1.7 HYGIENE EDUCATION

1.7.1 Hygiene Education

To promote the awareness of water usage and hygiene, an implementation of hygiene education was planned as one of the Study components. In fact, the household survey revealed necessity of more water consumption among non-piped households and the water quality analysis indicated that stored water in ger is contaminated with bacteria.

Booklet and poster were chosen as media of education and then school children were focused on as a target group, as there is no formal health education for the school children. General framework of this plan was consulted with Ministry of Health and Social Service as a responsible agency. They assured that the produced materials would be used as a supplementary booklet to the health education textbook for school children, which is now under discussion with Ministry of Education.

The actual preparation of implementation plan and its educational materials was contracted out to a local consultant. The contractor team, consisting of a moderator, an epidemiologist, and an illustrator, together with the staff from Public Health Center of Gobi-Altai engaged in organizing series of discussions and meetings in Altai City. While the whole process was consulted with the specialist of the JICA Study Team, the participatory approach was encouraged as much as possible.

In order to develop the implementation plan and its education materials, the following people were involved in the series of group discussions organized by the contractor team and the Public Health Center.

- 20 health volunteers
- 5 school children (Grade 4 and 5)
- 16 district leaders and citizen's representatives
- 17 court employees
- 29 health professionals

1.7.2 Problems Identified Through Group Discussion

(1) Health Volunteers

Most of the participants are living in ger area and appointed as a health volunteer which has recently been introduced to the community along with the National Community Health Program. The purpose of this group discussion was to invite opinions from household and community level in order to identify the problems to be addressed for hygiene and sanitation. The group was also expected to take a role of primary promoters of the hygiene education.

The discussion focused mostly on the issues of current water tariff and quality of water. One group of participants supported the increase of water tariff if the quality of water would improve but the other group suspected that poor households could not afford any increase. According to the participants who complained about the quality of water, they said, " The smell and taste of chlorine is too much" or "Since a sediment is always found at the bottom of water containers, the hardness of water must affect the health".

Regarding the issue on hygiene education, they pointed out that many households didn't cover water containers. They also suggested the use of local media for hygiene education.

(2) Pupils

The participants of this group are 4th and 5th grade pupils of primary schools. The purpose of group interview was to evaluate their knowledge, behavior and related hygiene practices and their concern about water in order to elaborate the educational material.

Through the hearing, it was revealed that the children had some knowledge about hygiene and most of them took a bath at home once a week. Although a public bath is available in Altai City, it is not popular among the children due to coldness of waiting room, long waiting time, and high fee.

As a matter of fact, one or two pupils were appointed as persons responsible for checking hygiene practice in the classroom. They said, "The children of very poor families always dress badly and wear unwashed clothes". "A child to child

approach" is one of the effective educational tools but, on the other hand, it could lead to unintended results such as discrimination of the poor.

In this context, it will be necessary for promoters to keep in mind that the hygiene education should not involve any discriminatory activities against children of poor families so that it won't instigate stiff propaganda.

(3) District Leaders and Citizen's Representatives

The purpose of the meeting was to get support and cooperation to the implementation of hygiene education. Although the participants were supportive, most of the time was spent on discussion about the quality of water in Altai City. They thought that the hardness of water causes many problems including people's health problems. One of the participants even stood firmly in his position, saying "The hygiene education will not succeed without resolving the problem on the quality of water".

Some questions about JICA project were also raised and they were answered during the meeting. The points are as follows.

- The main objective of the JICA study is to develop water resource including its supply system. The epidemiological study (The study of relationship between risk factors and frequency of disease in human population) is not included because it completely different from this Study in terms of its approach.
- The examination of water quality is conducted to find out if there are any excessive values compared with the standards. The primary purpose of the examination is to judge whether it is appropriate for drinking but not to specify or guess the cause of disease.

(4) Court Staff

The purpose of the meeting was to identify the problems on hygiene and sanitation to be addressed in materials. It was expected to help develop more comprehensive ones with different point of views. However, contribution was limited because of their weak motivation.

(5) Health Professionals

The group consisted of primary health doctors (Bag Physician), hygiene doctors, and

the staff of the Public Health Center.

The purpose of the meeting was to discuss and exchange opinions about a draft of the booklet. 29 illustrated pictures and their captions were shown to all the participants during the meeting. Through the discussion, the one that illustrates the use of sunlight to kill the germs in the water of transparent bottle was excluded. On the other hand, the group suggested adding an illustration that describes animals drinking water from the water containers that are placed at water delivery points. Some corrections on the text were also made.

1.7.3 IMPLEMENTATION PLAN

An implementation plan for hygiene education was developed by the staff of Public Health Center and the contractor team under the guidance of the JICA Study Team specialist. The plan was expected to include the objectives, methods, person in charge, and expected output including work schedule or activities.

1.7.4 Education Materials

The following were produced through the series of discussion and meeting done in Altai City.

(1) "Water and Health", A4, 30 page booklet with 29 color illustrations
(Refer to Appendix 14 Hygiene Education: Text of Hygiene Education Material – English / Appendix 15 Hygiene Education: Text of Hygiene Education Material-Mongolia for Booklet in the Data Book)

(2) "Water and Life", A1 color poster.

(3) Implementation Plan
(Refer to Appendix 16 Implementation Plan: Implementation plan for Hygiene Education)

Cover of Booklet " Water and Health"

According to the developed implementation plan for the hygiene education, the person in charge are expected to conduct training for trainers to improve their knowledge and teaching skill prior to the dissemination.

1.7.5 Implementation

As of October 31st of 1998, the Gobi-Altai province social health center conducted seven(7) times of trainers training for schoolteachers and health volunteers and six(6) times of hygiene education for children and mothers. In total 909 people participated in the program. If one trainer teaches 10 people, a half of the population in Altai will be disseminated (See Appendix 17 Output of Trainers Training for Hygiene Education). The social health center also plans to implement hygiene education in the period of the remaining year (See Appendix 18 Plan for Hygiene Education for 1998). The table below indicates the number of materials distributed to target groups. The rest of copies are kept at the social health center for the future plan.

Distribution of Hygiene Education Materials through Trainers Training

Target	Number of Materials
Schools	143
Health Volunteer	100
Medical Doctors and Other Health Professional	183
Total	426

According to the report prepared by the director of Social Health Center, trainers employed supplementary teaching skills for the hygiene education to give more efficient impact (Refer to Appendix 19 Progress Report on Training for Hygiene Education in the Data Book)

1.8 QUALITY OF WATER AND HEALTH

1.8.1 People's View on the Quality of Water

The issue of water quality and health problems was taken up because of the prominent concern among the people in Altai City. People are mainly concerned about the hardness of water and they firmly believe that it is the primary cause of their health problems. However the view seems to have been exaggerated by themselves (Refer to Appendix 20 Quality of Water: Hearing result from households in the Data Book).

Meanwhile the Pubic Health Center of Gobi-Altai and the National Public Heath Institute started the epidemiological study on the relationship between the quality of water and the health in Altai City. They conducted health check for 2,000 residents in Altai City together with 200 residents of rural area as a control group. The primary result came out in September 1997.

1.8.2 Dissemination Seminar at Altai City

According to the household survey, around 60% of the people in Altai City perceive that the quality of drinking water in Altai City is not good. In the direct interview to those people who answered that the quality of water is bad, they say hardness of water has negative impact on their health.

In addition, the former director of Social Health Center claimed that there is an association between concentration of magnesium and calcium in drinking water and morbidity of the people in Altai City. He also mentioned that continuous intake of higher ratio of Mg/ Ca in drinking water increases cardiovascular disease.

The water analysis conducted by the Study team showed that there are many more chances of microbiological contamination in stock water of ger dwellers since some of microbiological test indicated higher concentration of coli-form bacteria. On the

other hand, water analysis for chemical substances indicate that concentrations of the most minerals in water that the people in Altai City drink are within the range of Mongolian standard. Magnesium is slightly higher than that of Mongolian standard.

In order to disseminate the Study team's view on water and health to the people in Altai City, a mini-seminar was held in Altai City in October 1998, inviting those who represents the people in Altai City. The summary of the presentation is as follows.

Water is an indispensable resource to support human life and social and economic activities. The goals of the Study were to secure the necessary and sustainable volume of water for future economic development as well as to assure the distribution of water to the residents of Altai City.

Safe water must be delivered to the resident. In order to secure the quality of water, two areas of water quality analysis should be regularly carried out. One is microbiological analysis for monitoring contamination by microorganism. The other is chemical analysis for monitoring the levels of dissolved chemical substances.

Monitoring the microorganism contamination of the water is necessary to alarm the risk of infectious disease such as hepatitis, dysentery, and diarrhea. The analysis used for the monitoring is only the detection of general bacteria and coli-form bacteria. In other words, regular microbiological analysis is to find out the possibility of contamination by human feces but not for detecting pathogenic microorganism.

The results of the water quality analysis by the Study Team indicates that some of stock water in ger showed the possibility of contamination with bacteria originated from inappropriate hygiene practice.

To keep good quality of water is not only the responsibility of water supply organizations but also the responsibility of water consumers. In this sense, hygiene education was incorporated into the course of the Study.

The other test for the quality of water is to measure the levels of chemical substances. According to the analysis result of the Study team, the quality of water in terms of chemical substances including hardness are within the range of Mongolian standard except for magnesium (Mg: 31mg/l).

It is well known that higher concentration of iron brings about bad taste of water but not harmful effect on heath.

The concentrations of magnesium is slightly higher than the Mongolian standard while Japan and most countries do not have such a ceiling level of magnesium as shown in table below. The Study team acknowledges that some people who usually drink softer water somewhere else get diarrhea because the water in Altai City contains higher concentration of magnesium and surfeate ion. But people usually adapt themselves to this new environment in a week or two. Other than that, the Study team could not find any information to prove the relationship between magnesium (or ratio of magnesium and calcium) and health status through possible worldwide sources.

To clarify cause-effect association on non-infectious diseases, in particular chronic diseases is a very difficult task. Above all, there are factors that cause the diseases, (Instead of calling causal factor, the Study Team prefers to call it a risk factor), and it is well known that there are many risk factors such as smoking, drinking, gene, sex, age, stress, eating habit, taking salt, etc. to non-infectious diseases like cardiovascular disease

Water Quality Standard and Guideline for Hardness, Calcium, and Magnesium

Standard / Guideline	Total Hardness		Calcium	Magnesium
Study result(water supply)	199 mg $CaCO_3$/l		28 mg/l	31mg /l
Mongolian Standard	350 mg $CaCO_3$/l	(70m eq/l)	100mg l	30mg /l
EU (1995)	-		-	-
WHO health	-		-	-
WHO complaint	500 mg $CaCO_3$/l		-	-
Japanese standard	300 mg $CaCO_3$/l		-	-
US standard	-		-	-
Bulgarian standard	600 mg $CaCO_3$/l		150mg/l	80mg/l

Furthermore, it takes long time to identify and quantify the impact of a risk factor from the mix of various risk factors. For instance, infectious diseases show signs and symptoms within a short time after the attack of microorganism. Contrary, in case of the chronic diseases, it is very difficult to identify the true risk factor and it is necessary to keep track of certain population with a well-prepared study design together with lots of resources.

Quite a few number of the people attended the seminar (47 people). Those represent various public organizations including Mayer's office, the Governor's office, the Province social health center, the groundwater development company, and press agency.

Scores of opinions were exchanged regarding the association between hardness and health. The following summarizes the view of the people in Altai City after all.

The people in Altai City think that it is obvious that there is an association between the water quality and disease since they have been suffering from various diseases for a long time (40 years). Gobi-Altai Province social health center claims that certain chemical substances in drinking water affect human health from a technical view point citing certain chronic diseases.

The people in Altai City are looking forward to having a method and device to remove those excess minerals from the water.

In the course of the Study, the Study Team was informed that the Altai province social health center with the support of the Institute of Public Health in Ulaanbaatar had already conducted an epidemiological survey in this regard. Yet the Study Team has not received the results - any supporting data and documents which prove the association between the excess minerals and health, from Mongolian counter part.
It was found that the general director of the Institute of Public Health in Ulaanbaatar supports not only the view of Gobi-Altai social health center but also gave organizational support for conducting the epidemiological survey in Gobi-Altai Province. She mentioned the availability of a certain standard of magnesium in water. In this context, the Study team officially requested the provision of the following supporting information / documents on the matter.

- A copy of WHO's guideline that indicates a ceiling level of magnesium
- A standard or supporting evidence that the ratio of calcium and magnesium affects human health
- The result of the epidemiological study in targeting a relationship with chemical substances and human health of the people in Altai City, which has been carried out by the institute. The result should include supporting data, methodology, and the other necessary documents.

1.8.3 Weakness of the Epidemiological Survey by Mongolian side

The Study Team can not comment on the result of the above issue since the Study Team only has the summary of the document. However, Study team are concerned about constraints of its validity on the epidemiological study regarding the following aspects.

- Bias: Aside from its methodological weakness (descriptive study < analytic epidemiology), a health check usually increases resultant morbidity of target population compared with regular health statistics (systematic error)

- Confounding: The study seems not to consider other risk factors of the diseases at all such as smoking, drinking, gene, sex, age, stress, eating habit etc.
- Biological creditability: The belief in the existence of biological mechanism for the above cause – effect between the chemical substances (Mg/Ca balance, florid etc.) and the diseases are not known or postulated. It also forgot the human homeostasis which is a mechanism to keep a certain standard such as concentration of minerals in a body from external environment change.
- Consistency: There is no similar report or study that support the above result.

1.9 SOCIAL ANALYSIS

1.9.1 Preliminary Analysis

Social analysis was applied and it provided in-depth advice on social issues in the master plan and project implementation. While the technical objectives of the Study were the identification of groundwater resource and the provision of improved water supply, the social objectives might encompass the enhancement of the institutional capacity and improvement of quality of life.

