The Republic of Kazakhstan

Data Collection Survey For The Disaster Prevention Sector In The Republic Of Kazakhstan

Final Report

MARCH 2014

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NIPPON KOEI CO., LTD.

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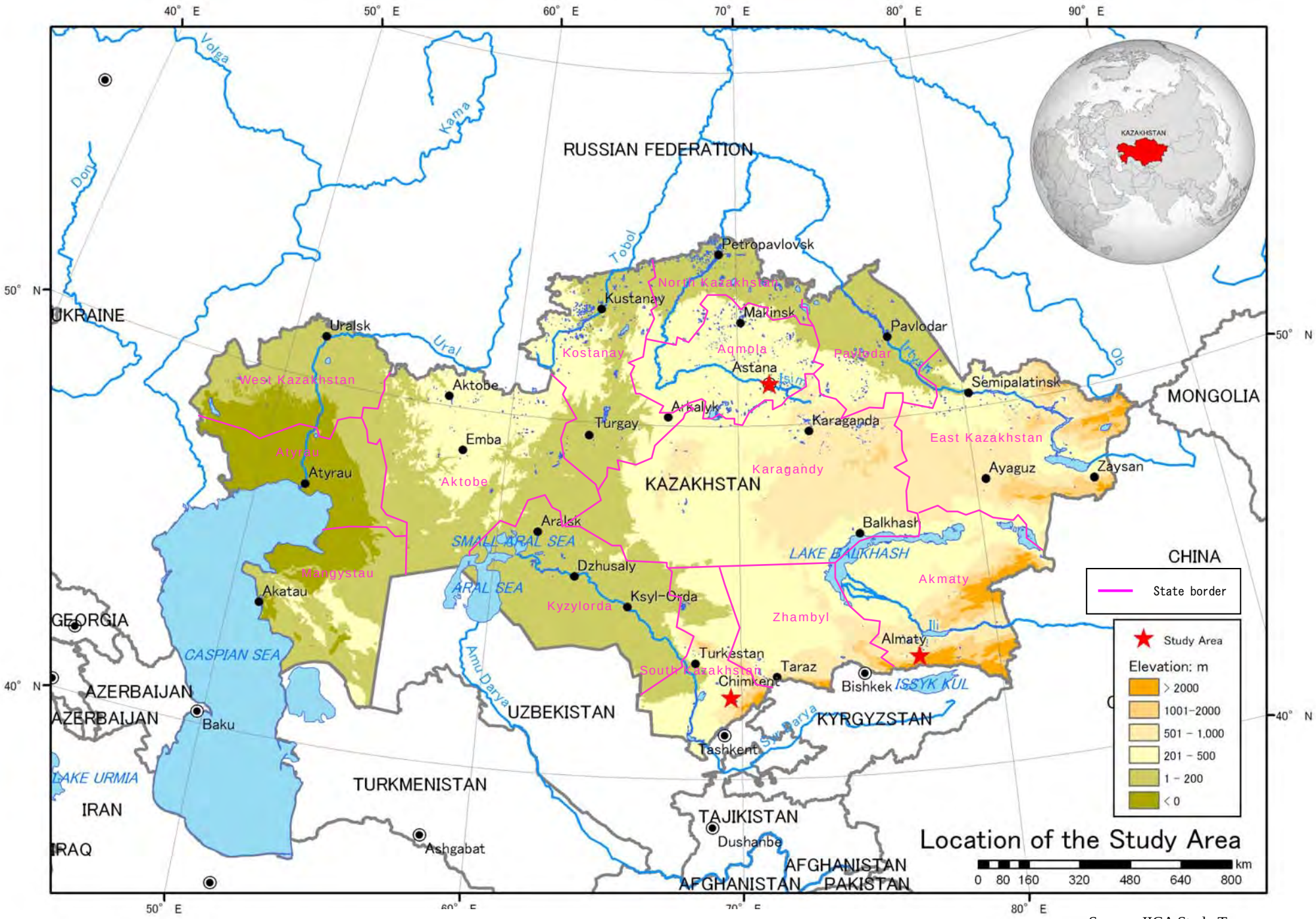
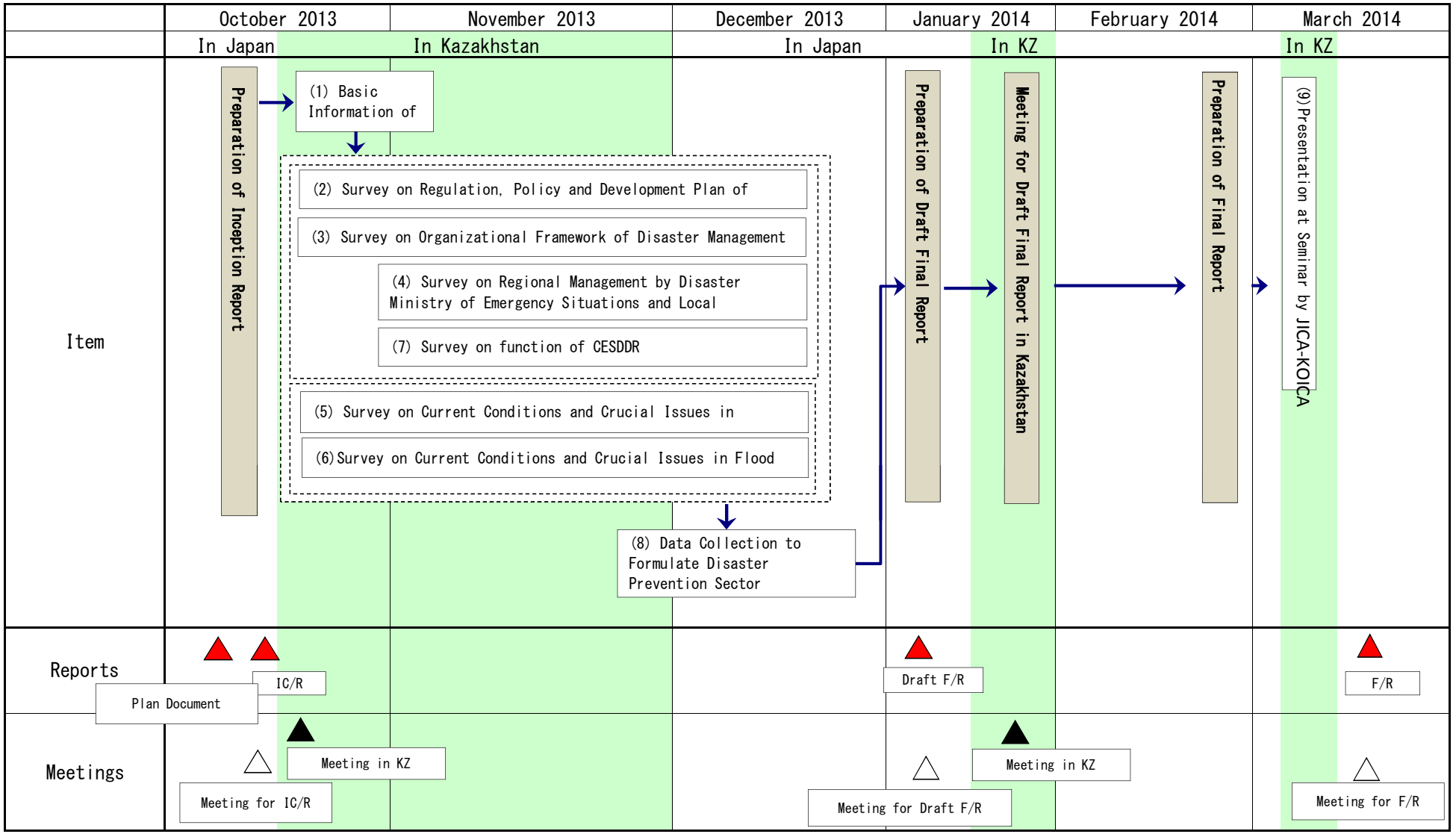


Study Area

Source: JICA Study Team



Source:JICA Study Team

Flow of the Study

Abbreviations　略語表　Список сокращений

A	ADB	Asian Development Bank	アジア開発銀行	Азиатский банк развития
	ADRC	Asian Disaster Reduction Center	アジア防災センター	Азиатский центр снижения риска стихийных бедствий
	ARC	American Red Cross	アメリカ赤十字	Американский Красный Крест
C	C/P	Counterpart Personnel	カウンターパート	Сотрудники организации-партнера
	CESDRR	Center for Emergency Situation and Disaster Risk Reduction	非常事態対応・災害リスク軽減センター	Центрально-Азиатский центр по реагированию на чрезвычайные ситуации и снижению риска бедствий (ЦАЦРЧС)
	CIS	Commonwealth of Independent States	独立国家共同体	Содружество Независимых Государств
	CTBT	Comprehensive Nuclear Test Ban Treaty	包括的核実験禁止条約	Договор о всеобъемлющем запрещении ядерных испытаний
B	BCP	Business Continuity Planning	事業継続計画	План обеспечения непрерывности деятельности
D	Department of DM	Department of Mobilization Preparation, Civil Defense, and Disaster Response of Almaty City	アルマティ市 動員準備、民間防衛、非常事態・災害対応局	Управление по мобилизационной подготовке, гражданской обороне, организации предупреждения и ликвидации аварий и стихийных бедствий города Алматы (Управление МПГОиЧС)
	DF/R	Draft Final Report	ドラフトファイナルレポート	Проект заключительного отчета
	DIPECHO	Disaster Preparedness ECHO	–	Программа по подготовленности к бедствиям департамента Европейской Комиссии по оказанию гуманитарной помощи
	DIG	Disaster Imagination Game	図上演習	Упражнение по моделированию бедствия
	DM Center	Center for Mobilization Preparation, and Disaster Response of Almaty City	アルマティ市 動員準備、非常事態・災害対応センター	Центр по мобилизационной подготовке, организации предупреждения и ликвидации аварий и стихийных бедствий города Алматы (Центр МПЧС)
	DOES	Department of Emergency Situations for Almaty City under the Ministry of Emergency Situations	(カザフスタン共和国 非常事態省 アルマティ市)非常事態局	Департамент по чрезвычайным ситуациям горда Алматы МЧС РК
	DRR	Disaster Risk Reduction	(自然)災害リスク軽減(活動)	(Мероприятия, направленные на) Снижение риска (стихийных) бедствий
E	EM-DAT	Emergency Events Database	災害データベース	Банк данных по чрезвычайным ситуациям
F	F/R	Final Report	ファイナルレポート	Заключительный отчет
	F/S	Feasibility Study	フィージビリティースタディー	Технико-экономическое обоснование
G	GASK	State Architecture and Construction Control	国家建築・建設委員会	Управление государственного архитектурно-строительного контроля (ГАСК)
	GDP	Gross Domestic Products	国内総生産	Валовый внутренний продукт (ВВП)
	GESI	Global Earthquake Safety Initiative	耐震性強化イニシアティブ	Глобальная инициатива сейсмической безопасности
	GIS	Geographic Information System	地理情報システム	Географическая информационная система
	GLOFs	Glacier Lake Outburst Floods	氷河湖の決壊による大規模洪水・土石流	Масштабные паводки и селевые потоки в результате прорыва ледниковых озер
	GOST	National standards	国家基準	Гостударственный стандарт (ГОСТ)
	GPS	Global Positioning System	全地球測位システム	Глобальная система позиционирования
	GSHAP	Global Seismic Hazard Assessment Program	世界地震ハザード評価プログラム	Программа оценки глобальной сейсмической опасности
H	HFA	Hyogo Framework for Action	兵庫行動枠組	Хиогская рамочная программа действий
I	IC/R	Inception Report	インセプションレポート	Начальный отчет

	ICHARM	International Center for Water Hazards and Risk Management Center	水災害・リスクマネージメント国際センター	Международный центр управления водными опасностями и рисками
	IFRC	International Federation of Red Cross and Red Crescent Societies	国際赤十字赤新月社連盟	Международная Федерация обществ Красного Креста и Красного Полумесяца (МФОКК и КП)
	IGS	Institute of Geological Science	地質学研究所	Институт геологических наук
	IRIN	Integrated Regional Information Networks	統合地域情報ネットワーク	Интегрированная региональная информационная сеть
J	JICA	Japan International Cooperation Agency	(独)国際協力機構	Японское агентство международного сотрудничества
	JICE	Japan International Cooperation Center	日本国際協力センター	Японский центр международного сотрудничества
	JIS	Japanese Industrial Standard	日本工業規格	Японский промышленный стандарт
	JSC	Joint Stock Company	株式会社	Акционерное общество
K	Kazcosmos	National Space Agency of the Republic of Kazakhstan	カザフスタン宇宙科学センター	Национальное космическое агентство Республики Казахстан (Казкосмос)
	KAZGIIZ	Geotechnical and Seismic Research for Construction	建設のための地質工学・地震研究会社	ТОО «Казахский геотехнический институт изысканий (КазГИИЗ)»
	KazHydromet	National Hydrometeorological Service of the Republic of Kazakhstan	–	РГП «Казгидромет»
	KazNIISSA	Kazakh State Research and Experimental Design Institute on Earthquake Engineering and Architecture	耐震工学研究所	Казахский научно-исследовательский и проектно-экспериментальный институт сейсмостойкого строительства и архитектуры (КазНИИССА)
	Kazselezashita	Ministry for Emergency Situations of the Republic of Kazakhstan Debris-Flow Protection Service (GV)	土石流防止サービス	ГУ «Казселезащита» МЧС РК
	Kazvodhoz	–	水資源委員会傘下の水管理会社	РГП «Казводхоз» при Комитете по водным ресурсам
	KNDC	Kazakhstan National Data Center	カザフスタンナショナルデータセンター	Казахстанский национальный центр данных
	KSK	Condominium Associations	集合住宅管理組合	Кооператив собственников квартир
L	LLP	Limited liability partnership	有限(責任)団体・組合	Товарищество с ограниченной ответственностью
M	M	Magnitude	マグニチュード	магнитуда
	MES	Ministry of Emergency Situations of the Republic of Kazakhstan	(カザフスタン共和国)非常事態省	Министерство по чрезвычайным ситуациям Республики Казахстан
	M/M	Man-Month	人/月	Человеко-месяц
	M/M	Minutes of Meeting	協議議事録	Протокол совещаний
	MSK	Medvedev-Sponheuer-Kárník	メドヴェーデフ・シュポンホイアー・カルニク(震度階級)	Шкала интенсивности землетрясений С.В. Медведева, В.Шпонхойера и В. Карника
	Mw	Moment Magnitude	モーメントマグニチュード	Моментная магнитуда
N	N/A	Not Available	データなし	Нет данных
	NGA	Non Government Association	非営利団体	Неправительственная ассоциация
	NGO	Non-Governmental Organization	非政府団体	Неправительственная организация
	NIS	New Independent States	旧ソ連	Новые независимые государства
	NNC	National Nuclear Centre	核物理研究所	Национальный ядерный центр
	NOAA	National Oceanic and Atmospheric Administration	米国海洋大気庁	Национальное управление океанографических и атмосферных

				исследований
	NPO	Nonprofit organization	非営利団体	Некоммерческая организация
O	ODA	Official Development Aid	政府開発援助	Официальная помощь в целях развития
P	P/R	Progress Report	プログレスレポート	Отчет о ходе работ
	PCM	Project Cycle Management	プロジェクトサイクルマネージメント	Цикл управления проектом
	PDM	Project Design Matrix	プロジェクトデザインマトリックス	Матрица схемы проекта
	PDMe	Project Design Matrix for Evaluation	評価用 PDM	Оценочная матрица схемы проекта
	PGA	peak ground acceleration	地動最大加速度	Пиковое ускорение поверхности грунта
	Previous Department of DM	Previous Department for Mobilization Preparation, Civil Defense, and Disaster Response of Almaty City	旧アルマティ市防災局	Департамент по мобилизационной подготовке, гражданской обороне, организации предупреждения и ликвидации аварий и стихийных бедствий города Алматы (старое название)
	PROGNOZ	Ministry for Emergency Kazakhstan State Enterprise “Kazselezashita” Scientific and Production Center	地震予知センター	Научно-производственный комплекс «Прогноз», филиал ГУ «Казселезащита» МЧС РК
R	RCSK	Red Crescent Society of Kazakhstan	カザフスタン赤新月社	Общество Красного Полумесяца Республики Казахстан
	RK	The Republic of Kazakhstan	カザフスタン共和国	Республика Казхастан (РК)
S	SMS	Short Message Service	ショートメッセージサービス	Служба коротких сообщений (СМС)
	SN	Construction Norm	建築基準	Строительные нормы
	SNiP	Construction Norm and Regulation	建築基準及び規則	Строительные нормы и правила (СНиП)
	SOME	Seismic Observation System	地震観測システム	Система сейсмического мониторинга
U	UN	United Nations	国際連合	Организация Объединенных Наций
	UNCRD	United Nations Centre for Regional Development	国際地域開発センター	Центр ООН по региональному развитию
	UNDP	United Nations Development Program	国連開発計画	Программа развития ООН
	UNIFEM	United Nations Development Fund for Women	国連女性開発基金	Фонд ООН для развития в интересах женщин
	UNISDR	United Nations Office for Disaster Risk Reduction	国連国際防災戦略	Международная стратегия ООН по уменьшению опасности стихийных бедствий
	UNOCHA	United Nations Office for Coordination of Humanitarian Affairs	国連人道問題調整部	Управление ООН по координации гуманитарных вопросов (УКГВ ООН)
	USAID	United States Agency for International Development	米国国際開発庁	Агентство США по международному развитию
	USSR	Union of Soviet Socialist Republics	ソビエト連邦	Союз Советских Социалистических Республик
	US$	United States Dollar	米国ドル	Доллар США
V	VP/VT	Reinforced concrete, type VP/VT	鉄筋コンクリート造、VP/VT ﾀｲﾌﾟ	Железобетон, тип ВП/ВТ
	Vs	Secondary Wave Velocity	横波（S 波）速度	Скорость поперечной волны
Y	Yugvodkhoz		水資源委員会傘下の水管理会社	РГП «Югводхоз» при Комитете по водным ресурсам
W	WB	World Bank	世界銀行	Всемирный банк (ВБ)
	WHO	World Health Organization	世界保健機関	Всемирная организация здравоохранения (ВОЗ)
	WMO	World Meteorological Organization	世界気象機関	Всемирная метеорологическая организация (ВМО)

Kick off Meeting with the Ministry of Emergency Situations of the Republic of Kazakhstan
(October 21, 2013, Astana)

Source: JICA study team

Kick off Meeting with the organizations concerned at Almaty
(October 29, 2013, Almaty)

Source: JICA study team

Interview with the Ministry of Emergency Situations of the Kyrgyz Republic
(November 11, 2013, Bishkek)

Source: JICA study team

Interview with the vice mayor of Almaty city
(November 15, 2013, Almaty)

Source: JICA study team

Interview with the Shimkent Regional Office of the Ministry of Emergency Situations of the Republic of Kazakhstan
(November 18, 2013, Shimkent)

Source: JICA study team

Interview with the South Kazakhstan Regional Office of Kazselezashita
(November 20, 2013, Shimknet)

Source: JICA study team

Many houses made of mud wall in the suburbs of Simkent are vulnerable to earthquakes or floods.
(November 18, 2013, Shimkent)

Source: JICA study team

Panel of Koksarai Reservoir Dam in South Kazakhstan
(November 20, 2013, Shimkent)

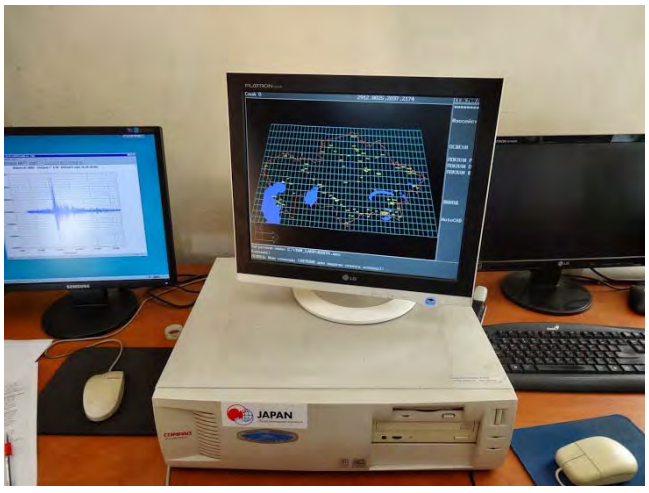
Source: JICA study team

Expansion of habitation to hilly area in Almaty
(November 16, 2013, Almaty)

Source: JICA study team

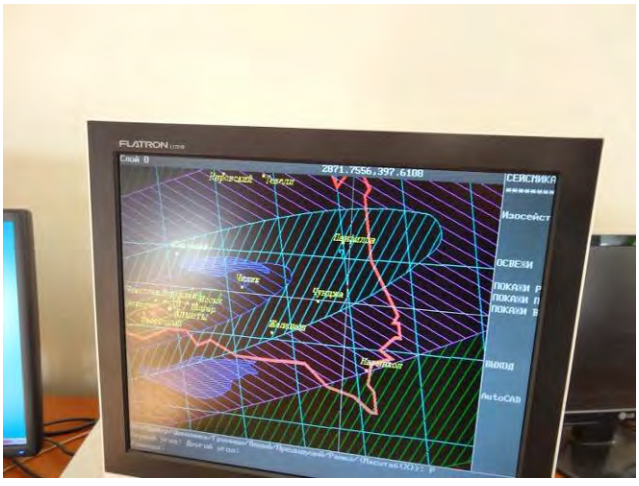
The project of Korkem Tau Residential Complex using Japanese aseismic technology
(November 2, 2013, Almaty)

Source: JICA study team



Monitoring network of earthquake by Institute of Seismology
(October 30, 2013, Almaty)

Source: JICA study team



Calculation of earthquake intensity by Institute of Seismology
(October 30, 2013, Almaty)

Source: JICA study team

SUMMARY

1. Outline of the Survey

1.1 As one of five countries among the Central Asia, the Government of Kazakhstan has taken the prevention of financial loss of the nation due to disasters as one of the key objectives in the national long-term development strategy called "Kazakhstan 2050". On the other hand, Japan put up a policy to set environmental conservation and climate change mitigation countermeasures as one of the priority assistance areas, and to carry out cooperation in areas such as dissemination of knowledge and technology related to disaster prevention in Japan as an earthquake-prone country (Country Assistance Policy to the Republic of Kazakhstan, Ministry of Foreign Affairs, May 2012). In accordance with this policy, Japan has conducted technical cooperation projects and development studies through the Japan International Cooperation Agency (JICA) regarding earthquake monitoring and earthquake disaster prevention. Although development studies, such as the Study on Earthquake Disaster Risk Management for Almaty City in the Republic of Kazakhstan, which was carried out in 2007-2009, have conducted the preparation of a disaster preparedness plan, efforts to reduce damage is still needed.

1.2 The request by the Government of Kazakhstan for cooperation in the field of disaster prevention is strong, and the cooperation program list on disaster prevention has been submitted to the Japanese side in October 2012. However, cooperation needs and the overall situation of the disaster prevention sector have not been well organized, and the formation of possible cooperation projects has yet to be realized. In order to implement a more effective support in the area of disaster prevention for Kazakhstan in the future, cooperation needs in related organizations should be grasped and this survey work should then be conducted. The target sectors are earthquake, in which necessity of cooperation is recognized based on the policy on disaster prevention, disaster management organization, and damage conditions; and flood and sediment disasters, in which frequency and actual damage are high.

1.3 The objectives are set to collect information on the current status, issues, and cooperation needs on earthquakes and flood and sediment disasters, and to examine the direction of cooperation in the disaster prevention sector in Kazakhstan.

1.4 The entire Kazakhstan is the target area of the survey. For the target areas of the field survey, Astana, Almaty, and Shymkent cities were selected taking into account the status of past disasters and existence of concerned agencies for disaster prevention.

1.5 In the present study, the Ministry of Emergency Situations (MES) under the central government, the Almaty Regional Office of MES, the province of South Kazakhstan, local governments of Almaty and Shymkent cities, and CESDRR were surveyed. A total of 36 agencies/offices have been interviewed.

1.6 The composition of the Survey Team is three members (Team Leader/Disaster Administration, Earthquake Disaster and Flood and Sediment Disaster) from Nippon Koei Co., Ltd. and the schedule is as follows:

- ✧ 1st Field Works : October 18 - November 27, 2013 (41 days)
- ✧ 2nd Field Works : January 24 - February 1, 2014 (9 days)
- ✧ 3rd Field Works : March 10 - 14, 2014 (6 days)

2. Country Information on Kazakhstan

2.1 Kazakhstan is located in the center of the Eurasian continent, and has a territory of approximately 2.72 million km^2,which is about seven times that of Japan and the ninth largest territory in the world. The northern, central, western, and southwestern parts of the country are composed of flat lands, such as steppe or desert. The northern, central, and western regions are spreading. In addition, the southeastern border is separated by the Altai Mountains, and the eastern border by the Tianshan Mountains. The territory of Kazakhstan includes about 48,000 lakes, such as the Caspian Sea, the Aral Sea, Lake Balkhash and Lake Zaysan, and about 8,500 rivers, such as the Irtysh River.

2.2 Kazakhstan has a continental climate, i.e. there is a big difference between daily and annual temperatures. The average temperature in January is -5 °C in the south and -20 °C in the north; reversely, the average temperature in July reaches 30 °C. The annual rainfall is very small, i.e., 300-400 mm in the mountainside, and 250 mm in the steppe region. Severe weather conditions affect social and industrial development from agriculture.

2.3 The total population of the country is 16,793,000 as of July 1, 2012 (according to the National Statistical Office).The population of Astana City, the capital of Kazakhstan, is 758,000, and that of Almaty City is 1,453,000. The country is a multiethnic nation. There are about 120 ethnic groups according to statistics. The most common race is Kazakh, which is composed of 64.6% of the total population (2011).

2.4 The basic national system is a republic headed by the president. The president is chosen by direct election by the people, and the term of the president is five years. In addition, third-term election prohibition was exempted by the first president, H.E. Nursultan Nazarbayev, by the constitutional amendment in 2007. The Parliament is bicameral composed of the upper house (Senate) and the lower house (Majlis). The capital is Astana, to which it was transferred from Almary in 1996.

2.5 Kazakhstan is surrounded by major countries, such as Russia and China, and therefore the country aims to foster “multidirectional foreign relationships” in order to maintain independency without being incorporated into the powers of such adjacent countries. For

Kazakhstan, Russia is its major partner in areas of politics, economy, military, and culture with historical ties from the Russian Empire era. Moreover, the country is strengthening its relationship with China on main economic sectors, such as construction of oil pipelines.

2.6 Kazakhstan has plenty of energy resources, such as oil and coal, and iron and non-ferrous metal resources, such as rare metals. Such resources are supporting the national economy, with 30% of gross domestic product (GDP) and 60% of exports are brought about by the oil and natural gas industry). The Government of Kazakhstan has made an effort to prepare economic reforms in order to have a transition from a planned economy to a market economy; promote commercialization such as privatization of state-owned enterprises, development of small- and medium-sized enterprises, and establishment of a securities trading market, banks, and pension reform; and prepare circumstances for foreign investment since its independence.

