this mining activities for their livelihood (JENNINGS 1999: 1). But in the last ten years with increasing prices for most of the commodities, an extreme population growth and increasing of poverty in the world, the number of artisanal and small-scale miners has been estimated at between 20-30 million, of these where alone 10-15 million artisanal and small-scale gold miners (HINTON 2005: 3). In most of the cases the artisanal and small-scale mining activities are informal because there is no statutory framework or basis in many countries which regulates the rights and the obligations of the small-scale miners. The reason for that is that the government of a developing country often ignores at first the activities of the small-scale miners and looks at it as a passing problem. Other reasons are that the state is not able to control the observance of the laws, or is not willing to accept the small-scale mining sector as an important employer and sub-sector of the local economy and key-driving-sector for rural areas.

In Mongolia there are different estimations about the number of small-scale miners. According to a report by the World Bank of 2003 there are at least 30,000 people who are involved in small-scale mining activities (WB 2003: 22). But another report of 2003 by “Rheinbraun Engineering und Wasser GmbH” for the World Bank estimated the number of small-scale miners up to 100,000 (RUHRMANN & BECKER 2003: 109). A further report by the World Bank of 2007 said that there are 30,000 small-scale miners in Mongolia which are working the whole year in this sector and during the summer this number increases up to 100,000 (WB 2007: 120). But the Mineral Resource Authority of Mongolia said there are “only” 54,000 artisanal and small-scale miners. At the moment the latest realistic estimations for the seasonal peak of people who are engaged in ASM is 100,000-120,000 small-scale miners, which complies up to 20 % of the rural workforce. One of the reasons for the increase in 2010 is the harsh winter 2009/2010 when more than 7 millions livestock had died.

The Mongolian small-scale mining activities started in 1991 after the collapse of the socialist system in the area of Boroo River in the surroundings of the former state owned “Tsagaan Chuluut Goldmine” in Selenge aimag. The first small-scale miners of Mongolia were former workers of this goldmine who had the skills and the knowledge how to mine for gold. These first miners started to reprocess the tailings of the former goldmine. Because of the use of obsolete techniques during the socialist period the recovery rate was quite bad so that a significant part of the gold still remained in the tailings. The same process could be observed in Nalaikh after closure of the former state owned coal mine in 1993. Here also former workers of the big coal mine started to dig for coal for private consumption and for selling. Only some years later in the mid-1990s there was a disproportional increase of the Mongolian small-scale mining sector when thousands of people who had lost their jobs in the course of the economical and political change had started to mine for gold. Finally at the end of the millennium about 10,000 people were engaged in small-scale mining activities throughout Mongolia.

According to a report of the Mongolian Business Development Agency in cooperation with Eco-Minex International Co. Ltd. in 2002 most of the small-scale miners (80 %) had worked in primary and alluvial gold mining deposits (MBDA 2003: 27). In this year placer gold mining activities were dominant in Selenge, Ovorkhangai, Arkhangai, Tuv, Bayankhongor und Bulgan aimag. Hard-rock mining activities were

noticed only in Selenge and Tuv aimag. A reason for that is the much easier availability or accessibility of this placer gold deposits. But in the recent years the circumstances changed a little. With an increase of the knowledge of the people about gold mining there was also an increase of hard-rock mining activities. Especially in Bayankhongor aimag thousands of people are extracting gold in hard-rock mining. In Bornuur hard-rock mining dominates too.

2.2 Introduction to Bornuur soum / Tuv aimag

Bornuur soum is one of the 27 soums of Tuv aimag and is located in the northern part of the central aimag of Mongolia. In the north it borders on Mandal soum and Bayangol soum of Selenge aimag and in the east on Batsumber soum of Tuv aimag. In the south Bornuur soum shares a border with Bayanchandmani soum and Bayantsogt soum of Tuv aimag, and in the west with Jargalant soum of Tuv aimag. Bornuur soum is located approximately 100 km to the northwest from the capital city of Ulaanbaatar and has a total land area of 114,000 km^2. The soum is divided into four bags, Uguumur, Nart, Bichigt and Mandal. Bornuur soum is located in the valley zone between the mountain ranges of the Khentii and Khangai mountainous area. The altitude reaches from 900 – 1,700 m above sea level, whereby the highest point is 1,727 m above sea level near the Gunan riverside. The climate of the soum is highly continental with an average annual precipitation of 265 mm. In the summer the average maximum temperatures reach up to 25 °C, in winter the absolute minimum temperatures reach less than -35 °C. The biggest river of this soum is Boroo River, which flows for more than 90 km before it joins with the Kharaa River.

By the end of 2009 Bornuur soum had a population of 4,611 people, of which were 2,311 male (50,1 %) and 2,300 female (49,9 %). Compared with the population in 2008 (4,677), there is a decrease by 66 people. But in addition to it compared with the population number in 2005 (4,263), it increased by 348. The headcount of people who are living in Bornuur soum centre is 3,462 in 2009. It increased compared to the previous year by 424. The headcount of people who lived in 2009 in the rural areas of Bornuur soum is 1,149. This was a decrease by 490 compared to the year 2008. With 945 unemployed people in 2008 in the soum, the rate of unemployment is quite high. According to the number of people who were in working age (64,8 %) the rate of unemployment amounted to 31,2 %. But according to the data from the local

governor's office, there where only 35 persons who were officially registered to be unemployed in 2008.

Bornuur soum is located in a favourable climatic region with good, fertile soils. Moreover the soum is rich in mineral resources, especially in gold and iron ore but also in tungsten and construction materials like high quality sand and gravel. During the communist time Bornuur soum was the main region of the Mongolian agriculture. The agriculture sector, including animal husbandry, was also the dominant employer of this soum and agriculture was practiced in almost all parts of the soum, especially in the fertile valleys such as Agit, Taist, Shar Khooloi and Davaanbulag. In the socialist time Bornuur was a state owned farm called "*Ernst Thälmann*" which was the main provider of milk, potatoes and vegetables for Ulaanbaatar and the biggest employer for the local people. The name refers to a famous German communist leader. It had been selected by the government of the GDR (German Democratic Republic) when GDR-specialists established this farm. As a result of the collapse of the socialist system after 1990 and the privatization of former state owned companies all farms in Mongolia collapsed too, most of the farm buildings fell in ruins and the cultivated land for potatoes and vegetables shrunk. Consequently many people had lost their jobs, left Bornuur soum and moved to the cities, especially to Ulaanbaatar and tried to find a new source of income to secure their livelihoods. Another part of the people who became unemployed had seeked for other possibilities to earn money in the soum.

Figure 1: Bornuur soum centre is located in the fertile valley zone between the Khentii and Khangai Mountains.