Regarding the groundwater resources, the issue recognized was mostly related to an environmental aspect but not social aspect. Since a technical development plan of improved water supply was not specified at this time, the analysis needed to limit its scope. In this context, the objectives of social analysis were set by the following angles.

- Specify the people who will have benefit or be influenced from the future plan / projects.

- Increase the likelihood to identify whether and how the plan and projects will be sustained.

- Increase the capacity to identify whether the plan and projects will meet specific equity objectives.

1.9.2 For Project Implementation

(1) Positive and Negative Influences of the Project

The people will either have benefit (+) or be negatively influenced (-) from the future plan and projects as summarized below. The result is compiled in Table 1.1. This section presents only the essential items of the result.

Negative influence (-)

While the higher income group of non-piped households approved 161% of increase, the lower income group of non-piped households approved 80% of increase from the current tariff level. As indicated in the result of the household survey, the lower income group of non-piped household consume less volume of water per day per person than the volume of higher income group. This is probably because of financial difficulty.

Since the consumption amount even for the higher income group is insufficient for required volume, it is recommended that exemption system of water charge for lower income group - unemployed and single female headed households should be revised periodically in accordance with local poverty level.

Benefit (+)

The proposed program for water supply system, which plans the installation of kiosk-type water delivery points in the ger area, will raise the availability of water in terms of time and distance. This also will lead to the increase in water consumption for non-piped households. The frequent supply of water is expected to reduce the habit of storing water and bring about less opportunity of contamination.

Negative influence (-)

However, 20% of non-piped households will not gain the very benefit of kiosk type of water supply which are designed to serve residents within 250m radius because 20% of them live more than 250m away from any of the planned kiosks. Therefore, it is recommended that the water supply department promote the use of water carrier.

(2) Increase the likelihood to identify whether and how the plan and projects will be sustained.

The people in Altai City look forward to having a device to remove excess minerals, in particular magnesium, from the current drinking water. However, the evidence that the water is not good for health is still vague or unfounded. Therefore, this can not be an established need in the proposed project but can be regarded as inconstant demand. See Table 1.2.

(3) Increase the capacity to identify whether the plan and projects will meet specific equity objectives.

A disparity of unit water price between non-piped households and piped households should be revised to fill the gap by opening the fact to public. To minimize the gap on the ratio of water fee to income can be the objective for the time being to begin with. See Table 1.3.

Table 1.1 People who will have benefit or be negatively influenced by the plan / projects (1/3)

Items	Important Issues /states	Social Benefits or disadvantage with improved water supply	To be considered and recommended action to the plan / projects
☐Geography	- Altai city is compact enough to walk across the residential area and it takes 1 hour to reach the other edge of the city - The temperature goes down to -30°C in winter	- Harsh climate affecting every aspect of economic activities and social life	- It needs to assess the seasonal change in socioeconomic state and water use.
☐Target population	- 18,966 as of December 1996 or 95% of the Esun Bulg Sum population live in the urban center (Altai City) - 87.5% of 3,075 out of 3,516 households depend on the delivery of the water from the water wagon (non-piped households) - The number of piped households in Altai City is 441 or 12.5% of the total households (3,516) - The average family size is 5.1members/family though the poor family's is 6.3 - 8% of households keep livestock in their plot and give paid-water to the livestock - The population growth rapidly decreased to the rate of 0.9% in the past 5 years - Seasonal migration is particularly common among the ger dwellers - According to the household survey, 26% of households are out of work and rely on pension or support from relatives or friends - The median of annual income of households is around Tg300,000 - The households spend 1-2% of the total expenditure for water	- Improved accessibility to water for the non-piped households - Improved quality of water for both the piped households and the non-piped households - Increased overall consumption of water of the non-piped households - Sloweing down of the migration to Ulaanbaatar	- It should be clarified how the plan will boost or prioritize industrial development or basic human need - The quality of water should be clarified with objective standard and made known to the residents about its meanings - Achievable objectives need to be set to the consumption of water with non-piped households - It is necessary to develop a criteria about which people will have the right to access the water supply

Table 1.1 People who will have benefit or be negatively influenced by the plan / projects (2/3)

Items	Important Issues /states	Social Benefits or Disadvantage with improved water supply	To be considered and recommended action to the plan / projects
☐ Socioeconomic / industry	- The Western Region Development Plan was proposed - Only 5% of labor force of the city engaged in agriculture in the area of processing and trading - Altai city accounts for 80% to 96% of all the industrial output in the Gobi Altai province. - Most industries experienced a drastic reduction of production while a number of new industries were established - Due to reduced number of jobs in the manufacturing and construction sectors, the number of labor force fell by 37% in 1995	- Well-prepared water demand in actualizing the development plan - Improved availability of water to private and public institutions - Improved facilities of institutions	- The extent of water consumption for industrial use should be clarified - Secured water supply for the institutions of public importance in terms of public finance or other measures
☐Religion and ethnic group	- Buddhism is dominant religion of the Khalkh race to which almost all the citizen of Altai belong		
☐Water related disease	- Frequent use of Oral Dehydration Salts hints the high prevalence of contaminated of water - Virus hepatitis, dysentery, and scabies are commonly seen in Altai City	- Reduced diarrhea cases of children and adults - Reduced prevalence of water related disease	- Measurement of growth monitoring should be institutionalized - Hygiene education and its promotion program should be institutionalized
☐Hygiene and sanitation	- There is only one privately operated public shower facility in Altai City where they sometimes run short of water. - The user of traditional pit latrine account for 29% of total households including the households sharing one with others	- Improved public bath service - Increased number of user of flash toilets	- The motivation for improved toilet facilities should be raised - Improved sewage system should be actualized

Table 1.1 People who will have benefit or be negatively influenced by the plan / projects (3/3)

Items	Important Issues /states	Social Benefits or Disadvantage with improved water supply	To be considered and recommended action to the plan / projects
☐Social group	- The poverty population accounts for 23% of the total population of the Altai city - The poor family tend to consume less amount of water	- Socially vulnerable group, female headed or unemployed households left from the improvement and suffer from additional monetary burden - Cost sharing might lead the poor to consumption of less and less water	- Secure the access of water for the social vulnerable group, female-headed or unemployed households
☐Gender	- Working women tend to suffer double burden of house work including carrying water and washing - Carrying water is women and children's work	- Reduced burden of workload, particularly for women and children, of carrying water in the non-piped households	- Institute WID approach in the area of hygiene education
☐Livelihood / households	- According to the hearing survey, the piped households spend Tg560, 1% of monthly expenditure for the water - According to hearing survey, the non piped households spend Tg1,000, 2% of monthly expenditure for the water - There is seasonal difference of expenditure. The winter is the most spending period		

Table 1.2 Likelihood to determine whether and how the plan / projects will be sustained. (1/2)

Items	Important Issues/ states	Acceleration or restriction toward improved water supply	To be considered and recommended action to the plan / projects
☐Expectation / Needs	The expectations towards the improvement of water supply is different between the piped and the non-piped households. - The piped households perceive that the water supply service is poor because of frequent stop of service and poor facilities - The piped households would like the authorities to improve the quality of water and the services About a half of the non-piped households expect to have the water supply service improved in terms of accessibility and the quality of water The non-piped households prefer a yard connection (71%) to a public kiosk (26%) The piped households use the water most in the evening 60% of the non-piped households wish to receive piped supply service in the future and approved 100% increase of the present tariff but within the level of increase in the past 40% of the non-piped households do not wish to receive the piped supply and would like to reserve the present tariff level 89% of non-piped households prefer that the water wagon service be operated in the morning	- The different interests on the water supply between the two type of households may weaken the support to the plan - Dissatisfaction against the quality of water could lead to a bottle neck problem and might deprive the confidence in Governmental work - Motivation towards the improved water system is not mature	- The scope and rage of improved water supply should focus on both the non-piped and piped households - Improve the access to the information on the quality of water - Create the capacity of motivation through media

Table 1.2 Likelihood to determine whether and how the plan / projects will be sustained. (2/2)

Items	Important Issues/ states	Acceleration or restriction toward improved water supply	To be considered and recommended action to the plan / projects
☐Recognition / awareness	- The perceived water consumption is different between the non-piped and the piped households. - The piped households perceive that they consume less amount of water for cooking, washing, and hygiene than they actually do - The majority of the households know about the water related diseases - Some people think that the smell of chlorine is too much	- The piped households are less sensitive to the importance of water resource or awareness to saving water	- Develop and institutionalize an objective method of setting the tariff - Increase the awareness on the importance of water resource through education - Increase the awareness on the control of the water quality
☐Participation in a way of cost sharing	- The piped households approve only 35% of increase to the current tariff level while the non-piped approved 163% - Some of the non-piped households are ready to pay 10 times higher tariff than the present level - The poor households are opposed to the increase of the tariff and even expect to lower it - In general, the households in Altai reserve the willingness to pay within the rate of increase made in the past few years	- There is a limitation of direct user charge system as a way of cost sharing - The impartial user charge system is not supported in terms of sustainable development and is likely to add the burden to the poor	- Reintroduction of subsidy, earmarked tax, loan should be considered for additional financing - Phase in the improvement of service including user charge system

Table 1.3 Equity Issues

Items	Important Issues / states	Equity problem	To be considered and recommended action to the plan / projects
☐Access to the water	- The piped households have access to water whenever they want while the non-piped households have access to water by water wagon delivery with fixed schedule and delivery point - 85% of the non-piped households have access to the water within 200m but still 7% of the non-piped households have to walk more than 500m to the delivery point - The average non-piped household carry 80.3 litters of water every other day and it takes 10.5 minutes for them to complete the workload by two persons - While the non-piped households consume 8.6 l/c/d, the piped households consume 145 l/d/c	- While there is an obvious disparity between the non-piped and piped households in terms of the accessibility, the unfairness in not well recognized by themselves	- A course of action against the unfairness on the issues of accessibility should be indicated - Review of delivery points should be made as an immediate action
☐Charge	- While the non-piped households pay Tg1,200 (80.3 x 15 times) per month for water, the piped households pay Tg600 (150 x 3 adults + 75 x 2 children) per month for water	- While there is an obvious disparity between the non-piped and piped households in terms of the water charge, the unfairness in not well recognized by themselves	- A course of action against the unfairness on the issues of water tariff should be indicated - Introduction of standard charge for minimum water requirement

2. ECONOMY

2.1 SOCIO-ECONOMY OF MONGOLIA

Mongolia has been in the process of transition from a centrally planned to a market oriented economy since around 1990. Due to a number of external shocks and internal political and economic instability, Mongolia experienced an economic and financial crisis in the early 1990's. The external shocks were triggered by the disintegration of the Council for Mutual Economic Assistance (CMEA), formed by former communist block countries, on which Mongolia depended largely in terms of external trade and economic assistance. The decline in world prices of Mongolia's major export commodities such as copper and cashmere were other factors adversely affecting the Mongolian economy. Domestically, Mongolia started political reforms to adopt a democratic system since 1990 in parallel with transforming its economic system into a market economy. While these internal challenges have been tackled, Mongolia failed to cope properly with the changes in the external economic condition. The economy shrank by about 30%, unemployment rose, and poverty population increased between 1990 and 1993. In 1993, however, the Mongolian economy hit the bottom and showed a sign of recovery. This upturn was due mainly to the improved macroeconomic management with the assistance of international aid organizations and the progress in structural reform stimulating private sector activities. The GDP growth rates, which turned negative in 1990 and remained so until 1993, became positive in 1994 after four-year successive shrinks as shown below.

GDP Growth Rates (%/year)

1986 :	9.4	1991 :	- 9.2	1996 :	2.4
1987 :	3.5	1992 :	- 9.5	1997 :	3.3
1988 :	5.1	1993 :	- 3.0		
1989 :	4.2	1994 :	2.3		
1990 :	- 2.5	1995 :	6.3		

Relatively high growth in 1995 was mostly due to the rise in copper price in the world market. The growth rate in 1998 is estimated to be not more than 3.5%.

Table 2.1 presents an outline of Mongolia by selected socio-economic indicators.

The new Mongolian Government formed after the election in June 1996 has drafted an action program. The objective of the action plan is to present a set of policy measures for structural reforms of the administration and the economy needed for economic recovery and increased sustainability for the 1996 - 1998 period. The proposals of the action plan were passed in the parliament in 1996 and have been effective since then. The following are some of the major policies and targets.

(1) A new institutional structure will be set up for the promotion of regional development, by which a regional council will be established. Regional councils will be responsible for formulating and prioritizing regional development policies that would stimulate production and service activities.

(2) The proportion of tax revenue to gross domestic product will be reduced from the present 27% to 20% by the end of 1999.

(3) Local administration will become more autonomous in local budget formulation with increased right in setting the rates of local taxes. The rate of subsidy will be determined according to standard indicators strictly fixed.

(4) Tight monetary policy will be continued. A development bank will be established. The rate of Tugrug devaluation will be limited to 2% per month.

(5) Management of power and auto transportation services will be privatized.

(6) External financial aid will be directed to production of infrastructure facilities such as energy, road, communications and water supply, social infrastructure such as health care and education and the promotion of export-oriented industries. Technical assistance will focus on strengthening management capabilities, promotion of investment programs, and training.

(7) Domestic investment law will be legislated. Foreign investment will be actively promoted. An institution will be set up that will support the development of small to medium scale industries.

(8) Coal mining industries will be privatized with liberalization of coal price.

2.2 SOCIO-ECONOMY OF GOBI ALTAI PROVINCE AND ALTAI CITY

2.2.1 Gobi Altai Province

The following table gives an outline of Gobi Altai Province compared with the nation. Table 2.2 presents the socio-economic indicators of Gobi-Alai Province.