2.7 From 2000 to 2006, real annual GDP growth rate was maintained at around 10%. Credit crunch of financial institutions had started since the second half of 2007, and GDP growth in 2008 and 2009 has significantly fallen as a result of the global financial crisis brought about by the bankruptcy of the Lehman Brothers. However, the GDP has showed a recovering trend, 7.0% in 2010 and 7.5% in 2011, as a result of government measures such as economic stimulus package, currency devaluation, and disposal of nonperforming assets. The GDP growth rate in 2012 was 5%.

3 Japan's Aid Policy for Kazakhstan

3.1 In July 1997, then Japanese Prime Minister Ryutaro Hashimoto proposed "Eurasia Diplomacy" which called for a proactive foreign policy to establish Central Asia and the Caucasus region as a "Silk Road region". Since then, Japan has been pushing for "Silk Road diplomacy", which focuses on the three pillars of political dialogues to enhance regional trust and mutual understanding, economic cooperation and resources development cooperation supporting regional prosperity, and cooperation for peace through nuclear non-proliferation, democratization, and stability. In August 2004, Yoriko Kawaguchi, the then Foreign Affairs Minister of Japan, launched a "Central Asia plus Japan" dialogue-raising diplomacy to a new level for exploring a new dimension while maintaining the conventional "Silk Road diplomacy". These foreign ministerial level consultation meetings have been held for four times up to now. In 2014, the fifth consultation meeting is scheduled to be held in Bishkek, Kyrgyzstan.

3.2 Being the nation with the largest area and the second largest population among the five Central Asian countries, Kazakhstan has significant power and the momentum of its phenomenal economic growth appears to outperform that of Russia. There have been moves to raise investments and to expand tourism in neighboring countries. In order to attract investors and workers from these countries, Kazakhstan is about to represent important components of its growth engines for its regional economy. Based on these circumstances and the fact that the

country has a large say, its stability and steady economic growth would greatly contribute to the development of the entire Central Asian region.

3.3 In the Assistance Program for Kazakhstan (May 2012), the main objectives set for the basic policy of assistance are to support nation-building with balanced social and economic development, and to support economic growth based on the market economy which is aimed by the long-term development strategy up to 2030 (Kazakhstan 2030). Basically, the program promotes regional cooperation, which is one of the five pillars adopted in the "Central Asia plus Japan" dialogue six years ago. The prioritized sectors (medium goal) are as follows: (1) development of economic infrastructure for the natural resources and energy sectors, and (2) environmental protection and climate change mitigation.

4. Current Conditions of Natural Disasters

4.1 Kazakhstan has an extensive territory with an area of 2,717,000 km^2 that is mainly characterized geographically by basin and continental lowland features. Most of the southern section of Kazakhstan is located in the north side of the Tien Sian Mountains. The Tien Sian is seismically known as one of the most active tectonic zones where the Eurasian continent and the Indian subcontinent collides with each other. The eastern section of Kazakhstan is located on the western edge of the Altay Mountains where an active tectonic zone exists. Figure 4.1 shows the seismic hazard potential in Kazakhstan.

4.2 Almaty City has often been affected by earthquakes in the past, and it has experienced relatively large earthquake motions of 7-9 MSK, as shown in Table 4.2 and Figure 4.2. There have been destructive earthquakes, i.e., the 1887 Vernenskoe Earthquake, 1889 Chilikskoe Earthquake, and 1911 Keminskoe Earthquake. Several tens and hundreds of people have been killed due to collapse of buildings during those three severe earthquake events.

4.3 Seismically active regions are distributed in and around Almaty City and in the provinces of South Kazakhstan, Zhambyl, Almaty, and East Kazakhstan, which are located in a zone along the Tien Sian Mountains and the Altay Mountains. The Tien Sian Mountains are a tectonic compressive zone with its principal stress axis along north-south direction. Under such tectonic condition, earthquakes are mainly caused by reverse faulting. The reverse faults are segmented by lateral-slip faults with a strike of NW-SE mainly also trigger earthquakes. As mentioned so far, most of the seismically active areas in Kazakhstan are located in the Tien Sian Mountains and the Altay regions. However, a destructive earthquake that occurred in West Kazakhstan Province in April 2008 affected 123 houses. It suggests that unknown active fault systems exist in Kazakhstan that are not part of the "Tien Sian-Altay" seismic zone.

4.4 Earthquake damages in densely populated areas are mainly building collapse and human casualty resulting from the former. In contrast, earthquakes in sparsely populated areas cause sediment disasters such as slope failures, landslides, rockfalls, and fissures in the ground that

affect houses on downward slopes. The sediments on the slopes often affect rural villages as debris flows resulting from heavy rains.

4.5 Kazakhstan's national seismological observatory network covers mainly Almaty City and its vicinities. Therefore, the network sparsely covers other regions of the country. Astana, the capital city of the country, is considered to be an inactive geological region but small earthquakes with magnitudes of 4 or less are sometimes observed. West Kazakhstan is also considered to be an inactive geological region as experienced in the 2008 Shalkarskoe Earthquake, which affected 123 houses as mentioned above. Therefore, it is necessary to thoroughly determine the geologically active zones in Kazakhstan in the future.

4.6 According to the flood hazard map of Kazakhstan by the World Health Organization (WHO) in 2010, the areas along the Syr Darya River and the Chu River in South Kazakhstan, Lake Zaysan, Lake Balkhash, and Lake Alakol have very high flood potential.

4.7 The main flood prone areas in Kazakhstan are, (i) along the mainstream of a large river, and, (ii) along the upstream of a tributary. In addition, the expanding urban area in the northwest area of Almaty City would be prone to flood in the future because the installation of drainage system is delayed. In the central area of Astana City, local flooding occurs frequently due to inadequacy of drainage.

4.8 The main causes of flood in Kazakhstan are, (i) rainfall and melting snow, (ii) insufficient capacity on management of reservoir and dam, and (iii) differences in water management among neighboring countries.

4.9 According to the landslide hazard map of Kazakhstan prepared by the WHO in 2010, the southeast and east areas of Kazakhstan are categorized as having "medium" or "high" landslide hazard. In Kazakhstan, there are several other types of sediment disasters such as landslide, debris flow, slope failure, and rockfall.

4.10 As previously mentioned, sediment disasters have wreaked enormous damages in the surrounding areas of Almaty City in the past. In addition, several sediment disasters have occurred in the mountainous areas of south and east Kazakhstan according to an interview by the JICA Study Team.

4.11 The main causes of sediment disasters in Kazakhstan are, (i) rainfall and snowmelt, (ii) earthquake, (iii) outburst of glacial lakes, (iv) arbitrary land development in hilly areas (e.g., the suburbs of Almaty City), and (v) aging equipment causing drainpipes to leak water.

4.12 Other natural disasters in Kazakhstan include snow avalanche, storm, cold wave, natural fire, and blown sand according to the data from EM-DAT and interviews. According to the information from Kazselezashita, in the administrative authority for sediment disaster, flooding, snow avalanche, and other natural disasters, several areas in the mountain region are damaged

by snow avalanches every year. In this report, snow avalanches are described alongside sediment disasters. According to the information from the Institute of Hydrogeology and Hydroecology, the problem of blown sand caused by desertification has been growing recently.

5. National Development Plan and Legislation

5.1 After Kazakhstan's independence in 1991, President Nazarbayev presented a long-term policy for the country called "Kazakhstan 2030: Enhancing prosperity, welfare, and security for all the citizens of Kazakhstan". In this program, the seven prioritized issues listed below were set based on the results of economic development and establishment of a sovereign nation that Kazakhstan has achieved in six years after its independence, and the experiences of newly industrialized economies and ASEAN countries which have achieved economic development in a relatively short period. By implementing the abovementioned prioritized issues, the program follows a long-term direction for the country.

5.2 On December 15, 2012, President Nazarbayev announced "Kazakhstan 2050", which is aimed for Kazakhstan to be one of the 30 most developed countries in the world by 2050 as a long-term goal. In this program, there are three major policies, as follows: (a) defining new markets and sources of economic growth for the purpose of establishing cooperative relationships with Kazakhstan, (b) creating favorable conditions for investment, and (c) developing effective public-private partnerships and private sectors. In order to achieve these goals, the importance of macroeconomic and fiscal policy, tax policy, and financial and debt policy was described. In order to realize these three policies, the president then introduced seven prioritized issues. Direct action targets on disaster management have not been described, but the country is promoting capacity building activities on disaster prevention in Central Asia, which is led by the Ministry of Emergency Situations (MES) with the support of donors.

5.3 In the National Development Plans of "Kazakhstan – 2030" and "Kazakhstan - 2050", any description directly connected with disaster prevention plan. Oh the other hand, the Department of Emergency and Situations (former organization of MES) prepared the Kazakhstan National Disaster Preparedness Plan with assiscetance of UNDP in 2000. This is considered as "National Comprehensive Disaster Plan" and now became a guideline for implementation of disaster mitigation measures undertaken by the central and local governments. The MES further prepared "The Concept of Prevention and Reduction of Natural and Man-made Disasters and Enhancement of National Management System in this Sector" based on the mid-term national development plan for 2007 – 2015.

5.4 In MES, the "Strategic Plan" and subsequent "action Plan" is prepared every three years in principle. Further many presidential decree has been issued and implemented till present.

6. Current Conditions and Crucial Issues of the Organizational Framework of Disaster Management Institutions

6.1 The central government consists of a total of 15 ministries under Prime Minister Serik Akhmetov. Furthermore, the local government consists of 14 provinces (Akmola, Aktobe, Almaty, Atyrau, East Kazakhstan, Zhambyl, West Kazakhstan, Karagandy, Kostanai, Kyzylorda, Mangystau, Pavlodar, North Kazakhstan, and South Kazakhstan) and two special municipalities (Astana and Almaty).

6.2 Ministry of Emergency Situations (MES) is the supreme agency under the central government that is responsible for disaster management and conducts countermeasures against large-scale emergency incidents and disasters. MES operates safety control of industries and technical management, conducts political coordination for disaster prevention, supervises state firefighting agencies, and acts as a coordinating agency for civil defense in Kazakhstan.

6.3 At present, the Center for Emergency Situations and Disaster Risk Reduction (CESDRR) is set up under the MES Central Office, which was established in accordance with an agreement with the Kyrgyz Republic by receiving assistance from the United Nations Development Programme (UNDP).

6.4 On the other hand, the regional offices of MES are established at 14 provinces and two special municipalities to handle disaster administration at the local level and to play crucial roles for each region. Furthermore, the Commission for Emergency Situations is set up at each province and representatives of concerned administrative agencies and utility companies for public services (e.g., water and gas) comprise the members of the commission.

6.5 Through analyses of the tasks allocated to the respective departments that were interviewed, the issues are summarized as follows:

Current Status and Issues of MES

Category	Subcategory	Current Situations	Issues
Policy & Plan	Policy	There are problems in coordination among governmental agencies upon occurrence of disaster. Demarcation of responsibilities and tasks of the agencies concerned with disaster management (except MES) is unclear. Countermeasures against large-scale disasters caused by natural phenomenon beyond expectation is delayed. Accumulation of technical know-how regarding structural measures (design and planning) is insufficient. No guideline is prepared yet for basic principles for disaster management against climate change risk.	Clarify coordination with other agencies in Disaster Preparedness Plan Verify effectiveness of coordination through joint drill Improve know-how of planning of countermeasures based on risk assessment Share the knowledge on risks due to climate changes and reflect it to the Disaster Preparedness Plan
	National Development Plan	The Strategic Plan is prepared based on the "Kazakhstan 2015" No description of disaster management and recovery plans are not included. Accumulation of know-how for hazard mapping and risk assessment is insufficient. Countermeasures for preparedness and technology development against earthquake disasters are delayed.	Keep consistency of policies and activities for disaster prevention considering disaster management cycle Clarify responsible agencies for disaster mitigation and recovery/ restoration in respective sectors Introduce technology for hazard map preparation and risk assessment
Organization & Institutions	Coordination	Under control of 2 institutes (National Research and Engineering Center for Industrial Safety and Kazelezashita) One of important tasks is coordination with upper agencies (the President, President's Office, Committee for National Security and Prime Minister's Office, etc.). MES is responsible to research, analyze, prepare countermeasures and report on emergency situations. MES conducts safety check of infrastructure (water resources management faculties, hydro power facilities, etc.) periodically in coordination with other agencies assuming large-scale disasters. Drills are conducted aiming at enhancement of coordination in related sectors. National level drills are conducted for risk management of flood and winter weather annually. Drills for earthquakes and accidents of oil/gas leakage in the Caspian Sea once two or three years.	Strengthen technology for planning and design (structural and non-structural measures) by attached agencies
	International Framework	Participation and coordination to international framework for disaster prevention (Shanghai Cooperation Organization ,etc.) is managed. Cooperation system of CESDRR still needs strengthened and activities are stagnated. Kazakhstan joins in international relief and rescue operations. MES conducts rescue training inviting foreign related agencies.	Earlier preparation of Action Plan and its implementation (Coordination with UNDP shall be accelerated).
Resources	Budget	It takes long time for securing approval on budget raising.	Simplify and keep transparency of the execution process of budget
	Rescue technology	Expertise knowledge and technology for rescue is insufficient for effective outcome. Introduction and utilization of more modern technology is required.	Strengthening of technology for rescue operation and education of experts
	Procurement of goods	Improvement of quality for rescue technology and related equipment is important. In general, procurement of goods for disaster management is handled by "Committee for State Material Reserves", Disaster Mitigation Department and Regional Offices. Release and delivery of goods is conducted speedy in accordance with MES department orders. However, it takes long time till completion of the administrative procedure to release state reserve since approval from the cabinet is required. Goods for disaster management in local government is reserved in accordance with ordinances of local government aside from MES.	Simplify and keep transparency of the execution process of release of reserved goods
Information & Telecommunication	Storage & dissemination of information	Information dissemination involves significant issues since the facilities are independent and not connected with network. A part of the "Kazakhstan National Atlas" (National Geographic Institute of Kazakhstan, 2010) is available in MES but not issued to public. Construction of infrastructure and strengthening of information system have not been progressed as priority countermeasures in flood/ sediment disaster sector. Data of disaster is not disclosed to public. At present, improvement works aiming to establish accessible system by local government. Infrastructure seems obsolete although rules for dissemination of disaster information from central to local and local to central governments are available.	Establish communication network of interagency (including related institutes and attached agencies) and introduce advanced technology and base-isolating technology (earthquake disaster prevention) Promote remote sensing technology by means of satellite Improve awareness on importance of sharing information (including related agencies) develop disaster database system and public system opened on internet
	Dedicated communication system	There is a risk in information dissemination of procurement of required goods upon earthquake occurrence. Although MES constructs and maintains information networks with not only internal MES but also external agencies (TV, radio and internet providers, etc.), it is insufficient.	Develop dissemination technology of disaster information (hardware and software) Modernize infrastructure of telecommunication (dedicated telecommunication lines in MES and securing redundancy, etc.)
Disaster Education and Training	Disaster education	Raising disaster awareness among citizens is necessary through disaster education. Disaster education is conducted by unit of offices and schools. Disaster prevention drill participated by all citizens is not conducted.	Develop curriculum for education of disaster prevention Increase specialists and staff with expertise Develop systematic program for participation by local people in disaster preparedness plan
	Training	Nationwide disaster drills are conducted twice ay year in spring and autumn (connecting MES Central Office and Regional Offices). MES operates rescue operation to save human lives and to find missing persons upon occurrence of disasters.	Develop systematic programs to train trainers
	Awareness on disaster prevention	There is no system to promote awareness raising program from legal, planning and organizational aspects. Roles and coordination system among mass media and between mass media and government agencies are not so clear in awareness raising.	Involve program for awareness enhancement in disaster preparedness plan Enforce regular meeting of MES and mass media and promote exchange of information for awareness raising
Evacuation System (status of activity in communities, etc.)	(Ref: Chapter 11)		
Emergency Response (early warning system and initial response, etc.)	(Ref: Chapter 11)		

Source: JICA Study Team

7. Transfer of Disaster Management Function from Local Government to Central Government

7.1 The regional offices of the Ministry of Emergency Situations (MES), which are located in 14 provinces and two special municipalities, handle disaster administration at the local level. The focal point is to transfer disaster management functions previously handled by local governments (provincial and city governments: *akimat*) to MES due to the modification of relevant laws. This was conducted in compliance with the ordinance "On Amendments and Additions to Some Legislative Acts of the Republic of Kazakhstan on the Divisions of Powers between the Government" dated June 13, 2013.

7.2 Through the institutional change mentioned above, the authority and functions of disaster administration at the local level have become concentrated in MES. However in actuality, this survey clarified that the modifications have not yet been completed and the current status is different in each region. Therefore, the respective MES Regional Offices need to complete the required procedure for consolidating disaster preparedness in respective regions at the earliest opportunity. The current conditions and crucial issues of the MES Regional Offices and local governments (*akimat*) are as follows:

Crucial Issues of the MES Regional Offices and Local Governments

Category	Subcategory	Countermeasures (Proposed)
Regional offices, Ministry of Emergency and Situations	Astana Regional Office	Prepare disaster database system and extend storing period (all disaster categories) Strengthen public services for disaster management in remote areas (vulnerable for aged people, handicapped people and children) Improve technologies for disaster relief operation in cold districts Establish dedicated communication network firmly functioning at emergencies
	Almaty Regional Office	Clarify roles and responsibilities of MES and local government Clarify budget allocation and approval procedure Establish dedicated communication network at emergencies
	South Kazakhstan Regional Office	Prepared manuals for training of disaster prevention Establish dedicated communication network at emergencies
Provincial Gov.	South Kazakhstan Province	Clarify roles and responsibilities of MES and local government Clarify budget allocation and approval procedure
City Gov.	Almaty City	Clarify roles and responsibilities of MES and local government Develop guidelines for hazard map preparation and enforce distribution of the guidelines Prepare manuals for training of disaster prevention
	Shimkent City	Clarify roles and responsibilities of MES and local government Develop guidelines for hazard map preparation and enforce distribution of the guidelines Prepare manuals for training of disaster prevention

Source: JICA Study Team

8. Current Situations and Issues in Earthquake Disaster Management

8.1 The issues for earthquake disaster management are summarized as follows:

Issues of Earthquake Disaster Management Sector

Categories	Subcategories	Issues
Observation Systems	Organization	Foster collaboration among related organizations
	Observation Networks	Replace or update the existing observation network
	Staff/Researchers	Enhance the coverage of the observation network
Understanding of Seismic Hazard and Risks	Hazard Maps	Update the nationwide seismic hazard maps based on the latest data Update the seismic hazard map of Almaty City
	Risk Assessment and Damage Estimation	Estimate earthquake damages based on the latest data
	Active Faults	Study and estimate the activities of faults in connection with earthquakes
Preparedness and Countermeasures	Responsible Organizations	Define roles and responsibilities of MES and local governments in case of emergency such as earthquake disasters
	Aseismicity of Buildings	Implement aseismic measures for important, existing public buildings Implement aseismic measures for existing private buildings Develop new aseismic measures suitable to Kazakhstan's architecture Implement model project to build earthquake-resistant buildings Control illegal construction of buildings Control the quality of geotechnical investigations

	Aseismicity of Infrastructures and Utilities	Strengthen aseismicity of aging water pipes Strengthen the aseismicity of road bridges Strengthen the aseismicity of dams Construct multipurpose underground utility conduits
	Urban Planning	Incorporate disaster management concepts in urban planning
	Disaster Management Resources	Take fire prevention measures for evacuation routes and facilities to raise awareness on disaster management Install signboards that provide information on access routes to evacuation places Store disaster management resources
	Others	
Selected Cities	Astana City	Observe seismic activities Evaluate seismic hazard potential and risks
	Shymkent City	Observe seismic activities Evaluate seismic hazard potential and risks
	Almaty City	Apply the JICA Study (2007-2009) results Introduce disaster management concepts in urban planning Prepare seismic hazard/risk maps for suburbs of the city Update the 1978 seismic hazard map

Source: JICA Study team

9. Current Conditions and Crucial Issues in Flood Disaster Management

9.1 The crucial issues in flood disaster management in Kazakhstan are summarized as follows:

Major Items	Minor Items	Issues
Flood risk assessment	Preparation of flood hazard maps	・ Preparation of medium- and large-scale (detailed) hazard maps ・ Sharing and effective use of hazard maps ・ Building of database on disasters
	Strengthening of land use planning and regulation	・ Strengthening of land use regulations ・ Land use planning responding to disaster risks
Monitoring and forecasting	Improvement of monitoring systems	・ Improvement and upgrading of automatic meteorological monitoring systems ・ Introduction of automatic hydrological monitoring systems ・ Creation of database and archive of observed data
	Improvement of analysis technologies and human resources development	・ Improvement and dissemination of flood analysis technologies involving simulations, satellite image analyzing, etc. ・ Training of experts (young engineers in particular)
	Improvement of public services	・ Improvement of quality of public services ・ Publication of meteorological and hydrological data (to contribute to agriculture, research, and other activities)
Structural countermeasures	Preparation of structural countermeasures against floods	・ Development and improvement of urban drainage facilities ・ Introduction of disaster (flood) management concepts into urban development Plans
		・ Flood control planning ・ Improvement of designing and construction technologies
		・ Improvement of capacity in operating and managing reservoir dams

Non-structural countermeasures	Development of early warning systems	・ Development of swift and reliable early warning systems ・ Making sure early warning systems are widely known to the public
	Emergency response	Common to all kinds of disasters (see Chapter 11).
	Community-based disaster management	Common to all kinds of disasters (see Chapter 11).

Source: JICA Study Team

10. Current Conditions and Crucial Issues in Sediment Disaster Management

10.1 The crucial issues in sediment disaster management in Kazakhstan are summarized as follows:

Major Items	Minor Items	Issues
Sediment disaster risk assessment	Preparation of sediment disaster hazard maps	・ Preparation of medium- and large-scale (detailed) hazard maps. ・ Sharing and effective use of hazard maps. ・ Building of database on disasters.
	Strengthening of land use planning and regulation	・ Strengthening of land-use regulations. ・ Land use planning responding to disaster risks.
Monitoring and forecasting	Improvement of monitoring systems	・ Improvement and upgrading of automatic monitoring systems (for meteorological and hydrological phenomena, glacier lakes, debris flows, landslides, and snowslides). ・ Creation of database and archive of observed data.
	Improvement of analysis technologies and human resources development	・ Improvement and dissemination of analysis technologies related to sediment disasters, glacier lakes, and snowslides. ・ Training of experts (young engineers in particular).
Structural countermeasures	Preparation of structural countermeasures against sediment disasters	・ Preparation of countermeasures in the Large Almaty River basin. ・ Dissemination of new technologies.
		・ Improvement of design and construction technologies.
		・ Maintenance of existing anti-debris facilities. ・ Upgrading of decrepit infrastructures. ・ Formulation of medium- and long-term debris protection plans.
Non-structural countermeasures	Improvement and expansion of early warning system	・ Development of swift and reliable early warning systems. ・ Ensure early warning systems are widely known to the public.
	Emergency response	Common to all kinds of disasters (see Chapter 11).
	Community-based disaster management	Common to all kinds of disasters (see Chapter 11).