Source: Robert Sandmann, October 2010

As stated above, Bornuur soum is very rich in gold deposits. The soum belongs to the golden zone of northern Khentii, which is rich in placer and hard-rock gold deposits. So many people started to mine for gold with light equipment and in the beginning with no knowledge (*artisanal and small-scale mining*). In the following years gold mining activities became an important source of income to more and more people who were directly engaged in the mining activities and furthermore to people

who indirectly depended on these activities. Most of the local ASM are engaged in hard rock mining in the Sujigtei Mountains, a site 32 km from the soum centre. These deposits, earlier used by a gold mining company, are now being explored by local miners because the gold vein is very small and not particularly interesting for an industrial gold mining company. Because of this gold vein there is a contract between "*Gunbileg Gold LLC*" the licence holder of this region and the local XAMO Company, which allows the small-scale miners from Bornuur to dig here for gold. But in most parts of Mongolia where artisanal and small-scale gold miners are working, a gold mining company owns a license for this area what leads to problems between the company and the miners because these companies want to recover all the gold on their own and they are in fear of a chaotic way of gold mining by the small-scale miners which might pollute the natural environment.

Because of the very rich gold deposits many gold mining companies (large-sized, medium-sized and smaller ones) are active in Tuv aimag so that this aimag is one of the heaviest exploration and exploitation licensed aimags of Mongolia. In 2009 existed 536 exploitation and 174 exploration gold mining licences for Tuv aimag which means that 1,230,714 ha of land fell under exploitation licensed areas and 44,140 ha of land fell under exploration licensed area (SDC 2010: 28). In Bornuur soum the biggest concessionaire is the Canadian based "*Centerra Gold*"-Company which started their hard-rock mining activities in 1997 and runs the "Boroo Gold Mine" since 2004 in Bayangol soum and Mandal soum of Selenge aimag and furthermore the "Gutsuurt Gold Mine" 35 km in the east of "Boroo".

Figure 2: Boroo Gold Mine.

Source: Robert Sandmann, September 2009

The concessionaire for the mining site in the Sujigtei Mountains is "*Gunbileg Gold LLC*", a Mongolian based gold mining company, which started in 2003 with a licence for 45 hectares their hard-rock gold mining activities. However in October 2010 there were rumours that "*Gunbileg*" had sold their licence of the Sujigtei Mountains to "*Centerra Gold*" or is in negotiations with "*Centerra*" about it.

3. Research methodology

3.1 Evaluation of publications about Bornuur soum and small-scale gold mining in Mongolia

At the moment the author of this report is writing his PhD-thesis about the Mongolian artisanal and small-scale mining sector in general, with a special focus on gold mining. For this purpose he collected, analyzed and evaluated many reports, literature, statistics and topographical maps about this topic. A small selection of these was used for the preparation of this report, especially reports with a main focus on Tuv aimag or Bornuur soum. Additional sources of information were data from the National Statistical Office of Mongolia, the Sustainable Artisanal Mining project and a new report by Hugjliin Ezed NGO about the socio-economic situation in Bornuur.

3.2 Expert interviews

During the fieldwork in Bornuur soum centre the author had met different experts of the soum and interviewed them. These people were the assistant of the local governor as the expert of the administration, the director of the XAAN bank, a teacher of the local school as well as the director of XAMO Company. In comparison with the answers of the standardized questionnaires the evaluation of these expert interviews showed very interesting and partly different views. On one side the views by the staff of the administration and the banks differed considerably from those from the other side which were expressed by the shopkeepers, people of the XAMO Company or other local people.

3.3 Interviews with a standardized questionnaire

While mapping all the shops and other businesses in Bornuur soum centre a standardized questionnaire has been used for interviewing the shopkeepers and the owner of other businesses or services to get an insight into the present socio-economic situation of the soum centre. A central question was how long their shop or business here exists. That was one key to show the socio-economic changes in Bornuur soum centre in the last two years. But these interviews also focused on their lives, e.g. what they had worked before they opened up their businesses and if other family members (especially husband or wife) were working. Other aspects of these

interviews were questions concerning their future, their wishes and especially the aspect what might happen to them when the gold deposits will be exploited and most of the small-scale miners will leave Bornuur soum centre. There were additional interesting aspects mentioned by some interviewed people. Some of the standardized interviews developed into a semi-expert interview because the interviewed people told more than they were asked. This additional information was very helpful to get a better understanding of the conditions in the soum centre and the people's life.

3.4 Visualization of the socio-economic situation and the changes between 2008 and 2010 by charts, a thematic map and photos

In order to make the present socio-economic situation and the changes in the last two years more transparent, a thematic map of the spatial distribution of all shops and other businesses of Bornuur soum centre has been drawn. On the map there is a differentiation between shops and supermarkets on the one side (green points) and other services like car repair service, haircutter, restaurants/pubs or gas station on the other side (red points). On this thematic map you can also identify the age of the shops or other services and if they were opened before the foundation of XAMO Company or later. Through charts and diagrams most of the answers of the people interviewed with standardized questionnaires are comparable and you can see a trend in the answers. There are also a selected number of photos included in this report which are showing important changes in and interesting aspects of Bornuur soum centre.

3.5 Observations

All observations and mappings were made during the two visits of Bornuur soum centre in September and October 2010. During the walks through the soum centre the author got a good view of the present situation of the people's life and could detect changes in the socio-economic situation. In addition to the interview answers a good picture of the present situation could be taken especially how the small-scale gold mining sector presented by the XAMO Company influences the socio-economic situation and the life of most of the people in the soum centre.

4. Small-scale gold mining in Bornuur soum

4.1 The small-scale gold mining sector in Bornuur soum and the usage of mercury until beginning of 2008

With the collapse of the socialist system and the state owned companies after 1989, many local people lost their jobs. But as stated above, the first small-scale mining activities in Mongolia started shortly after in the area of Boroo River in the surrounding of the former state owned "Tsagaan Chuluut Goldmine" in Selenge aimag not far away from Bornuur soum. Already during socialism, industrial gold mining was pursued in the Sujigtei Mountains, although the economic key sector was agriculture and livestock farming. So the people from Bornuur soum remembered these activities in the close mountains on their search for new job opportunities and sources of income and started to dig for gold on their own. Frequently occurring natural disasters, like harsh winters and dry summers (dzud, gan), had forced more and more farmers to give up their agricultural and livestock farming activities. Therefore, the numbers of small-scale gold miners in Bornuur soum grew quickly in the mid-1990s.

Just like in industrial mining, also small-scale gold miners use almost all around the world chemicals to extract gold from the gold ore, because this ensures a higher recovery rate than other methods. The usage of mercury is typical for the worldwide small-scale gold mining activities but is also connected with serious environmental hazards and impacts. According to a report of the National University of Mongolia (NUM) and the Centre for Development Research (CDR), until 2005 there were about 400 artisanal and small-scale miners in Bornuur soum and each miner had recovered 223,8 grams of gold by using 400 grams of mercury per year (JANZEN et al. 2005: 32). With this high usage of mercury also environmental impacts were very high in the soum. Most of the mercury (about 80-90 %) was imported from China, the remaining 10-20 % percent came directly from Mongolia, primarily from leaked mercury in Boroo River. The mercury in Boroo River was released into the environment in socialist time during amalgamation of hard-rock ore because of bad equipment. Also in 1956 mercury was released, when a mercury storage tank of the "*Mongolor*" company exploded and 10 tons of this chemical leaked into the Boroo River (GRAYSON 2007: 36). Besides that the mercury content of the soil in the foundations of the old Boroo gold recovery factory is remarkably high. The mercury

content of the soil beneath the processing plant no. 1 reaches up to 6,833 g per ton of soil, while under processing plant no. 2 up to 2,541 g per ton are found. At the time of the survey in 2000 about 300 people panned for mercury in the river and dug mines into the mercury-contaminated subsoil of the terraces of the Boroo River (TUMENBAYAR et al. 2000: 6).