Outline of Gobi Altai Province Compared with the Nation for 1995

Item	Mongolia	Gobi Altai	(%)
Land area (square km)	1,566,500	142,000	9.1
Population	2,317,500	72,921	3.1
Population density (person/sq.km)	1.5	0.5	-
Unemployment	23,605	1,621	6.9
Local budget expenditure (000Tg)	147,730,600	1,585,461	1.1
Number of livestock (000 head)	28,572	2,103	7.4
Sown land (ha)	356,466	513	0.1
Total harvest (ton)	359,903	1,782	0.5
Industrial output (million Tg)	302,274	808	0.3
Transport cargo turnover (000 tons*km)	1,266,400	4,476	0.4

Source : (a) Mongolian Economy and Society in 1995, (b) Gobi Altai , Province Governor's Office
Note : There are some discrepancies in the table with those in Table 2.2. For making a consistent comparison, figures in source (a) are used.

Gobi Altai Province is characterized as having a large land area accounting for 9% of the national land with a low level of settlement resulting in low population density of 0.5 persons per km^2, which is one-third of the national density. The major industry of the province is agriculture production, especially animal husbandry. The number of livestock reached 2.1 million in 1995, accounting for 7.4% of that of Mongolia. In terms of the total number of livestock, Gobi Altai Province holds the fourth place in Mongolia. The numbers are especially high for camel, sheep and goat as shown below. The numbers in parenthesis indicate the ranks in Mongolia.

	(thousand head)	
- Camel :	40.2	(4)
- Horse :	102.9	(13)
- Cattle :	95.2	(15)
- Sheep :	950.6	(4)
- Goat :	904.6	(2)

In contrast, crop cultivation activities stay at a low level. Industrial production and transportation also show lower level of activities. Unemployment is high in Gobi Altai reflecting a greater degree of production reduction and loss of job opportunities.

The rates of change of population and the number of livestock were 1.4 % per year and 5.5 % per year respectively between 1991 and 1995 as shown in Table 2.2.

The advantages and disadvantages and growth potential of the province are presented in detail in Subsection 2.3.2 " Gobi Altai Province Development Plan ".

2.2.2 Altai City

(1) Definition and Placement of Altai City

Officially, Altai City has been placed under the administration of Esunbulag Village, Gobi Altai Province since April 1996. Altai City was composed of four Bag's (No.1 - No.4) formerly, but two more Bags, Rashaant and Naran, were attached to Esun Bulg Village. The word " Altai City" used in the present study refers to the four central.

Altai City is the administrative capital of Gobi Altai Province as well as social, economic and logistical center for the province. The city is expected to become the center of future economic development of the western territories.

(2) Population

Condition until 1995

Table 2.3 and 2.4 show the change in the population of Altai City by natural and social factors and by settlement pattern and district. Altai City had a population of 20,068 at the end of year 1995, accounting for 27.5 % of Gobi Altai Province's population of 72,921. Out of this, 19,057 people, or 95% of the total population lived in the urban area, the existing built-up area of the city and the remaining 1,011 lived in the rural area in a scattered settlement pattern. The sex distribution was 9,739 male and 10,329

female, indicating the possibility of out-migration of male population as labor force. The number of households were 3,692, giving an average household size of 5.4, 20% higher than the national average of 4.5.

Table 2.3 shows a trend of the Altai City's population by source of change between 1986 and 1995. Overall the city experienced a rapid population increase between 1986 and 1990 at an annual average rate of 6.4% per year, while the rate of growth decelerated in 1990's to an average of 0.9% per year. This change in population growth pattern is related with economic condition of the city. When the economy was growing, there was a flow of in-migrants into the city as seen in the positive numbers of social change except year 1989. Since 1991 when the economy kept shrinking and unemployment increased, there was an outflow of population to other areas, mostly to Ulaanbaatar. Return to nomadic life was not common.

In the aspect of natural change of population, the crude birth rate kept falling since 1986. The rate of decrease was especially high since 1990 reaching an average of minus 7.5% per year. The rate for the previous five years was minus 1.9% per year. In addition to a general tendency of having fewer children, hardships in livelihood in this period discouraged people to have children. The levels of crude birth rate and crude death rate of Altai City are slightly higher than those of Mongolia as follows.

Crude Birth Rates and Death Rates of Altai City and Mongolia
(Unit : per 1,000 population)

Year	Crude Birth rate		Crude Death rate	
	Altai	Mongolia	Altai	Mongolia
1990	37.1	35.3	9.7	8.5
1995	25.1	23.7	7.7	7.3

Table 2.4 shows the population of Altai City by settlement pattern, apartment area and ger area and the distribution of the population among districts (" Bag " in Mongolian). In 1995 the apartment population numbered 3,703 accounting for 18% of all the population. The table shows that the change in the total population results mainly from the change in the ger population. While the apartment population shows a

relatively stable growth, the growth rate of the ger population showed a drastic drop from 7.2 % per year between 1986 and 1990 to 0.1 % per year since 1990. The ger area functions as the source and destination of migration. Fluctuations of population of each district can be explained by the moving of population by such factors as the construction of new apartments, termination of bus service in distant ger areas and the construction of new power line and associated resettlement of the population.

Seasonal fluctuation seems to take place in the rural part of Altai City. A document points out that in 1996, 220 herdsman families have moved to their winter places in the neighboring Sums. Assuming a household size of 5.4, about 1,200 people, equivalent to 6% of the whole population, make seasonal migration.

Condition since 1995

The population of Altai City since 1995 is as follows.

Year	Population
1995	20,068
1996	17,121
1997	17,761
1998	17,955

According to the statistics provided by the Gobi-Altai Provincial Office, the population in Altai City saw a big decline in 1996 by 14.7%. It was explained by a provincial officer that the decline in 1996 was due to two factors : out-migration of the population and recounting of the population. Concerning the latter factor, prior to 1996, the population figures were prepared based the declaration by residents, which tended to overestimate the actual figure, because the residents tended to declare the number of households members larger than the actual number in order to increase the amount of food that they can acquire by food card. The population figure was recounted in 1996 to acquire the accurate number of residents in the city. The Study, therefore, bases the population projection until 2015 on this recounted population figures since 1996, that is 17,761 in 1997 as the starting year for the projection.

(3) Economic Condition

Condition until 1995

1) Agriculture

Table 2.5 provides an overview of Altai City's socio-economic condition. Altai City plays only a minor role in agriculture production in Gobi Altai Province with agriculture labor force accounting only for 5% of the total labor force of the city. Its role is found more in the processing, trading, and consumption of agriculture products. Agriculture activities in Altai City can be summarized in two points : increasing number of livestock and still stagnant level of production of wheat, potato, and vegetables. The total harvest area of these crops declined from 57.5 hectares in 1991 to 20.0 hectares in 1995. On the contrary, the livestock sector showed a remarkable growth in the same period. The total number of livestock doubled in four years from 37,000 in 1991 to 73,000 in 1995. The annual average rate of growth was 18.5% per year exceeding that of Gobi Altai Province at 5.5% per year, resulting in an increase of the Altai City's share in the number of livestock from 2.2% to 3.5% of the province. The following table summarizes the annual average growth rates of livestock by kind comparing Altai City and Gobi Altai Province.

Annual Average Growth Rates of the Number of Livestock in Altai City and Gobi Altai Province between 1991 and 1995

(Unit : %/year)

Kind	Altai City	Gobi Altai Province
Total	18.5	5.5
Camel	76.8	- 4.1
Horse	15.0	5.0
Cattle	8.2	4.7
Sheep	15.8	0.2
Goat	24.8	14.4

2) Manufacturing Activities

Most of the manufacturing activities in Gobi Altai Province are found in Altai City. In terms of industrial output, those of Altai City have been accounting for a range of 80% to 96% of all the industrial output in the province since 1991. In 1995, the total

industrial output and sales of Altai City reached Tg 776 million and Tg 667 million respectively, accounting for 96% each of those of Gobi Altai Province.

Table 2.6 shows production amounts of manufacturing and mining goods in Altai City since 1985. In the absence of reliable data on industrial production and sales in real term (getting rid of impact of inflation) and price index in Altai, data on industrial production amounts are the only source based on which an analysis can be made on trends of industrial production. Commodities that had or have been produced in Altai City include food and beverage, books and stationery, leather, construction materials, and consumer goods. The following points were clarified concerning the trends of industrial production in Altai City.

(a) Most industries experienced a drastic reduction of production since around 1990 as a result of the change in financial arrangement supporting industrial production. Many industries were closed down with production stopped. Production levels in 1995 of those industries continuing production were in a range of 10 - 30% of 1991 levels.

(b) All the construction materials industries stopped production in 1992 or 1993. No resumption of operation has been reported as of September 1996.

(c) While many industries still remain stagnant, positive trends are also observed. A number of new industries were established in recent years and started production. Some old industries also show a sign of recovery. The commodities the new industries started to produce include ger furniture, candle, knitted goods, fine leather, processed cattle skin, and juice. Such products as candies, lemonade, juice, and formatted paper produced by old industries have started to recover.

Table 2.7 presents the results of the interview and questionnaire survey for industries conducted in October 1996. The objective of the survey was to collect information on their recent performance and future prospect, which cannot be obtained from statistics. Out of the nine industries interviewed, five were established after 1990.

All the four industries established before 1990 experienced a drastic fall in production level between 1990 and 1992, which coincides with the finding from the statistics.

Two of the five new industries, Altai Camel Company and Entum Company show a notable growth, while the remaining three industries keep the initial production level or show a gradual expansion. An important point to show growing entrepreneurship was made by the Altai Camel Company director during the interview. According to him, their business has been going up since their products are competitive taking advantage of lower price and better quality raw material (goat and sheep wool) provided from the hinterland. Wool produced in Gobi Altai Province is famous for its high quality. Wool washing process costs higher if the raw materials are transported to larger cities such as Ulaanbaatar as has been the case so far. On the basis of recent favorable performances, Altai Camel and Entum plan to expand their production capacities in 1997. TS-6 and 60 Jil Company also have expansion plans in coming 2 to 3 years.

3) Livelihood of the Population

The following table summarizes the distribution of labor force in Altai City by sector.

Labor Force in Altai City by Sector

(unit : in number)

Sector	1985	1990	1995
Primary	170	214	184
Secondary	1,535	2,604	613
(Manufacturing)	(720)	(1,404)	(426)
(Construction)	(815)	(1,200)	(187)
Tertiary	3,170	3,596	3,220
Total	4,875	6,414	4,017

The total number of labor force fell by 37% in 1995 compared with 1990. The fall was mostly due to reduced number of jobs in the manufacturing and construction sub-sectors. The reduction in labor force in the primary (agriculture, livestock, etc.) and tertiary sub-sectors (trade, commerce, etc.) were limited to 10 to 14 %.

Reduction in labor force is reflected in an increase of unemployment as shown in Table 2.5. The number of unemployed people registered at the labor office kept rising until 1994 reaching 1,817. In 1995, the figure dropped to 1,660, which might be a sign of recovering job opportunities. Table 2.5 also shows that the poverty population, defined as those with monthly income below Tg 6,900 have increased until 1995, reaching 4,591. The proportions to the city's population were 14%, 15%, and 23% in 1993, 1994, and 1995, respectively.

Table 2.8 presents the result of a preliminary household survey conducted in October 1996. The objective of the preliminary survey are :

(a) to prepare for a full range household survey planned in May 1997 in questionnaire designing, and

(b) to get a general feeling of people's living standard.

Since the number of households interviewed this time was only four, two apartment households and two ger households, the information obtained is only indicative. In response to a question asking about the change in the living standard in terms of sufficiency and easiness in obtaining commodities and their prices, three households indicated a decline between 1990 and 1992 compared with 1985, followed by gradual recovery until 1996. One household which experienced continuous decline of the living standard until 1996 was a pensioner with a monthly income of Tg 6,900 for three household members. Their living standard worsened drastically in 1996 as a result of price liberalization. It seems that while people having certain cash and non-cash income have been able to manage the situation, pensioners are receiving only the adverse impact of the transition process.

Condition since 1995

Regrettably no data are prepared in Mongolia on regional income such as gross regional domestic product (GRDP), equivalent to Gross Domestic Product (GDP) for Mongolia. This makes it difficult to analyze trends of economic growth at regional level in a consistent way with the national economic trends. Recent performance of the Altai economy, therefore, has to be analyzed by integrating pieces of various

information collected from statistics and interviews with officials and private people in Altai City. Table 2.5 and 2.6 present socio-economic conditions and production trends in Altai City. The findings can be summarized as follows.

- Data in the total number of livestock is not consistent before and after 1996. This inconsistency would probably be due to the expansion of the Esunbulag Village (Altai City) boundary in 1996. Looking at the figures in 1996, 1997 and 1998 the number of livestock has been on the rise.
- The same point can be made for crop production. The trend since 1996 indicates an increase in production.
- Industrial output and sales, on the contrary, have been almost constant in current price level, showing a sign of decline in constant terms.
- Cargo turnover showed a slight increase since 1995, indicating the amount of goods transported has been gradually rising, which could be an indication of commercial activities continued steadily.

  Focusing on the manufactured goods in Altai, the trend seems to be rather on the down side as shown in Table 2.6. Comparing 1995 and 1997, the items with increased production numbered five, while those with reduced production numbered eleven. There are seven items whose productions have been stopped since early 1990's.

It is difficult to make a judgement on the trend in economic growth without regional income data. In case of Altai City, the composition of the agriculture sector, especially livestock sub-sector, should be high. At the national level, the agriculture sector accounts for 35% of GDP. The composition of the agriculture sector in Altai could well exceed 50% considering its role as the center of Gobi-Altai Province which is the fourth in Mongolia in the number of livestock. Though the industrial output may be declining, the overall economy of Altai might remain constant or little by little be expanding, supported by the agriculture sector and related activities.