Source: JICA Study Team

11. Current Conditions and Crucial Issues on Emergency Response and Community -based Disaster Management

11.1 The crucial issues in on emergency response in Kazakhstan are summarized as follows:

- Clarify the roles and responsibilities of MES and the local governments
- Enforce public relations regarding activities of MES
- Modernize methodologies for early warning and telecommunications
- Participation of private firms and public involvement
- Renew and modernize telecommunication facilities, equipment, and infrastructure in the MES Regional Offices (including earthquake-proofing)

11.2 The crucial issues of community-based disaster management are summarized as follows:

- Strengthen disaster awareness of citizens
- Promote evacuation by citizens' own initiative
- Strengthen disaster prevention in areas inhabited by aged people
- Activate KSK and strengthen disaster management
- Conduct highly realistic disaster management drills
- Train leaders of self-managed disaster prevention organizations
- Store/reserve materials for disaster prevention through the people's initiative
- Clarify the roles and responsibilities among MES, donors, NGOs, communities, and stakeholders
- Strengthen the cooperation of stakeholders on disaster countermeasures
- Disseminate the outcome of the UNDP DIPECHO IV Project
- Promote disaster administration and prepare disaster preparedness plan by coordination between the local administration and the citizens.
- Prepare BCP by private companies

12. Analyses of Survey Results

12.1 In order to evaluate the crucial issues following four evaluation pillars were set up:

(1) Status of Accomplishment: Status of implementation and/or current status of the issues concerned by the related agencies, donors, and nongovernmental organizations (NGOs) in Kazakhstan
(2) Relevance: Degree on consistency with national and local level policies and direction regarding the disaster prevention sector
(3) Impact: Direct and indirect negative/positive changes due to assistance
(4) Sustainability: Possibility of continuation of self-improvement even after provision of assistance

12.2 Based on the results of analyses on the current status, the following respective four important issues for overall disaster administration, earthquake disaster management and flood/ sediment disaster management sectors are recommended as follows:

Important issues for overall disaster administration

1. Strengthen national- and local-level functions for disaster prevention (clarification of priority areas)
2. Strengthen the capacity of response and develop evacuation system in communities
3. Coordinate among concerned agencies and strengthen the organization for emergency response
4. Establish and expand the telecommunications system for disaster management

Important issues for earthquake disaster management

1. Enhance seismic observation systems and capacities of related organizations and researchers
2. Update seismic hazard potential/risks based on the latest data and technology
3. Improve aseismicity of infrastructures and utilities for preparedness against earthquake disasters
4. Incorporate disaster management concepts into urban development master plans

Important issues for flood/ sediment disaster management

1. Enhance capacity building and human resources for flood and sediment disaster risk assessment
2. Upgrade monitoring system and analysis technology
3. Strengthen the capacity for design, construction, operation and maintenance, and management of structural countermeasures
4. Maintain and improve early warning systems

13. Recommendations for Strengthening the Disaster Prevention Sector in Kazakhstan

13.1 In order to implement the assistance programs, four basic principles are considered and recommended. The four principles are described thoroughly as follows:

Principle 1: Aim step-by-step improvement from a long-term point of view
Principle 2: Emphasize human resources development to contribute to self-reliance in the future (particularly for the young generation)
Principle 3: Adapt technologies in disaster prevention and know-how used in Japan into field conditions in collaboration with Kazakhstan
Principle 4: Synchronize with movements of international and regional cooperation framework disaster prevention

13.2 Based on the analyses of the issues in the overall disaster administration, the areas where

Japan has advantages in comparison with other donors are shown below:

For overall disaster administration sector

- Introduction of current status and knowledge on disaster education in Japan
- Introduction of recovery and restoration plans after the Great Hanshin-Awaji Earthquake and the Great East Japan Earthquake Disasters
- Emergency radio network
- Cooperation with mass media for disaster information dissemination

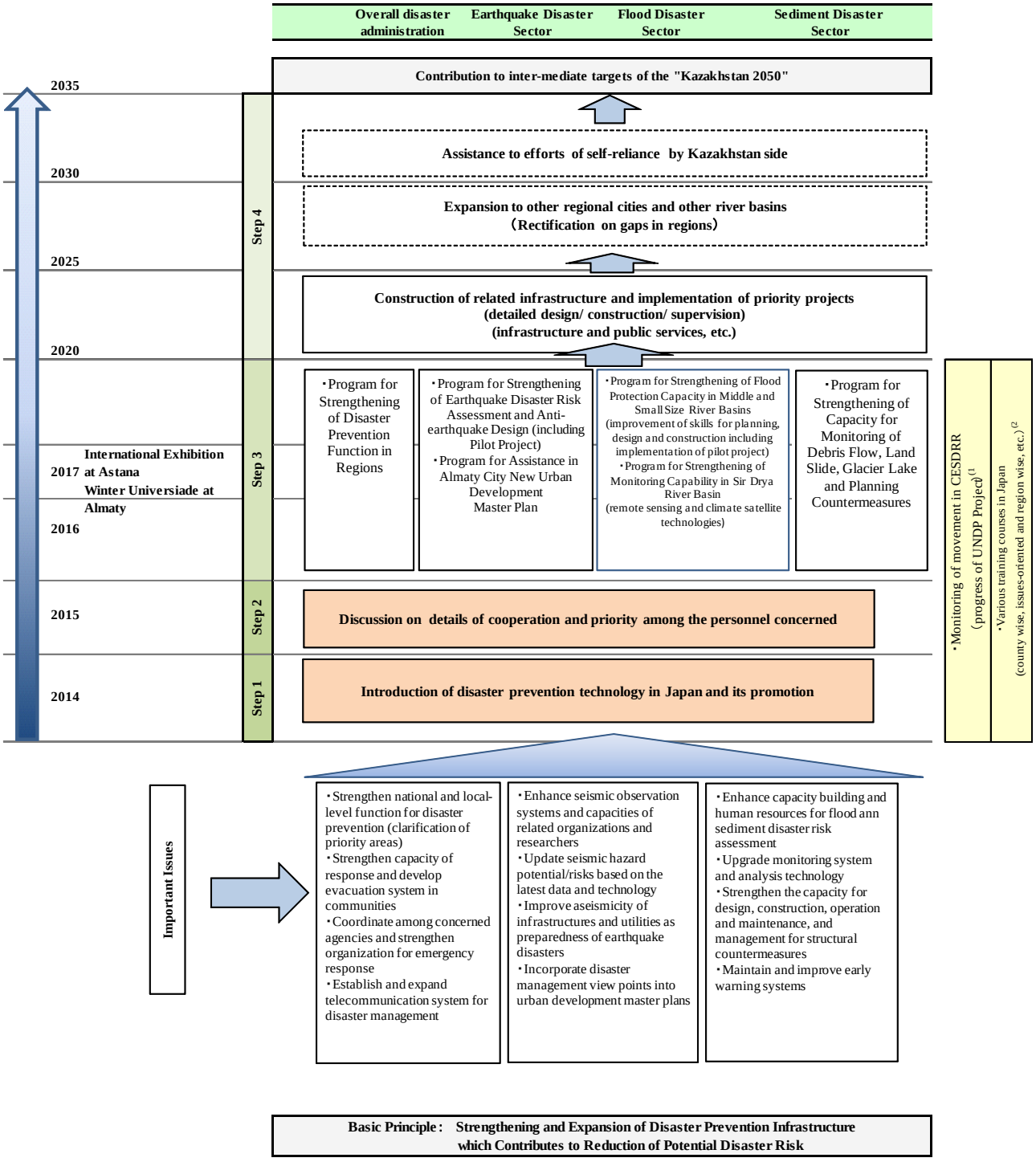
For earthquake disaster sector

- Sharing of Japan's experiences and lessons learned from past earthquake disasters
- Hardware and software that are useful for earthquake disaster management
- Cooperative researches, seminars, and projects bilaterally
- Development of human resources related to earthquake disaster management
- Utilization of past JICA Study (2009)

For Flood / sediment disaster sector

- Automatic monitoring system
- Simulation analysis and remote sensing technology using satellite imagery
- Countermeasures against sediment disaster
- Early warning system
- Countermeasures against snow disaster

13.3 A draft framework plan for strengthening the disaster prevention sector in Kazakhstan is presented as follows:



Source: Study Team Note: 1) Possible to incorporate as one component in the "Program for Strengthening of Disaster Prevention Function in Regions"
2) Possible to incorporate in the programs of each sector and implement in the respective period

Draft Framework Plan for Assistance Program

Data Collection Survey for the Disaster Prevention Sector in the Republic of Kazakhstan

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Chapter 1 Outline of the Survey

1.1 Background

In general, "Central Asia" is defined to include the five countries of Kazakhstan, Uzbekistan, Kyrgyz, Tajikistan and Turkmenistan. Central Asia has approximately 30 million or more people and it belongs to a potential zone of earthquakes, landslides, and other disasters. The Government of Kazakhstan has taken the prevention of financial loss of the nation due to disasters as one of the key objectives in the national long-term development strategy called "Kazakhstan 2050". In addition, based on recognition of the development of early information dissemination system and damage estimation of large-scale disasters across trans-boundaries, development of response agencies with experts, and the need for awareness-raising activities to strengthen the residents and local community, the Government of Kazakhstan has reached an agreement with the Government of Kyrgyz on regional cooperation on disaster risk management along with the Hyogo Framework for Action 2005-2015. In August 2011, both countries agreed on the establishment of the Center for Emergency Situation and Disaster Risk Reduction (hereinafter referred to as “CESDRR”).

In such circumstances, Japan put up a policy to set environmental conservation and climate change mitigation countermeasures as one of the priority assistance areas, and to carry out cooperation in areas such as dissemination of knowledge and technology related to disaster prevention in Japan as an earthquake-prone country (Country Assistance Policy to the Republic of Kazakhstan, Ministry of Foreign Affairs, May 2012). In accordance with this policy, Japan has conducted technical cooperation projects and development studies through the Japan International Cooperation Agency (JICA) regarding earthquake monitoring and earthquake disaster prevention. Although development studies, such as the Study on Earthquake Disaster Risk Management for Almaty City in the Republic of Kazakhstan, which was carried out in 2007-2009, have conducted the preparation of a disaster preparedness plan, efforts to reduce damage is still needed.

The request by the Government of Kazakhstan for cooperation in the field of disaster prevention is strong, and the cooperation program list on disaster prevention has been submitted to the Japanese side in October 2012. However, cooperation needs and the overall situation of the disaster prevention sector have not been well organized, and the formation of possible cooperation projects has yet to be realized. A seminar on comprehensive disaster management was held in Almaty on August 14 and 15, 2013. Active discussions on the issues which draw keen interest from the Government of Kazakhstan, particularly earthquake-resistant construction, community disaster management and formation of a disaster risk reduction center, were carried out.

In order to implement a more effective support in the area of disaster prevention for Kazakhstan in the future, cooperation needs in related organizations should be grasped and this survey work should then be conducted. The target sectors are earthquake, in which necessity of cooperation is recognized based

on the policy on disaster prevention, disaster management organization, and damage conditions; and flood and sediment disasters, in which frequency and actual damage are high.

1.2 Objective

The objectives are set to collect information on the current status, issues, and cooperation needs on earthquakes and flood and sediment disasters, and to examine the direction of cooperation in the disaster prevention sector in Kazakhstan.

1.3 Target Survey Area

The entire Kazakhstan is the target area of the survey. For the target areas of the field survey, Astana, Almaty, and Shymkent cities were selected taking into account the status of past disasters and existence of concerned agencies for disaster prevention.

1.4 Target Organizations of the Survey

In the present study, the Ministry of Emergency Situations (MES) under the central government, the Almaty Regional Office of MES, the province of South Kazakhstan, local governments of Almaty and Shymkent cities, and CESDRR were surveyed. As for efficiency of the survey work and maintaining smooth communications between the Kazakh side and the JICA Study Team, it was decided to place MES as the counterpart agency for the survey. The Study Team requested MES to carry out activities such as confirmation of appointments with the central government agencies in the disaster prevention sector.

A total of 36 agencies/offices, as listed in Table 1.1 below, have been interviewed.

Table 1.1 List of Agencies/ Office for Interview

No.	Category		Name of Agencies/ Offices	Related Information
1	Central Gov.	Main Office	Ministry of Emergency and Situations (MES)	Interview to representatives of 4 departments
2			Ministry of Regional Development	Upper agency observing KazNIISSA
3		Regional Office	MES Almaty Regional Office	Interview to representatives of 3 sections
4			MES Astana Regional Office	Interview to representatives of 1 section
5			MES South Kazakhstan Regional Office	Interview to representatives of 2 sections
6	Bilateral Committee (Center)		CESDRR(at Almaty)	Chairman (Mr.Okasov) & Deputy Director of International Cooperation Dept. (Mr. Zhanguzhinov)
7	Local Gov.	Province	South Kazakhstan Province	Department of Construction
8		City	Almaty City	Vice Mayor, Advisor, Deputy Director of Urban Development Planning
9			Almaty City	Architecture and Urban Development (Regional Office of Min. of Regional Development)
10			Almaty City Urban Development Center	under Almaty City Gov. (100% shared by stock holders)
11			Shimkent City	Vice Mayor
12	Attached Agencies to Central Gov.		Kazselezaschita (at Almaty)	under MES
13			Kazselezaschita (at South Kazakhstan)	under MES
14			Institute of Industrial Safety (at Astana)	under MES
15			RSE KazHydromet (at Astana)	under Min. of Environment and Water Resources
16			RSE KazHydromet (at Almaty)	under Min. of Environment and Water Resources
17			Water Resources Committee (at Astana)	under Min. of Environment and Water Resources
18			Yugvodkhoz (at South Kazakhstan)	Water resources management organization under Water Resources Committee(organization under "KazVodkhoz")
19			KazNIISSA(at Almaty)	under Min. of Regional Development
20			KazNIISSA Research Center (at Almaty)	under Min. of Regional Development
21			Institute of Seismology (at Almaty)	under Min. of Education and Science
22			Institute of Geography (at Almaty)	under Min. of Education and Science
23			Institute of Hydrogeology and Hydroecology (at Almaty)	under Min. of Education and Science
24	Independent Institutes		National Data Center (at Almaty)	
25			Institute of Space Research (at Almaty)	Kazcosmos(under Kazakhstan Space Research Center)
26			KazGIIZ (at Almaty)	Private firm
27	Universities	National	KazNTU (National University of Technology)	
28		Private	KazGAZA (at Almaty)	
29	International Donors		UNISDR	Kazakhstan Office (at Almaty)
30			UNDP	DEPECHO VII Project (at Almaty)
31			UNDP	Kazakhstan Office (at Astana)
32			UNDP	Kyrgyz Office (at Bishkek)
33			UNDP	Strengthening of Disaster Risk Reduction Project (at Astana)
34			World Bank	Kazakhstan Office (at Astana)
35	Private Companies	Developer of real estates	Ana Zher Kurylys Ltd.	Implementing development of suburban housing project in Almaty City
36	Kyrgyz Republic		Ministry of Emergency and Situations	Bishkek (at Osh for main office)

Source: JICA Study Team

1.5 Composition of the Survey Team

The composition of the Survey Team is as follows:

Mr. Yoshihiro Motoki (Team Leader/Disaster Administration) Nippon Koei Co., Ltd.

Mr. Kenichi Tanaka (Earthquake Disaster) Nippon Koei Co., Ltd.

Mr. Tomoyuki Nishikawa (Flood and Sediment Disaster) Nippon Koei Co., Ltd.

1.6 Survey Schedule

The survey works were conducted following the schedule below and as shown in Table 1.2. The details of the survey works are shown in Table 1.1 as well.

1st Field Works

October 18, 2013 : Departure from Japan (Narita~Seoul~Almaty~Astana)

October 19-26 : Stay in Astana

October 26-November 3 : Stay in Almaty

November 3-10 : Stay in Bishkek (for securing entry visa into Kazakhstan)

November 10-17 : Stay in Astana (Mr. Motoki)

(November 10-16) : Stay in Almaty (Mr. Tanaka and Mr. Nishikawa)

November 17-21 : Stay in Shymkent (South Kazakhstan)

November 21-26 : Stay in Astana

November 26 : Departure from Astana (Astana~Almaty~Seoul~Narita)

November 27 : Arrival in Tokyo

2nd Field Works (Explanation and discussion on the Draft Final Report)

January 24, 2014 : Departure from Japan (Narita~Seoul~Almaty)

January 24-27 : Stay in Almaty (January 27: explanation and discussion)

January 28-31 : Stay in Astana (January 30: explanation and discussion)

January 31 : Departure from Astana (Astana~Almaty~Seoul~Narita)

February 1 : Arrival in Tokyo)

3rd Field Works (Participation in the KOICA-JICA Joint Seminar (only for Mr. Motoki))

March 10, 2014 : Departure from Japan (Narita~Seoul~Almaty)

March 10-14 : Stay in Almaty (March 12-13: Joint Seminar)

March 14 : Departure from Almaty (Almaty~Seoul~Narita)

March 15 : Arrival in Tokyo

Table 1.2 Overall Survey Schedule

		Position	Name	Company	2013 Sep (1)	Oct (2)	Nov (3)	Dec (4)	2014 Jan (5)	Feb (6)	Mar (7)	Man-month Field	Man-month Home	Trip
Field Work	1	Team Leader/ Disaster Administration	Yoshjihiro MOTOKI	Nippon Koei Co., Ltd.		41			9		6	1.87		3.0
	2	Earthquake Disaster	Kenichi TANAKA	Nippon Koei Co., Ltd.		41			9			1.67		2.0
	3	Flood and Sediment Disasters	Tomoyuki NISHIKAWA	Nippon Koei Co., Ltd.		41			9			1.67		2.0
		Subtotal of Field Work										5.21		7.0
Home Work	1	Team Leader/ Disaster Administration	Yoshjihiro MOTOKI	Nippon Koei Co., Ltd.		3		17			1		1.05	
	2	Earthquake Disaster	Kenichi TANAKA	Nippon Koei Co., Ltd.		3		17					1.00	
	3	Flood and Sediment Disasters	Tomoyuki NISHIKAWA	Nippon Koei Co., Ltd.		3		17					1.00	
		Subtotal of Home Work											3.05	
		Reports				IC/R				DF/R		F/R		
		Total (man-month)	Field work / Home wrk									5.21	3.05	7.0
													8.26	

Source: JICA Study Team

Chapter 2 Country Information on Kazakhstan

2.1 Geography and Climate

Kazakhstan is located in the center of the Eurasian continent, and has a territory of approximately 2.72 million km^2,which is about seven times that of Japan and the ninth largest territory in the world. The northern, central, western, and southwestern parts of the country are composed of flat lands, such as steppe or desert. The northern, central, and western regions are spreading. In addition, the southeastern border is separated by the Altai Mountains, and the eastern border by the Tianshan Mountains. The territory of Kazakhstan includes about 48,000 lakes, such as the Caspian Sea, the Aral Sea, Lake Balkhash and Lake Zaysan, and about 8,500 rivers, such as the Irtysh River.

Kazakhstan has a continental climate, i.e. there is a big difference between daily and annual temperatures. The average temperature in January is -5 °C in the south and -20 °C in the north; reversely, the average temperature in July reaches 30 °C. The annual rainfall is very small, i.e., 300-400 mm in the mountainside, and 250 mm in the steppe region. Severe weather conditions affect social and industrial development from agriculture.

2.2 Population, Ethnicity and Language

The total population of the country is 16,793,000 as of July 1, 2012 (according to the National Statistical Office).The population of Astana City, the capital of Kazakhstan, is 758,000, and that of Almaty City is 1,453,000.

The country is a multiethnic nation.There are about 120 ethnic groups according to statistics. The most common race is Kazakh, which is composed of 64.6% of the total population (2011), while22.4% are Russiansand they mainly live in Almaty City and northern states. Other races are Uzbek (3.0%), Ukraine (1.9%), Uighur (1.4%),Tatar (1.2%),and German (1.1%).There also a few Koreans.

According to the national constitution enacted in 1995, Kazakh has been decided as the national language while Russian has been decided as the official language (various interethnic exchange languages). Kazakh belongs to the Turkic as well as the Turkish, which is mostly related to Kirghiz.

2.3 National System

The basic national system is a republic headed by the president. The president is chosen by direct election by the people, and the term of the president is five years. In addition, third-term election prohibition was exempted by the first president,H.E. Nursultan Nazarbayev, by the constitutional amendment in 2007.

The president appoints a prime minister, and ministers on the basis of recommendation by the prime minister. The prime minister's recommendation is not required for the appointment of the foreign minister, defense minister, interior minister, and minister of justice. The president also appoints a mayor

for both Almaty and Astana cities, and a state governor. The Parliament is bicameral composed of the upper house (Senate) and the lower house (Majlis).

In 1995, it was decided through the Presidential Decree in September 15, 1995 that the capital be relocated to Akmola City. Accordingly, government officials began to move at the end of 1996. The Congress, Office of the President, key government agencies, the Supreme Court, and other governmental offices were officially transferred on November 8, 1997, and the name of the capital was changed to Astana (meaning "capital" in Kazakh) on December 10, 1997.

2.4 Diplomatic Policy

Kazakhstan is surrounded by major countries, such as Russia and China, and therefore the country aims to foster “multidirectional foreign relationships” in order to maintain independency without being incorporated into the powers of such adjacent countries. For Kazakhstan, Russia is its major partner in areas of politics, economy, military, and culture with historical ties from the Russian Empire era. Moreover, the country is strengthening its relationship with China on main economic sectors, such as construction of oil pipelines. In addition, economic and military cooperation with the United States are also underway, and Kazakhstan has dispatched a few troops for postwar reconstruction of Iraq in order to show cooperation with the United States in the field of counterterrorism.

2.5 Economic Conditions

Kazakhstan has plenty of energy resources, such as oil and coal, and iron and non-ferrous metal resources, such as rare metals. Such resources are supporting the national economy, with 30% of gross domestic product (GDP) and 60% of exports are brought about by the oil and natural gas industry). After the collapse of the Soviet Union, the east coast of the Caspian Sea and northern part of the country were highlighted for rich oil reserves in theworld, hence American and European companies have advanced to exploit such reserves. The Japanese oil company INPEX (a joint venture between International Oil and Teikoku Oil) has also advanced in the north Caspian Sea for continental shelf development. On the other hand, Kazakhstan has, in recent years, focused on the development of uranium resources, which is believed to be the second largest deposit in the world (18% of world reserves). Furthermore, Kazakhstan actively promotes the implementation of new technology through joint ventures with foreign companies.

The Government of Kazakhstan has made an effort to prepare economic reforms in order to have a transition from a planned economy to a market economy; promote commercialization such as privatization of state-owned enterprises, development of small- and medium-sized enterprises, and establishment of a securities trading market, banks, and pension reform; and prepare circumstances for foreign investment since its independence.

From 2000 to 2006, real annual GDP growth rate was maintained at around 10%. Credit crunch of financial institutions had started since the second half of 2007, and GDP growth in 2008 and 2009 has

significantly fallen as a result of the global financial crisis brought about by the bankruptcy of the Lehman Brothers. However, the GDP has showed a recovering trend, 7.0% in 2010 and 7.5% in 2011, as a result of government measures such as economic stimulus package, currency devaluation, and disposal of nonperforming assets. The GDP growth rate in 2012 was 5%.

Chapter 3 Japan's Aid Policy for Kazakhstan

3.1 Trends in Japan's Diplomacy in Central Asia in Recent Years

In July 1997, then Japanese Prime Minister Ryutaro Hashimoto proposed "Eurasia Diplomacy" which called for a proactive foreign policy to establish Central Asia and the Caucasus region as a "Silk Road region". Since then, Japan has been pushing for "Silk Road diplomacy", which focuses on the three pillars of political dialogues to enhance regional trust and mutual understanding, economic cooperation and resources development cooperation supporting regional prosperity, and cooperation for peace through nuclear non-proliferation, democratization, and stability. In August 2004, Yoriko Kawaguchi, the then Foreign Affairs Minister of Japan, launched a "Central Asia plus Japan" dialogue-raising diplomacy to a new level for exploring a new dimension while maintaining the conventional "Silk Road diplomacy". These foreign ministerial level consultation meetings have been held for four times up to now. In 2014, the fifth consultation meeting is scheduled to be held in Bishkek, Kyrgyzstan.

Furthermore, meetings of senior officials are being held once every year or two years since March 2005. The sixth meeting was held in December 2011. In addition, the "Tokyo Dialogue" has been held to supplement such meetings. The fifth meeting was held in May 2013 continuing the dialogue. A history of important domestic and international movements for Central Asia diplomacy (close to ten years) is shown in Table 3.1 of the Appendix, and key indicators of five Central Asian countries are shown in Table 3.1 below.

Table 3.1 Major Index of Five Countries in Central Asia

Items	Kazakhstan	Uzbekistan	Kyrgyz	Tajikistan	Turkmenistan
Area (km^2)	2,724,900 (7 times of Japan)	447,400 (1.2 times of Japan)	198,500 (half of Japan)	143,100 (40% of Japan)	488,000 (1.3 times of Japan)
Population	17,140,000	28,100,000	5,400,000	7,100,000	5,200,000
Capital	Astana	Tashkent	Bishkek	Dushanbe	Ashgabat
Ethnic Groups	Kazakh (63%) Russian (24%) Uzbek (3%)	Uzbek (78%) Russian (85%) Tajik (5%)	Kyrgyz (75%) Uzbek (14%) Russian (7%)	Tajik (80%) Uzbek (17%)	Turkmen (81%) Uzbek (9%) Russian (4%)
Language	Kazakh (Russian is official language)	Uzbek (Russian is widely used)	Kyrgyz (Russian is official language)	Tajik (Russian is widely used)	Turkmen (Russian is widely used)
Religion	Muslim (70%), Russian Orthodox (26%)	Sunni Muslim is common	Sunni Muslim (75%), Russian Orthodox (20%)	Sunni Muslim is common	Sunni Muslim is common
Key Industries	Mining, Agriculture Metallurgy	Textiles industry, Food processing, Machine manufacturing, Mining (gold, oil	Agriculture, Livestock industry, Gold mining	Agriculture (cotton), Aluminium production, Hydropower	Mining (oil and gas), Agriculture (cotton), Pasturage

		and gas)			
GDP (USD)	196.5 billion	45.4 billion	6.5 billion	6.5 billion	33.7 billion
GDP per Capita (USD)	11,773	1,367	875	836	5,999
Economic Growth (Real GDP)	5.0% (2012)	8.3% (2012)	-0.9% (2012)	7.4% (2012)	11.1% (2012)
Inflation Rate	5.1% (2012)	12.1% (2012)	2.8% (2012)	12.4% (2012)	4.9% (2012)

Source: JICA Study Team based on information from the Ministry of Foreign Affairs of Japan

3.2 Significance of Assistance to Kazakhstan

Being the nation with the largest area and the second largest population among the five Central Asian countries, Kazakhstan has significant power and the momentum of its phenomenal economic growth appears to outperform that of Russia. There have been moves to raise investments and to expand tourism in neighboring countries. In order to attract investors and workers from these countries, Kazakhstan is about to represent important components of its growth engines for its regional economy. Based on these circumstances and the fact that the country has a large say, its stability and steady economic growth would greatly contribute to the development of the entire Central Asian region.

3.3 Japan's Country Assistance Program for the Republic of Kazakhstan (September 2006)

Japan's Country Assistance Program for the Republic of Kazakhstan (September 2006), prepared by the Ministry of Foreign Affairs seven years ago, summarized the general situation, political situation, economic conditions, and development issues of Kazakhstan; analyzed the trends for development assistance strategy; and presented a basic policy of assistance. For the priority sectors, it was described as follows:

"Japan's assistance is aiming not to address all the development issues in Kazakhstan, but to support Kazakhstan's effort to achieve its development strategies including the principle and objectives of assistance to Kazakhstan in accordance with the general official development assistance (ODA) framework, while also bearing the common requests to be indicated by Central Asian countries in the 'Central Asia plus Japan' dialogues. Japan's targets in the next 3-5 years are to facilitate the shift to a market economy, sustain its economic growth, strengthen its aid-absorbing capacity by ensuring the stability of its macro-economy and an efficient public sector, and implementing policies to allocate the financial resources obtained as a result of the foregoing policies for poverty reduction, environmental preservation, and industrial development. In addition, in terms of promoting the 'Central Asia plus Japan' dialogue, Japan's assistance to Kazakhstan is focused on the country's self-help efforts toward the area of poverty reduction through sustainable economic growth, and supporting the increase of local economic levels to achieve this goal."

The following four points are the priority areas:

(1) Support for policy formulation, institutional improvement, and human resources development for sustainable economic growth;

(2) Economic and social infrastructure improvement including its operation and management systems;

(3) Support for environmental preservation, farming community development, and healthcare due to correct disparities in the rural area; and

(4) Relaxation of social difficulties derived from environmental problems and system transitions.

3.4 Assistance Program for Kazakhstan (May 2012)

In the Assistance Program for Kazakhstan (May 2012), the main objectives set for the basic policy of assistance are to support nation-building with balanced social and economic development, and to support economic growth based on the market economy which is aimed by the long-term development strategy up to 2030 (Kazakhstan 2030). Basically, the program promotes regional cooperation, which is one of the five pillars adopted in the "Central Asia plus Japan" dialogue six years ago. The prioritized sectors (medium goal) are as follows: (1) development of economic infrastructure for the natural resources and energy sectors, and (2) environmental protection and climate change mitigation.

In addition, a total of 15 projects have been published in the business plan of the program during the three fiscal years from 2010 to 2012. Such projects have already been completed or are still in progress. An outline of the projects is given in the table below.