Because of this excessive usage of mercury in ASM in Bornuur soum, the careless transportation and storage as well as the usage of this poisonous chemical at home in the gers or houses of the local miners, in 2007 the Mongolian government intervened. Under the order of the prime minister, the State Inspection Agency carried out visual inspections and examinations in the implementation of Chemical Poisonous and Dangerous Substance Law (SDC 2010: 29). Most of the miners had known in general that the usage of mercury can be dangerous and cause severe health problems. But most of them had no exact knowledge about the dangers of this toxic chemical. Hence, the miners had often toughed it with their bare skin and inhaled the mercury vapour. In case they had used it at home, all family members were surrounded by the toxic mercury vapour.

Another huge problem was the careless disposal of mercury because many people threw used mercury into the normal garbage or into their toilets. This way, the mercury had infiltrated the ground and got into the water which the local people used for drinking and cooking. This was stopped in 2008 with the implementation of the Chemical Poisonous and Dangerous Substance Law. As a result of this new law in January 2008 147 mercury using mills were confiscated and discarded in Bornuur soum, which resulted the end of small-scale gold mining in the area.

4.2 The foundation of XAMO Company in 2008

This decision was an important measure to preserve the health of the people of Bornuur soum centre and the local environment. But it also ruined the livelihood of thousands of people. Consequently the local gold miners initiated and established with the help of the Sustainable Artisanal Mining project and the Mongolian Government the “Bornuur Artisanal and Small-Scale Miners Association” (BASMA), an NGO that aims at protecting their rights and legalizing their work as well as their income under the existing legal framework. BASMA started its work in 2008 under

the precept of a mercury free life and work and organized a consultative meeting in Bornuur soum centre with the precept of a “mercury-free life”. At the end of this meeting there was a decision to open up a mercury free ore processing plant with the guarantee of operational and financial support by the Sustainable Artisanal Mining project and the Mongolian Government. For this project BASMA founded the XAMO Company, in order to run the mercury free ore processing plant and to provide milling services.

The mercury free gold processing technology was introduced by the Sustainable Artisanal Mining project which established the processing plant in September 2008 in partnership with the XAMO Company as a pilot project. In the beginning, the processing plant served to experiment and recommend mercury free technology for various gold ores from different parts of Mongolia and to train the miners on mercury free technologies. The reason for this was that the local small-scale miners would only accept this mercury free technology if there were nearly the same amounts of gold processed. At the end of several experiments the best equipment for the processing plant was identified. The rate of gold recovery amounts up to 74 %. That corresponds approximately to the rate of recovery the miners had before while using mercury. Depending on the origin of the gold ore, the rate of gold recovery amounts 60-74 %, because different gold ores from different aimags have a different gold content.

Figure 3: A roller mill of XAMO Company in the background with two water sluices and carpets inside. The right one is just used.

Source: Robert Sandmann, October 2010

4.3 The XAMO Company today

Since September 2008, the mercury free ore processing plant runs successfully in Bornuur soum centre. Small-scale gold miners come from many different aimags to process their gold ore here, even from aimags far away like Bayankhongor, because until now only in Mandal soum there is another mercury free processing plant in Mongolia. The Mongolian government plans to establish five mercury free processing

plants like XAMO throughout Mongolia, one of them in Bayankhongor aimag. But that is for sure definitely not enough! For the economy and the environment of Mongolia it is important that more mercury free processing plants should be opened, in order to reduce the distances that the miners have to cover. Otherwise they will only bring the best gold ore with the highest gold concentration to the plants and leave the gold ore with a much lower concentration behind, because it doesn't pay to drive tons of gold ore with a low concentration hundreds of kilometres through the country. Or they will perhaps process the gold ore with a low gold concentration at home with mercury again.

Figure 4: With jute bags the gold ore is usually transported to XAMO Company. In front the rest of a truckload.

Source: Robert Sandmann, October 2010

The daily maximum processing capacity of XAMO is currently up to 16 tons of gold ore. For this there is one jaw crusher, which breaks the bigger pieces of ore into smaller ones, eight roller mills with water sluices and carpets in it which mill the small pieces of gold ore into a fine powder and separates the tailings from the gold concentrate (first gravity concentration), as well as one Holman shaking table, which separates more tailings from the gold concentrate and upgrades it this way. This process (secondary gravity concentration) replaces the role of mercury in gold amalgamation. After these processing steps the gold concentrate is leached with a (10 %) diluted nitric acid to digest and reduce the amount of sulphides in the concentrate to improve the following gas smelting. During this acid digestion the upgraded concentrate loses 40-50 % of its mass. After digestion the concentrate is

Figure 5: The jaw crusher of XAMO Company. Underneath there are two typical wheelbarrows.

Source: Robert Sandmann, October 2010

washed in water and dried. In the end, the gold rich concentrate will be mixed with anhydrous borax, a flux, and melted with a gas smelter in a porcelain crucible to produce a gold bar.

The facilities of XAMO are running 24/7, but often not the entire roller mills are working because they have to be repaired or there are other problems with the equipment. So the maximum processing capacity of 16 tons of gold ore can't be reached every day so that the average capacity is 12-14 tons per day. The small-scale miners who want to process their gold ore at the XAMO Company have to pay 100.000 MNT per ton of gold ore or 13,000 MNT per wheelbarrow with 135 kg of gold ore. But because of the limited capacity of the processing plant they often have to wait several hours, sometimes more than one day. The typical size of a group of miners is 6-8 people. XAMO had built a hotel in the opposite of the processing plant for miners or groups who come from outside of Bornuur soum centre and who have to wait to process their gold ore. In the hotel there are 10 rooms for rent. Each room can be shared by four people. The price per room and night is 15,000 MNT. The hotel is almost constantly booked out all the time and an additional source of income for XAMO. Just like the canteen in the main building of the Company, where the miners could have a meal for a fair price.

Figure 6: The hotel built by XAMO Company in the opposite of the processing plant. A new group of small-scale miners arrive.