An interview with Altai Camel company during the field survey revealed that their

exist some companies gradually expanding production. Altai Camel company introduced new machinery made in China and increased its employee from 40 to 80 in 1997. They have started to sell new products such as camel and young bull cashmere to foreign markets. They at the same time have some problems in operation. The biggest problem is the lack of working capital. They mainly depend on their sales for operation and no bank loan is borrowed. The problem with the local banks is their incredibly high interests rates, such as 10% per month equivalent to 120% per year.

It was pointed out by a city hall officer that while large scale and traditional manufacturing activities such as those appearing in the official statistics are stagnant or declining, small scale activities at household levels are expanding.

2.3 EXISTING DEVELOPMENT PLANS

2.3.1 Western Regions Development Plan

"The Western Region Development Plan" was prepared by the Ministry of Infrastructure Development in 1993, followed by the approval by the Government in 1994. The objective of the plan is to indicate the directions of development for the Western Region. The Western Region comprises five provinces : Bayan Olgii, Khovd, Uvs, Zavhkan, and Gobi Altai. A population of 435,000 lived in the region in 1995, with 20% living in large towns with a population of more than 20,000 such as Khovd, Ulaangom, Olgii, Altai, and Uliastay. The land area of the Western Region is 415,000 km^2 accounting for 26% of the national land. The advantages and disadvantages of the Western Region are summarized as follows.

1) Advantages : abundant reserve of potential energy and mineral resources, sufficient labor resources, power supply from Russia, vast land resource, abundant livestock resources amounting to 8 million heads and potential for tourism development
2) Disadvantages : long distance from major industrial centers such as Ulaanbaatar, Erdenet and Darkhan and railway route, underdeveloped infrastructure and industries, low level of mining resources exploration, low economic capacity and weak coordination in technology, production and services, and fragile environment.

The Western Region Development Plan proposes the following directions of development for the Western Region.

1) Road construction
   - Bulgan (Khovd) - Urumchi (China) route
   - Tosontsengel - Khovd - Altai - Artsuur route
   - Altai - Khovd - Tsagaannuur route (Relation with the Central Asian countries will be strengthened stimulating export-oriented industries.)
2) Establishment of an international airport in Khovd serving the whole Western Region
3) Construction of power stations at :
   - Nuurstiing (100 - 150 MW)
   - Khovd River (hydropower)
   - Ulaanboom (hydropower)
4) The following two types of industries will develop.
   - export oriented large scale industries producing cement, polymetal ore processing, meat, skin and processed leather, oil, salt, and chemical goods.
   - small to medium scale industries producing and supplying first-hand foodstuff for regional, provincial and district centers.
5) Development in the agriculture sector will result in an increase of livestock up to 16 to 17 million and an expansion of cultivation land by 100,000 hectares annually for wheat, vegetables, and fruits production.

As a result of these developments, the population of the Western Region is projected to reach 678,000 in 2010 with the population of the major cities projected as follows.

- Khovd : 52,400
- Ulaangom : 42,500
- Olgii : 28,800
- Altai : 28,100
- Uliastay : 42,400

2.3.2 Gobi Altai Province Development Plan

The Gobi Altai Province Development Plan (hereafter referred to as the " Gobi Altai Plan ") was worked out by the Settlement and Urban Development Bureau of the Ministry of Infrastructure Development at the request of the Gobi Altai Province Governor's Office and on the basis of the Government decree No. 119 dated July 5 1995. The major objective of the Gobi Altai Plan is to identify conditions and trends of socio-economic development and indicate directions of development of the province based on a comprehensive analysis of natural, socio-economic and financial aspects. The Gobi Altai Plan was prepared within a framework of a number of nation-wide reports and sector-wise master plans as well as incorporating proposals made by province level experts. The target year of the Gobi Altai Plan is year 2010.

The key issues addressed in the Gobi Altai Plan are the following.

- Establishment of supportive axes of transportation and energy systems
- Establishment of an appropriate hierarchy and network of urban systems
- Promotion of small and medium scale industries
- Achievement of well-balanced planning of housing, household services and food supply
- Promotion of industries and services in the rural area

The advantages and disadvantages of Gobi Altai Province are pointed out in the Gobi-Altai Plan as follows.

1) Advantages : the number of livestock ranking fourth in the country, geographical location bordering China and in the vicinity of Russia, endowment of abundant mineral resources and other natural resources, experience in growing fruits and berries.
2) Disadvantages : long distance from major industrial centers such as Ulaanbaatar, Erdenet and Darkhan, difficulty in water supply, especially in Altai City, underdeveloped infrastructure, low population density, shortage of pasture land, large proportion of Gobi area (sand covered area).

The Gobi Altai Plan sets forth the potential and directions of development for the province as follows.

1) From the regional development point of view, Gobi Altai Province is regarded as part of Khuvsgul-Zavkhan zone for the development of infrastructure, promotion of trade and services activities and environmental management.
   In terms of spatial structure of Gobi Altai Province, the province is divided into four micro regions : Altai City micro-region, Bigger micro-region, Sharga micro-region and Altai Village micro-region.

2) The livestock sector has a potential of increasing the number of livestock from present 2.1 million to 2.6 million. Appropriate management will be required from economic point of view for processing and marketing of products.

3) The province is endowed with rich mineral resources as Table 2.9 and Figure 2.1 show. The information on the present status in the table has been added by the JICA study team based on the information collected in Altai City. The following is a summary.

   - Operating mining projects : four coal mines, three salt sites, one limestone site, one chalk site, two gravel sites (* There is an information that there are two small scale gold mines operating in addition to these projects.)
   - Investigated projects : four gold mines, two asbestos sites, three clay sites
   - Committed projects : one magnesite site (The present status of this project will be discussed more in detail in the (1) in 2.4.2 Socio-Economic Framework).

4) Prospective types of industries are mining resource related industries and small and medium scale industries. The former type include gold related industry, fire resistant building material industry based on magnesite and decoration industry related with garnet. The latter type of industries are recommended for 19

locations in the province as shown in Table 2.10. Those recommended for Altai City include : food, flour, dairy products, milk powder, seasoning, meat storage, iodine salt, sewing, boot, felt and felt boot, knitted goods, soap, ger woodwork, magnesite and leather wear.

5) Tourism resources are found in the fields of natural sightseeing, animal hunting and child camping.

6) The Gobi Altai Plan proposes the establishment of a free trade zone at Burgastai border point in Altai District. It is envisaged that commercial and production activities will expand through strengthened links with China. (* As an initial step, the Mongolian Government erected buildings for customs and passport control operations and officers residence at Burgastai border point to prepare for a full opening of the point. Discussion with the Chinese Government remains regarding the specifics of the plan.)

7) Based on a comparison of three alternative means of energy production enhancement, diesel power, hydropower and nuclear power, the Gobi Altai Plan concludes that the hydropower development at the Zavkhan River is the most viable option. It proposes the construction of 18 MW capacity hydropower station at Ulanboom by 2005. Solar and wind power generators are proposed for the rural area.

8) The development of road systems are planned with the following priorities.
   1st priority : Altai City - Hovd, Altai City - Bayanhongol (East - West)
   2nd priority : Altai City - Burgastai (to south, border with China)
   3rd priority : Altai City - Ulastay - Huvsgol (to North)

9) The Gobi Altai Plan proposes the introduction of wage privilege and tax exemption systems especially aimed at remote provinces such as Gobi Altai. With wage levels set artificially higher than more advanced provinces, the

With wage levels set artificially higher than more advanced provinces, the population will be more easily able to cope with higher prices of commodities. Special tax reduction or exemption would also serve the same objective.

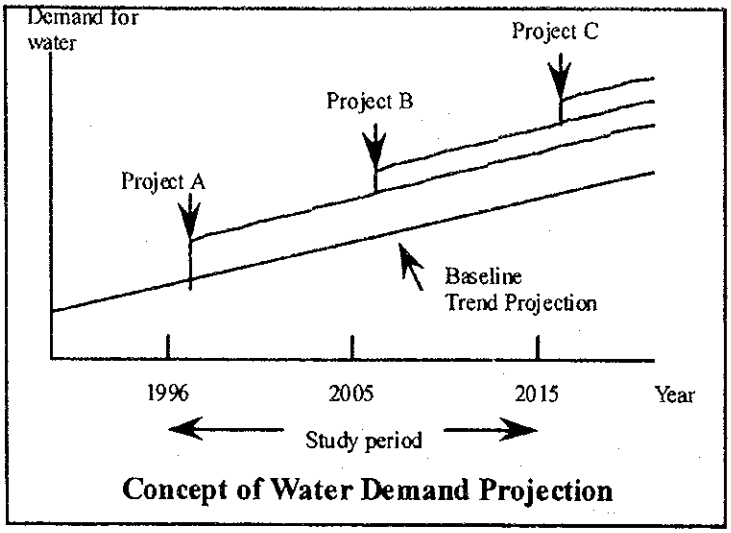
The Gobi Altai Plan projects the population of Gobi Altai Province and Altai City at 101,500 and 28,100 respectively in 2015.

2.4 SOCIO-ECONOMIC FRAMEWORK

2.4.1 Objective and Approach

A socio-economic framework will serve as the basis for water demand projection. The socio-economic framework comprises population of Altai City in 2005 and 2015 and the growth rates of the economy and the industrial sector until the year 2015.

The figure below gives a concept of water demand projection for industrial and domestic uses. The socio-economic framework will provide a base-line projection in the form of growth rates. Water demand by residents and industries and organizations consuming small amount of water will closely follow the baseline. A large water consumer, on the contrary, will influence water demand as adding a step on top of the baseline. The socio-economic framework will provide growth rates of industrial sector and population, which will show the form of the baseline. Large water consumers will be considered separately and only those projects already committed with definite plan will be taken into account. In this sense, the present socio-economic framework and water demand projection should be reviewed and revised from time to time in the light of actual developments taking place. Accordingly water supply plan should be amended at a right time so as to meet changes in water demand.



Concept of Water Demand Projection

2.4.2 Socio-Economic Framework

(1) Growth of Economy and Industry

1) Existing targets and prospects

Existing Water Demand Projection

The Altai City Water Supply Department made a projection of water demand for industrial and domestic uses for the year 2015 as shown in Table 2.11 and Summarized below.

Water Demand Projection by Altai City Water Supply Department

(Unit : m^3/day)

Item	Around 1990*	1996	2015	Growth rate (%/yr) (96-2015)
Industry/organizations	1,289	358	8,601	18.2
Domestic use	269	533	854	2.5
Hot water supply	301	102	149	2.0
Total	1,859	993	9,604	12.7

* Considered the peak amount in the past

Average growth rates projected are 18.2%, 2.5% and 2.0 % per year for industrial use, domestic use and hot water supply respectively, resulting in a total demand increase at 12.7% annually.

Existing economic growth targets

Interviews were conducted to collect information on the prospects of economic growth in the coming years. As of October 1996, there seemed to be no officially agreed targets of economic growth within the Government. Discussions were going on in the parliament concerning the appropriate level of economic growth target. The following shows a summary of the information collected by interviews as well as the forecasts made by the former National Development Board (NDB) and the Asian Development Bank (ADB).

Economic Growth Prospects and Targets

(Unit : %/year)

Year	Interviews			ADB	NDB
	A	B	C		
1996	6.0 - 8.0	6.0 - 8.0	4.0 - 5.0	4.0	5.3
1997				4.0	5.5
1998				4.5	5.5
1999				4.5	5.8
2000				-	6.0
2000 -	-	8.0 - 10.0	-	-	-

Source :
ADB : Economic Review and Bank Operations, June 1995
NDB : Paper on National Economic and Social Development, February 1996

Rather ambitious view sets the target at around 6.0% to 8.0% per year, while more conservative views forecast 4.0 to 5.0 % per year or 5.0 to 6.0 % per year growth. Beyond 2000, only information obtained was that indicating a growth of 8.0 to 10.0 % per year.

On a regional basis, an information indicated 5.0 to 6.0 % per year growth for provinces and 4.0 to 5.0 % growth for Gobi Altai Province.

2) Growth Targets of Altai City

Growth Targets

Growth targets of Altai City are set on the basis of an analysis of the recent trend of economic activities in Altai City, the existing targets and prospects and growth potential of Gobi Altai Province.

Figure 2.2 shows a concept of the forecast and the set targets of economic growth and industrial growth. The following are the established targets in Altai City.

(Unit : %/year)

	1995-2005	2005-2015
Economy	3.0	4.0
Industry	4.0	5.0

Methodology

The first judgment is to make a choice of if the Altai's economy will grow or keep stagnant in the coming years. The study judges that the economy will grow at a certain pace instead of remaining stagnant or deteriorating, though the level of growth will depend on the progress of a number of reform programs being carried out at national and regional levels. This view is based on the finding that the City's economy shows a number of signs indicating recovery of some of the old industries and expansion of new industries such as Gobi Altai Company and Entum Company. Accordingly the pessimistic/gloomy scenario in Figure 2.2 was eliminated.

The rates of growth assumed by the Altai City Water Supply Department at 12.5% per year for total and 18.2% per year for industrial use would represent the optimistic and ambitious scenario. The assumptions underlying this forecast are that all the industrial projects planned and approved by the Government will be implemented and operated at the full capacities and that all the existing factories, including those currently withholding production, will operate utilizing all their capacities. The only possibility that this degree of high growth is realized would be the case in which many of the mining resources development projects and associated industrial projects are

realized. Though the possibility is not nil, this scenario looks too ambitious to be applied as the baseline projection at this point.