Table 3.2 Outline of Japan's Assistance Program

Assistance Program		Abstract	Project Name	Scheme
Priority Area 1: Development of economic infrastructure for the natural resources and energy sectors				
Issue 1: Economic infrastructure improvement including its operation and management systems	Economic Infrastructure Development	- To develop transportation, telecommunication, and electrical facilities. - To manage, operate, and maintain such facilities properly.	The projectfor reconstruction of corridor (Jambul region) under the Central Asia Regional Economic Cooperation (CAREC)	Loan
			Thematic and regional training courses for young leaders in the development of economic infrastructure (1 program)	Training Programs
	Others	-	The project for water supply and sewerage networks in Astana	Loan
			Grass Roots grant aid Projects on social security for human (4 projects)	Grassroots Grant Aid
Priority Area 2: Environmental protection and climate change mitigation				
Issue 2: Environmental protection and	Environmental Protection	- To implement and develop technology for air and water quality monitoring.	Project for implementation of clean energy using solar system	Grant Aid

climate change mitigation by using advanced technology		- To develop technology for sewage and waste disposal. - To develop capacity of administrators, engineers and experts. - To share knowledge and technology on disaster management such as for earthquakes.	Grass Roots grant aid projects on social security for human in environmental sector (4 projects)	Training Programs
			Grass Roots grant aid projects on social security for human in environmental conservation	Grassroots Grant Aid
			Improving the conditions of fisheries and social environment around the Aral Sea (phase 2)	Multi-sector
Others				
Support for policy formulation, institutional improvement and human resources development for sustainable economic growth	Human Resources Development	- Human resources development of state institutions and central/ local officials aimed at capacity building of the central and local government. - Training for industrial development and small- and medium-sized enterprises (SMEs).	Kazakhstan-Japan Center for Human Development (Phase II)	Technical Cooperation
			Kazakhstan-Japan Center for Human Development, Enterprise Development Project	Technical Cooperation
			Thematic, regional training courses and training for young leaders in the field of human resource development (5 projects)	Training Programs
	Industrial Development and Policy Formulation	- Promotion of small and medium enterprises. - Entrepreneurial activities mainly for the manufacturing sector. - Financial and capital market development. - Implementation of industrial cluster system.	Thematic and regional training courses for young leaders in government support of industries (5 projects)	Training Programs
			Consultation program for small businesses (BAS)	Multi-sector
Others	-	-	Strengthening human security at the former nuclear test site at Semipalatinsk	Multi-sector
	-	-	Support for sustainable and independent development of Afghanistan	Multi-sector

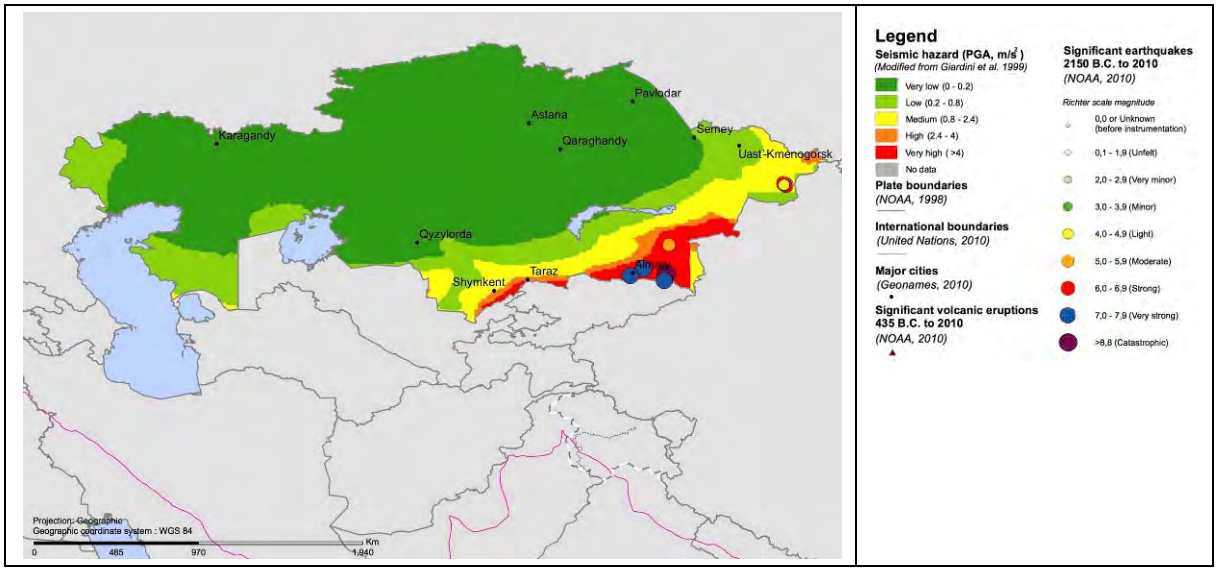
Source: Japan's Country Assistance Program for the Republic of Kazakhstan, May 2012, the Ministry of Foreign Affairs of Japan (Japanese only).

Chapter 4 Current Conditions of Natural Disasters

4.1 Earthquake Disasters

4.1.1 Seismic Hazard Potential

Kazakhstan has an extensive territory with an area of 2,717,000 km^2 that is mainly characterized geographically by basin and continental lowland features. Most of the southern section of Kazakhstan is located in the north side of the Tien Sian Mountains. The Tien Sian is seismically known as one of the most active tectonic zones where the Eurasian continent and the Indian subcontinent collides with each other. The eastern section of Kazakhstan is located on the western edge of the Altay Mountains where an active tectonic zone exists. Figure 4.1 shows the seismic hazard potential in Kazakhstan.



Source: WHO, 2010

Figure 4.1 Seismic Hazard Potential in Kazakhstan

Most historical earthquakes which affected Kazakhstan have their epicenters in the Tien Sian Mountains or the Altay Mountains. Almaty City, which has a population of about 150 million, is the largest city in Kazakhstan and the economic center of the country. The city is located north of the Tien Sian Mountains. It is considered that Almaty City is the most dangerous populated area in Kazakhstan should a large earthquake occur.

4.1.2 Past Earthquake Records

(1) Earthquakes in and around Kazakhstan

Table 4.1 below shows a list of the major historic and destructive earthquakes in Kazakhstan and its neighboring countries.

Table 4.1 Major Historical Earthquakes (Last 150 Years)

Date (Y/M/D)	Location	Magnitude (M)	Name
1865.03.22	Merke region, Zhambul area	6.4	Merkenskoe
1868.08.29	South Kastek village, Almaty area	6.4	Kasteksoe
1885.08.02	Region lakes of Belovodsk and Karabalty, Kyrgyz Rep.	6.9	Belovodskoe
1887.06.08	Almaty region	7.3	Vernenskoe
1889.07.11	Near Chilik village, Charyn, Almaty area	8.3	Chilikskoe
1911.01.03	Southern Almaty city	8.2	Keminskoe
1921	Region lake of Kuldzha, China	6.5	Kuldzhinskoe
1929.06.03	Kyzylkum, Kyzylorda area	6.4	Chilikskoe
1938.06.20	Region of villages of Dzhil-aryk and Kyzyl-bairak, Kyrgyz	6.4	Kemino-Chuiskoe
1958.12.21	Dzungarian-Alatau ridge, Almaty area	6.4	Dzhungarskoe
1970.06.05	Prezhevalsk City region, Kyrgyz	6.8	Sarykomyshskoe
1971.05.10	Taraz City region	5.7	Zhambylskoe
1978.03.24	Near Kurmenty village, Almaty area	6.8	Zhalanash-Typskoe
1979.09.25	Bakanas village region, Almaty area	6.1	Bakanasskoe
1990.06.14	Northern Zaisan City, East Kazakhstan	6.8	Zaisanskoe
1990.11.12	ZalilskAlatau ridge, Almaty area	6.3	Baisoruskoe
1992.08.19	Kyrgyz Alatau ridge, Kyrgyz	7.3	Susamyrskoe
1993.12.30	Near Tekeli village, Almaty area	6.1	Tekelisskoe
2003.05.22	Village Lugovoe	5.0	Lugovskoe
2003.09.27	South Western Siberia, Russia	7.3	Altai
2003.12.01	Near Symbe village, Almaty area	6.1	Narynkolskoe
2008.04.26	Settlement Rybtsekh, West Kazakhstan region	5.0	Shalkarskoe
2009.06.13	Tekeli, East Kazakhstan	5.4	Tekeli 2009

Source: Institute of Seismology, Kazakhstan

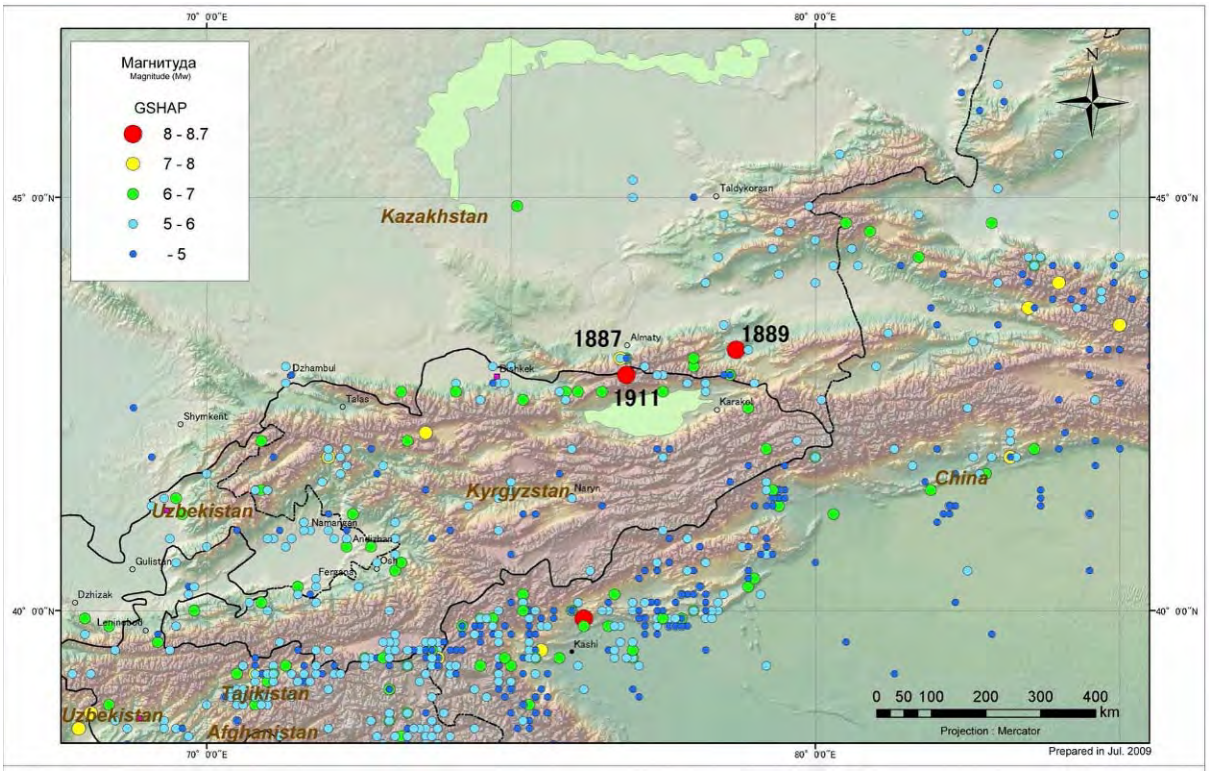
(2) Past Earthquake Damages in Almaty City

Almaty City has often been affected by earthquakes in the past, and it has experienced relatively large earthquake motions of 7-9 MSK, as shown in Table 4.2 and Figure 4.2. There have been destructive earthquakes, i.e., the 1887 Vernenskoe Earthquake, 1889 Chilikskoe Earthquake, and 1911 Keminskoe Earthquake. Several tens and hundreds of people have been killed due to collapse of buildings during those three severe earthquake events.

Table 4.2 Earthquake Damage Records of Almaty City

Date	Local Time	Name	Epicenter		Magnitude	Intensity	Deaths
			N	E	(M)	(MSK)	
1887.06.09	04:35	Verny	43.1	76.8	7.3	8 – 9	236
1889.07.12	03:14	Chilik	43.2	78.7	8.3	7 – 8	0
1911.01.04	04:25	Kemin	42.9	76.9	8.2	8 – 9	44
1945.04.19	23:46		42.9	77.5	5.7	5 – 6	
1970.06.05	10:53		42.5	78.9	6.8	5	
1978.03.25	03:06		42.8	78.6	7.2	5 – 6	
1983.01.01	01:46		42.9	77.5	5.2	4 – 5	
1988.06.17	08:22		42.9	77.5	5.4	4	
1990.11.12	18:28		42.9	78.1	6.3	5 – 6	

Source: JICA, 2009



Source: JICA, 2009

Figure 4.2 Location Map of Epicenters in and around Almaty City

(3) Estimation of Earthquake Damages inAlmaty City

The following JICA study had been implemented between 2007 and 2009:

"The Study on Earthquake Disaster Risk Management for Almaty City"

Through the study above, earthquake damages have been estimated based on earthquakes scenarios, which were compared to three historical earthquakes that occurred near the city.

Table 4.3 Estimation of Earthquake Damages in Almaty City

Scenario Earthquake	Building Damage		Human Damage		Bridge (Nos.)
	Complex	House	Dead	Injury	
Verny	990	24,400	22,000	28,000	18
Chilik	80	5,200	2,000	2,000	6
Kemin	430	15,200	9,000	11,000	11

Scenario Earthquake	Water Pipes (Nos.)	Sewerage (Nos.)	Gas Pipes (km)	Power Lines (km)
Verny	500	600	600	3
Chilik	Few	Few	100	Few
Kemin	100	100	400	0.3

Source: JICA, 2009

4.1.3 Characteristics of Earthquake Damages in Kazakhstan

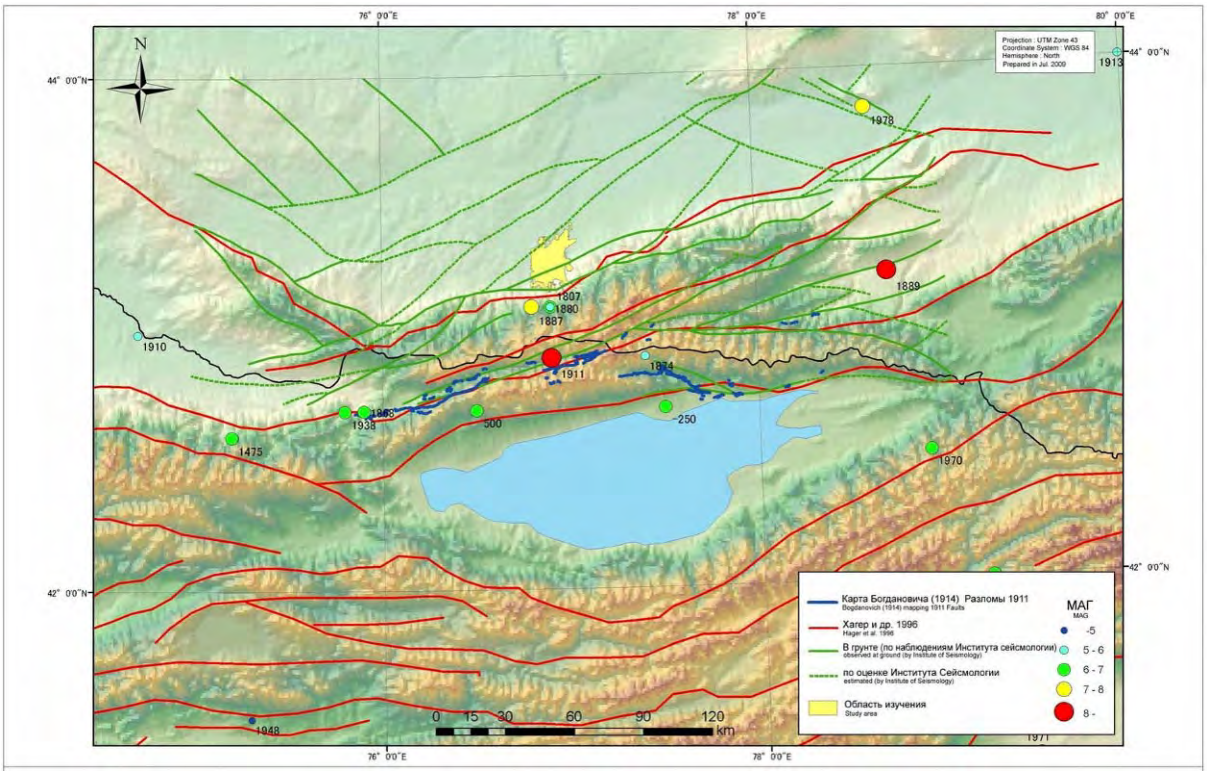
(1) Places of Occurrence

Seismically active regions are distributed in and around Almaty City and in the provinces of South Kazakhstan, Zhambyl, Almaty, and East Kazakhstan, which are located in a zone along the Tien Sian Mountains and the Altay Mountains. The Tien Sian Mountains are a tectonic compressive zone with its principal stress axis along north-south direction. Under such tectonic condition, earthquakes are mainly caused by reverse faulting.

The reverse faults are segmented by lateral-slip faults with a strike of NW-SE mainly also trigger earthquakes.

As mentioned so far, most of the seismically active areas in Kazakhstan are located in the Tien Sian Mountains and the Altay regions. However, a destructive earthquake that occurred in West Kazakhstan Province in April 2008 affected 123 houses. It suggests that unknown active fault systems exist in Kazakhstan that are not part of the “Tien Sian-Altay” seismic zone.

Figure 4.3 shows the distribution of tectonic faults and severe earthquakes in Kazakhstan.



Source: JICA, 2009

Figure 4.3 Distribution of Tectonic Faults and Severe Earthquakes

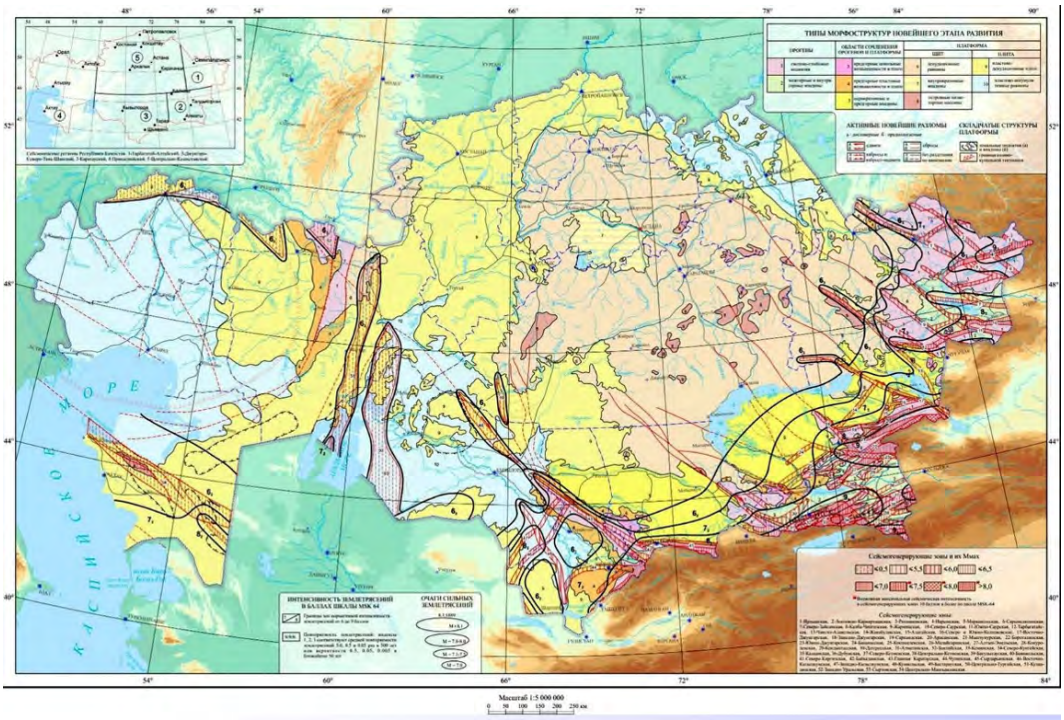
(2) Characteristics of Earthquake Damages

Earthquake damages in densely populated areas are mainly building collapse and human casualty resulting from the former. In contrast, earthquakes in sparsely populated areas cause sediment disasters such as slope failures, landslides, rockfalls, and fissures in the ground that affect houses on downward slopes. The sediments on the slopes often affect rural villages as debris flows resulting from heavy rains.

(3) Other Issues

Kazakhstan's national seismological observatory network covers mainly Almaty City and its vicinities. Therefore, the network sparsely covers other regions of the country. Astana, the capital city of the country, is considered to be an inactive geological region but small earthquakes with magnitudes of 4 or less are sometimes observed. West Kazakhstan is also considered to be an inactive geological region as experienced in the 2008 Shalkarskoe Earthquake, which affected 123 houses as mentioned above. Therefore, it is necessary to thoroughly determine the geologically active zones in Kazakhstan in the future.

The seismic hazard map of Kazakhstan is shown in Figure 4.4.



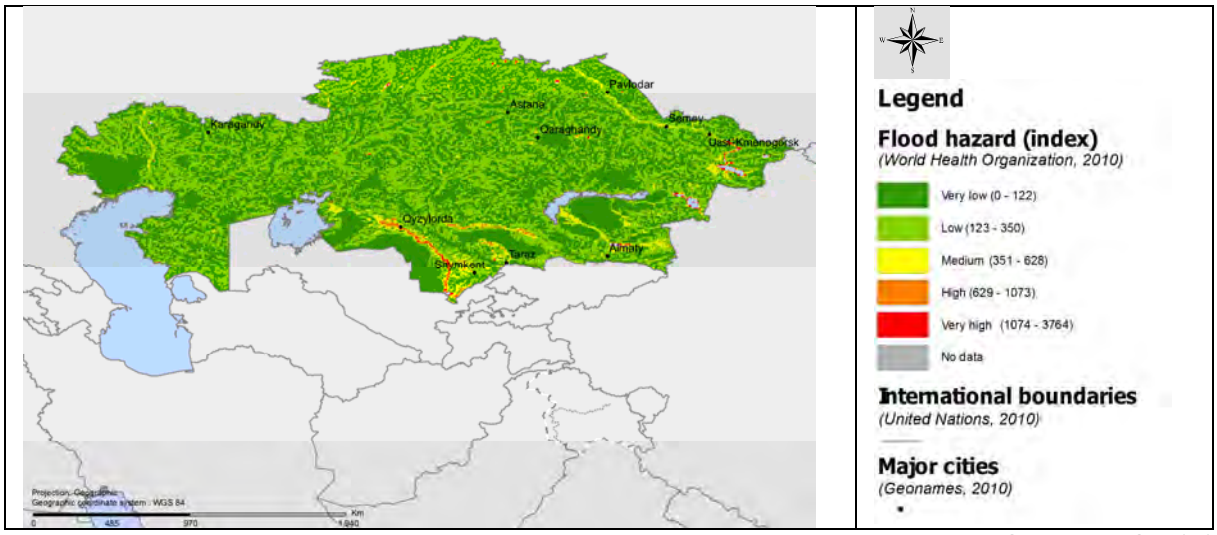
Source: Institute of Seismology, Kazakhstan

Figure 4.4 Seismic Hazard Map of Kazakhstan

4.2 Flood Disasters

4.2.1 Potential Hazard of Flood Disasters

According to the flood hazard map of Kazakhstan by the World Health Organization (WHO) in 2010, the areas along the Syr Darya River and the Chu River in South Kazakhstan, Lake Zaysan, Lake Balkhash, and Lake Alakol have very high flood potential as shown in Figure 4.5.



Source: WHO, 2010

Figure 4.5 Flood Hazard Map of Kazakhstan

4.2.2 Past Records of Flood Disasters

Table 4.4 gives a summary of records of flood disasters in Kazakhstan in recent years. The information of these flood disaster records have been collected from interviews and the internet.