Source: Robert Sandmann, October 2010

XAMO is owned by five people of Bornuur soum centre who were former artisanal and small-scale miners and employs 60 local people. So the Company is one of the biggest employers of the soum centre. In total 270-280 small-scale miners of Bornuur soum use the facilities of the processing plant and an additional count of 200 miners came from other aimags to Bornuur to process their gold ore here. These other aimags are for example Bayankhongor, Selenge or Khentii. But according to rumours and estimations by the interviewed people, 500 small-scale miners are working in total in the Sujigtei Mountains all around the year. In wintertime this number raises up

to 2,000 people. The reason for this is that during this time there are no other job opportunities and consequently no other sources of income.

According to information given by Mr. Narantsogt Belkhuu, the general manager of XAMO, the Company is buying 300-350 grams of gold per day, if all of the eight roller mills are running. On average the Company is buying 240 grams of gold per day. The gold content per ton of gold ore that can be processed with this mercury free method is on average 20 g. So if on average six roller mills are running the daily production is 240 g of gold. For the small-scale miners XAMO is a secure and trusted buyer, because the Company is buying all of the gold which is processed in the processing plant. If the miners would sell their gold to a bank, they would have to pay the wind fall tax which amounts 66 %. At the moment the price for one g of gold sways between 45,000-50,000 MNT. XAMO pays this price to the miners too. The Company sells this gold to mobile buyers or in Ulaanbaatar and add 2,000 MNT per gram of gold to the price they had paid to the miners. These 2,000 MNT per gram is the profit for XAMO, even if they had paid 45,000 or 50,000 MNT per gram of gold to the miners themselves.

Figure 7: The gold rich concentrate will be melted with a gas smelter to a gold bar. In this case to a bar of about 45 grams with a worth of 2.1 million MNT.

Source: Robert Sandmann, October 2010

Because of this environmentally compatible mercury free way of processing the maximum rate of gold recovery amounts up to 74 %. A higher rate of recovery can only be reached with leaching by cyanide, the way the industrial gold mining companies do it. So there are still up to 10 grams of gold per ton in the tailings. These tailings belong to the owner of the plant were the gold was processed. At the moment the management of XAMO is trying to find an industrial gold mining company that wants to buy these tailings, so that the rest of the gold can be recovered as well. This also could be a very interesting additional profit for the company. Because with an average daily processing capacity of 12-14 tons of gold ore, what is 360-420 tons of gold ore per month, a huge amount of tailings were produced every month. In each single month between 3.6 and 4.2 kg of gold remain

in the tailings. According to the information by the general manager there are more than 5,000 tons of tailings in the backyard of the processing plant. For these tailings XAMO is constructing a storehouse at present because there is no more space at the stockpiles in the rear of the processing plant.

4.4 How much a small-scale gold miner does earn per month?

It is difficult to say how much a single small-scale miner earns per month. But maybe a sample calculation could help to get a better imagination. For this sample calculation we use the 240 g of gold that XAMO is buying on average per day, which is 7.2 kg per month. This amount of gold is produced by 280 people directly from Bornuur soum centre and an additional count of 200 people from outside Bornuur, so 480 people in total. That means that every single small-scale gold miner produces on average 15 g of gold per month. The price per gram of gold in October 2010 was 48,000 MNT, which means that one miner earns 720,000 MNT per month, deducting the costs for the processing and transport. That is nearly twice as much as the Mongolian average monthly income. For sure that's a very simple sample calculation, but it shows the potential of artisanal and small-scale gold mining as a good source of income as well as its wealth-creating potential.

This calculation correlates to the answers of many people which were interviewed. The common tenor was that the people of Bornuur soum centre have more money since the foundation of XAMO. Most of the shopkeepers said that the local people could buy more things of daily needs now. It is also possible for some of the shopkeepers to save a part of the money they earn. While the expert interviews with members of BASMA, they told about people who used the money they earned in small-scale mining to buy new greenhouses from Korea, better seeds for agriculture from Europe, new cows, new cars, microbuses, tractors or trucks, to build better houses made of stone or wood, to build stables, as well as to open up new businesses like a hotel, a brick production or a transport business. This example from Bornuur illustrates the positive potential of the artisanal and small-scale gold mining sector for sustainable development in Mongolia. It also corresponds to the answers of the miners, who said they didn't want to work their whole life in small-scale mining. They only try to make good money to do something else in the future.

5. The present economic situation in Bornuur soum centre

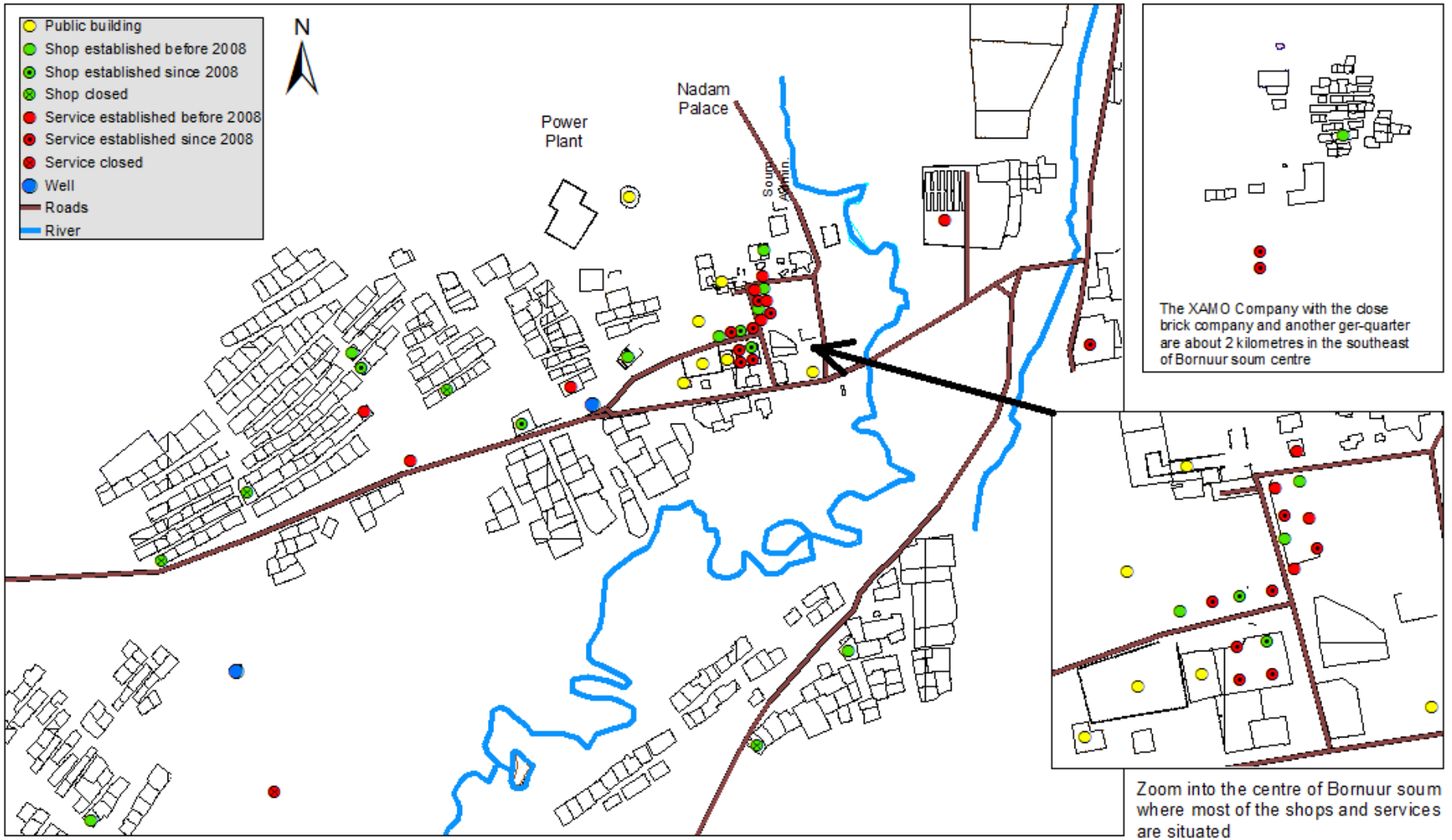
5.1 The spatial distribution of shops and services in Bornuur soum centre