GDP growth rates of Mongolia were 2.3% in 1994, 6.3% in 1995, and 2.4% in 1996. A number of factors have affected these growth rates such as expansion of private sector and world prices of copper and cashmere. The last two to three years have seen these factors affecting growth rates both positively and negatively. The Mongolian economy has been strengthening, but still with a high level of fragility, resulting in the fluctuation of growth rates. Considering these aspects, it would be realistic to assume a growth of 4.0% to 5.0% per year for Mongolia for the coming years. Considering various disadvantages of Gobi Altai Province and Altai City, economic growth rate of Altai City is set at 3.0 % per year between 1995 and 2005 and 4.0 % per year between 2005 and 2015. The growth rates of the industrial sector are set higher, considering its leading role, at 4.0% per year in 1995 - 2005 period and 5.0% per year in 2005 - 2015 period.

Thus, the level of growth is considered in two stages : 1995 - 2005 period as the transition period and 2005 - 2015 period as the full market economy stage. An information indicated the Government aims at privatizing 60% of the state property by the year 2000 indicating that transition process still takes at least another 4 years on a national basis. The transition process will be over only after structural reforms of the economy is completed as well as entrepreneurship grows and prevails on the part of the private sector. It would require longer time for provinces, especially for a province like Gobi Altai situated in a remote area with locational disadvantages, to complete the transition period and reach the full market economy stage. Based on these considerations, economic and industrial growth of Altai City is staged into the transition stage between 1995 and 2005 followed by the full market economy stage between 2005 and 2015.

3) Individual Industrial Development Projects

There are two industrial development projects which need consideration in water demand projection : Altai Camel Company and Entum Company. Altai Camel Company was established in 1993 as a joint venture of Chinese and Mongolian investors. It employs 40 workers at present (in 1996) and produces washed wool and knitted goods. It consumes about 100 to 130 m^3 per week of water for washing wool. The present water source is the well owned and operated by the company. The company expects to be connected with the public water supply system for secure supply of good quality water.

Entum Company is another fast growing company in Altai established in 1992. It produces felt, liquor and processed food. It plans to double its production capacity in 1997. The amount of water use projected by the Altai City Water Supply Department is 5.0 and 400 m^3 per day in 1996 and 2015, respectively.

The information collected in Altai City indicated that the establishment of a magnesite factory was already committed with financial source determined. Information gathered in Ulaanbaatar later, however, clarified that no application for exploration has been submitted so far to the Ministry of Infrastructure Development. It is too early to judge at this point that this project is committed and needs to be incorporated into demand projection.

4) Pre-requisites for Realistic Scenario

There are a number of prerequisites that should be met in achieving the realistic scenario both at national and regional levels as follows.

- Sound macroeconomic management to secure stability of the economy.
- Financial sector reform to stimulate private sector activities. This is especially important at regional level, where debt problem and lack of working capital are one of the major problems faced by local companies.

- Privatization and reform of non-viable state-owned enterprises.
- Reform in agriculture sector, especially intensive livestock and crop production subsectors.
- Improvement of physical infrastructure such as power, water supply, road, air transportation, and telecommunications. The locational disadvantage of Altai City needs to be reduced by infrastructure development. The necessity for external assistance on concessional terms will continue to be needed.
- Proper care for socially vulnerable population.

(2) Population

Population of Altai City was projected for the target years of 2005 and 2015. The population of Altai City was projected first for the total population, then for each district and by settlement pattern, ger area or apartment area.

The projection of the total population is composed of two elements, natural change and social change. Natural change of population refers to changes in population caused by births and deaths of the population. Social change of population is caused by migration into and out of Altai City.

Growth of the total population is projected in the following steps.

a. Estimate of change of the population by natural factor, considering birth rate, infant mortality rate and death rate
b. Estimate of the number of labor force required to achieve the projected economic growth
c. Estimate of the need for additional labor force
d. Estimate of the new labor force entering into the labor market of Altai City
e. Estimate of a balance between additionally required labor force and the newly added labor force
f. Estimate of out-migration and in-migration of labor force resulting from the balance of the required and additional labor force
g. Conversion of the number of labor force to change into population figure based on the assumed dependency ratio
h. Estimate of the total population as a result of natural and social factors

Table 2.12 presents the assumptions applied. Table 2.13 shows the projected population in 2005 and 2015. The projected population is as follows.

1997 : 17,761
2005 : 18,790
2015 : 20,961

The total population thus projected is broken down into the ger population and apartment population applying the present distribution proportions as follows.

Population Projected by Settlement Pattern

Year	Ger	Apartment	Total
1997	14,516	3,245	17,761
2005	15,357	3,433	18,790
2015	17,131	3,830	20,961

It is judged that the distributional proportion between ger and apartment areas remain unchanged, assuming that there will be no such an investment on apartment construction as to change the proportions.

Table 2.14 shows the projected population of Altai City by district and settlement pattern.

Table 2.1 Outline of Mongolian Socio-Economy (1/2)

Item	Unit	Year						Rate of Change (%/year)			
		1985	1990	1995	1996	1997	1998 (6)	1985-90	1990-95	1995-96	1996-97
1. Population/emplyment											
Population	000	1,900.6	2,149.3	2,317.5	2,353.3	2,387.0	2,413.6	2.5	1.5	1.5	1.4
Number of household (1)	000	n.a.	427.8	514.1	517.7	531.1	n.a	-	3.7	0.7	2.6
Household size (1)	person/household	n.a.	4.8	4.5	4.5	4.5	n.a	-	-	-	-
Crude birth rate	per 1000 pop	38.2	35.3	23.7	22.2	20.9	15.5	-1.6	-7.7	-6.3	-5.9
Crude death rate	per 1000 pop	10.3	8.5	7.3	7.5	7.2	n.a	-3.8	-3.0	2.7	-4.0
Infant mortality rate	per 1000 live birth	n.a.	64	44	40	40	36	-	-7.2	-9.1	0.0
Number of employees (2)											
Industry	000	85.4	131.6	108.1	104.6	98.9	n.a	4.4	-3.9	-3.2	-5.4
Agriculture	000	203.0	258.8	354.3	358.1	373.0	n.a	2.5	6.5	1.1	4.2
Construction	000	32.7	66.0	29.5	29.7	27.1	n.a	7.3	-14.9	0.7	-8.8
Others	000	227.6	393.2	332.3	329.1	307.3	n.a	5.6	-3.3	-1.0	-6.6
Total	000	516.0	783.6	794.7	791.8	779.2	n.a	4.3	0.3	-0.4	-1.6
Economically active population (3)											
Employed	000	n.a.	783.6	794.7	791.8	779.2	n.a	-	0.4	-0.4	-1.6
Unemployed	000	n.a.	55.4	45.1	55.4	63.7	54.1	-	-5.0	22.8	15.0
Total	000	n.a.	839.0	839.8	847.2	842.9	-	-	0.0	0.9	-0.5
Unemployment rate	%	n.a.	6.6	5.4	6.5	7.6	n.a	-	-5.0	21.8	15.6
2. Economy											
Gross domestic product (current prices)	billion Tg	9.4	10.5	391.1	586.5	737.0	n.a	2.2	106.3	50.0	25.7
Gross domestic product (1993 prices)	billion Tg	172.7	208.6	180.7	185.0	191.1	n.a	3.8	-2.8	2.4	3.3
Gross domestic product composition											
industry	%	31.8	35.6	28.8	20.6	20.4	n.a	-	-	-	-
agriculture	%	14.3	15.2	36.7	36.8	34.6	n.a	-	-	-	-
construction	%	4.4	5.0	2.2	3.8	3.4	n.a	-	-	-	-
transport	%	11.5	10.2	3.5	4.7	4.4	n.a	-	-	-	-
communication, trade and material	%	1.5	1.8	1.1	1.1	1.1	n.a	-	-	-	-
technical provision	%	22.3	19.4	13.5	18.3	21.8	n.a	-	-	-	-
services	%	12.9	11.5	11.8	14.7	14.3	n.a	-	-	-	-
others	%	1.3	1.2	2.3	-	-	n.a	-	-	-	-
Total	%	100.0	100.0	100.0	100.0	100.0	n.a	-	-	-	-
Gross domestic product growth rates (2)											
industry	%/year	-	4.2	-2.9	0.2	2.8	n.a	-	-	-	-
agriculture	%/year	-	2.8	-0.5	10.0	2.6	n.a	-	-	-	-
construction	%/year	-	4.2	-14.2	5.0	-6.0	n.a	-	-	-	-
transport	%/year	-	1.7	-15.9	7.3	4.5	n.a	-	-	-	-
communication, trade and material	%/year	-	8.3	-9.1	11.5	8.0	n.a	-	-	-	-
technical provision	%/year	-	5.5	-6.5	2.5	4.8	n.a	-	-	-	-
services	%/year	-	4.1	6.5	5.6	6.0	n.a	-	-	-	-
others	%/year	-	1.4	10.1	-	-	n.a	-	-	-	-
Total	%/year	-	3.8	-2.8	2.4	3.3	n.a	-	-	-	-

Table 2.1 Outline of Mongolian Socio-Economy (2/2)

Item	Unit	Year						Rate of Change (%/year)			
		1985	1990	1995	1996	1997	1998 (6)	1985-9	1990-9	95-96	96-97
2. Economy (continued)											
Gross industrial product (1993 prices) (3)	billion Tg	240.2	194.1	211.3	206.5	215.6	n.a	-4.2	1.7	-2.3	4.4
Gross agricultural output (1993 prices)	billion Tg	105.5	109.2	102.8	104.9	107.7	n.a	0.7	-1.2	2.0	2.7
Livestock	billion Tg	66.8	79.3	87.8	91.1	93.1	n.a	3.5	2.1	3.8	2.2
crops	billion Tg	38.7	29.9	15.0	13.8	14.6	n.a	-5.0	-12.9	-8.0	5.8
Number of Livestock	million head	22.5	25.9	28.6	29.3	31.3	n.a	2.9	2.0	2.4	6.8
Export value (4)	million US$	689.1	660.7	473.3	424.3	451.5	218.2	-0.8	-6.5	-10.4	6.4
Import value	million US$	1,096.0	924.0	415.3	450.9	574.7	337.4	-3.4	-14.8	8.6	27.5
Trade balance	million US$	-406.9	-263.3	58.0	-26.6	-123.2	-119.2	-	-	-145.9	363.2
Consumer price index (5)	%/year	-	52.7	53.1	58.7	17.5	1.6	-	-	10.5	-70.2
3. Central government public finance (7)											
Revenue	billion Tg	n.a.	6.5	144.6	162.9	213.7	n.a	-	86.0	12.7	31.2
Expenditure	billion Tg	n.a.	n.a	149.3	211.3	291.2	n.a	-	-	41.5	37.8
Balance	billion Tg	n.a.	-	-4.7	-48.4	-77.5	n.a	-	-	929.8	60.1
Bal ance as % of GRDP	%	n.a.	-	2.6	26.2	40.6	n.a	-	-	-	-
4. Household income											
Average annual househol income											
Urban area	thousand Tg	n.a.	n.a.	460	620	825	n.a	-	-	34.8	33.1
Rural area (8)	thousand Tg	n.a.	n.a.	330	476	851	n.a	-	-	44.2	78.8
5. Transportation											
Freight turnover	million ton*km	7,905.0	6,971.6	2,437.1	2,685.4	2,686.1	2,166.9	-2.5	-19.0	10.2	0.0
Passenger turnover	million passenger*km	1,419.0	2,056.1	1,424.2	1,541.1	1,725.7	1,392.7	7.7	-7.1	8.2	12.0

Note : (1) 1989 in stead of 1990, (2) 1980 instead of 1985 (3) 1991 instead of 1990
(2) GRDP growth rates in 1990 and 1995 are annual average growth rates of the preceeding 5 years.
(3) Industrial output in 1996 and 1997 are given in 1995 price level. These values are converted to 1993 price level for the comparison purpose using the following deflator.
Industrial product in 1995 in 1993 prices : 211.3 billion togrog (1995 data)
Industrial product in 1995 in 199 prices : 222.9 billion togrog (1997 data)
Deflator for converting 1995 price to 1993 level : 0.95
(4) Export values in 1995, 1996 and 1997 exclude gold export.
(5) Inflation in 1990 is that of 1991.
(6) Information in January to September period or as of the end of September 1998
(7) Values in 1990 are those in 1991.
(8) Cause for the resverse in urban-rural relation in 1997 is not known.
Source : Mongolian Economy and Society in 1995 and 1996, State Statistical Office of Mongolia
Mongolian Statistical Yearbook 1997, National Statistical Officeof Mongolia
Statistical Bulletin September 1998, National Statistical Office

Table 2.2 Socio-economic Indicators of Gobi Altai Province (1/2)