Table 4.4 Recent Records of Flood Disasters in Kazakhstan

Date	Affected Area	Outline of the Flood Disaster	Affected Persons/Estimated Damage	Source
August 10, 2013	Oblast of Kostanay	Rainfall continued in Taranovka and Karabaly in Kostanay, near the border of Russia and northern Kazakhstan, and total rainfall for three days was 155 mm. Flooding occurred due to failure of a reservoir dam on the Ayat River.	No further information is available.	・News in Russia http://ria.ru/eco_news/20130810/955512824.html ・TENGRI NEWS http://en.tengrinews.kz/disasters/Over-300-people-evacuated-from-flooded-villages-in-Kostanay-oblast-21762/
January 16, 2013	Saryagash, Oblast of South Kazakhstan	Flooding occurred at Saryagash in South Kazakhstan due to heavy rainfall and strong winds. Schools and hospitals in the Suzaksky and Saryagash regions were damaged by strong winds (25-30 m/s).	No further information is available.	・News in Russia http://www.dailynews.kz/acidents/v-yuzhnom-kazaxstane-prodolzhayutsya-vosstanovitelnye-raboty-v-postradavshix-ot-stixii-rajonax/19962/
January 13, 2013	Shymkent, Oblast of South Kazakhstan	Flooding occurred in South Kazakhstan due to heavy rainfall and strong winds.	No further information is available.	・Daily News in Russia http://www.dailynews.kz/acidents/v-yuzhnom-kazaxstane-likvidiruyut-posledstviya-uragannogo-vetra-i-navodneniya/19695/
September 30, 2012	Zhezkazgan, Oblast of Karagandy	Flooding occurred at Zhezkazgan in Karagandy due to overflow of an irrigation channel. Two people were killed and 60 people were left homeless. The flooded area was over a hundred yards.	Two deaths (Source: Russian news)	・News in Russia http://info-7.ru/Novosti/Zemlya/show1novost.php?Tip=zemlya&ID_zapros=15550
February 21, 2012	Oblast of South Kazakhstan	Flooding occurred at Shymkent City and nine districts in South Kazakhstan due to heavy rainfall and snowmelt caused by rapid increase in temperature from February 18 to 20, 2012. The worst-affected areas were Ordabasy and Aryss districts located in a suburb of Shymkent City.	Estimated damage: USD 8,000,000 Affected persons: 9,400 (Source: IFRC report)	・IFRC http://reliefweb.int/sites/reliefweb.int/files/resources/MDRKZ005ou1.pdf ・Reliefweb http://reliefweb.int/disaster/fl-2012-000030-kaz ・News in Russia http://mir24.tv/news/incidentes/4706602
April 9, 2011	Oblast of West Kazakhstan	Flooding occurred at Chingirlausky, Taskalinsky, Zelenovsky, and Terektinsky districts in West Kazakhstan due to heavy rainfall and snowmelt from April 9 to 15, 2011.	Two deaths Estimated damage: USD 67,000,000 Affected persons: 16,000 (Source: EM-DAT)	・IFRC http://www.ifrc.org/docs/appeals/11/MDRKZ004do.pdf ・Reliefweb http://reliefweb.int/disaster/fl-2011-000038-kaz
March 17, 2010	No further information is available.	No further information is available.	Affected persons: 13,000 (Source: EM-DAT)	・EM-DAT
March 11, 2010	Taldykurgan, Oblast of Almaty	Flooding occurred at Taldykurgan in the oblast of Almaty due to failure of a reservoir dam. Strong torrents with depths of 2 m hit the downstream districts and some bridges. Over 40 persons were killed and 300 persons injured.	44 deaths Estimated damage: USD 34,576,000 Affected persons: 16,200 (Source: EM-DAT)	・UNOCHA http://reliefweb.int/sites/reliefweb.int/files/resources/F4508E4B3E1E97BFC12576F000334F7F-Full_Report.pdf ・ADRC http://www.adrc.asia/view_disaster_en.php?NationCode=398&lang=en&KEY=1374 ・Reliefweb http://reliefweb.int/disaster/fl-2010-000051-kaz ・REUTERS http://www.reuters.com/article/2010/03/12/idUSLDE62B0O3._CH_.2400 ・Wikipedia http://en.wikipedia.org/wiki/Kyzyl-Agash_Dam_failure

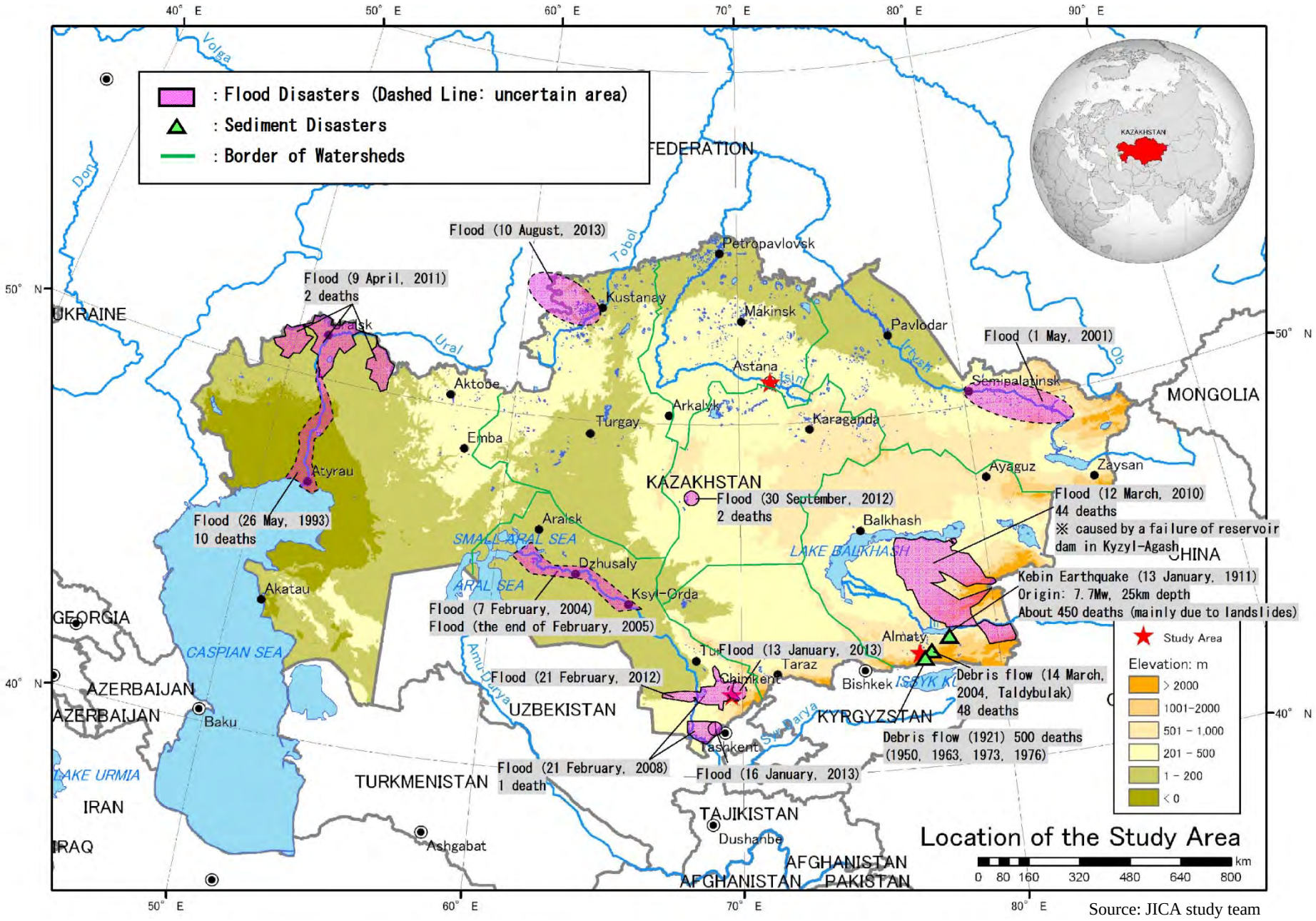
February 20, 2008	Oblast of South Kazakhstan	Flooding occurred in Zhylbulak and Kyzyl-Agash in South Kazakhstan due to heavy rainfall and snowmelt caused by rapid increase intemperature from February 21 to 22, 2008. The number of flooded houses was 2,383, and number ofcollapsed houses was 298.	Onedeath Estimated damage: USD130,000,000 Affected persons: 13,000 (Source: EM-DAT)	・UNOCHA http://reliefweb.int/sites/reliefweb.int/files/resources/11EE97D9A1ADACABC12574120034CFD7-Full_Report.pdf ・ADRC http://www.adrc.asia/view_disaster_en.php?NationCode=398&lang=en&KEY=1145 ・IFRC http://reliefweb.int/sites/reliefweb.int/files/resources/7C4EB394F4ECBCF485257403005C1FB3-Full_Report.pdf ・Reliefweb http://reliefweb.int/disaster/fl-2008-000032-kaz
February 24, 2005	Oblast of Kyzylorda	Flooding occurred along the Syr Darya River in Kyzylorda.	Estimated damage: USD 7,662,000 Affected persons: 25,000 (Source: EM-DAT)	・Development of Flood Monitoring Information System in Kazakhstan, L.F. Spivak, O.P. Arkhipkin, G.N. Sagatdinova
February 7, 2004	Oblast of Kyzylorda	Flooding occurred along the Syr Darya River in Kyzylorda due to an increase in water level of Syardara Reservoir. Flooded area covered 590 km^2 and the number of flooded houses was 343.	No further information is available.	・IRIN Asia http://www.irinnews.org/report/22879/kazakhstan-syrdarya-continues-to-flood-with-2-000-people-evacuated ・Development of Flood Monitoring Information System in Kazakhstan, L.F. Spivak, O.P. Arkhipkin, G.N. Sagatdinova
May 1, 2001	Oblast of East Kazakhstan	Flooding continued for one month in East Kazakhstan which damaged 28 villages.	Estimated damage: USD 3,300,000 Affected persons: 4,500 (Source: IFRC report)	・IFRC http://www.ifrc.org/docs/appeals/01/170102.pdf
April 1, 2000	No further information is available.	No further information is available.	Estimated damage: USD 1,500,000 (Source: EM-DAT)	・EM-DAT
May 26, 1993	Oblast of Atyrau and East Kazakhstan	Flooding occurred in Atyrayskaya, Zapadna-Kazakhstanskaya, and AktJubinskaya regions in Atyrau and East Kazakhstan due to heavy rainfall and snowmelt. There were 5,500 houses that collapsed and 30,000 persons who lost their houses.	Ten deaths Estimated damage: USD 36,532,000 Affected persons: 30,000 (Source: EM-DAT)	・EM-DAT ・Reliefweb: http://reliefweb.int/report/kazakhstan/kazakhstan-heavy-rainsfloods-may-1993-undha-situation-reports-1-5

Source: JICA Study Team

4.2.3 Features of Flood Disasters in Kazakhstan

(1) Floods Prone Areas

A location map of recent floods and sediment disasters is shown in Figure 4.6 on the following page.



Source: JICA study team

Figure 4.6 Location Map of Recent Floods and Sediment Disasters in Kazakhstan

The main flood prone areas in Kazakhstan are as follows:

i) Along the mainstream of a large river, and

ii) Along the upstream of a tributary.

In addition, the expanding urban area in the northwest area of Almaty City would be prone to flood in the future because the installation of drainage system is delayed. In the central area of Astana City, local flooding occurs frequently due to inadequacy of drainage.

(2) Causes of Floods

The main causes of flood in Kazakhstan are as follows:

i) Rainfall and melting snow,

ii) Insufficient capacity on management of reservoir dam, and

iii) Differences in water management among neighboring countries.

i) Rainfall and melting snow

In Kazakhstan, even large rivers freeze due to low temperatures and strong continental northwest winds from December to February. However, in early spring throughout the months from February until April, rapid increase in temperature from below 0 °C up to 15 °C occurs frequently. Snowmelt caused by rapid increase in temperature and continuous rainfall would raise the water level of the river in a short time. In cases where the downstream of rivers freezes, river water would overflow at the boundary between frozen water and running water. In August until October, heavy local rainfall occurs frequently. The flood which occurred in northern Kazakhstan in August 2013 was caused by a heavy rainfall at 155 mm in three days.

On the other hand, there was no record that the cause of past flooding was due to flash floods. Flash floods are short-term events, occurring within six hours of the causative event (heavy rainfall, dam failure, levee failure, rapid snowmelt, and ice jams) and often within two hours at the start of high intensity rainfall. It can be considered that sudden heavy rainfall which causes flash flood rarely occurs in Kazakhstan. However, in the upstream site of small- and medium-sized rivers, when rainfall and snowmelt occurs at the same time, a runoff similar to flash flood may occur. However, such runoff would become debris flow which includes sediment materials.

ii) Insufficient capacity on management of reservoir dam

The flood which occurred at Taldykurganin region in Almaty oblast on March 12, 2010 was caused by the failure of the Kyzyl-Agash Dam for irrigation. The flood left more than 40 people dead and 300 injured. According to an interview by the JICA Study Team, it was considered that the direct cause of the failure of the Kyzyl-Agash Dam was due to trouble of a discharge gate. Moreover, the flood that

occurred in Kostanay oblast on August 10, 2013 was also due to the collapse of a water storage dam in the Ayat River.

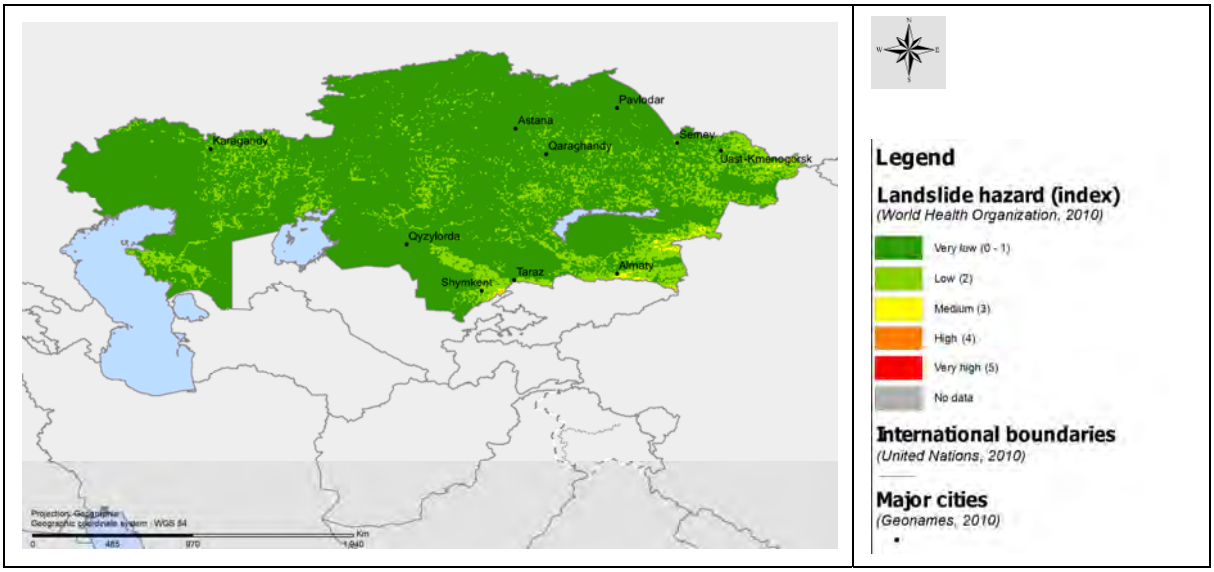
iii) Differences in water management among neighboring countries

There are many international rivers in Kazakhstan, such as the Syr Darya River, the Tobol River, the Ural River, and the Irtysh River. The river running in the vast domain of the former Soviet Union was changed to an international river which flows across some Central Asian countries after the dissolution of the Soviet Union. According to an interview by the JICA Study Team, the international river has been managed by each country. There is an international water resource committee with members from the five Central Asian countries but there are some problems such as inadequate sharing of information among the countries. Thus, insufficient sharing of information about the river among the neighboring countries is one of the causes of flooding.

4.3 Sediment Disasters

4.3.1 Potential Hazard of Sediment Disasters

According to the landslide hazard map of Kazakhstan prepared by the WHO in 2010 (Figure 4.7), the southeast and east areas of Kazakhstan are categorized as having “medium” or “high” landslide hazard. In Kazakhstan, there are several other types of sediment disasters such as landslide, debris flow, slope failure, and rockfall.



Source: WHO (2010)

Figure 4.7 Landslide Hazard Map of Kazakhstan

4.3.2 Past Records of Sediment Disasters

Table 4.5 below gives a summary of records of major sediment disasters around Almaty City.

Table 4.5 Past Records of SedimentDisasters Around Almaty City

Date	Affected Area	Outline of the Sediment Disaster	Affected Persons/Estimated Damage	Source
March 14, 2004	Taldybulak, Oblast of Almaty	The debris flow occurred due to heavy rainfall at 1:30 a.m. on March 14, 2004 and hit two residential buildings in the little village of Taldybulak. The volume of sediment yield was 3 million m^3.	48 deaths (Source: EM-DAT)	・IRIN http://www.irinnews.org/report/23867/kazakhstan-landslide-kills-28-in-south ・IFRC https://www.ifrc.org/en/news-and-media/news-stories/europe-central-asia/kazakhstan/deadly-landslide-hits-kazakh-town/ ・BBC News http://news.bbc.co.uk/2/hi/asia-pacific/3510218.stm
July 8, 1921	Malaya Almatinka valley, Oblast of Almaty	The debris flow occurred due to heavy rainfall in Malaya Almatinka valley outside Almaty City in July 1921. It killed 500 people out of Almaty's population of 45,000 at that time, and destroyed much of the city. The total volume of that flow is thought to have been 10 million m^3. After that, several large-scale debris flows occurred in 1950, 1963, 1973, and 1976. About 700 small-scale debris flows occurred in the last 100 years.	About 500 deaths Estimated damage: USD 100,000,000	Mudflow Phenomena in the Southwest Kazakhstan (Management Basics), A. R. Medeu, 2011
January 4, 1911	Oblast of Almaty	Many large-scale landslides occurred due to the Kemin earthquake (Origin: 7.7 Mw, 25 km depth) on January 4, 1911. Most of the 450 people killed by this earthquake disaster were victims of landslides.	Refer to the previous section on earthquake disaster	Refer to the previous section on earthquake disaster.

Source: JICA Study Team

4.3.3 Features of Sediment Disasters in Kazakhstan

(1) Sediment Disasters Prone Area

As previously mentioned, sediment disasters have wreaked enormous damages in the surrounding areas of Almaty City in the past. In addition, several sediment disasters have occurred in the mountainous areas of south and east Kazakhstan according to an interview by the JICA Study Team; however, there are no records of such.

(2) Causes of Sediment Disasters

The main causes of sediment disasters in Kazakhstan are as follows:

i) Rainfall and snowmelt,

ii) Earthquake,

iii) Outburst of glacial lakes,

iv) Arbitrary land development in hilly areas (e.g., the suburbs of Almaty City), and

v) Aging equipment causing drainpipes to leak water.

A combination of rainfall and snowmelt or a huge earthquake triggers large-scale landslide or debris flow. On July 7, 1998, a glacial lake had an outburst at the Dugoba of the Altay Mountain range in Kirghiz. Large-scale debris flow caused by the outburst of the glacial lake hit the Shahimardan region in Uzbekistan that killed more than 100 people. In Kazakhstan, there are more than 2,000 glacial lakes which pose high risk of outburst in Kazakhstan, the same as in Kyrgyzstan. The impact of global warming to large-scale debris flows and floods caused by glacier lake outburst flood (GLOF) is a growing problem.

In Almaty City, the sphere of habitation is expanding to the hilly areas of the city suburbs due to the increase in population. Landslides and slope failures occur due to arbitrary land development by cutting slopes and embankments without conducting adequate investigations on the area. In the old habitation area, several landslides have occurred due to water leaks from aging drainpipes. Thus, one of the features of sediment disasters in Kazakhstan is that human activities cause landslides or slope failures.

4.4 Other Natural Disasters

Other natural disasters in Kazakhstan include snow avalanche, storm, cold wave, natural fire, and blown sand. According to data from EM-DAT, a strong storm occurred on December 20, 1995 that killed 112 people. Moreover, a cold wave in January 2001 killed three people, and 600,000 people were affected by a cold wave in November 1997. A natural fire occurred on August 17, 1997 that affected 8,000 people.

According to the information from Kazselezashita, in the administrative authority for sediment disaster, flooding, snow avalanche, and other natural disasters, several areas in the mountain region are damaged by snow avalanches every year. In this report, snow avalanches are described alongside sediment disasters.

According to the information from the Institute of Hydrogeology and Hydroecology, the problem of blown sand caused by desertification has been growing recently.

Chapter 5 National Development Plan and Legislation

5.1 National Development Program[1]

5.1.1 Kazakhstan 2030

After Kazakhstan's independence in 1991, President Nazarbayev presented a long-term policy for the country called "Kazakhstan 2030: Enhancing prosperity, welfare, and security for all the citizens of Kazakhstan".

In this program, the seven prioritized issues listed below were set based on the results of economic development and establishment of a sovereign nation that Kazakhstan has achieved in six years after its independence, and the experiences of newly industrialized economies and ASEAN countries which have achieved economic development in a relatively short period.

(1) Ensure national security.

(2) Strengthen domestic political stability and consolidation of the society.

(3) Gain economic growth based on an open market economy (with high levels of foreign investments and internal savings).

(4) Improve health, education, and well-being of Kazakh citizens.

(5) Utilize power resources in Kazakhstan through rapid increase in extracting and exporting oil and gas with the aim of gaining revenues, which would enhance the stability of economic growth and improvement of living standards of the people.

(6) Develop infrastructure more particularly for transportation and communications.

(7) Establish an effective and up-to-date corps of civil servants and state-owned formations of Kazakhstan that are loyal to the cause that they serve and capable of acting as representatives of the people in achieving the priorities.

By implementing the abovementioned prioritized issues, the program follows a long-term direction for the country. The country will obtain political stability in 2030 and living standards will be improved through economic development.

[1] From the "Abstract of Politics and Economy in Kazakhstan", the Embassy of Japan in Kazakhstan, September 2013.

However, in 1997 and the following year that the program was announced, industrial production of the country reduced, gross domestic product (GDP) growth declined and tax revenues decreased due to: (a) shrinking of Asia's economy, (b) weakness in commodity prices including petroleum, and (c) the Russian economic crisis. For these reasons, the country faced an expansion of trade deficit and an increase in government spending, thus, the country applied for an emergency loan to the International Monetary Fund (IMF) in 1998, and placed under its control.

5.1.2 National Program in 2000-2012

(1) Midterm governmental program (1998-2000)

The "mid-term governmental program (1998-2000)", announced in November 1997, was a realized strategic plan extracted from Kazakhstan 2030. The following six prioritized agendas were set: (a) strengthening national security (e.g., multidirectional diplomacy for oil development with foreign companies, etc.); (b) solving rural problems (e.g., by micro loan); (c) tackling poverty and unemployment; (d) ensuring economic development (improving infrastructure such as railways, roads and bridges, airports, and ports, and privatizing national companies); (e) implementing economic and social reforms (e.g., solving unpaid pensions and salaries and improving budget allocation system); and (f) reforming governmental organization (e.g., strengthening discipline of government officials).

As a result, with the support of optimum factors and the rise of petroleum prices, Kazakhstan's economy has recovered. Hence, the country was able to pay its debt to IMF in May 2000.

1) Social and Economic Development Plan of Kazakhstan from 2001 to 2005

The five-year medium-term plan "Social and Economic Development Plan of Kazakhstan from 2001 to 2005", which defined the goals to be achieved in the first ten years, is the first step of Kazakhstan 2030.

2) Adoption of the Strategy for the Development of Industrial and Technological Innovations 2003-2015

In 2003, the growth of production of machinery manufacturing was 20% higher than the production of natural resources for the first time since the country's independence. However, in the same year, exports of crude oil, including gas and condensate, increased by 13% over the previous year, and the ratio of crude oil exports to total exports rose to 54% (from 52% in 2002). It had been clear that the economy of the country tended to further depend on crude oil.

In this situation, the government modified one of the seven prioritized issues, i.e., "develop mineral resources mainly oil and gas with the aim of gaining revenues which would enhance stable economic growth and improvement of living standards of the people"; and adapted the "strategy for development of industries and technology innovations 2003-2015" in May 2003. The purpose of this modification is to shift the focus away from resources through diversification of the economic industrial structure through the development of the manufacturing industry.

In March 2006, the "2006-2008 government programs" have been formulated as an addendum to Kazakhstan 2030 by the president. The program aims for Kazakhstan to be one of 50 competitive countries in the next ten years.

3) National Strategic Plan 2020: Kazakhstan's Way to Leadership

The government has adopted and implemented measures against financial crisis in 2009, when the country was greatly affected by the international financial crisis. As a conclusion of these measures, President Nazarbayev delivered a strategic plan including strategic goals for 2020 at the annual state of the nation address in January 2010.

In the strategy, the promotion of business activities for achieving economic diversity is particularly emphasized. In order to support entrepreneurs who take the risk by themselves, develop new markets, and introduce innovation, a unified budget program on corporate development in the region (Business Roadmap 2020) was introduced in 2010.

4) National program on promoting industry innovation development in Kazakhstan (2010-2014)

In March 2010, in order to realize Kazakhstan 2030, the national program on promoting industry innovation development has been adopted through a presidential decree as the first phase of a five-year economic development plan. The purpose of the program is to secure a balanced and stable economic growth through competition and diversity of the economy. Various numerical targets have also been set in the program.

5) Program on business road map (2011-2020)

After the financial crisis in the United States was solved in 2010, the abovementioned "national program on promoting industry innovation development in Kazakhstan (2010-2014)" was implemented as the first phase program, and the country also formulated the "program on business road map (2011-2020)" including the second phase program. This program contains details of the first phase program, which is regarded as a preparation period in 2010,,promotion of new businesses and export industries in 2011-2014, and further development in 2014-2020.

5.1.3 Kazakhstan 2050

On December 15, 2012, President Nazarbayev announced "Kazakhstan 2050", which is aimed for Kazakhstan to be one of the 30 most developed countries in the world by 2050 as a long-term goal. In this program, there are three major policies, as follows: (a) defining new markets and sources of economic growth for the purpose of establishing cooperative relationships with Kazakhstan, (b) creating favorable conditions for investment, and (c) developing effective public-private partnerships and private sectors. In order to achieve these goals, the importance of macroeconomic and fiscal policy, tax policy, and financial and debt policy was described. In order to realize these three policies, the president then introduced seven prioritized issues, as follows:

(1) Economic policy opening up a new way such as economic pragmatism based on the principle of investment properties.

(2) Support for comprehensive entrepreneurship, which is the leading force for the national economy.

(3) New principles of social policy such as personal responsibility and social security.

(4) Knowledge and special technology are important signposts for modern education, training, expertise, and re-training system.

(5) Strengthening further development of democracy and the country's status in Kazakhstan.

(6) Consistency and predictability of foreign policy for the strengthening of the security of the world community and for the promotion of national interests.

(7) Patriotic spirit of the new Kazakhstan to serve as basis of a multireligious and multiethnic society.

The program was formulated by summarizing Kazakhstan 2030 published in 1997 and set 53 new numerical targets for all the sectors. In addition, as shown in Table 5.1 below, the country is achieving an economic growth rate of more than 5.0% in every year after 2010.

Table 5.1 Real GDP Growth Rate in Kazakhstan (%)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
9.8	13.5	9.5	9.2	9.4	9.4	10.6	8.5	3.3	1.2	7.0	7.5	5.0	6.0

Source: Statistics Agency in Kazakhstan

Direct action targets on disaster management have not been described, but the country is promoting capacity building activities on disaster prevention in Central Asia, which is led by the Ministry of Emergency Situations (MES) with the support of donors.

5.2 Laws and Regulations

(1) Laws on disaster management

By a presidential decree enacted on August 21, 1991, the National Committee for Emergence was established. In addition, the emergency law on industrial disaster and natural disaster or civil defense law is acting as the basic policy for the protection of Kazakh citizens during emergency situations, such as natural disasters.

The laws and regulations on crisis management are listed in Table 5.2 below. Disaster measures have been implemented based on such laws.

Table 5.2 Major Regulations on Emergency

No.	Date Enacted	Description of Law or Regulation
19	July 5, 1996	About emergency situations of natural and manmade disasters
48	November 22, 1996	On fire
87-1	March 27, 1997	On rescue services and the status of rescues
100-1	May 7, 1997	About civil defense
106-2	November 27, 2000	On state material reserve
314	April 3, 2002	On industrial safety of hazardous production facilities
580	July 7, 2004	On mandatory insurance of civil liability of owners of objects associated with risk of harming third parties

Source: Kazselezashita Website

(2) Positioning of disaster management in the development plan

There is no description on disaster management in the two national development programs mentioned above, i.e., Kazakhstan 2030 and Kazakhstan 2050. On the other hand, the Emergency Authority (now MES) formulated the "Kazakhstan Natural Disaster Preparedness Plan" with the support of the United Nations Development Programme (UNDP) in 2000. This plan has been considered as a national comprehensive disaster plan, and serves as a guideline for the implementation of disaster management by the central and local governments. In addition, MES formulated a medium-term national program intended for 2007-2015 that is aimed at prevention and mitigation of natural and anthropologic disasters and improvement of the state management system.

MES has formulated a strategic plan and annual activities basically in every three years. In addition, a number of presidential decrees on disaster management have been ordered and executed.

Chapter 6 Current Conditions and Crucial Issues of the Organizational Framework of Disaster Management Institutions

6.1 Organizational System for Disaster Management in the Central and Local Governments

The central government consists of a total of 15 ministries under Prime Minister Serik Akhmetov. Furthermore, the local government consists of 14 provinces (Akmola, Aktobe, Almaty, Atyrau, East Kazakhstan, Zhambyl, West Kazakhstan, Karagandy, Kostanai, Kyzylorda, Mangystau, Pavlodar, North Kazakhstan, and South Kazakhstan) and two special municipalities (Astana and Almaty). The organization of the central government is shown in Figure 6.1.