As to see on the map at the next page, most of the shops and businesses are concentrated in the middle of Bornuur soum centre on or next to the main road. In total there are **17 shops** and **18 service facilities** in the soum centre which could be detected. In some of these businesses it was not possible to talk to the owners to make an expert or a standardized interview because of different reasons. Either the shop or business was closed forever, or it was closed on this particular day, or nobody was to see on the site. The main cause for that was probably that at this time was the main harvest time in this region. Moreover one of the few days in Bornuur was an official holiday. That was a big pity, because the answers of the different interviews were very interesting and helpful to get deep insights to the current socioeconomic situation of Bornuur soum centre and the living conditions of the people today.

In the centre of Bornuur there are the public buildings of the soum centre like the government's house, the local school, the kindergarten, the culture palace, a Tibetan temple as well as a Christian church. Furthermore there is a typical high density of businesses, because here are most of the local shops and service facilities situated. In the centre of Bornuur around the public buildings for the administration and education there are in total **6 shops** and businesses, mainly shops for food, clothes or things of daily needs, as well as **10 services**, mainly restaurants and pubs, banks, hotels and barber or beauty parlors.

Besides the shops in the centre of Bornuur, every single ger-quarter of this soum centre has or had at least one own small shop which sells mainly food. Some of them also offer things of daily needs like drugs, cosmetic or stationery materials. Another characteristic point of the spatial distribution of shops and services in Bornuur soum centre which were carried out was that none of the car repair services were located directly in the centre. All of them were established in the ger-quarters. Furthermore there are no services or businesses like restaurants, pubs or barber shops in these ger-quarters. Apart from that there is the typical situation that the local gas station is not close to the centre of a Mongolian soum centre and also a little bit far away from other houses or gers.

Spatial distribution and changes in the business sector of Bornuur soum centre since 2008



Source: Basic plan of Bornuur soum centre
Scale: approximately 1:10,000

Design and Mapping by: Robert Sandmann October 2010

5.2 The development and changes of businesses in Bornuur soum centre

Since 2008 there were many changes in the local economy of Bornuur soum centre and its business sector. As stated above, every ger-quarter has or had an own shop. But **4** of these small or medium **ger-quarter shops** closed since 2008. There are two possible main reasons for this: On the one hand in Bornuur soum centre there are two new supermarkets, which opened in 2008 and in 2009. So these supermarkets could have forced the owners of these 4 ger-quarter shops to give up their businesses because the customers maybe preferred to buy at the new, bigger supermarkets, which perhaps could offer better prices. On the other hand with the implementation of the new Chemical Poisonous and Dangerous Substance Law and the confiscation of the local mercury using mills in 2008, many people left Bornuur soum centre because of the radical loss of jobs and income. According to statements of the interviewees the owners of these ger-quarter shops were among these people.

However, since 2008 a quite big number of new shops and service facilities was opened up. Especially in the centre of Bornuur **7 service facilities** were opened completely new or opened up after expansion of old smaller ones. Now there are for example **2 new hotels** and **3 new restaurants**. A deeply interesting aspect is that one of the new hotels (which also include a restaurant) is owned by a small-scale miner, who opened up this hotel in summer 2010 with the money he earned in ASM. He is still working in small-scale mining and uses the facilities of XAMO. His wife is running the hotel and restaurant with the help of other family members, particularly the children. At the moment there are 6 rooms with only 1-2 beds per room. However, the owners want to buy more beds if they have more money soon. According to their statements the maximum capacity of one room are 3 beds and the price per bed and night is 5,000 MNT. Most of their customers are small-scale miners, probably because the owner is a small-scale gold miner too.

Figure 8: The hotel in the centre of Bornuur (including a restaurant) opened up in summer 2010 by a small-scale miner and his wife.

Source: Robert Sandmann, October 2010

Figure 9: The first supermarket in the centre of Bornuur opened up in 2008.

Source: Robert Sandmann, October 2010

Another big change or development was the opening of **2 supermarkets** in the centre of Bornuur, one in 2008, the other one in 2009. Both supermarkets are located front to front and were smaller shops before which were enlarged to supermarkets. For one of these supermarkets a new house was built (2008) only a few metres away from the old shop. The old building of this shop is now used by one of the new restaurants in the centre. For the other supermarket the old building of the former community centre, which is owned by the local governor (as a private person) and his family, was renovated in 2009. He and his family are not only the owners of the building, they also own the supermarket, the hotel and the restaurant which are located inside this building. The fourth facility inside this building is a branch of the Хадгаламж ("Savings bank"), which was also opened up in 2009 and which is one of the **2 banks** in Bornuur soum centre. The other one is the Xaan ("Khaan Bank") which is close to the government's house and which exists since 1985.

Figure 10: One of the new restaurants of Bornuur. This is the former building of the shop which was enlarged to the first supermarket.

Source: Robert Sandmann, October 2010

Most of the positive economic changes (the opening of new businesses) since 2008 relates to the centre of Bornuur. Nevertheless in the ger-quarters there are **2 new shops** too, which were both opened up in 2009 and which offer food and things of daily needs. Moreover, there is a new **milk company** in the eastern part of the soum centre, which was opened up in 2009. Unfortunately it was not possible to clarify exactly who is the owner of this company. Some people mentioned secretly that this

is a Chinese owned company. Others said that the owner is from Ulaanbaatar but this company was indeed constructed with Chinese money.

Figure 11 (on top): The entrance of XAMO Company.
Figure 12: The backyard of XAMO Company with lots of tailings.
Source: Robert Sandmann, October 2010

Of course the biggest and most important change for the local economy was the foundation of the XAMO Company in 2008. As stated above 60 people from the soum centre are working for the company. That makes XAMO to the biggest employer of Bornuur. It´s not just that XAMO needs people to run the processing plant or repair things, there is also a need for people who work in the office, the canteen, the hotel, or as a driver. But in the days of field work in Bornuur soum centre the author of this report didn´t saw so much people at XAMO.