Items	Unit	1991	1992	1993	1994	1995	1996	1997	1998
Population	number	68,974	71,703	71,528	72,236	72,921	69,012	70,249	
male	number	33,189	34,832	34,520	35,197	35,462	33,965	34,320	
female	number	35,785	36,871	37,008	37,039	37,459	35,047	35,929	
Labor resources	number	31,444	30,621	32,444	33,098	34,146			
Number of death	number	500	573	498	440	511	458	491	322
Number of birth	number	2,157	1,865	1,620	1,822	1,740	1,647	1,618	1,144
Infectious disease	number	551	404	336	752	1,006	371	304	269
Unemployment	number	2,214	2,102	2,336	2,617	2,778			
Poverty population	number	n.a.	11,294	12,548	16,434	14,537			
Number of crime cases	number	105	122	195	223	186			220
Local budget revenue	000 Tg	38,704.8	61,293.1	134,119.7	266,483.3	355,508.5			348,694.5
Local budget expenditure	000 Tg	140,286.7	195,295.8	837,830.4	880,503.6	1,585,461.0			2,075,932.5
Livestock, total	000 heads	1,696.6	1,738.1	1,766.9	1,973.4	2,102.5			
Camel	000 heads	47.6	43.3	39.1	39.6	40.2			
Horse	000 heads	24.5	81.1	79.6	91.2	102.9			
Cattle	000 heads	79.3	76.4	68.4	81.9	95.2			
Sheep	000 heads	957.5	994.3	946.6	975.1	959.6			
Goat	000 heads	527.7	580.1	633.2	765.6	904.6			
Female livestock, total	000 heads	797.7	844.2	821.8	854.2	886.8			
camel	000 heads	13.8	11.3	10.2	10.3	10.5			
mare	000 heads	20.8	20.1	21.3	24.3	27.2			
cow	000 heads	u.r.	u.r.	29.6	33.6	35.2			
sheep	000 heads	480.1	u.r.	447.8	432.1	416.4			
goat	000 heads	u.r.	283.2	312.8	353.9	395.5			
Total brought-up offspring	000 heads	u.r.	u.r.	485.7	576.7	525.3			576.1
Camel	000 heads	u.r.	u.r.	u.r.	3.7	3.9			3.2
Horse	000 heads	u.r.	u.r.	u.r.	14.6	16.1			13.2
Cattle	000 heads	u.r.	u.r.	u.r.	22.6	25.4			16.4
Sheep	000 heads	478.5	u.r.	u.r.	382.6	333.6			278.6
Goat	000 heads	200.2	u.r.	162.7	253.2	246.3			264.6
Total meat purveyance to state	ton	12,387.4	u.r.	u.r.	1,697.7	1,007.7			
Camel cashmere production	ton	236.6	u.r.	202.4	194.1	197.9	200.9	201.6	
Sheep wool production	ton	1,462.3	u.r.	u.r.	1,335.2	1,347.9	1,390.7	1,354.5	
Goat Cashmere wool production	ton	151.0	u.r.	164.4	174.1	215.8	258.9	267.3	
Goat hair	ton	u.r.	u.r.	u.r.	71.9	91.7	136.0	146.8	
Skins, Horse mane	ton	u.r.	u.r.	34.9	10.2	28.5	31.6	35.1	
Horse hair	ton	37.5	36.8	32.9	8.5	32.5	35.6	36.2	
Camel skin	ton	u.r.	u.r.	1,926.0	1,578.0	1,258.0	1,956.0	2,366.0	
Horse skin	ton	u.r.	u.r.	2,577.0	2,709.0	3,139.0	3,769.0	5,311.0	
Cattle skin	ton	4,726.0	u.r.	u.r.	4,759.0	5,609.0	8,125.0	10,372.0	
Sheep skin	ton	195,163.0	u.r.	u.r.	160,951.0	187,258.0	189,008.0	151,523.0	
goat skin	ton	u.r.	u.r.	u.r.	55,628.0	73,955.0	101,392.0	111,551.0	

Table 2.2 Socio-economic Indicators of Gobi Altai Province (2/2)

Items	Unit	1991	1992	1993	1994	1995	1996	1997	1998
Cultivated land, total	ha	31.7	u.r.	2,770.8	1,643.2	1,067.1			1,351.5
wheat area	ha	n.a.	872.2	1,736.6	1,002.0	512.7			621.0
potato area	ha	n.a.	u.r.	139.8	120.2	69.2			208.6
vegetables area	ha	n.a.	59.0	28.4	77.5	43.9			96.2
fodder area	ha	n.a.	1,438.6	u.r.	405.0	396.3			186.5
fruits & berries area	ha	n.a.	u.r.	66.8	38.5	45.0			46.1
Total harvest	ton	5,603.8	4,494.3	u.r.	2,322.4	1,919.3			2,046.6
Wheat production	ton	568.1	u.r.	u.r.	620.0	414.5			613.7
Potato production	ton	516.9	u.r.	u.r.	704.7	487.4			922.7
Vegetables production	ton	311.6	320.9	u.r.	400.7	333.9			317.0
Fodder crop production	ton	4,144.8	u.r.	2,048.0	525.0	546.0			193.2
Industrial output	000 Tg	35,652.6	u.r.	u.r.	430,427.4	808,363.3			1,314,717.3
Industrial sales	000 Tg	97,506.3	u.r.	u.r.	437,576.3	697,947.7			815,658.5
Total construction works	000 Tg	42,457.2	u.r.	u.r.	17,429.4	165,663.1			281,785.4
Transport cargo turnover	000 tonnes /km	38,403.6	u.r.	u.r.	1,557.8	4,475.6			110.0
Transported cargo	000 Tg	265.4	115.0	u.r.	21.6	140.3			54.2
Tariff income	000 Tg	12,085.6	u.r.	u.r.	92,684.2	66,928.4			65,975.1

Source : JICA Preparatory Study Team, May 1996
Note : u.r ; unreadable

Table 2.3 Population of Altai City by Source of Change

Year	Total	Natural Change			Social change	Birth Rate (/1000)	Death Rate (/1000)	Rate of natu -ral change (/1000)
		Birth	Death	Change				
1986	14,993	601	96	505	1,348	40.1	6.4	33.7
1987	16,846	635	85	550	807	37.7	5.0	32.6
1988	18,203	675	105	570	545	37.1	5.8	31.3
1989	19,318	686	89	597	-695	35.5	4.6	30.9
1990	19,220	713	186	527	351	37.1	9.7	27.4
1991	20,098	624	117	507	-424	31.0	5.8	25.2
1992	20,181	596	162	434	-904	29.5	8.0	21.5
1993	19,711	477	123	354	-162	24.2	6.2	18.0
1994	19,903	441	112	329	-164	22.2	5.6	16.5
1995	20,068	503	154	349	-3,296	25.1	7.7	17.4
1996 *	17,121	310	101	209	431	18.1	5.9	12.2
1997	17,761	243	118	125	69	13.7	6.6	7.0
1998 **	17,955	276	82	194	-	15.4	4.6	10.8

Source : Gobi-Altai Province Governor's Office

* A big fall in total population in 1996 is explained mainly by recounting of acurate population.

** The number of birth and death are as of October 1998. The total poplation is estimated by adding net natural increase (276-82 =194) and 1997 population (17,761), therefore considering no migration.

Average annual growth rate (%/year)			
Period	Population	Birth rate	Death rate
1986-199	6.4	-1.9	10.9
1990-199	0.9	-7.5	-4.5

Table 2.4 Population of Altai City by Settlement Pattern and District

Year	Total	Settlement pattern		District			
		Apartment Area	Ger Area	I	II	III	IV
1986	14,993	2,641	12,352	4,100	3,402	3,504	3,987
1987	16,846	2,720	14,126	4,665	3,930	3,902	4,349
1988	18,203	2,765	15,438	4,951	4,192	4,422	4,638
1989	19,318	2,810	16,508	5,234	4,461	4,561	5,062
1990	19,220	2,930	16,290	5,288	4,173	4,790	4,969
1991	20,098	3,110	16,988	4,527	4,105	5,016	6,450
1992	20,181	3,145	17,036	4,693	4,286	5,159	6,043
1993	19,711	3,216	16,495	4,152	3,722	4,927	6,910
1994	19,903	3,684	16,219	4,865	4,725	5,297	5,016
1995	20,068	3,703	16,365	4,904	4,876	5,217	5,071
1996	17,121	3,128	13,923	3,606	4,095	4,476	4,944
1997	17,767	3,245	14,516	3,813	4,162	4,696	5,090
			Rate of change (%/year)				
1986-87	12.4	3.0	14.4	13.8	15.5	11.4	9.1
1987-88	8.1	1.7	9.3	6.1	6.7	13.3	6.6
1988-89	6.1	1.6	6.9	5.7	6.4	3.1	9.1
1989-90	-0.5	4.3	-1.3	1.0	-6.5	5.0	-1.8
1990-91	4.6	6.1	4.3	-14.4	-1.6	4.7	29.8
1991-92	0.4	1.1	0.3	3.7	4.4	2.9	-6.3
1992-93	-2.3	2.3	-3.2	-11.5	-13.2	-4.5	14.3
1993-94	1.0	14.6	-1.7	17.2	26.9	7.5	-27.4
1994-95	0.8	0.5	0.9	0.8	3.2	-1.5	1.1
1995-96	-14.7	-15.5	-14.9	-26.5	-16.0	-14.2	-2.5
1996-97	3.8	3.7	4.3	5.7	1.6	4.9	3.0
1986-90		2.6	7.2	6.6	5.2	8.1	5.7
1990-95		4.8	0.1	-1.5	3.2	1.7	0.4
1986-95		3.8	3.2	2.0	4.1	4.5	2.7

Note : A big drop in population in 1996 is explained mainly by recounting of population in 1996. Population figures since 1996 are considered more accurate.

Source : Gobi-Altai Province Governor's Office

Table 2.5 Overview of Altai City by Major Socio-Economic Indicators

Items	Unit	1991	1992	1993	1994	1995	1996	1997	1998
Population	number	19,232	20,181	19,711	19,903	20,068	16,942	17,761	18,000
male	number	8,793	9,980	9,467	8,667	9,739	8,374	8,412	8,842
female	number	10,439	10,201	10,244	10,236	10,329	8,568	9,349	9,158
Labor resources	number	9,161	9,449	7,464	7,763	8,148	9,200	9,300	10,100
Number of death	number	167	162	123	112	154	101	118	82
Number of birth	number	715	600	478	453	503	310	243	276
Infectious disease	number	338	345	325	309	424	350	347	362
Unemployment	number	1,377	1,448	1,751	1,817	1,660	2,330	2,410	2,375
Poverty population	number	-	-	2,847	3,055	4,591	5,250	5,932	6,121
	%	-	-	14.4	15.3	22.8	31.0	33.4	34.0
Local budget revenue	000 Tg	1,059.9	1,314.0	6,822.4	7,201.6	36,489.0	n.a	n.a	n.a
Local budget expenditure	000 Tg	13,138.8	26,727.3	70,048.0	183,621.4	541,725.0	n.a	n.a	n.a
Livestock, total	head	37,020	45,291	54,614	69,582	72,907	134,437	147,981	150,976
Camel	head	18	57	186	173	176	808	658	592
Horse	head	1,655	1,894	2,230	2,693	2,897	6,987	5,790	5,876
Cattle	head	3,080	3,848	2,947	3,899	4,219	9,380	7,447	7,657
Sheep	head	20,232	23,740	30,484	38,207	36,428	63,179	71,752	64,546
Goat	head	12,035	15,752	18,767	24,610	29,187	54,009	61,534	72,311
Total meat purveyance to state	ton	6.6	7.2	8.0	8.7	9.8	10.2	11.4	12.5
Camel wool production	ton	0.8	0.4	0.6	0.9	0.8	0.9	1.1	0.5
Sheep wool production	ton	75.1	18.0	30.0	43.2	54.1	55.4	58.3	60.4
Cashmere wool production	ton	0.2	0.5	3.9	5.0	6.5	6.7	7.2	6.5
Cultivated land	ha	57.5	55.7	57.2	31.0	20.0	60.0	62.0	72.0
Wheat production	ton	12.5	18.6	37.2	24.0	n.a.	8.5	12.0	12.0
Potato production	ton	159.0	117.7	150.0	35.0	83.0	164.5	182.4	240.0
Vegetables production	ton	80.6	29.7	63.0	6.0	6.7	121.4	135.0	158.0
Industrial output	000 Tg	32,379.5	24,156.9	44,327.7	40,631.7	775,818.1	776,892.0	778,900.0	790,110.0
Industrial sales	000 Tg	93,709.8	99,101.9	579,005.5	410,415.8	666,949.9	656,856.0	689,997.0	715,160.0
Cargo turnover	000 ton*km	38,403.6	14,434.2	30,108.0	1,557.8	4,475.6	4,686.0	4,580.0	4,682.0

Source : (1) JICA Preparatory Study Team, May 1996
(2) Govi Altai Province Office

Table 2.6 Main Production Items in Altai City

Item	Unit	1985	1986	1987	1991	1992	1993	1994	1995	1996 (2)	1997	1998	1995/91 (%)
1. Bread	ton	640.7	673.7	700.0	356.5	505.4	238.1	158.0	94.5	13.9	26.0	29.0	27
2. Cookery	ton	512.8	607.0	612.0	355.0	297.2	52.0	34.0	50.0	12.6	16.0	20.0	14
3. Liquor	000 liter	112.6	101.4	65.0	105.1	117.5	60.6	51.1	55.1	28.1	26.0	10.0	52
4. Macaroni	ton	121.2	122.4	83.7	16.4	38.3	10.0	4.9	12.9	0.0	54.0	15.0	79
5. Sea bucktorn oil	000 liter	0.0	0.0	0.0	0.0	0.0	100.0	20.0	0.3	1.3	2.0	5.0	-
6. Lemonade	000 liter	105.8	126.0	126.4	206.4	79.8	12.4	16.1	56.3	28.6	32.0	45.0	27
7. Juice	000 liter	0.0	0.0	0.0	0.0	0.0	0.2	0.2	2.6	0.3	4.0	0.6	-
8. Candies	ton	34.2	47.3	24.5	15.4	1.8	5.2	20.6	17.3	14.0	115.0	126.0	112
9. Books	000 spread	55.3	52.7	57.0	59.8	51.2	54.9	24.0	0.0	15.5	12.5	10.6	-
10. Formatted paper	sheets	1,485.8	1,664.9	1,657.5	1,080.1	879.1	1,550.8	889.0	3,697.9	673.9	356.0	446.0	342
11. Electricity	000 Kwh	12,563.2	13,639.3	14,000.3	23,995.4	15,203.4	9,925.0	6,923.1	7,161.7	4,527.7	4,342.0	4,656.0	30
12. Heat	000 gcal	0.0	0.0	0.0	117.7	89.1	58.6	40.6	41.3	18.4	20.1	21.5	35
13. Coal (1)	000 ton	60.0	72.6	78.7	87.8	52.2	24.1	40.2	20.8	7.6	20.7	34.5	24
14. Gold (1)	Kg	0.0	0.0	0.0	0.0	0.0	1.5	10.1	15.7	13.5	13.7	13.9	-
15. Fine leather	000 dm^2	0.0	0.0	0.0	0.0	0.0	0.0	37.4	14.0	0.0	0.0	0.0	-
16. Processed cattle skin	Kg	0.0	0.0	0.0	0.0	0.0	0.0	100.0	1,000.0	0.0	0.0	0.0	-
17. Soap	ton	70.0	48.0	0.0	0.0	0.0	0.0	180.0	0.0	0.0	0.0	0.0	-
18. Bricks	000 pieces	2,001.0	2,195.8	914.0	2,475.4	503.0	0.0	0.0	0.0	0.0	0.0	0.0	-
19. Basalt blocks	000 pieces	128.8	100.0	31.9	509.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
20. Concrete	m3	3,195.0	3,718.5	5,761.7	0.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	-
21. Ferro concrete	m3	200.0	1,328.9	2,552.0	1,734.1	530.9	0.0	0.0	0.0	0.0	0.0	0.0	-
22. Concrete powder	m3	817.6	820.9	642.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
23. Felt	pieces	0.0	0.0	0.0	0.0	0.0	0.0	0.0	519.0	0.0	0.0	0.0	-
24. Ger furniture (3)	000 Tg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,500.5	800.0	1,630.5	-
25. Candle	000 pieces	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	-
26. Knitted goods (3)	000 Tg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4,500.3	0.0	0.0	-