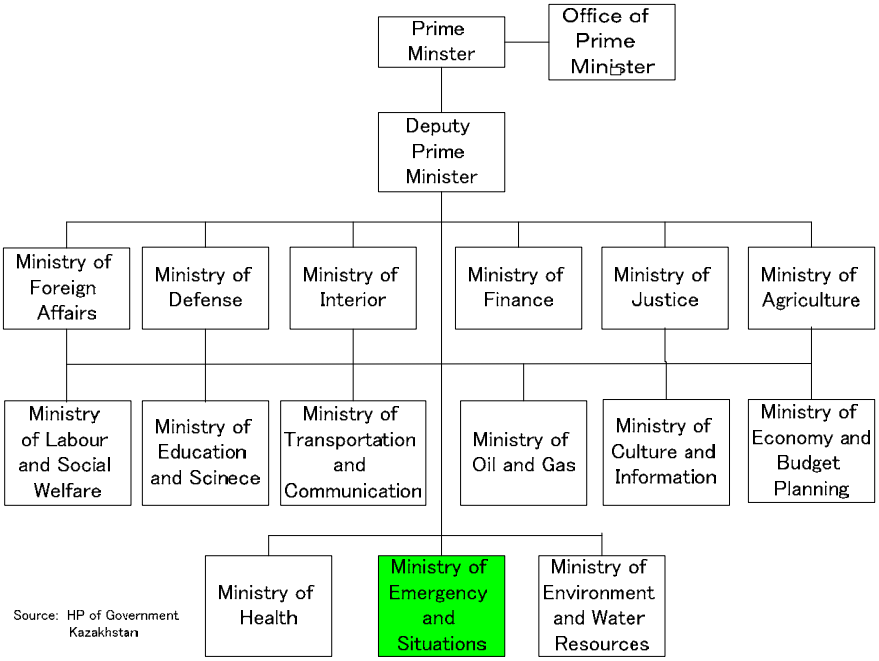


Figure 6.1 Organization of the Central Government of Kazakhstan

The Ministry of Emergency Situations (MES) is the supreme agency under the central government that is responsible for disaster management and conducts countermeasures against large-scale emergency incidents and disasters. MES operates safety control of industries and technical management, conducts political coordination for disaster prevention, supervises state firefighting agencies, and acts as a coordinating agency for civil defense in Kazakhstan. The tasks of MES are defined as follows:

(1) Planning and implementation of national policies to protect the people and land against natural disasters.

(2) Maintenance and operation of the system for disaster prevention and responding to emergency situations.

(3) Civil defense during emergencies and coordination of disaster administrative activities of the

central and local governments in the field of prevention and mitigation measures against natural disasters.

(4) Training of people, civil servants, and government agencies at all levels and organization of emergency rescue.

(5) Realization of international cooperation and integration of national system of civil defense with international organizations.

(6) Implementation of countermeasure system to mitigate the risk of natural disasters and emergency preparedness.

(7) Effective operation of emergency rescue service.

(8) Adjustment of activities, preparation and control of the monitoring system, communication and warning, and automatic emergency information control system of the country.

(9) Alarm or warn the people of an emergency.

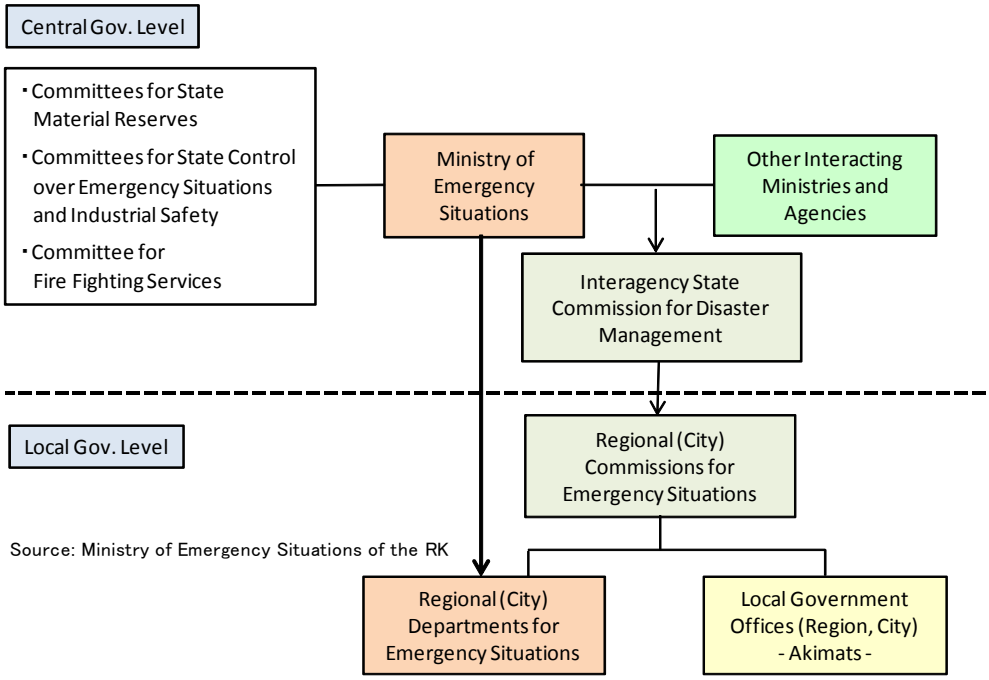
(10) Organization of research and its completion in order to protect people and land at times of emergency.

(11) Evaluation and acceptance of construction and urban plans made by experts, and promotion of humanitarian works and international humanitarian aid as prerequisite civil conditions.

At present, the Center for Emergency Situations and Disaster Risk Reduction (CESDRR) is set up under the MES Central Office, which was established in accordance with an agreement with the Kyrgyz Republic by receiving assistance from the United Nations Development Programme (UNDP). Its details are described in Section 6.3 of this report.

On the other hand, the regional offices of MES are established at 14 provinces and two special municipalities to handle disaster administration at the local level and to play crucial roles for each region. Furthermore, the Commission for Emergency Situations is set up at each province and representatives of concerned administrative agencies and utility companies for public services (e.g., water and gas) comprise the members of the commission.

Figure 6.2 shows the organizational structure for disaster management at the central and local levels.



Source: JICA Study Team

Figure 6.2 Organizational Structure for Disaster Management

In the past the local government offices (provincial and city governments: *akimat*) also had a department concerned with emergency situations, which have similar sections as composed in the MES Central Office. The main tasks of the emergency situation department were to respond to local level emergency situations and reduce disaster risks. Local government budget was being utilized for such activities then. On the contrary, the MES Central Office had been functioned for safety control of firefighting in the industrial sector from the state point of view, as well as civil defense and disaster management of companies, among others. However, at present, these functions have been transferred to the MES Regional Offices and disaster administration at the local level is held by MES. Accordingly, roles such as firefighting, rescue operation, disaster damage response in public services and civil defense were transferred to MES.

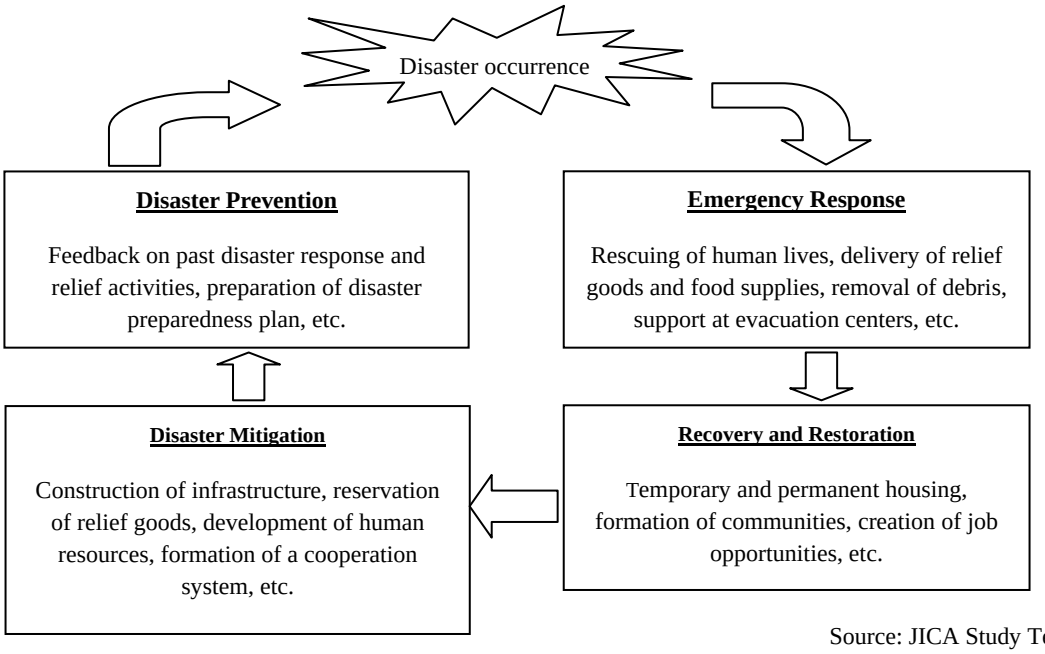
6.2 Ministry of Emergency Situations

6.2.1 Organization System

MES is widely authorized for disaster administration of emergency situations at the state and local levels of the former regime of the Soviet Union. The MES Central Office in Astana is composed of 15 departments, as shown in Figure 6.3.

Figure 6.3 Organizational Chart of MES

In general, the concept of disaster management is defined as a series of activities starting from emergency response at the occurrence of disaster, recovery and restoration, mitigation, and prevention and in a continuous stream, and not as individual acts, toward mitigation, as shown in Figure 6.4. This concept is commonly known as the “Disaster Management Cycle”, which is recognized as a general idea in many countries.



Source: JICA Study Team

Figure 6.4 Basic Concept of the Disaster Management Cycle

As shown in the disaster management cycle and the tasks and organization of MES, the function of recovery and restoration is not covered. This fact is also pointed out in the final report of the "Study on Earthquake Disaster Risk management for Almaty City in the Republic of Kazakhstan (2007-2009)".

Furthermore, every department mainly handles administrative jobs in the central government and controls regional offices with approximately 10 to 20 staff each. MES involves three independent committees—namely, the Committee for State Material Reserves, the Committee for State Control over Emergency Situations and Industrial Safety, and the Committee for Fire Fighting Services—and 74 branch offices. The total number of staff of MES is approximately 36,000.

6.2.2 Current Status and Issues

Through analyses of the tasks allocated to the respective departments that were interviewed, the issues are summarized in Table 6.1 below.

Table 6.1 Current Status and Issues of MES

Category	Subcategory	Current Situations	Issues
Policy & Plan	Policy	There are problems in coordination among governmental agencies upon occurrence of disaster. Demarcation of responsibilities and tasks of the agencies concerned with disaster management (except MES) is unclear. Countermeasures against large-scale disasters caused by natural phenomenon beyond expectation is delayed. Accumulation of technical know-how regarding structural measures (design and planning) is insufficient. No guideline is prepared yet for basic principles for disaster management against climate change risk.	Clarify coordination with other agencies in Disaster Preparedness Plan Verify effectiveness of coordination through joint drill Improve know-how of planning of countermeasures based on risk assessment Share the knowledge on risks due to climate changes and reflect it to the Disaster Preparedness Plan
	National Development Plan	The Strategic Plan is prepared based on the "Kazakhstan 2015" No description of disaster management and recovery plans are not included. Accumulation of know-how for hazard mapping and risk assessment is insufficient. Countermeasures for preparedness and technology development against earthquake disasters are delayed.	Keep consistency of policies and activities for disaster prevention considering disaster management cycle Clarify responsible agencies for disaster mitigation and recovery/ restoration in respective sectors Introduce technology for hazard map preparation and risk assessment
Organization & Institutions	Coordination	Under control of 2 institutes (National Research and Engineering Center for Industrial Safety and Kazelezashita) One of important tasks is coordination with upper agencies (the President, President's Office, Committee for National Security and Prime Minister's Office, etc.). MES is responsible to research, analyze, prepare countermeasures and report on emergency situations. MES conducts safety check of infrastructure (water resources management faculties, hydro power facilities, etc.) periodically in coordination with other agencies assuming large-scale disasters. Drills are conducted aiming at enhancement of coordination in related sectors. National level drills are conducted for risk management of flood and winter weather annually. Drills for earthquakes and accidents of oil/gas leakage in the Caspian Sea once two or three years.	Strengthen technology for planning and design (structural and non-structural measures) by attached agencies
	International Framework	Participation and coordination to international framework for disaster prevention (Shanghai Cooperation Organization ,etc.) is managed. Cooperation system of CESDRR still needs strengthened and activities are stagnated. Kazakhstan joins in international relief and rescue operations. MES conducts rescue training inviting foreign related agencies.	Earlier preparation of Action Plan and its implementation (Coordination with UNDP shall be accelerated).
Resources	Budget	It takes long time for securing approval on budget raising.	Simplify and keep transparency of the execution process of budget
	Rescue technology	Expertise knowledge and technology for rescue is insufficient for effective outcome. Introduction and utilization of more modern technology is required.	Strengthening of technology for rescue operation and education of experts
	Procurement of goods	Improvement of quality for rescue technology and related equipment is important. In general, procurement of goods for disaster management is handled by "Committee for State Material Reserves", Disaster Mitigation Department and Regional Offices. Release and delivery of goods is conducted speedy in accordance with MES department orders. However, it takes long time till completion of the administrative procedure to release state reserve since approval from the cabinet is required. Goods for disaster management in local government is reserved in accordance with ordinances of local government aside from MES.	Simplify and keep transparency of the execution process of release of reserved goods
Information & Telecommunication	Storage & dissemination of information	Information dissemination involves significant issues since the facilities are independent and not connected with network. A part of the "Kazakhstan National Atlas" (National Geographic Institute of Kazakhstan, 2010) is available in MES but not issued to public. Construction of infrastructure and strengthening of information system have not been progressed as priority countermeasures in flood/ sediment disaster sector. Data of disaster is not disclosed to public. At present, improvement works aiming to establish accessible system by local government. Infrastructure seems obsolete although rules for dissemination of disaster information from central to local and local to central governments are available.	Establish communication network of interagency (including related institutes and attached agencies) and introduce advanced technology and base-isolating technology (earthquake disaster prevention) Promote remote sensing technology by means of satellite Improve awareness on importance of sharing information (including related agencies) develop disaster database system and public system opened on internet
	Dedicated communication system	There is a risk in information dissemination of procurement of required goods upon earthquake occurrence. Although MES constructs and maintains information networks with not only internal MES but also external agencies (TV, radio and internet providers, etc.), it is insufficient.	Develop dissemination technology of disaster information (hardware and software) Modernize infrastructure of telecommunication (dedicated telecommunication lines in MES and securing redundancy, etc.)
Disaster Education and Training	Disaster education	Raising disaster awareness among citizens is necessary through disaster education. Disaster education is conducted by unit of offices and schools. Disaster prevention drill participated by all citizens is not conducted.	Develop curriculum for education of disaster prevention Increase specialists and staff with expertise Develop systematic program for participation by local people in disaster preparedness plan
	Training	Nationwide disaster drills are conducted twice ay year in spring and autumn (connecting MES Central Office and Regional Offices). MES operates rescue operation to save human lives and to find missing persons upon occurrence of disasters.	Develop systematic programs to train trainers
	Awareness on disaster prevention	There is no system to promote awareness raising program from legal, planning and organizational aspects. Roles and coordination system among mass media and between mass media and government agencies are not so clear in awareness raising.	Involve program for awareness enhancement in disaster preparedness plan Enforce regular meeting of MES and mass media and promote exchange of information for awareness raising
Evacuation System (status of activity in communities, etc.)	(Ref: Chapter 11)		
Emergency Response (early warning system and initial response, etc.)	(Ref: Chapter 11)		

Source: Study Team

6.3 Center for Emergency Situations and Disaster Risk Reduction (CESDRR)

(1) Background of establishment of CESDRR

On May 17, 2013, the agreement on the establishment of CESDRR was signed between MES of the Republic of Kazakhstan and the Kyrgyz Republic. Before that time, the scheme has been prepared mainly in cooperation with UNDP from 2010 to 2011 and numerous discussions and negotiations has been conducted between 2012 and 2013. Although scheduled to join before, the Republic of Tajikistan withdrew and CESDRR was eventually launched by only two countries. Both sides have agreed to assign their respective staff to CESDRR.

(2) Current status of the agreement

At present, ratification of the agreement is in progress at the lower house (*Mazhilis*). MES provided an office building for CESDRR and is preparing to commence the associated activities.

(3) Staffing and preparatory works

It is presumed that five personnel from Kazakhstan, five personnel from the Kyrgyz Republic, and four clerical workers will be assigned, for a total of 14 personnel. At present, two personnel from each country were dispatched.

(4) Future activities of CESDRR

MES is discussing the future direction with international donors, such as UNDP. A list is prepared to clarify which field of cooperation can be realized. The Kazakh side contributed to the budget of CESDRR from its own account. It seems that full-scale activities will be commenced after ratification of the agreement.

(5) Movement of the Kyrgyz side

In a discussion among ministers, the Kyrgyz Republic declared that the country can solve its shortage of budget and does not require any assistance from Kazakhstan. Upon receipt of this statement, Kazakhstan recognizes that the matter is concerned with the Kyrgyz Republic should the latter requests assistance from international donors for execution of the agreement.

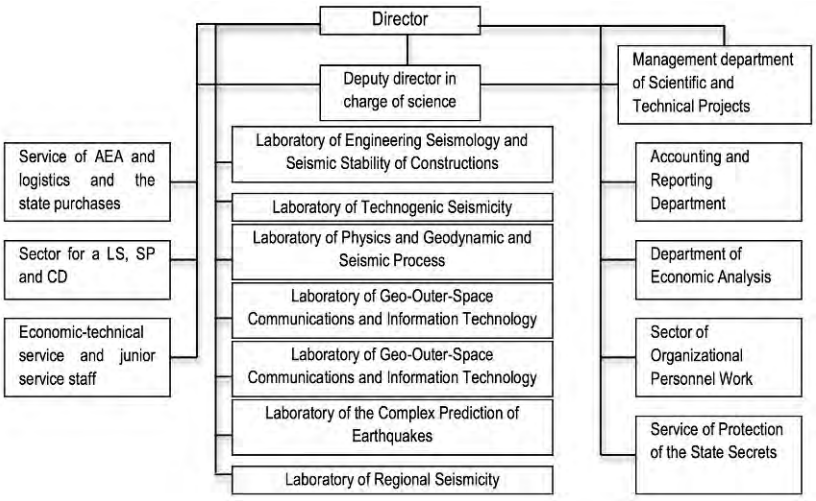
(6) Expectation to JICA for activities of CESDRR

As for the activities of CESDRR, although UNDP has a schedule to update the earthquake risk assessment in Almaty City, no details have been decided yet. No definite action can be seen, though it was reported that the European Union (EU) along with other international donor agencies has contributed to the budget. It seems that MES would like to discuss with JICA after the completion of the ratification procedure at parliament.

6.4 Attached Agencies, Institutes and Universities

6.4.1 JSC Institute of Seismology

The Institute of Seismology under the Ministry of Education and Science conducts seismological researches and studies for earthquake risk reduction. There are about 400 staff working in the institute. In past researches, the institute had been able to complete nationwide earthquake hazard maps. The institute monitors seismic activities with about 60 observatories. In Almaty City, there are 18 earthquake observation points and 15 strong motion observation points. The organizational chart of the Institute of Seismology is shown in Figure 6.5.

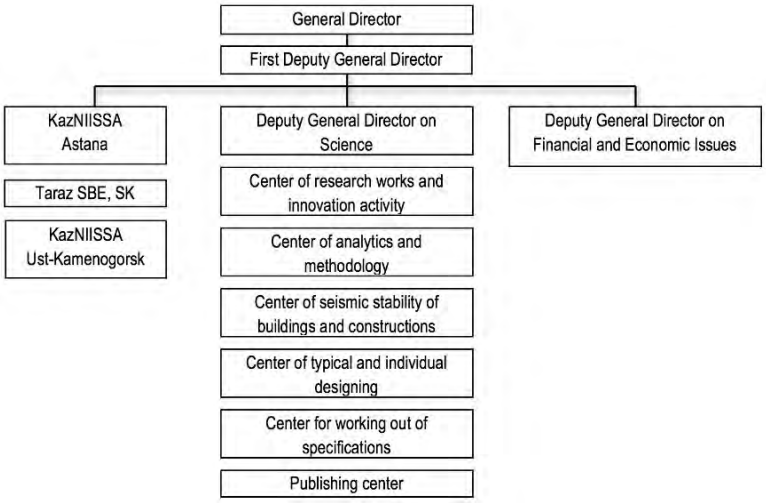


Source: Institute of Seismology, Kazakhstan

Figure 6.5 Organizational Chart of the Institute of Seismology, Kazakhstan

6.4.2 JSC Kazakh Scientific-Research Institute of Construction and Architecture (KazNIISSA)

KazNIISSA is a research institute under the Ministry of Regional Development. The institute prepares design criteria, guidelines and manuals for aseismic design, and design specifications for buildings with special shapes or structures. The institute also conducts seismic stability tests for new and existing buildings with their originally developed equipment. Figure 6.6 shows the organizational chart of KazNIISSA.

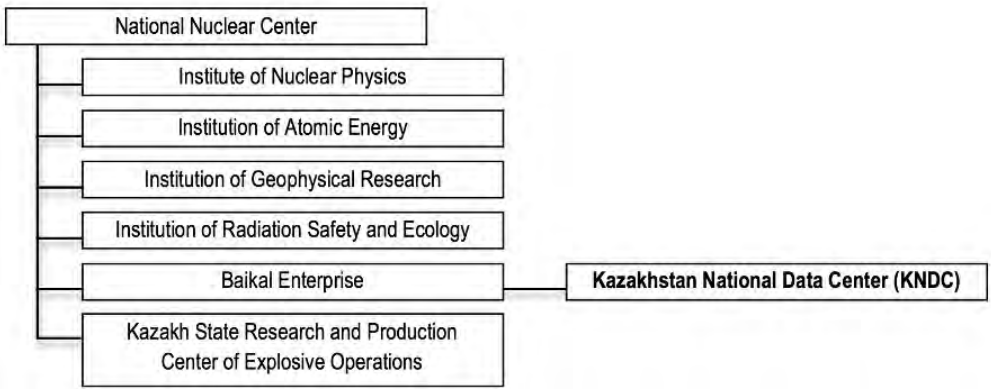


Source: KazNIISSA

Figure 6.6 Organizational Chart of KazNIISSA

6.4.3 Kazakhstan National Data Center (KNDC)

KNDC was set up in the National Nuclear Center under the Ministry of Industry and New Technologies. Based on the Comprehensive Nuclear Test Ban Treaty (CTBT), the center was established globally in order to monitor explosions that are induced by nuclear tests in the world. The center monitors not only nuclear explosions but also earthquakes due to diastrophism. The acquired earthquake data are transmitted to the Institute of Seismology periodically, and its observatories are linked with the International Monitoring System (IMS). The observatory network of KNDC covers an extensive area with five seismic arrays, seven three-component stations, and two infrasound stations. These facilities complement the observatory network of the Institute of Seismology. Figure 6.7 shows the organizational chart of KNDC.



Source: JICA Study Team taken from the website of KNDC

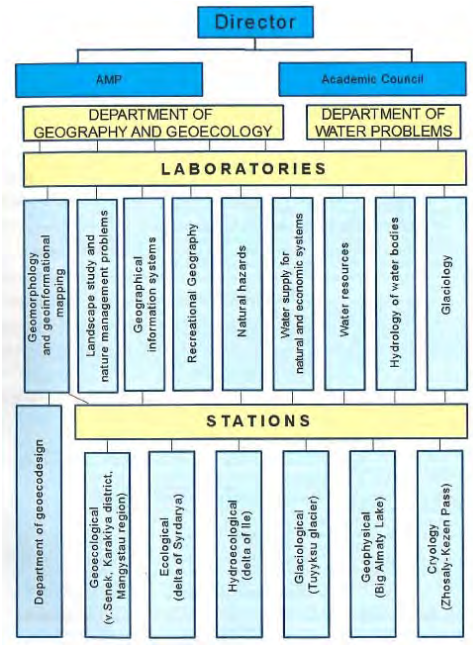
Figure 6.7 Organizational Chart of KNDC

6.4.4 Institute of Geography

The Institute of Geography is a government-owned enterprise affiliated with the Ministry of Education and Science that engages in natural and social research and activities. The institute celebrated its 75th anniversary in 2013. It raises most of its funds from government-commissioned researches contracted through tenders, and joint projects with private companies and/or associations. The institute has a staff of 186 people including researchers specializing in topography, geography, meteorology, floods, and information technology. Its organizational structure comprises nine laboratories and six regional stations. In relation to natural disasters, its survey and research activities cover glaciers and glacier lake collapse, snowslides, heavy rains, floods, sediment disasters, droughts, sandstorms and desertification.

To date, the Institute of Geography has been taking the initiative in creating hazard maps and assessing risks of earthquakes, landslides, debris flows, snowslides, and other phenomena for the country as a whole.

The Institute of Geography has been engaged in joint research projects not just with Commonwealth of Independent States (CIS) countries but also with Japan, Germany, the UK, the USA, Norway, France, Australia, Sweden, and Turkey. Although small in scale, joint research projects with China have also been implemented in recent years. As for international organizations, the institute has participated in risk assessment and water-related research projects with UNDP and the United Nations Educational, Scientific, and Cultural Organization (UNESCO). The institute also carried out a joint research on desertification with the Asian Development Bank (ADB). Figure 6.8 shows the organizational chart of the Institute of Geography.



Source: Pamphlet of the Institute of Geography

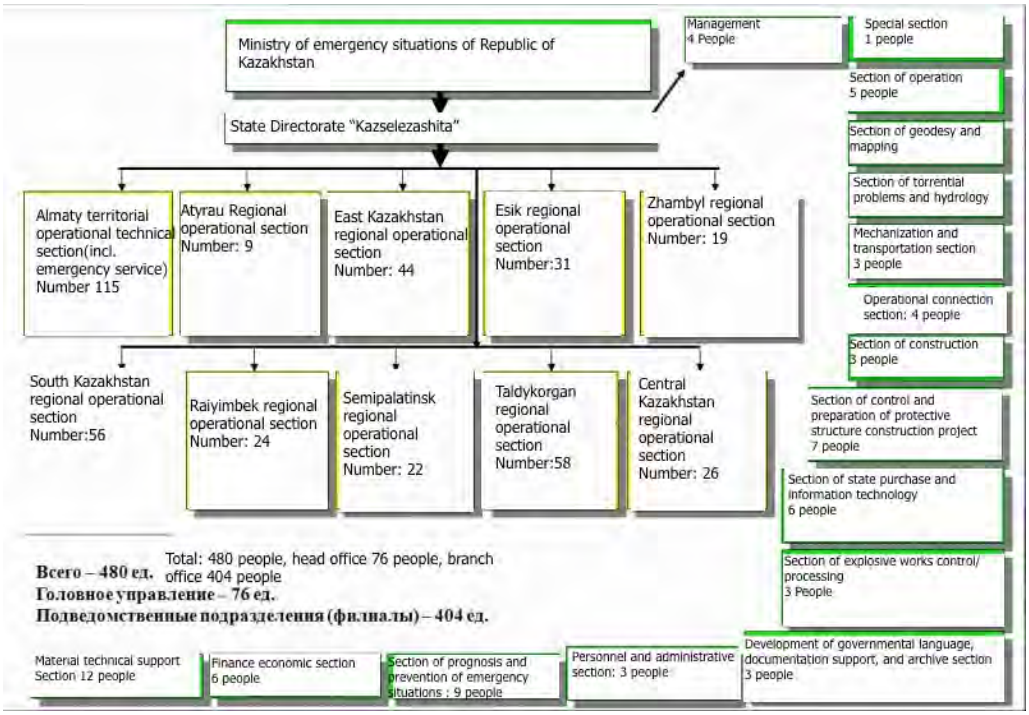
Figure 6.8 Organizational Chart of the Institute of Geography

6.4.5 Kazselezashita (Debris-flow Protection Service)

Kazselezashita (Debris-flow Protection Service) is affiliated to MES and engages in activities related to forecasting debris flows, snowslides, landslides, floods, earthquakes, etc. It is financed with the central government's budget. It has 11 regional branches and a workforce of 480 employees across the country, as shown in Figure 6.9.