Another very interesting aspect is a new **brick production company**, which was opened up in 2009 or 2010 by a community of 20 small-scale miners opposite of XAMO. These people used the money they earned in ASM to buy the equipment and machines to produce bricks, which they use on their own, sell in Bornuur and most likely on the market in Ulaanbaatar. This is a very good example for the potential of ASM and its sustainability effects. Many other people from Bornuur who are working as small-scale miners also use the money they earn from gold production to invest in a better future. There are for example several groups of people who pooled their money to buy new greenhouses from Korea.

Two experts from BASMA gave good examples for that: People use the money from ASM to buy better seeds for agriculture, new cows, new cars, new greenhouses, new microbuses to open up a transport business, new tractors or trucks, or to build better houses made of stone or wood, or to build stables for the animals. That also means that the money from ASM is either an extra income or a certain part of the monthly

income of the people, not the only income like some years ago. The members of BASMA claimed that ASM is not the main business for many people anymore. They often use the money from ASM to expand their new main business which is predominantly agriculture. Therefore BASMA estimated the proportion of money from ASM of the monthly income to 50-60 %. So the livelihood of the local people seems to be much more secured today because they have different sources of income.

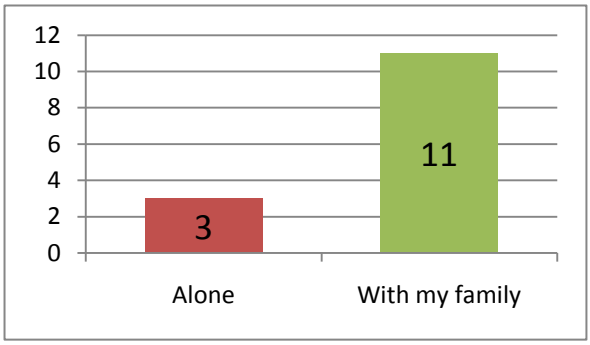
Nevertheless these statements could not be verified because there were no interviews with private persons and only some very few interviews with small-scale miners. But the members of BASMA gave some interesting facts and statistics which show a reduction of the dependence of the people of Bornuur of the artisanal and small-scale mining sector. According to their statements, about 300 families in Bornuur soum centre with 800 people in total some years ago depended on the money from ASM activities. Today there are allegedly only 300 people of these 300 families which depend on money from ASM. This means that 500 people less depends on money from ASM. Most of the difference of these 500 people do not left Bornuur soum and moved to other soums or Ulaanbaatar. They now have other jobs in Bornuur respectively using other sources of income.

5.3 Evaluation and interpretation of the standardized interviews

In the standardized interviews with the owner of shops and different service facilities of Bornuur soum centre, several questions were asked. A choice of them will be presented and discussed in the following. Not all of the questions of the questionnaire were useful, respectively not all of these questions were answered by the people. Other questions like “when have you opened up your business in Bornuur” or “what was your profession before you opened up your business” are presented in the map of Bornuur above or not necessary to discuss here to get a current insight of the changes of the socioeconomic situation of Bornuur soum centre.

Question: Do you know or do you had known before you opened up your shop that ASM is practiced in the surrounding of Bornuur?

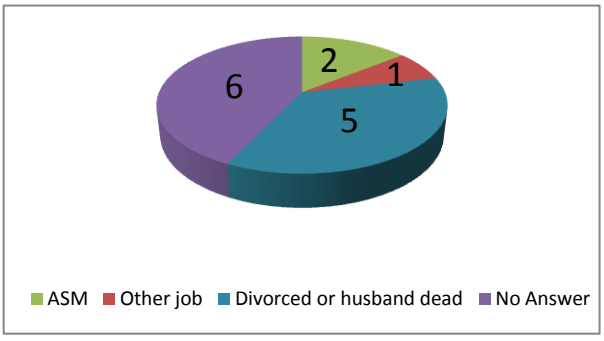
One of the first questions was if people know that artisanal and small-scale mining is practiced in the surrounding of Bornuur. Surprisingly only 50 % of the respondents said they know that ASM is practiced here. A very unusual value for a place where the small-scale gold mining sector was one of the few employer and the most important source of income for long time, not only in the time of transition after the collapse of the socialist system and the shutdown of the local state owned farm. But in most of the interviews it seemed that the people do not like to talk about this topic, probably because small-scale mining was an illegal sub-sector of the Mongolian economy for many years.



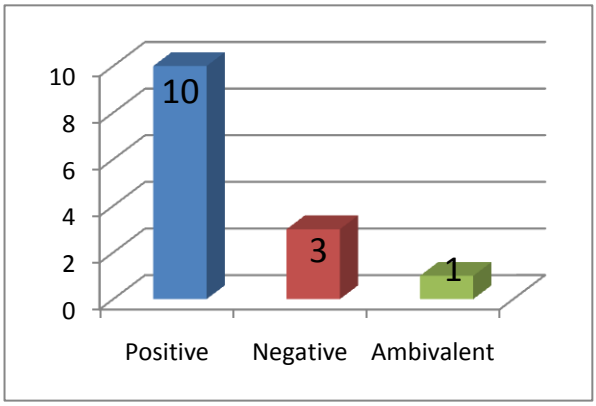
Question: Do you work alone or together with your family in your shop?

That impression rose while the next question, if the owners of the shops or service facilities are working alone or together with their family members (including husbands) in their business. Nearly 80 % of the interviewees answered that their family members also work in this business. But interestingly in nearly of all the cases no husband or son was visible. Only in some of the mapped shops daughters or daughters-in-law were present. Maybe the reasons for this were either that it was the main harvest time in the surrounding of Bornuur soum or their husbands and sons are working as a small-scale miner, but they didn´t want to tell.

Another reason for it was that 36 % of the interviewed women are living alone, because they were divorced or their husband had died. Only two women (14 %) said that their husbands are working as a small-scale miner. Another woman hadn´t had a husband, but she said that her sons are working in ASM. 43 % gave no answer to that specific question. Only one husband of the interviewed women had another job, he is the local soum governor.

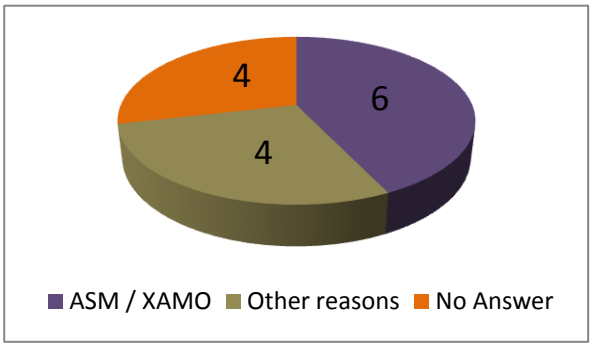


Question: What is your husband working?