Note :
(1) Coal and gold mines are located outside the Esonbulag Sum (Altai City).
(2) First three quarters (January to September)
(3) No data on physical amount were available.
Source : Gobi Altai Province Governor's Office

Table 2.7 Operational Performances of Surveyed Companies in Altai City (1/2)

Organization	Year of establish-ment	Present condition (operating or closed)	Kind of output or service	Total Output		Number of employ-ee	Land area used (sq. meter)
				Year	million togrog		
1. Altai State Enterprise	1958	seasonal operation	trade	-	2.8	7	4,000
2. Goviin Urgee State Enterpri	1986	temporarily closed. will open in April 1997	ferro concrete	1995	14.0	25	5,000
3. Badrakh Company	1993	operating	printing house and commerce	1996	12-13	8	2,048
4. Tulga-Altai Company	1987	operating	bread, cookies, candies, soft drinks, syrup, flour, trading, iodine salt	1995	210.0	60	n.a.
5. Altai Camel Company	1993	operating	washed camel, sheep and goat wool, knitted wear	1996	20.0	40	54,000
6. Entum Company	1992	operating	Production of felt, liquor, processed seals and foodstuff	1995	80.0	120	800
7. TS-6	1994	temporarily closed. will open in April 1997	sheep and goat skin processing. trading	1996	15.0	11	36,000
8. 60 Jil Company	une, 198	operating	milk and milk products delivered to child care center and hospitals/ vegetables and berries	1995/96	14.0	28	6,000
9. Artsat Cooperative	1991	operating	hairdressing	1996	1.2	4	200

Note : The information above were obtained by interviews and questionnaire survey conducted between October 14 and 18, 1996.

Table 2.7 Operational Performances of Surveyed Companies in Altai City (2/2)

Organization	Comparison of business performance in real term *												Problems faced, if any	Future prospect
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996		
1. Altai State Enterprise	100	101	101	102	100	104	102	19	150	101	91.5		shortage of operational fund	Production of construction materials in addition to trade
2. Goviin Urgee State Enterprise	-	100	101	104	105	84	55	42	0	0	0	30	No market. Only market is bridge construction at the Taishir River. No water tanki	To recover 70-80% of peak production level in 2000.
3. Badrakh Company	-	-	-	-	-	-	-	-	100	108	134	132	limited market, outdated equipment, a drastic decrease demand for books and publica	modernization of equipment and technology in 1996-1998
4. Tulga-Altai Company	-	-	-	-	-	100	-	-	-	-	-	30	outdated equipment, debt to government and others, too heavy tax	to recover to peak level by 2005
5. Altai Camel Company	-	-	-	-	-	-	-	-	100	138	366	386	Shortage of operational fund, bad water quality	1997=400.To expand capacity and employees to increase to 120 in 1997 summer
6. Entum Company	-	-	-	-	-	-	-	100	160	300	####		high electricity and water tariff	Factory's capacity to be doubled in 1997
7. TS-6	-	-	-	-	-	-	-	-	-	100	100	100	Price rise of skin. Bad water quality giving adverse effect on skin processing (secondary problem)	Plan to expand capacity to 250 tons of skins per day (100 skins per day now) in 2000 buying new machines from Germany machines from Germany or Checko by 1999.
8. 60 Jil Company	100	105	105	105	110	125	10	12	14	19	22	23	(a) Water quality is bad for so drinks and canned cucumbers. they transport water from Zav River. (b) Disruption of powe supply during summer.	Performance has been gradually recovering. The target is to produce 100 tons of milk in year 2000 (100 at present). Profits made in the last two years are sufficient for future expansion.
9. Artsat Cooperative	-	-	-	-	-	-	100	90	90	103	105	95	lack and high prices of equipment	cosmetic service and treatment

Note : * The interviewee was requested to compare their business performances in real term, getting rid of inflation effect, assuming the 1985 production level or the level of the year in which production started as 100.

Table 2.8 Results of Sample Household Interview Survey (1/2)

Item	Household	
	1	2
1. Address	Apartment no. 2-17, Building 22, District IV	Apartment 5, Building 11, District IV
2. Settlement pattern	apartment	apartment
3. Monthly income (Tg)		
cash	32,000	6,900
non-cash	20,000	0
total	52,000	6,900
4. Number of household members	6	3
5. Occupation	husband : school guardian wife : division chief of market office	pensioner
6. Living standard of this year	stable	Worsened drastically due to price rises
7. Change of living standard since 1985		
1985	100	100
1990	30	down
1991	30	down
1992	30	down
1993	50	down
1994	70	down
1995	80	down
1996	90	30 - 40
8. The method of obtaining water	tap water	fetch water at nearby apartment
9. Distance, time length and frequency of fetching water	-	100 meters away, 15 - 20 minutes, twice a day
10. Water consumption per day	no idea	40 liters per day
11. For what purpose water is needed sufficiently.	Laundry. Have problem when power is cut and there is no water. This happens about twice a month.	cooking
12. Payment for water (Tg/month)	Tg 1,080 (Tg 180 * 6 persons)	No cash payment because they cannot afford it. Instead they offer labor such as sowing wood.
13. Satisfaction with the water supply service	satisfied. no complaint	Not satisfied.
14. Problems in water supply service	none	Previously water tanker used to come here, but that was stopped because people here cannot pay water tariff. A solution would be installing one stand-pipe for one building. There are two buildings, one with 12 families and the other with 6 families.
15. Willingness to pay for water	Tg250 per person per month (39% more than now)	30 mung per liter (0.3 tugrug)
16. Other issues	-	-

Table 2.8 Results of Sample Household Interview Survey (2/2)

Item	Household	
	3	4
1. Address	Apartment No.1, 2nd Street District IV	No.2, 3rd Street District IV
2. Settlement pattern	ger	ger
3. Monthly income (Tg)		
cash	10,000	35,000
non-cash	0	833
total	10,000	35,833
4. Number of household members	6	3
5. Occupation	Unemployed. Do trading from time to time. Previously (husband) driver (wife) working at timber factory	family business making boots
6. Living standard of this year	stable	improving
7. Change of living standard since 1985		
1985	100	100
1990	60	70
1991	60	60
1992	60	50
1993	65	60
1994	70	70
1995	75	80 -
1996	80-85	100
8. The method of obtaining water	water tanker	water tanker
9. Distance, time length and frequency of fetching water	50-100 meters away, 3 minutes, twice a day	50-100 meters away, 3 minutes, twice a day
10 Water consumption per day	60 liter per day	50 liters per day
11 For what purpose water is needed more sufficiently.	cooking	cooking
12 Payment for water (Tg/month)	0.5 Tg per liter (Tg 900/month)	0.5 Tg per liter (Tg 750/month)
13 Satisfaction with the water supply service	satisfied.	happy with the present service
14 Problems in water supply service	none	none
15 Willingness to pay for water	1,000 Tg per month.(about 10% more than now.	70 mung per liter (40% more than now)
16 Other issues	-	They mainly make two to three traditional type boots per month, which cost about Tg 30,000 to 70,000. Their business has been going up since their marriage in 1994, when they were presented by relatives with livestock. Also increasing purchasing ability of rural people due to increased number of livestock they possess contributes to better business performance.

Table 2.9 Existing and Planned Mining Projects

No.	Deposit Name	Number on the map (Figure 2.1)	Size of the deposit	Present status
	Coal			
1	Tsakhir	1	28.3 million tons	A
2	Maanit	2	0.4 million tons	A
3	Khuren gol	3	5.0 million tons	A
4	Zeegt	4	4.5 million tons	A
	Gold			
5	Nergui	5	50 kg	D
6	Khoshuut	6	75 kg	D
7	Khur uul	7	25 kg	D
8	Khar uul	8	80 kg	D
9	Shar Khooloi	30	70 kg	
	Asbestos			
10	Alag uul	9	100,000 tons	D
11	Taishir	10	115,000 tons	D
	Magnesite			
12	Bideriin gol	11	5.0 million tons	E
	Khuler			
13	Bayan gol			
	Salt			
14	Tsookhor	13	470,900 tons	A
15	Bor nuur	14	437,700 tons	A
16	Biger	15	62,900 tons	A
	Limestone			
17	Tsagaan olom	16	2,885,600 m^3	A
	Chalk			
18	Chandmani	17	658,300 m^3	A
	Pyroxenite			
19	Khadaasan	18	173,600 m^3	
	Almandine			
20	Altan khudag (primary)	19	30 tons	
21	Altan khudag (placer)	20	880.9 kg	
	Clay			
22	Tsagaan olom	21	1,744,000 m^3	D
23	Taishir	22	2,114,000 m^3	D
24	Sukhiin khooloi	23	8,738,000 m^3	D
25	Shavart	24	-	
26	Sharga	25	-	
27	Tsogt	26	-	
	Gravel			
28	Zavkhan gol	27	1,959000 m^3	A
29	Guulin	28	139,000 m^3	A
	Pigment Minerals			
30	Buu barnag	29	200,400 tons	

Source : The Project on Development of Gobi Altai Aimag
Note : Present status is classified as follows.
A : operating
B : existing, but production stopped.
C : existed before, but closed permanently
D : investigated and planned project
E : committed project with a specific time schedule and financial source secured

Table 2.10 Projected New Small and Medium Sized Industries

#	Name / Location	Altai City	Bayan Uul	Hohmort	Jargalan	Sharga	Taishir	Haliun	Tseel	Guulin	Delger	Tonhil	Darvi	Togrog	Bugat	Altai	Biger	Chandmani	Tsogt	Erdene
1	Food factory	+	+									+		+		+	+			
2	Bakery			+	+	+	+	+	+	+	+		+		+			+	+	+
3	Lemonade factory			+	+			+											+	
4	Flour factory	+								+	+		+	+					+	
5	Fruit-processing shop							+					+			+	+			
6	Milk products' factory	+	+				+									+	+		+	
7	Milk powder factory	+														+	+			
8	Canned vegetable fact.				+															
9	Seasoning's factory	+				+														+
10	Camel milk factory													+		+				
11	Winery																+			
12	Feather grass flour fact.			+																
13	Meat storage and	+	+									+		+			+			
	sausage ham shop																			
14	Iodine salt factory	+															+		+	
15	Skin-processing factory		+									+						+		
16	Sewing factory	+	+									+		+		+	+			
17	Boot-making factory	+		+																
18	Felt and felt-boot fact.	+	+									+					+			
19	Knitted-goods factory	+	+						+			+					+			
20	Knitted-goods shop			+		+	+								+					
21	Hand-made carpet fact.				+				+					+				+		+
22	Soap factory	+	+		+			+	+		+	+	+	+	+	+	+	+	+	+
23	Ger woodwork factory	+	+																	
24	Fish-powder fodder fact.															+			+	
25	Candle factory		+			+						+		+			+			
26	Chalk factory																	+		
27	Decorative stone processing factory								+											
28	Mineral color shop							+											+	
29	Magnesite factory	+																		
30	Leather wear factory	+																		
31	Brick factory						+												+	

Table 2.11 Water Demand for Industrial and Domestic Uses for Altai City Projected by Altai City Water Supply Department for Year 2015

(Unit : cubic meter per day)

Water Consumer	Peak time in the past or around 1990	1996	2015
1. Brick factory	6.5	0.0	80.0
2. Wall Material factory	228.4	0.0	303.3
3. Construction materials factory	162.4	0.0	25.0
4. Power station	6.5	15.0	158.4
5. Wool washing factory	2.5	0.0	1,400.0
6. Entum Company	2.5	5.0	400.0
7. Cashmere Tops Factory	6.5	0.0	400.0
8. Magnesite factory	0.0	0.0	1,000.0
9. Brick fuel factory	2.5	0.0	6.0
10. TS-6 and Gal Co.,Ltd.	3.6	2.4	16.0
11. Heat and power stations	228.4	0.0	2,544.0
12. Central steam house	10.2	0.0	456.0
13. Seal processing shops	1.6	0.0	200.0
14. Skin processing factory	6.4	0.0	100.0
15. Other organizations (1)	782.9	336.0	1,513.0
16. Drinking water supply	269.3	532.7	854.0
17. Tanked water to steam houses	301.2	102.0	149.0
Total	2,021.4	993.1	9,604.7

Source : Altai City Water Supply Department

Notes :

(1) Other organizations include currently under operation : the 160-bed hospital, epidemic center, Aimag governor's office, schools, training facilities and hotels, child care centers, bathhouses, stations, Tulga Foodstuff company, Agriculture Stock Exchange, Folk Ensemble etc. There are about 100 organizations.