Kazselezashita engages in monitoring, analyzing, designing, bidding for and supervision of facilities construction, land management, and other activities related to debris flows, snowslides, landslides, floods, and glacier lakes. It cooperates with the regional branches of MES and KazHydromet by sharing monitoring data, among others.

The Koksarai Reservoir was developed in 2011 in the Syr Darya River basin under a project where Kazselezashita acted as the main ordering party. The reservoir is in operation under the management of the on-site office that was founded by the Shymkent Branch of Kazselezashita.



Source: Website of Kazselezashita

Figure 6.9 Organizational Chart of Kazselezashita

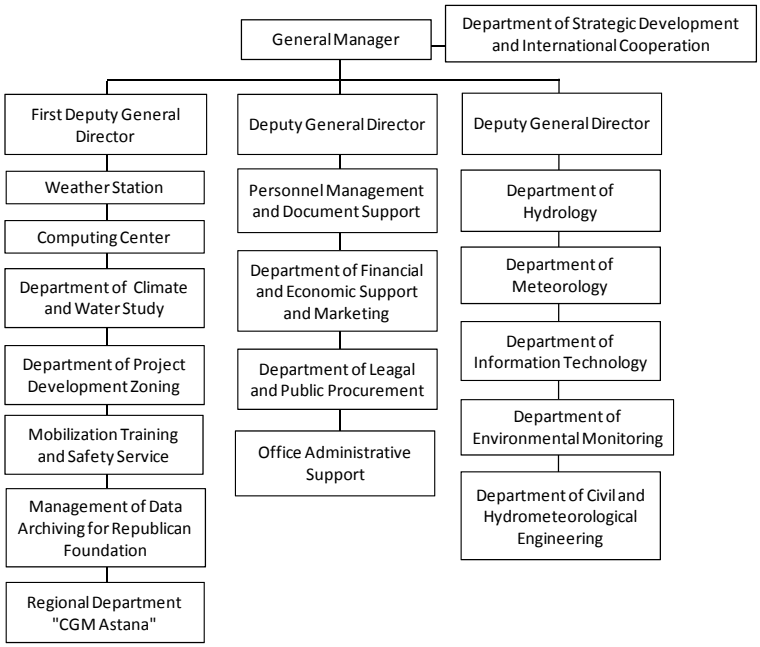
6.4.6 KazHydromet

KazHydromet was founded in 1999 as a state enterprise affiliated with the Ministry of Environment and Water Resources. Its major activities include monitoring of weather, climate, and the environment, as well as providing information such as weather forecasts and hazard notifications. Fully financed by the Ministry of Environment and Water Resources, KazHydromet is mainly comprised by the hydrological

and meteorological departments. Its headquarters in Astana is staffed by approximately 200 employees, while approximately 3,500 persons work in its regional branches. Figure 6.10 shows the organizational chart of KazHydromet.

KazHydromet has 15 regional branches, 298 hydrological posts, 277 meteorological stations, and nine atmospheric observation stations. A total of 90 meteorological stations are automated, measuring data such as air temperature, humidity, atmospheric pressure, rainfall, wind speed, wind direction, and sunshine hours. Such data are being sent to the head office every three hours.

KazHydromet's monitoring staff compare the observed data to the reference values every day to determine whether an emergency is likely to occur. If the likelihood is high, this is reported to MES. However, KazHydromet's responsibility stretches only as far as providing observed data to the relevant organizations. It is MES that takes responsibility for issuing warnings.



Source: Website of Kazhydromet

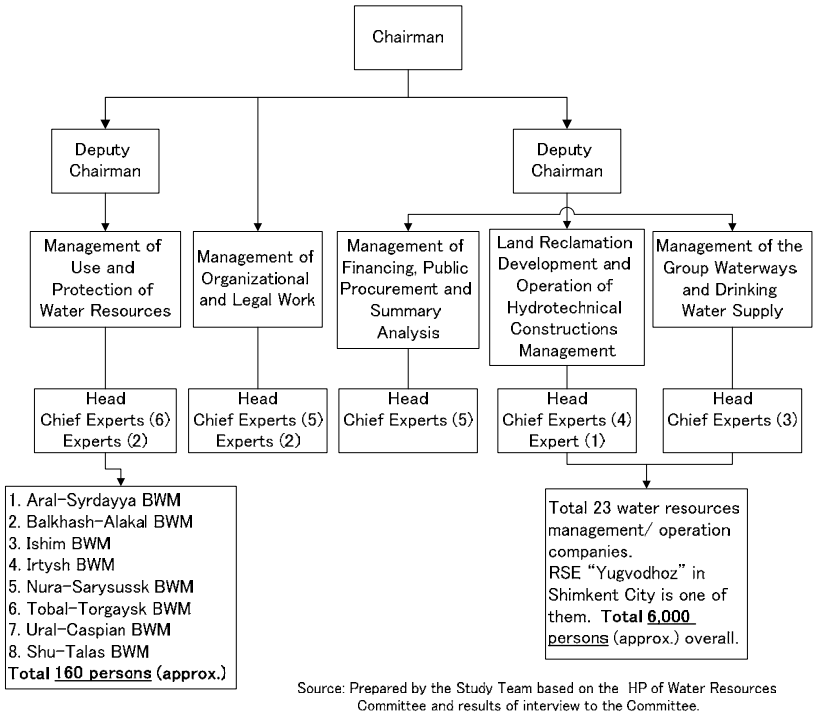
Figure 6.10 Organizational Chart of KazHydromet

6.4.7 Water Resources Committee

The Water Resources Committee, which is affiliated with the Ministry of Environment and Water Resources, manages the usage of water from major rivers across the country. Its head office in Astana has five departments, and employs a total of 36 staff members. The country's territory is divided into eight basins, in which each basin has a regional office. The regional offices employ a total of 160 staff members.

The Ministry of Environment and Water Resources also has an affiliated state enterprise called Kazvodhoz, which further has an affiliated company called Yugvodkhoz. These companies are in charge

of the operation and management of water resource management facilities in Kazakhstan. The South Kazakhstan Branch of Yugvodkhoz has eight offices in the province, employing 1,300 staff members. Figure 6.11 shows the organizational chart of the Water Resources Committee.



Source: JICA Study Team

Figure 6.11 Organizational Structure of the Water Resources Committee

6.4.8 Institute of Hydrogeology and Geoecology

The Institute of Hydrogeology and Geoecology was founded in 1965 as an organization affiliated with the Ministry of Education and Science. It is a state joint-stock company with 100% of the shares held by the ministry. This state institution is also a corporation that concludes operation contracts with the private sector. It engages in assessments, mapping, development of analytical methods, chemical analyses, and other activities related to mineral and water resources. It has seven laboratories for simulating hydrodynamic and geoecological processes, applied hydroecological research, regional hydrogeology and geoecology, groundwater resources, hydrogeological thermal abnormalities, man-made hydrogeological processes, and chemical analyses. It also conducts field surveys such as drilling explorations. Apart from matters of water resource management in dry regions, the institute engages in countermeasures against industrial water pollution and development of geothermal and waste heat energies.

6.4.9 Institute of Space Research

The Institute of Space Research was founded in 1991 as an organization affiliated with the Kazakhstan Space Science Center. It has 12 laboratories which conduct satellite-based monitoring of the

atmosphere and earth surface, among other activities. It has a workforce of approximately 130 staff members who monitor floods, forest fires, steppe fires, and oil contamination of the Caspian Sea by using satellites. The institute works together with the Ministry of Environmental Protection in monitoring relatively small-scale incidents of contamination and alike, and with MES in surveying large-scale disasters.

6.5 Donors, International Aid Organizations, and Nongovernmental Organizations (NGOs)

6.5.1 United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA)

UNOCHA has an office in Almaty City and conducts activities with priority such as emergency relief, recovery, and restoration after occurrence of disasters in the entire Caucasus region and Central Asia. UNOCHA maintains close relationships with UNDP and the United Nations International Strategy for Disaster Reduction (UNISDR) because of the similar features and objectives of their activities. Especially in Kazakhstan, UNOCHA is coordinating with UNDP and UNISDR for disaster risk reduction in Central Asia and the establishment of CESDRR in order to strengthen coordination in the region.

Furthermore, UNOCHA extended its assistance through the Red Crescent Society for the damage caused by the cold wave (recorded at -40 ℃ to -46 ℃) that hit the northern and central parts of Kazakhstan in December 2012.

6.5.2 United Nations International Strategy for Disaster Reduction (UNISDR)

UNISDR, as a member agency of UN, is tasked to support in creating disaster management policies and strengthening disaster prevention functions, e.g., reduction of disaster risks. The five priority issues are as follows:

(1) Strengthening of disaster management capability of the target country

(2) Support in risk assessment

(3) Promotion of risk reduction countermeasures

(4) Assistance to judgment by decision makers

(5) Strengthening of adaptability to climate change

According to a person-in-charge in UNISDR, the agency prioritizes coordination with focus on regional cooperation in Central Asia. Furthermore, UNISDR has prepared a comprehensive strategic plan for the establishment of CESDRR in coordination with UNOCHA and UNDP.

6.5.3 UNDP

As mentioned in the previous clauses, UNDP continues its assistance consistently from the preparatory stage of CESDRR until the present. In connection with this, UNDP is undertaking the project

"Strengthening National Capacity for Risk Assessment, Prevention, and Response to Natural Hazard". The project period is from June 2013 to December 2015 and the total budget is approximately JPY 150 million. The purpose of this project is to assist the preparation of disaster preparedness plan and national response plan, including strengthening of community-based disaster management at the provincical level. Based on the interview with the project manager, Mr. Baimukhambetov, it is presumed that the project works would become part of the activities of CESDRR.

On the other hand, since the project involves activities for human resources development and strengthening, the UNDP Kazakhstan Office expects the participation of JICA, which has numerous experiences in this field.

Furthermore, Mr. Baimukhambetov is a former staff of MES. The results of the project will affect the evaluation of CESDRR. Accordingly, it will be essential to monitor internal movements in CESDRR as well as the progress of the said project from time to time through collection of information from MES. In addition, it was informed that two staff (working group) who have been temporarily dispatched from the Kyrgyz Republic returned to their home country due to budgetary problems in October 2013.

Moreover, it was informed that a new project will start upon completion of DIPECHO VII in December 2013; and in continuation, UNDP will act as the most active donor agency in the field of community-based disaster management through the DIPECHO project.

6.5.4 World Bank

The Country Assistance Policy of the World Bank in Kazakhstan consists of three pillars, namely (i) assistance to improvement of competiveness, (ii) assistance to public involvement, and (iii) assistance to adaptive countermeasures for climate change. According to the information collected during the interview, there are many cases that can support technical assistance since sufficient financial resources are available from the Kazakh side. The World Bank mainly handles environmental conservation and water resources-related projects. Aligned with the Country Assistance Policy, the following projects are being undertaken at present:

(1) Groundwater and portable water supply project;

(2) The Nora River drainage improvement project (amendment: canal improvement works);

(3) The Aral Sea Watershed irrigation and drainage improvement project;

(4) The Syr Darya River basin water resources management and structure rehabilitation project (reservoirs, dikes, and other hydraulic structures); and

(5) Agriculture and Irrigation Sector Assistance Program (improvement of secondary and tertiary canals, assistance for establishing water users' union to be managed by branch offices of the Water Resources Committee, etc.).

6.5.5 NGOs

In Kazakhstan, the activities of NGOs are not so outstanding compared with those in the Kyrgyz Republic. Under such situation, the Red Crescent Society is participating in the DIPECHO project undertaken by UNDP as well as in community-based disaster management.

Chapter 7 Current Conditions and Crucial Issues in Disaster Management in Regions

7.1 Transfer of Disaster Management Function from Local Government to Central Government

The regional offices of the Ministry of Emergency Situations (MES), which are located in 14 provinces and two special municipalities, handle disaster administration at the local level, as mentioned in Section 6.1. The focal point is to transfer disaster management functions previously handled by local governments (provincial and city governments: *akimat*) to MES due to the modification of relevant laws. This was conducted in compliance with the ordinance "On Amendments and Additions to Some Legislative Acts of the Republic of Kazakhstan on the Divisions of Powers between the Government" dated June 13, 2013. According to information obtained from MES, the changes made to the former management systems are as follows:

(1) No changes in authority on budget utilization at local governments (province, city, and district)
- Civil defense at the local level,
- Prevention and mitigation of emergency situations at the local level, and
- Prevention and cessation of wild fires in districts (city) and villages.

(2) Modification in the organization of the Committee of Emergency Situations
- Replacement of the committee under the provincial governor, city mayor, and head of district (under the vice governor, vice mayor, and deputy head of district office in the former system).

(3) Transfer of authorization on local budget to the head of the MES Regional Office
- Although the MES Regional Office conducted their activities by using budget provided by the central government, local budget became available through the modification of relevant laws.

Through the institutional change mentioned above, the authority and functions of disaster administration at the local level have become concentrated in MES. However in actuality, this survey clarified that the modifications have not yet been completed and the current status is different in each region. Therefore, the respective MES Regional Offices need to complete the required procedure for consolidating disaster preparedness in respective regions at the earliest opportunity.

7.2 Current Conditions and Crucial Issues in Regions

In the current survey, a series of interviews with concerned staff at the local government offices listed below were conducted in order to grasp the current conditions of disaster administration in regions. The Survey Team analyzed the current conditions and crucial issues of the MES Regional Offices and local governments (*akimat*), and summarized them as follows:

(1) MES Regional Office : Astana, Almaty, and South Kazakhstan
(2) Provincial Government : South Kazakhstan (at Shymkent)
(3) City Government : Almaty and Shymkent

Table 7.1 Current Conditions and Crucial Issues of the MES Regional Offices and Local Governments

Category	Subcategory	Issues	Countermeasures (Proposed)
Regional offices, Ministry of Emergency and Situations	Astana Regional Office	Astana Regional Office of MES has three district office in Yecil, Almaty and Saryarka. The Commission for Emergency Situation is established in Astana City Government for discussion by gathering concerned agencies upon occurrence of disasters. Disaster records are abandoned after three years in principle except large scale emergency situations. Disaster record archives (after 1997) are stored at "VTTISA" in technology center of MES. However, it seems not convenient for use based on the interviews. MES is working to improve the past disaster record archives at present. Since population density is low, disaster management in remote areas is quite difficult. Normally, in autumn households reserve food staff for winter, but problems lie in electricity and medical services. Technology in rescue operation in snowy and iced fields is immature.	Prepare disaster database system and extend storing period (all disaster categories) Strengthen public services for disaster management in remote areas (vulnerable for aged people, handicapped people and children) Improve technologies for disaster relief operation in cold districts Establish dedicated communication network firmly functioning at emergencies
	Almaty Regional Office	MES Almaty Regional Office composes of seven district offices. The Commission for Emergency Situations is established in Almaty City Government and City Mayor takes its Chairperson. City Government has right to nominate members of the Commission. The members consist of heads of district offices, head of civil defense department of MES Almaty, branch office of Ministry of Education, Public utilities company for gas and water, branch office of Ministry of Interior, Kazselezashita and Kazhydromet, etc. Disaster drills are conducted annually, every three months and in seasons. The budget both from central and local government became available to utilize for civil defense from 2013. However, it can be used only for prevention. Early warning system with automated dispatching signals is required (for flood and debris flow). Transfer of the right for disaster administration from Almaty City to MES Almaty is still underway. As for sharing of disaster information, coordination with Kazhydromet and Kazselezashita is essential. Technology and equipment to quickly identify the areas damaged by disasters is necessary (for identification of origins of debris/mud flow) (ex. unmanned flight equipment) Strengthening of remote sensing technology and monitoring by satellites is required. Establishment of disaster information system and its network is crucial issue for entire MES. Effective solution might not be found only at one regional office.	Clarify roles and responsibilities of MES and local government Clarify budget allocation and approval procedure Establish dedicated communication network at emergencies
	South Kazakhstan Regional Office	MES South Kazakhstan Regional Office is extending efforts in disaster education and drills in coordination with Shimkent City and related agencies aiming at civil defense. The Office cannot directly tie-up with donors since no authorization is given except the drills managed by MES Central Office for national level. Although the function of disaster management of local government has been transferred to the MES Regional Offices, the duties and tasks were not change at all. The manual for training is not documented.	Prepared manuals for training of disaster prevention Establish dedicated communication network at emergencies

Category	Subcategory	Issues	Countermeasures (Proposed)
Provincial Gov.	South Kazakhstan Province	Although the disaster prevention function is transferred to MES South Kazakhstan Regional Office, budget allocation is determined by the Commission of Emergency Situations. Deterioration of disaster awareness among the staff of provincial government is a matter of concern. Among five vice mayors, Mr. Kamviekov has a role of chairperson of the Commission for Emergency Situations. Countermeasures were taken for public structures, high-rise buildings and road, etc. earthquake resistance project were not realized yet.	Clarify roles and responsibilities of MES and local government Clarify budget allocation and approval procedure
City Gov.	Almaty City	Disaster response and disaster education in Almaty City are under control of MES Almaty Regional Office. Improvement in disaster management in Almaty City is not confirmed after JICA Study in 2007. Urbanization in the suburban areas is progressed and target areas are expanded. In the New Urban Development Master Plan of Almaty, it is essential to incorporate the view of disaster management. Assistances by experts for preparation of the plan is required. Although the Institute of Seismology takes in charge for hazard mapping, the progress is behind the schedule.	Clarify roles and responsibilities of MES and local government Develop guidelines for hazard map preparation and enforce distribution of the guidelines Prepare manuals for training of disaster prevention
	Shimkent City	The Commission of Emergency Situations is set up in Shimkent City Government and City Mayor plays the role of its chairperson. There is no disaster preparedness plan yet. However, each section has own mid and long term action plans (Strategic Plan and Operation Plan). In accordance with the laws, 2 % of the annual budget shall be allocated to disaster management activities and to save for emergency situations. Actual status could not be confirmed. In Shimkent, detailed action plan is pre-determined upon occurrence of severe earthquake. Assuming a large-scale earthquake, drills are conducted by the Commission for Emergency Situations, MES, Provincial and City Governments. Preparation of hazard maps for planning infrastructures is not yet initiated.	Clarify roles and responsibilities of MES and local government Develop guidelines for hazard map preparation and enforce distribution of the guidelines Prepare manuals for training of disaster prevention

Source: Study Team

Chapter 8 Current Situations and Issues in Earthquake Disaster Management

8.1 Summary of Current Situations and Issues in Earthquake Disaster Management

Table 8.1 provides a summary of the current situations and issues in earthquake disaster management in Kazakhstan. The information shown in the table was collated by the JICA Study Team from a series of interviews with related organizations in Kazakhstan and websites on the internet.

Table 8.1 Current Situations and Issues in Earthquake Disaster Management

Categories	Subcategories	Current Situations	Issues
Observation Systems	Organization	The Institute of Seismology is the main organization. The Kazakhstan National Data Center (KNDC) shares the acquired data with the Institute of Seismology.	Foster collaboration among related organizations
	Observation Networks	Observation networks have been established mainly in/around Almaty City. Strong motion seismographs, high-sensitivity seismometers, and global positioning system (GPS) receivers were installed by JICA in Almaty City. The Institute of Seismology periodically publishes earthquake catalogues.	Replace or update the existing observation network
	Staff/Researchers	Universities do not have educational courses on seismology. KNDC has educational courses for young seismologists or researchers.	Enhance the coverage of the observation network
Understanding of Seismic Hazard and Risks	Hazard Maps	The Institute of Seismology have prepared nationwide seismic hazard maps in the past. The hazard map of Almaty City was prepared in 1995. Copies of the map are still in use. JICA prepared seismic hazard/risk maps in 2009.	Update the nationwide seismic hazard maps based on the latest data Update the seismic hazard map of Almaty City
	Risk Assessment and Damage Estimation	The Ministry of Emergency Situations (MES) recognizes the risky/dangerous facilities. JICA assessed seismic risks in Almaty City in 2007-2009.	Estimate earthquake damages based on the latest data
	Active Faults	Very few field investigations were conducted recently.	Study and estimate the activities of faults in connection with earthquakes
Preparedness and Countermeasures	Responsible Organizations	MES and local governments are responsible for earthquake disasters. Disaster management functions were handed over to MES's branch offices.	Define roles and responsibilities of MES and local governments in case of emergency such as earthquake disasters
	Aseismicity of Buildings	KazNIISSA has prepared aseismic guidelines and manuals. Seismic strengthening of public buildings and facilities has been done. Seismic strengthening of existing private buildings and houses has not been done at all.	Implement aseismic measures for important, existing public buildings Implement aseismic measures for existing private buildings Develop new aseismic measures suitable to Kazakhstan's architecture Implement model project to build earthquake-resistant buildings Control illegal construction of

			buildings Control the quality of geotechnical investigations
	Aseismicity of Infrastructures and Utilities	Public infrastructures and utilities have become deteriorated and lost aseismicity. Seismic strengthening has not been undertaken.	Strengthen aseismicity of aging water pipes Strengthen the aseismicity of road bridges Strengthen the aseismicity of dams Construct multipurpose underground utility conduits
	Urban Planning	Parks and green areas are considered in urban planning. Investigations of buildings without aseismicity have been conducted. Disaster management concepts are not sufficiently taken into consideration in urban planning.	Incorporate disaster management concepts in urban planning
	Disaster Management Resources	Evacuation routes and places have been identified. Many evacuation facilities lack aseismicity or safety.	Take fire prevention measures for evacuation routes and facilities to raise awareness on disaster management Install signboards that provide information on access routes to evacuation places Store disaster management resources
	Others	Dangerous buildings have been demolished.	
Selected Cities	Astana City	Earthquake hazards are not considered because of low seismic activities.	Observe seismic activities Evaluate seismic hazard potential and risks
	Shymkent City	Earthquake hazards are not considered because of low seismic activities. However, South Kazakhstan Province is located in an active seismic zone along the Tien Sian Mountains.	Observe seismic activities Evaluate seismic hazard potential and risks
	Almaty City	Almaty City has seismic hazard potential with a return period of about 100 years. Therefore public awareness is relatively high compared to other regions. Many institutes and research centers related to earthquake disaster management are located in the city. A JICA Study was conducted in 2007-2009. The hazard map of the city was prepared in 1978. Seismic risk is very high in the city. Earthquake hazards and risks of suburbs of the city are not assessed.	Apply the JICA Study (2007-2009) results Introduce disaster management concepts in urban planning Prepare seismic hazard/risk maps for suburbs of the city Update the 1978 seismic hazard map

Source: JICA Study Team

8.2 Seismic Observation Systems

(1) Organizations

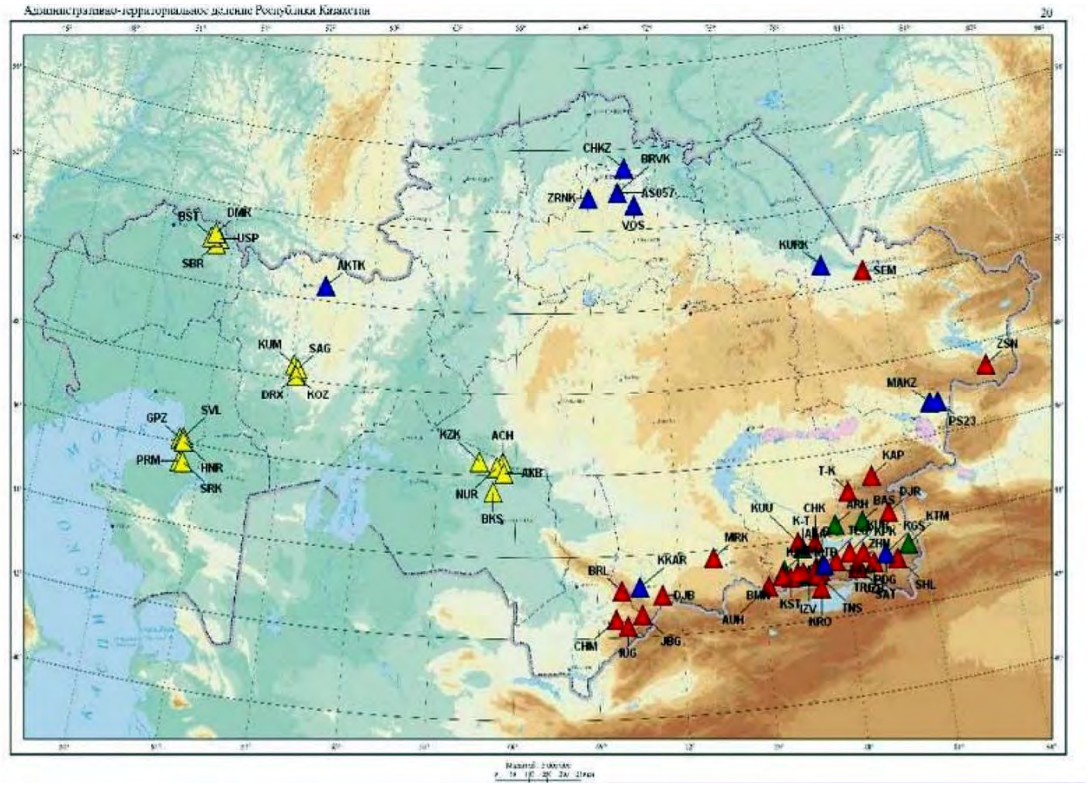
The joint-stock company named the National Center of Seismological Observation and Research was founded under the authority of the Committee of Science of the Ministry of Education and Science based on Decree No. 647 of the Government of the Republic of Kazakhstan, dated March 21, 2012. This center was established on the basis of three organizations; and the Institute of Seismology seems to be

the main organization among the three. The functions of the center are to predict earthquakes, reduce earthquake impacts and damages to urban areas, and estimate and indentify seismic hazard and risks in Kazakhstan.

The Kazakhstan National Data Center (KNDC) of the Geophysical Research Institute of the National Nuclear Center (NNC) under the Ministry of Industry and New Technologies has a seismic observation network. The seismic data acquired through the network is sent to the Institute of Seismology. The Institute of Seismology plays the most important role in seismic observation in the country. The nationwide seismic observation network is composed of networks that are operated by the Institute of Seismology and KNDC. PROGNOZ, a section of Kazselezashita, operates its own seismic monitoring system independently.