Question: Did Bornuur soum centre has developed more positive or more negative in your opinion after installing of the processing plant (XAMO) 2 years ago?

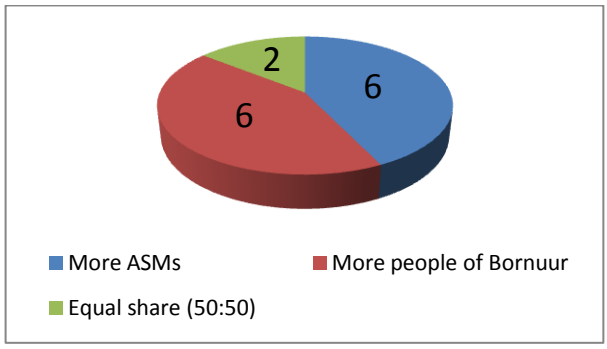
By far more open the people answered to the question, if Bornuur soum centre developed more positive or more negative in the last two years after the foundation of XAMO and the installing of the mercury free processing plant. 71 % of the interviewed said that the foundation of XAMO was positive or very positive for the soum centre because new jobs have since developed, so many people do have a job now, and almost all of the people do have more money now and could buy more things in the shops and supermarkets or new things (cars, seeds etc.). Moreover no mercury is used anymore (especially at home) and the agriculture also developed positive. However 21 % answered that Bornuur developed more negative in their opinion because many people drink more alcohol and because of the new supermarkets it is hard to survive for the small shops. From the point of view of one of the interviewed people the development is ambivalent because the people do have more money now, but the environment and the river will be polluted and destroyed.



Question: What are the possible reasons for that development in your opinion?

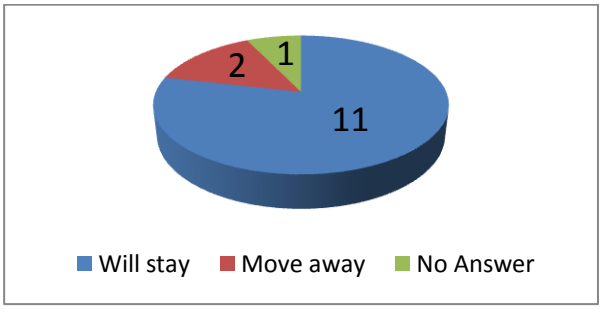
To the question what are the possible reasons for that positive or negative development 43 % of the people answered that artisanal and small-scale gold mining activities in the close Sujigtei Mountains and the foundation of XAMO led to that positive development of Bornuur in the last years. 28.5 % of the interviewees gave other reasons for the positive development and mainly spoke about the influence of the redeveloping local agriculture sector. One person said that the cultural and civil life had changed and improved. So the main tenor of the answers was that the people's life improved and was becoming better in the last two years. Another part of 28.5 % of the interviewed people did not answer that question, mainly people who evaluate the developing of Bornuur soum centre negative.

The question if the shopkeepers and owners of the other businesses do have more small-scale miners or more other people of the soum centre as customers was answered very equally: 43 % said that they do have more people who are active in ASM and a further percentage of 43 % said that they do have more people from Bornuur as customers. In 14 % of the local businesses the owners said that the amount of small-scale miners and of other people of the soum centre were similar (50:50). These answers couldn´t be verified during the time of field work in Bornuur because except in the two supermarkets almost in all of the smaller shops no customers or only a very few were present. In most of the cases children came in and only bought some sweets or men bought a box of cigarettes. So maybe this equal share is correct, but otherwise maybe most of the small-scale miners didn´t have the time to buy food and things of daily needs, so that their wives are doing that. In that case maybe the shopkeepers did not classify these women as a small-scale miner.



Question: Do you have more ASMs or more other people of Bornuur soum centre as customers?

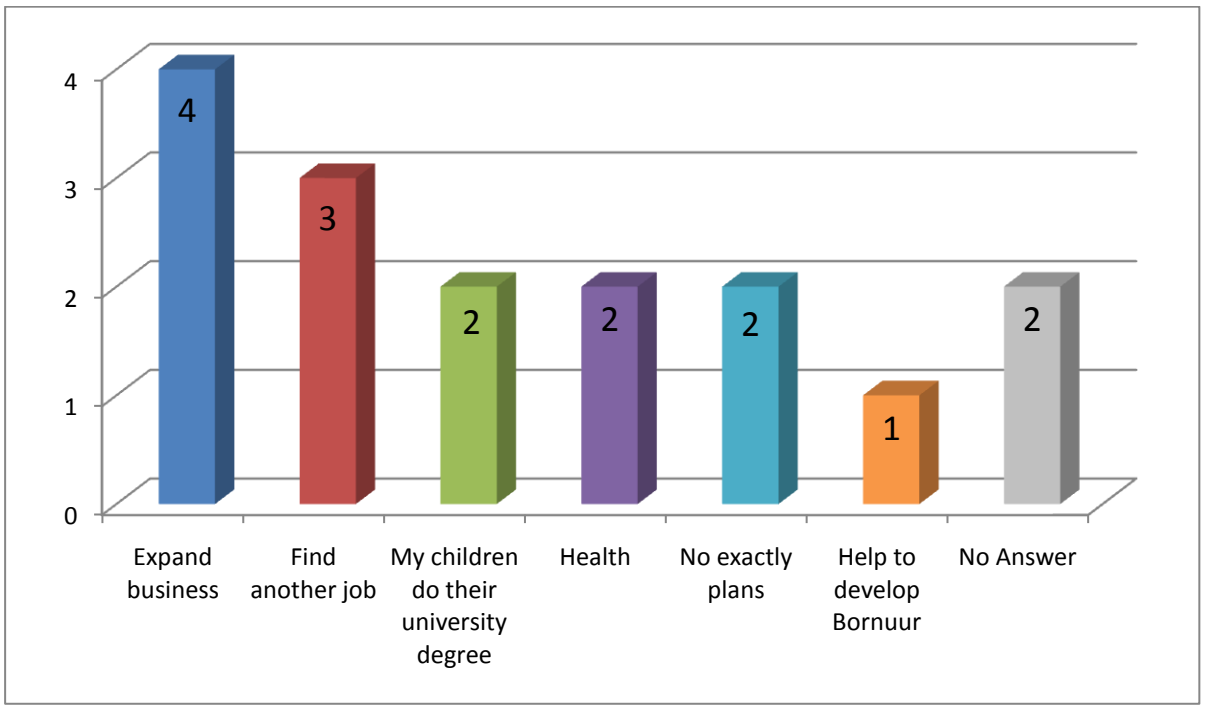
Perhaps the next question was quite difficult to answer: “What will you do if there is no gold anymore in the future and all of the small-scale miners will leave this region?” The intention of this question was to get to know which effects this scenario would have on the shopkeepers and owners of the other businesses and what that would mean to them. Most of the interviewed people were very surprised about this question and said that this is a quite negative question respectively a very negative thought. That’s why approximately 79 % said that they will stay in Bornuur soum centre. Most of these people hope to find a job in the agricultural sector of Bornuur. Only 14 % or two people would be willing to move away in this case. The destination of both people would be Ulaanbaatar. One of the interviewees did not answer that question.