(2) Projections for water consumption of population are based on forecasts of population growth a the formal norms of water consumption. Present consumption rates are considered significantl

(3) The projections assume that new or rehabilitated industries will work at full capacity. Previous these industries used small amount of water, because they had not utilized all their capacities.

Table 2.12 Assumptions for the Projection of Altai City's Population

(a) $(\text{Population by natural change})_n = (\text{Population})_{n-1} + (\text{Natural increment of population})_n$

(b) Total birth = Population by natural change (a)/1,000 * crude birth rate

Crude birth rate (per 1,000 population) :

1995-2000 :	15.9 (average of 1996 (18.1) and 1997 (13.7))
2001-2015 :	15.0 (assumed)

(c) Infant Mortality = Number of birth * infant mortality rate

Infant mortality rates are assumed as follows.

52.73 per 1,000 live births for 1996-2000
45.00 per 1,000 live births for 2001-2005
40.00 per 1,000 live births for 2006-2010
35.00 per 1,000 live births for 2011-2015

(d) Total death = Population by natural change * crude death rate

Crude death rate (per 1,000 population) :

1995-2000 :	6.3 (average of 1996 (5.9) and 1997 (6.6))
2001-2015 :	6.0 (assumed)

(e) $(\text{Natural increment of population})_n = (\text{total birth})_{n-1} - (\text{infant mortality})_{n-1} - (\text{total death})_{n-1}$

(f) Labor force in 1997 is estimated as follows.

Labor resource :	9,300
Unemployment :	2,410
Labor force :	6,890

Labor force requirement since 1997 is assumed to growth at the same rats as the economic growth rates as follows.

3.0% per year for 1996 - 2005 period
4.0% per year for 2005 - 2015 period

(g) $(\text{Additional labor force requirement})_n = (\text{Labor force})_n - (\text{Labor force})_{n-1}$

(h) Data were obtained regarding the population by age strata in 1995. These data are adjusted to 1997 applying the same proportions for each age stratum. The number of population to become 16 years of age in each year are all counted as entering into the labor market. The proportion that continues on to upper level school is assumed to be cancelled out by those entering into the labor market from the upper level schools.
It is assumed that all those surviving the infant age (up to 12 months of age) reach 16 years of age.

(i) (Balance in labor force) = labor force added by Altai population(h) - labor force requirement(g)

(j) For the labor force unable to find a job in Altai City, the ratio of out-migration from Altai City and the unemployed labor force staying in Altai City are assumed as follows. Negative values indicate in-migration of labor force into Altai city.

Out-migration :	50%
Unemployment	50%

(k) Total population to migrate out of or into Altai City is estimated by the following formula.

Migrating population = migrating labor force * dependency ratio

Dependency ratio is derived as total population divided by working labor force as follows.

Population 199	17,761
Labor force 199	6,890
Dependency rati	2.6

(l) Total population = Population by natural change (a) - Out-migrating population (k)

Table 2.13 Population Projected for Altai City

Year	Population change by natural factor					Population change by social factor						Total Population (rounded)
	Population by natural change (a)	Total birth (b)	Infant mortality (c)	Total death (d)	Natural increment of population (e)	Number of labor force required to achieve economic growth (f)	Additional labor force requirement (g)	Labor force to be added by Altai population (h)	Balance in labor force (i)	Labor force out-migrating from Altai City (j)	Population out-migrating from Altai City (k)	(l)
1997	17,761	282	15	112	-	6,890	-	-	-	-	-	17,760
1998	17,916	285	15	113	155	7,097	207	426	219	110	285	17,630
1999	18,073	287	15	114	157	7,310	213	426	213	107	277	17,800
2000	18,231	290	15	115	158	7,529	219	426	207	103	269	17,960
2001	18,391	276	12	110	160	7,755	226	426	200	100	260	18,130
2002	18,545	278	13	111	154	7,987	233	426	194	97	252	18,290
2003	18,699	280	13	112	154	8,227	240	426	187	93	242	18,460
2004	18,854	283	13	113	155	8,474	247	426	179	90	233	18,620
2005	19,011	285	13	114	157	8,728	254	426	172	86	224	18,790
2006	19,169	288	12	115	158	9,077	349	585	236	118	307	18,860
2007	19,330	290	12	116	161	9,440	363	706	343	172	446	18,880
2008	19,492	292	12	117	162	9,818	378	550	172	86	224	19,270
2009	19,655	295	12	118	163	10,211	393	661	268	134	349	19,310
2010	19,820	297	12	119	165	10,619	408	379	-30	-15	-39	19,860
2011	19,986	300	11	120	166	11,044	425	256	-169	-84	-220	20,210
2012	20,155	302	11	121	169	11,486	442	387	-55	-27	-71	20,230
2013	20,325	305	11	122	170	11,945	459	253	-206	-103	-268	20,590
2014	20,497	307	11	123	172	12,423	478	267	-211	-105	-274	20,770
2015	20,670	310	11	124	173	12,920	497	270	-227	-113	-295	20,960

Table 2.14 Projected Population of Altai City by District and Dwelling Pattern

Item	Household		Population		
	Number	(%)	1997	2005	2015
District I					
Ger	680	21.6	3,709	3,924	4,377
Apartment	204	6.5	1,357	1,435	1,601
District II					
Ger	631	20.0	3,442	3,642	4,063
Apartment	0	0.0	0	0	0
District III					
Ger	809	25.7	4,413	4,669	5,208
Apartment	0	0.0	0	0	0
District IV					
Ger	541	17.2	2,951	3,122	3,483
Apartment	284	9.0	1,888	1,998	2,229
Total					
Ger	2,661	84.5	14,516	15,357	17,131
Apartment	488	15.5	3,245	3,433	3,830
Total	3,149	100.0	17,761	18,790	20,961

(1) Population in 1997 by district and dwelling pattern is estimated based on the total population in 1997 and distribution proportions of households in 1997.
(2) Population in ger area includes those living in private houses built in ger areas.
(3) It is assumed that distribution of population among districts and area remains constant in the future.
(4) Figuires may no add up to total due to rounding.

(Number of Household Members in 1997)

	Population	Household	Household member
Ger	14,516	2,661	5.5
Apartment	3,245	488	6.6
Total	17,761	3,149	5.6

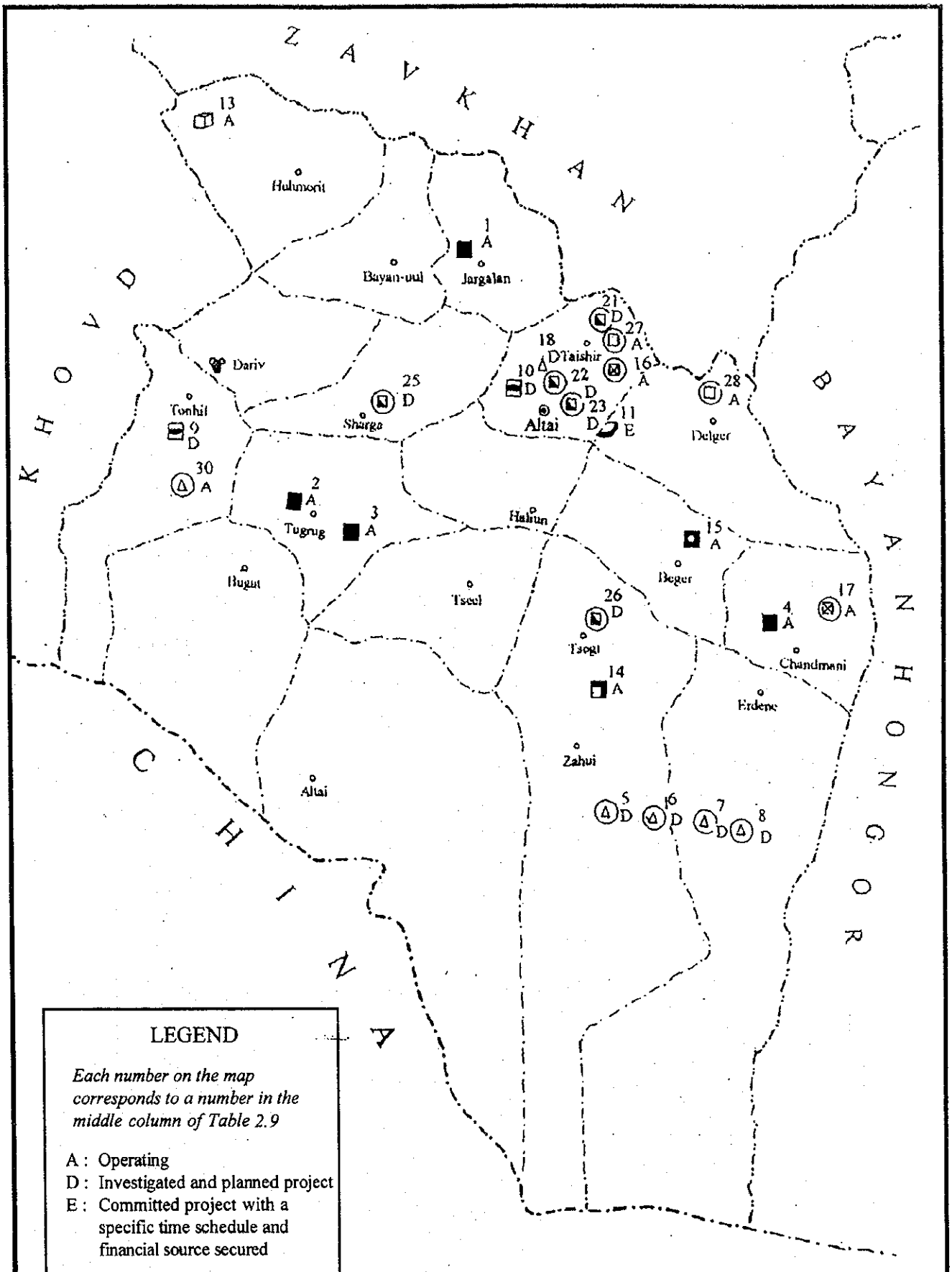


Figure 2.1 Location of Existing and Planned Mining Project

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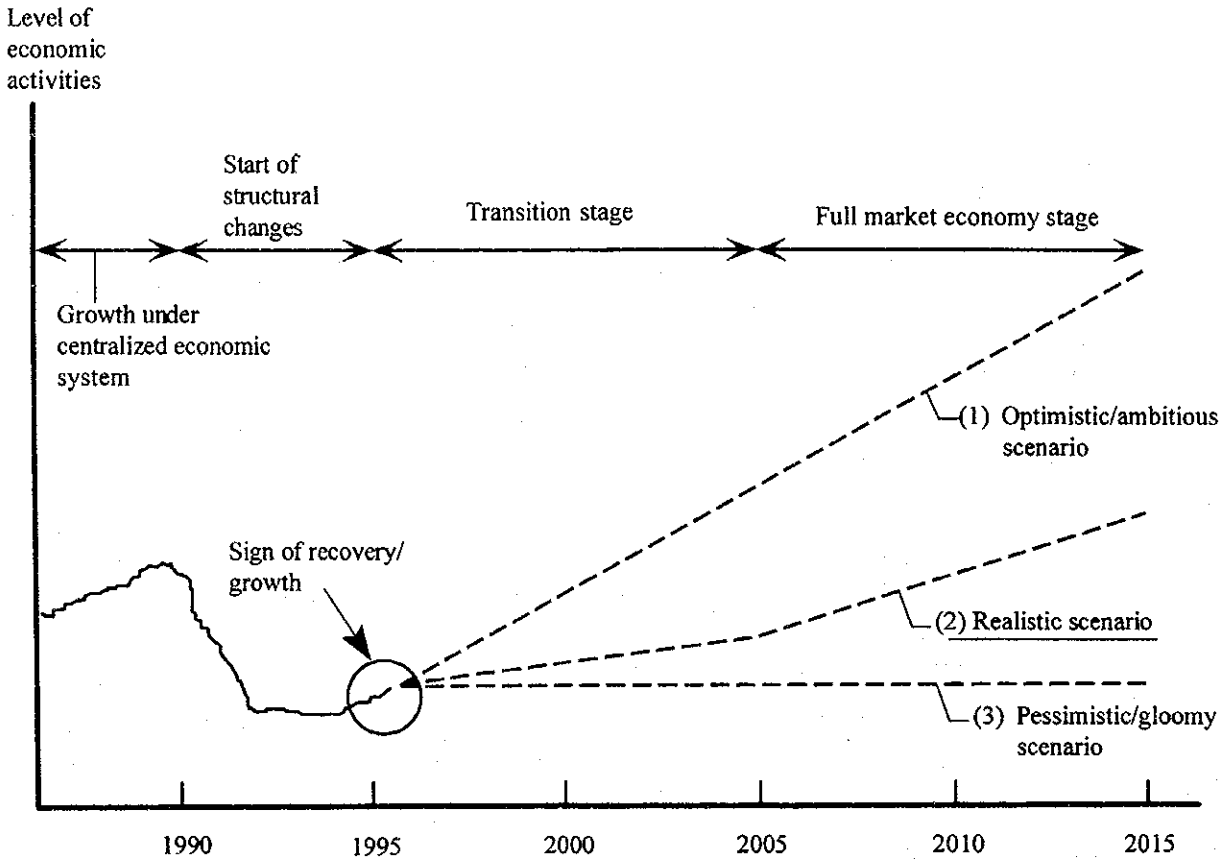

(1) Optimistic/ambitious scenario:

Water demand projection by Altai City Public Service Department (18.2% / year for industry and 12.5% / year for total)

(2) Realistic Scenario

Economic Growth (%/year)	1995-2005	2005-2015
Economy	3.0	4.0
Industry	4.0	5.0
Population (000)	18.8 (2005)	21.0 (2015)

(3) Pessimistic/gloomy scenario :

stagnation or deterioration of economy

Figure 2.2 Growth Targets of Altai City