Question: What will you do if the ASMs will maybe leave this region in the future? Stay or leave?

This hope and trust in a better future and a better life is also shown in the last question, what kind of plans or wishes do the people have for the future? In this case multiple answers were possible. Four people answered that they would expand their business, either to expand their existing business themselves or that their children build another new bigger one. Three people hoped to find another job, maybe in agriculture or they wanted to open up another business, but don´t know what kind of business at the moment. One of the interviewed women hoped that all of their family member will work in agriculture in future. Maybe because of her husband or some of her sons are working in the dangerous small-scale mining sector, but she didn´t say what they are doing at the moment.

A further amount of two people wished that their children will do their university degree so that their children will get a better job and earn a good salary. Two other people said that they don´t have an exact plan for the future. One of them wants to do many different things but didn´t say what she exactly meant with that. The wish of two people for the future is only a good health. One of the respondents said that he will help to develop Bornuur in a good way and an additional amount of two people didn´t answer that question.



Question: What are your plans and wishes for the future? (Multiple answers possible)

6. Conclusions and Recommendations

In Bornuur soum the small-scale gold mining sector was the main employer and the main source of income for many years. After the closure of the state owned farm many people had lost their work and had to find new job opportunities. Therefore the gold deposits of the surrounding Sujigtei Mountains became the new mean of existence for most of the local people. With the implementation of the Chemical Poisonous and Dangerous Substance Law in 2008, these people lost their jobs and sources of income again. But the construction of the mercury free ore processing plant in cooperation with the Mongolian Government and the Sustainable Artisanal Mining Project offered them a new chance and gave them back their means of existence. In the last two years after the foundation of XAMO the development of Bornuur soum centre has been remarkable. This case could be a good example of positive development for other soums or aimags in Mongolia where small-scale mining is practiced – despite its still negative connotation.

The current socioeconomic situation in Bornuur soum centre seems to have developed very positive in the last two years. While the time of field research, among other things, many new houses made of stone and wood were to see. That fits to the answers most of the local people gave in the interviews. The tenor was that the people do have more money now which they use for different things not only to secure their livelihood. That's why many people built up a new house who had a *ger* (traditional Mongolian tent) before. Other people bought new cars or trucks. Others pooled their money and bought greenhouses for agriculture or machines for a brick production company. Most of the interviewed people stated that they use the money from ASM to buy better seeds from Europe or more animals. In Bornuur agriculture is again one of the most important employers and sources of income for the people.

As a result of this, a diversification of the sources of income is created. The people are not only depending on the money by small-scale mining activities anymore. They make themselves much more independent of ASM. Consequently their life is much more secured now. Today ASM is one of a family's incomes, not the only one like some years ago, but approximately still the most important one. It should be understood that many people and probably the whole region are still depending on money from ASM. If these mining activities suddenly would come to an end for a

longer time or maybe forever, many families would face serious problems. Experts from BASMA estimated the proportion of money from ASM of the monthly income to 50-60 %. In an ideal case this worth is the average for a typical family of a small-scale miner and not an exceptional example.

In Bornuur soum centre there are 17 shops and 18 other service facilities. Four of these shops and ten of these service facilities were opened up in the last two years after the foundation of XAMO. But at the same time four smaller shops closed maybe because of the influence of the two new supermarkets, which perhaps could offer better prices to the customers. One of the new service facilities is a hotel opened up by a local small-scale miner. This is a great example for the sustainability potential of ASM. Other very good examples are on one hand the foundation of the brick production company and on the other hand of course the various investments in new greenhouses by small-scale miners. This can be understood as a sustainable use of the natural resources of the region (gold) because the people use the money to invest in a better and more secure future.

Altogether many people do have a new job now due to the foundation of XAMO or they have their old jobs back which they had lost in 2008 as the new law was implemented. Other people do have more than one job now, if they are active in small-scale mining and for example in agriculture. Or more people of a certain family do have a job now if maybe one person is active in ASM and uses the money to do agriculture too he could create perhaps a job for his brother which was unemployed before. In addition XAMO created jobs for 60 people of Bornuur and became one of the biggest employers. Hence, it can be conceded that the life of many people is much better today than some years ago.

In almost all of the expert and standardized interviews the people said that their life has changed positive and improved in the last two years. Some aspects of this positive development (besides that more people have a job now) are according to the statements of the interviewees increasing wages, an increase of the living standard, a revitalization of the agriculture sector and the positive changes in the local economy with many new shops and other businesses. A certain part of the people told that they are able to save some money at the bank. But the people of Bornuur see these changes critical or ambivalent too. Some of them criticized the affects of the mining activities to the environment, others the alcohol consumption of the

(young) people, and others that not everybody could participate to the changes and the new wealth. However, almost all of the people spoke very positive about XAMO and its influence on their life and for Bornuur in general. According to their statements XAMO also finances several activities in the soum centre, for example competitions of the school or other cultural activities. Furthermore the company plans to build a bath house in Bornuur where the people can have a shower.

The case of Bornuur soum centre is an example and evidence for a positive rural development initiated by ASM which should encourage the Mongolian Government to give the permission to open up more of these mercury free ore processing plants. Until now, the government intends to open up only five of these processing plants for the whole country. But as stated and illustrated above, that is not enough! More processing plants like in Bornuur could be one of the best possibilities to avoid that the miners will only bring the best gold ore with the highest gold concentration to the plants and leave the gold ore with a lower concentration behind. But that is economically and ecologically not useful and not a sustainable way of valorisation of the natural resources. In the paragraph below, some recommendations and ideas should be put up for discussion.

With more processing plants the Mongolian Government perhaps also could get a better control of the small-scale mining sector, avoid the usage of mercury and maybe collect taxes. In addition, all small-scale gold miners of Mongolia should possibly be obliged to process their gold ore in one of these processing plants. But for that a registration of all of the miners would be necessary. Maybe the implementation of a “Gold washers card” like in other developing countries were ASM is practiced could help to regulate this important Mongolian industrial sub-sector which contributes up to 10 % to the GDP. But the Mongolian Government would also have to control the ASM activities much better. Every aimag should have a branch office of the Mineral Resources Authority of Mongolia (MRAM) which controls the ASM activities regularly on site and sells the “Gold washer cards” on one hand and provides security trainings for the miners on the other hand.

Annex

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About the author:

Robert Sandmann had studied geography at Free University of Berlin, Germany. At the moment he is writing his PhD thesis about the small-scale mining sector of Mongolia with a special focus on the small-scale gold mining sector. The main question of his PhD thesis is, if there is a possible sustainable development in the rural areas of Mongolia because of the small-scale mining activities.

He had worked for the Sustainable Artisanal Mining Project for two month in September and October 2010 and visited while this Bornuur soum centre twice.

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