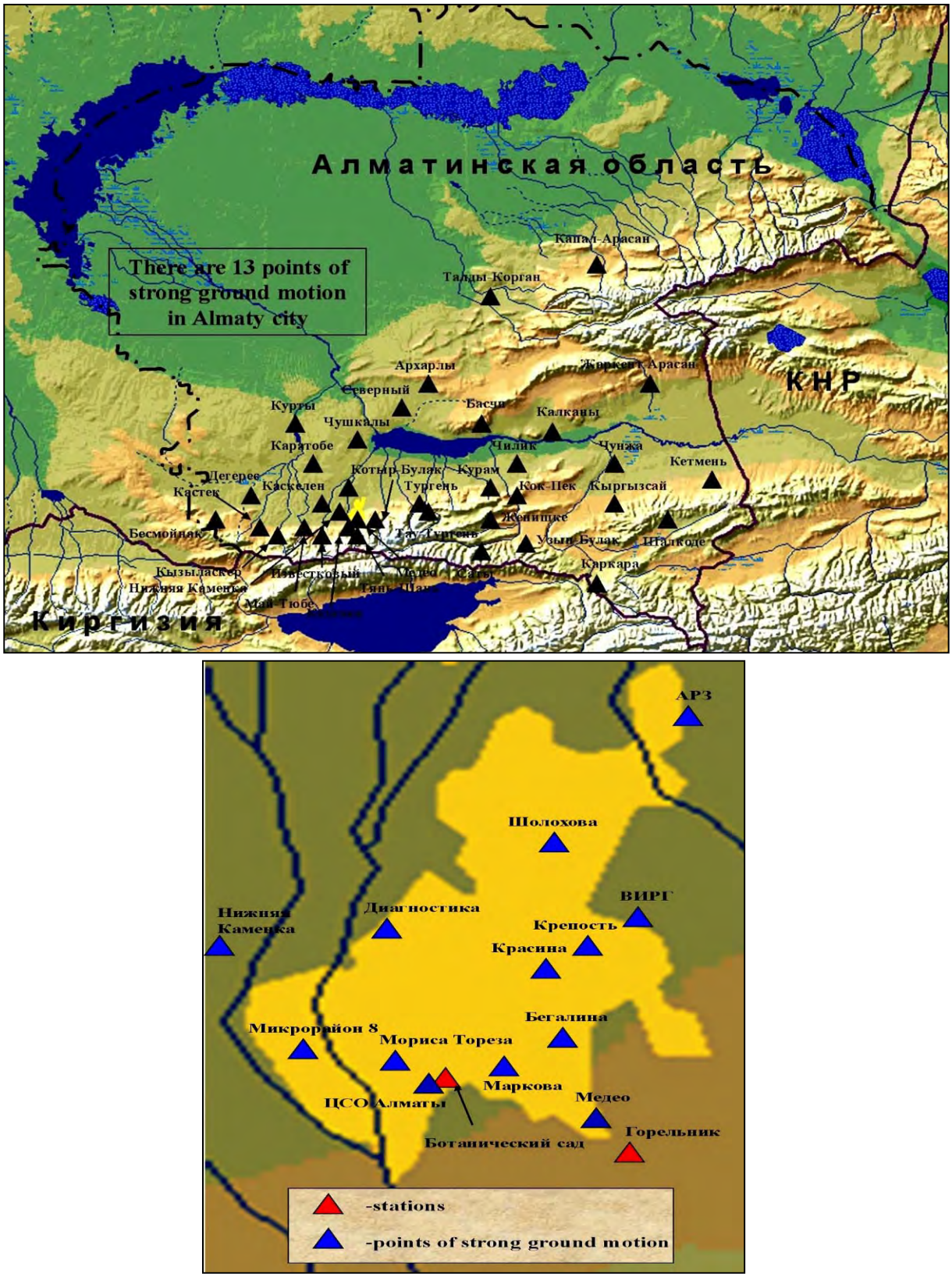
(2) Seismic Observation Networks

Kazakhstan's nationwide seismological observation system (Figure 8.1) is organized such that the seismic stations of the Institute of Seismology, which are located mainly around Almaty (Figure 8.2), form the system's core, while the seismic stations of KNDC perform supporting roles. Seismological observation data are collected and summarized by the Institute of Seismology. The Institute of Seismology published an earthquake catalogue for 2000-2010 to share the data with related organizations.



Source: Institute of Seismology, Kazakhstan

Figure 8.1 Nationwide Earthquake Observation Network of Kazakhstan



Source: Institute of Seismology, Kazakhstan

Figure 8.2 Seismic Observation Network in/around Almaty City

Source: Institute of Seismology, Kazakhstan

Figure 8.3 Earthquake Catalogue for 2000–2010 (Cover)

(3) Technical Staff and Researchers

Departments of seismology in the state universities have been closed after the country's independence. Training of young researchers in seismology is an important task in maintaining the operation of the seismic observation system in the future. KNDC has a school for training young researchers; however, it is currently suspended due to financial reasons.

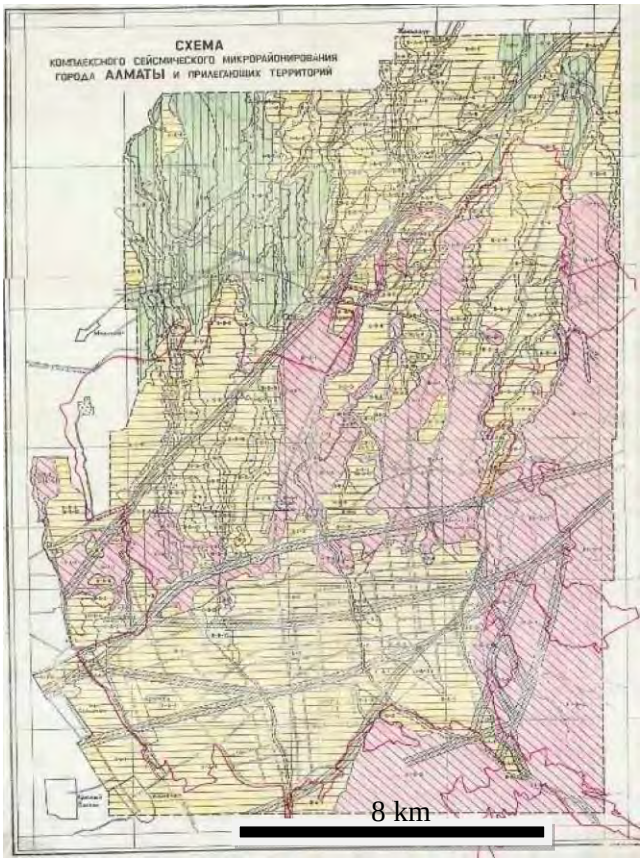
Issues and Tasks:

- Foster collaboration among related organizations,
- Replace or update the existing observation network,
- Enhance the coverage of the observation network, and
- Educate young researchers in universities and/or related organizations such as KNDC.

8.3 Understanding Seismic Hazard and Risks

(1) Hazard Maps

Nationwide and provincial scale seismic hazard maps were prepared by the Institute of Seismology. The Institute of Seismology also prepared a large-scale seismic hazard map of Almaty City in 1995. The seismic hazard map of Almaty City shows fissures on the ground (tectonic faults), but it does not explain or identify which tectonic faults are seismic faults (active faults) and which are not. In-situ geological studies on tectonic faults have not been conducted in Almaty City.



Legend (MSK scale zoning)

Zone I（Green）: Intensity 8

Zone II（Yellow） Intensity 9

Zone III（Pink）: Intensity greater than 9

Source: Institute of Seismology, Kazakhstan

Figure 8.4 Seismic Hazard Map (1995 Version)

(2) Estimation of Damages and Risks

MES has independently identified the risky (dangerous) facilities should an earthquake occur. MES also has its own estimation of damages based on the worst earthquake disaster events. However, the details of such are not accessible to the public.

(3) Understanding Seismic Hazards and Risks in Almaty City

In 2007-2009, JICA assessed the seismic hazards and risks in Almaty City by applying micro-zoning method and prepared a draft plan for earthquake disaster management in Almaty City. Unfortunately, the results of JICA have not been utilized for reducing seismic hazards and risks. On the other hand, Almaty City has a plan of preparing a “new generation” seismic micro-zoning map.

Issues and Tasks:

- Update the nationwide seismic hazard maps based on the latest data,
- Update the seismic hazard map of Almaty City,
- Estimate earthquake damages based on the latest data, and
- Study and estimate the activities of faults in connection with earthquakes.

8.4 Preparedness and Countermeasures for Earthquake Disasters

(1) Improvement of Aseismicity of Buildings

The priority of earthquake disaster management in Kazakhstan is to increase earthquake resistance of buildings (seismic reinforcement). KazNIISSA, as a "technical center", conducts seismic strengthening of buildings in areas with high seismic hazard potential. The institute developed several technical standards in the field of seismic resistance. The current building codes of Kazakhstan were changed to "Eurocode 8" and modified according to the building types in the country.

Table 8.2 Building Construction Guidelines and Criteria (as of 2009)

SNiP RK 2.03-07-2001	Building construction in Almaty City and its adjacent areas considering seismic micro-zoning
SNiP RK 2.03-28-2004	Seismic intensity scales of MSK-64 (K)
SNiP RK 2.03-30-2006	Building construction in seismic hazardous zones
SNiP RK 3.02-01-2001	Buildings for ordinary residents
SNiP 2.03.01-84 (Soviet era)	Concrete and reinforced concrete structures (GOSSTROI 1989)
K PSN 10-83 (Soviet era)	Manual and recommendations on earthquake-resistant reinforcement of buildings in Zones II and III in Almaty City, 1986
K SNiP 2.03-01-84	Design manual of heavyweight/lightweight concrete, reinforced concrete structures, excluding pre-stressed reinforced concrete

Source: JICA, 2007-2009

The Kazakhstan government adapted the program to improve earthquake resistance of public buildings, such as hospitals, school and cultural facilities, in 2004. The program has been implemented in Almaty City and other areas. This project was meant to last for eight years, from 2005 to 2012; however, it has not yet been completed. Seismic strengthening of private buildings (apartment buildings and individual houses) has not been done yet due to insufficient financial capability of residents.

In remote areas of the country, there are many buildings made of adobe bricks and wood, which are materials with extremely low seismic resistance. Accordingly, it is necessary to develop and adopt methods for seismic reinforcement corresponding to the architectural styles in Kazakhstan. However, in many cases it is better for existing buildings to be reconstructed rather than be reinforced. One reason for the delay of aseismic reinforcement in remote areas is the lack of cheap and efficient technology for such works.

KazNIISSA has continuously been diagnosing the earthquake resistance of existing buildings. Demolition of buildings with low earthquake resistance and relocation of their residents have been also undertaken using the budget of local governments.

(2) Improvement of Aseismicity of Infrastructures and Utilities

Social infrastructure and public utilities should be, in general, designed and erected by considering earthquake resistance (corresponding to intensity 9 of the Medvedev–Sponheuer–Karnik scale (MSK)). In actuality, however, their levels of seismic resistance seem to be very low.

Most of the social infrastructures and public utilities developed during the Soviet Union era have deteriorated and lack sufficient strength and earthquake resistance. For example, the water pipelines in Almaty City have become old and often cause water leakage accidents. It is reported that such water leakage is one of the factors of landslides in Almaty City.

(3) Disaster Management Resources and Evacuation Facilities

In Kazakhstan, each province or large city usually prepares its own urban development plan. Generally, an urban plan shows open spaces and parks that can be used as evacuation places or rescue centers in case of an emergency or disaster. Each local government provides indoor/outdoor evacuation places including access routes to such. However, it is very difficult to see the signboards showing the evacuation places and access routes to such. In addition, it seems that disaster management resources are not provided at each evacuation place.

(4) Disaster Management in Urban Development Planning

In Almaty City, seismic strengthening of existing public facilities has been carried out based on the results of diagnosis of such facilities. In addition, buildings or areas of buildings that need rebuilding have been identified. Especially, very dangerous buildings without sufficient strength have been ordered to be demolished. However, the disaster management concepts or ideas are generally not incorporated into urban planning.

Issues and Tasks:

<u>Responsible Organizations</u>

- Define the roles and responsibilities of MES and local governments in case of earthquake disaster.

<u>Aseismicity of Buildings</u>

- Implement aseismic measures for existing public important buildings,
- Implement aseismic measures for existing private buildings,
- Develop new aseismic measures suitable to Kazakhstan’s architecture,
- Implement model project to build earthquake-resistant buildings,
- Control illegal construction of buildings, and
- Control quality of geotechnical investigations.

<u>Aseismicity of Infrastructures and Utilities</u>

- Strengthen earthquake resistance of aging water pipes,
- Strengthen earthquake resistance of road bridges,
- Strengthen earthquake resistance of dams, and
- Construct multipurpose underground utility conduits.

Urban Planning

- Incorporate disaster management concepts into urban planning.

Disaster Management Resources

- Take fire prevention measures for evacuation routes and facilities to raise awareness on disaster management,
- Install signboards that provide information on access routes to evacuation places, and
- Store disaster management resources.

8.5 Situations and Issues in Selected Cities (Astana, Shymkent, and Almaty)

(1) Astana City

Astana is the capital city of Kazakhstan. It is considered that seismic hazard potential is very low in Kazakhstan. This is one of the reasons why the capital was moved from Almaty to Astana. Accordingly, seismic hazard is not taken into consideration for Astana City. Earthquake disaster management plans are not prepared, and countermeasures and preparedness for seismic hazard are not carried out in the city.

(2) Shymkent City

Shymkent is the central city of South Kazakhstan Province. Based on the seismic hazard map prepared by the Institute of Seismology, South Kazakhstan Province is located on a zone with relatively high seismic hazard potential. On the other hand, the seismic hazard potential of Shymkent is categorized as "relatively low", same as Astana's, according to the seismic hazard maps. Most of the buildings in the city seem to lack earthquake resistance. However, seismic hazard is not taken into consideration and earthquake disaster management plans are not prepared by the city. Countermeasures and preparedness for seismic hazard are not carried out as well.

(3) Almaty City

Almaty City, which has a population of 1.5 million, is the economic center of Kazakhstan. The city has experienced three catastrophic earthquakes in the past. The last catastrophic earthquake that occurred in Almaty City is the Kemin Earthquake in 1911. In addition, many people know that the city has the potential for a catastrophic earthquake, with a return period in the near future. The Institute of Seismology observes seismic activities in Almaty City with its seismological observation networks.

1) Past Cooperative Projects by JICA

JICA has conducted the following project and development study in Almaty City in the past for reducing seismic hazards and risks:

<Technical Assistance Project>

"Technical Cooperation for Continuation and Improvement of the Seismological Monitoring System for Earthquake Preparedness and Risk Assessment in the Region of Almaty City (1999-2000)": JICA (1999-2002)

<Development Study>

"The Study on Earthquake Disaster Risk Management for Almaty City (2007-2009)": JICA (2007-2009) or JICA (2009)

JICA (1999-2002) enhanced the seismological observation network of Almaty City and the capacity of researchers in the Institute of Seismology as its counterpart organization. However, the equipment installed in Almaty City through the project are currently aging, and being difficult to maintain. Table 8.3 lists the equipment granted by JICA for the Institute of Seismology.

Table 8.3 Equipment Granted by JICA for the Institute of Seismology (1999-2002) (1/2)

	Name of Machinery/Equipment	Specifications	Quantity
STRONG MOTION OBSERVATION NETWORK			
1	Strong Motion Seismograph Support Software Parts and Tools for Repair of Strong Motion Seismograph	KINEMETRICS, Altas Etna, PCMCIA TYPE2, Quicklook for Windows Format Converter	15 sets 4 sets 1 sets
2	Software for Analysis	KINEMETRICS SMA KINEMETRICS PSD	1 set 1 set
3	Notebook Computer	IBM compatible Windows 98 PCMCIA	4 sets
4	Desktop Computer	IBM compatible PCMCIA (Option)	1 set
5	Peripheral devices for PC	Printer, CD-ROM writer, etc.	1 set
SEISMIC OBSERVATION NETWORK			
1	High-sensitivity Seismometer Personal Computer Peripheral Devices for PC Uninterruptible Power Supply (UPS) Batteries	Short-period (T-1 Sec.) velocity meter 3 components A/D Converter with GPS clock timing Newest model Printer, CD-ROM writer, etc. External storage driver Software 12 V	5 sets 5 sets 5 sets 5 sets 5 sets
2	Broadband Seismometer Personal Computer Peripheral Devices for PC UPS Batteries	CMG-3T A/D Converter with GPS clock timing Newest model Printer, CD-ROM writer, etc. External storage driver Software 12 V	1 set 1 set 1 set 1 set 1 set
3	Personal Computer (for analysis in Almaty Center) Peripheral Devices for PC	Newest model Printer, CD-ROM writer, etc. External storage driver Software (waveform software)	
4	Solar battery for stations		1 or 2 set(s)
GPS OBSERVATION NETWORK			
1	GPS Receiver	Dual band, geodetic receiver with antenna, battery, battery charger, antenna cable, attachment, memory card	4 sets
2	GPS Data Processing Software	Bernese	1 set
3	Personal Computer	Engineering Work Station with UNIX OS	2 sets
4	Laser Printer	Appropriate device driver	1 set
5	Notebook Computer	FD, HD, Windows OS	4 sets

Table 8.4 Granted Equipment for the Institute of Seismology by JICA (1999-2002) (2/2)

	Name of Machinery and Equipment	Quantity
1	DELL Power Edge (S/N FV2531S)	1 set
2	CD-R Drive (MELCO) CDRW-8432	1 set
3	Printer OKI Microline 900 PSIIILT	1 set
4	Software Date acquisition program & Date processing program	1 set
5	Notebook Computer SONY PCG-GR7F	1 set
6	Batteries Pack SONY PCGA-BP2E	1 set
7	Vaio GPS SONY PCQA-GPS3VH	1 set
8	Soft MATLAB ver 6.1	1 set
9	Printer EPSON LP-1200 AC 100V	1 set
10	USB cable EPSON USBCB1	1 set
11	FREQUPS-A 1.0 kVA, Mitsubishi Denki	1 set
12	CD-R drive media 10 sheets/sets	1 set
13	HUB 8 ports	1 set
14	Global Positioning System (Book)	1 vol.
15	GPS Satellite Surveying (Book)	1 vol.
16	GPS for geodesy (Book)	1 vol.
17	Color scanner	1 set
18	PC projector	1 set
19	Visualizer	1 set
20	Others	1 set

Source: JICA

The JICA Study (2007-2009) aimed to prepare a master plan on earthquake disaster mitigation and disaster management in Almaty City. The study applied the method of seismic micro-zoning for assessing seismic hazards and risks in the central part of the city, and estimated human and material damages based on several scenarios of historical earthquakes (Verny, Chilik, and Kemin earthquakes). Based on detailed analysis of the situation and issues on earthquake disaster management in Almaty City, the study prepared a master plan for earthquake disaster management in Almaty City. Moreover, in order to speed up the implementation of the plan in priority areas, the study prepared the "Action Plan for Earthquake Disaster Risk Management in Almaty" (components are shown in Table 8.5). In the study, a series of community-based projects were implemented in two areas of the city (i.e., Almalinsky and Medeus) for improving disaster preparedness of local communities.

Table 8.5 Components of Earthquake Disaster Management for Almaty City (JICA 2007-2009)

Part 1 General Directions	Chapter 1	Basic policy of plans
	Chapter 2	General situation and damage estimation
	Chapter 3	Responsibilities of related organization
Part 2 Mitigation of Risks	Chapter 4	Organizational structure for reducing seismic risks
	Chapter 5	Human resource development
	Chapter 6	Regional development
	Chapter 7	Urban development
	Chapter 8	Strengthening of earthquake resistance of facilities
	Chapter 9	Researches on earthquakes
Part 3 Preparedness	Chapter 10	Basic matters and implementation system
	Chapter 11	Implementation of preparedness for residents and communities Initial actions
	Chapter 12	Info-communications
	Chapter 13	Fire prevention and treatment of dangerous goods
	Chapter 14	Rescue and evacuation
	Chapter 15	Emergency transportation
	Chapter 16	Emergency medical system
	Chapter 17	Search and rescue of missing people, and treatment of dead bodies
	Chapter 18	Water and food supply Public utilities, communication lines, and transportation
	Chapter 19	Treatment of garbage, debris, and human waste
	Chapter 20	
	Chapter 21	
Part 4 Emergency Response	Chapter 22	Basic matters on emergency response
	Chapter 23	Establishment of a disaster countermeasures office and its operation Collection of information and communications
	Chapter 24	Security, traffic control, and emergency transportation
	Chapter 25	Mutual cooperation of related organizations
	Chapter 26	Evacuation and rescue
	Chapter 27	Emergency medical treatment and sanitation
	Chapter 28	Search and rescue of missing people, and treatment of dead bodies
	Chapter 29	Fire extinguishment and management of hazardous materials Education
	Chapter 30	Water and food supply
	Chapter 31	Emergency rehabilitation of utilities, info-communication, transportation, and facilities for sediment disasters
	Chapter 32	Treatment of garbage, debris, and human waste
	Chapter 33	Temporary shelters and refuge life
	Chapter 34	
	Chapter 35	
Part 5 Rehabilitation and Reconstruction	Chapter 36	General matters on reconstruction
	Chapter 37	Head of reconstruction
	Chapter 38	Formulation of reconstruction plan
	Chapter 39	Stabilization of civil life
	Chapter 40	Reconstruction of urban areas
Part 6 Support System	Chapter 41	Support for other regions

Source: JICA

Table 8.6 Components of Action Plans for Seismic Risk Reduction in Almaty City (JICA 2007-2009)

Number	Action Plan	Component
0	Approval of Plans	0 Approval of disaster management plan for Almaty City
1	Strengthening organizations and relevant systems related to disaster management	1-1 Definition of responsibilities for each section and the period of the performance 1-2 Plan, Do, Check, and Action (PDCA Cycle) 1-3 Clarification of emergency response systems
2	Strengthening of earthquake resistance and control	2-1 Strengthening of earthquake resistance of existing apartments 2-2 Improvement of aseismicity of new buildings 2-3 Improvement of aseismicity of buildings along emergency transportation routes
3	Formulation of community-based disaster management	3-1 Risk reduction activities 3-2 Preparedness
4	Control of land use	4-1 Land readjustment projects in vulnerable areas along rivers and channels 4-2 Introduction of housing policy 4-3 Identification and establishment of emergency transportation routes
5	Strengthening and control of earthquake resistance of infrastructures and utilities	5-1 Strengthening of earthquake resistance of existing bridges 5-2 Strengthening of earthquake resistance of water pipe and sewerage networks

Source: JICA

Currently the suburbs of Almaty City are growing toward the northwest and southeast directions. However, seismic hazards and risks in those areas are not yet understood.

Issues and Tasks:

Astana City

- Observe seismic activities; and evaluate seismic hazard potential and risks.

Shymkent City

- Observe seismic activities; and evaluate seismic hazard potential and risks.

Almaty City

- Apply the results of the JICA study (2007-2009),
- Introduce disaster management concepts in urban planning,
- Prepare seismic hazard/risk maps of the suburbs of the city, and
- Update the 1978 seismic hazard map.

Chapter 9 Current Conditions and Crucial Issues in Flood Disaster Management

9.1 Summary of Current Conditions and Crucial Issues in Flood Disaster Management

Table 9.1 gives a summary of the current conditions and crucial issues in flood disaster management in Kazakhstan.

Table 9.1 Current Conditions and Crucial Issues in Flood Disaster Management in Kazakhstan

Major Items	Minor Items	Current Conditions	Issues
Flood risk assessment	Preparation of flood hazard maps	・ Small-scale hazard maps of the whole country have been prepared. ・ Detailed hazard maps have not been well prepared. ・ The urban district of Almaty City has been expanding and the areas requiring hazard maps have also been expanding. ・ Hazard maps are not made available to local residents. ・ Disaster records are not kept systematically or chronologically.	・ Preparation of medium- and large-scale (detailed) hazard maps ・ Sharing and effective use of hazard maps ・ Building of database on disasters
	Strengthening of land use planning and regulation	・ In provincial cities, people illegally reside in restricted areas along channels and rivers.	・ Strengthening of land use regulations ・ Land use planning responding disaster risks
Monitoring and forecasting	Improvement of monitoring systems	・ Meteorological observation is being gradually automated. ・ Almost all hydrological observations are conducted manually.	・ Improvement and upgrading of automatic meteorological monitoring systems ・ Introduction of automatic hydrological monitoring systems ・ Creation of database and archive of observed data
	Improvement of analysis technologies and human resources development	・ Flood simulation technologies are insufficient. ・ Scientific knowledge about snowmelt runoff is insufficient. ・ It is difficult to carry out wide area damage assessment at the time of a disaster.	・ Improvement and dissemination of flood analysis technologies involving simulations, satellite image analyzing, etc. ・ Training of experts (young engineers in particular)
	Improvement of public services	・ KazHydromet releases weather forecast and information about snow avalanches on its website. ・ KazHydromet does not publish meteorological or hydrological data of past periods on its website, and obtaining such data is expensive.	・ Improvement of quality of services ・ Publication of meteorological and hydrological data (to contribute to agriculture, research, and other activities)

Structural countermeasures	Preparation of structural countermeasures against floods	・ Drainage facilities in the new urban district in the northwestern part of Almaty are underdeveloped. ・ Insufficient urban drainage systems in Astana frequently cause road flooding.	・ Development and improvement of urban drainage facilities ・ Introduction of disaster (flood) management concepts into urban development plans
		・ Knowledge and awareness about standards for design and construction works are low. ・ In particular, there are problems with the and construction of structural countermeasures in the regions (ad-hoc steps are taken).	・ Flood control planning ・ Improvement of designing and construction technologies
		・ Reservoir dam frequently breaks causing	・ Improvement of capacity in operating and managing reservoir dams
Non-structural countermeasures	Development of early warning systems	・ An organizational scheme for early warning has been set up. ・ Notification services for meteorological and hydrological information are provided to the general public through short message service (SMS), among other means. ・ Almaty has a warning system using sirens, but sirens are manually operated and the system has not been retrofitted for 30 years. ・ The general public does not know the meaning of sirens. ・ In Shymkent, warnings are passed from Kazselezashita to municipalities and then on from municipalities to the local public through letters.	・ Development of swift and reliable early warning systems ・ Making sure early warning systems are widely known to the public
	Emergency response	Common to all kinds of disasters (see Chapter	Common to all kinds of disasters (see Chapter 11).
	Community-based disaster management	Common to all kinds of disasters (see Chapter	Common to all kinds of disasters (see Chapter 11).

Source: JICA Study Team

The following sections give details of the individual items listed in the table above:

9.2 Current Conditions and Crucial Issues of Risk Assessment

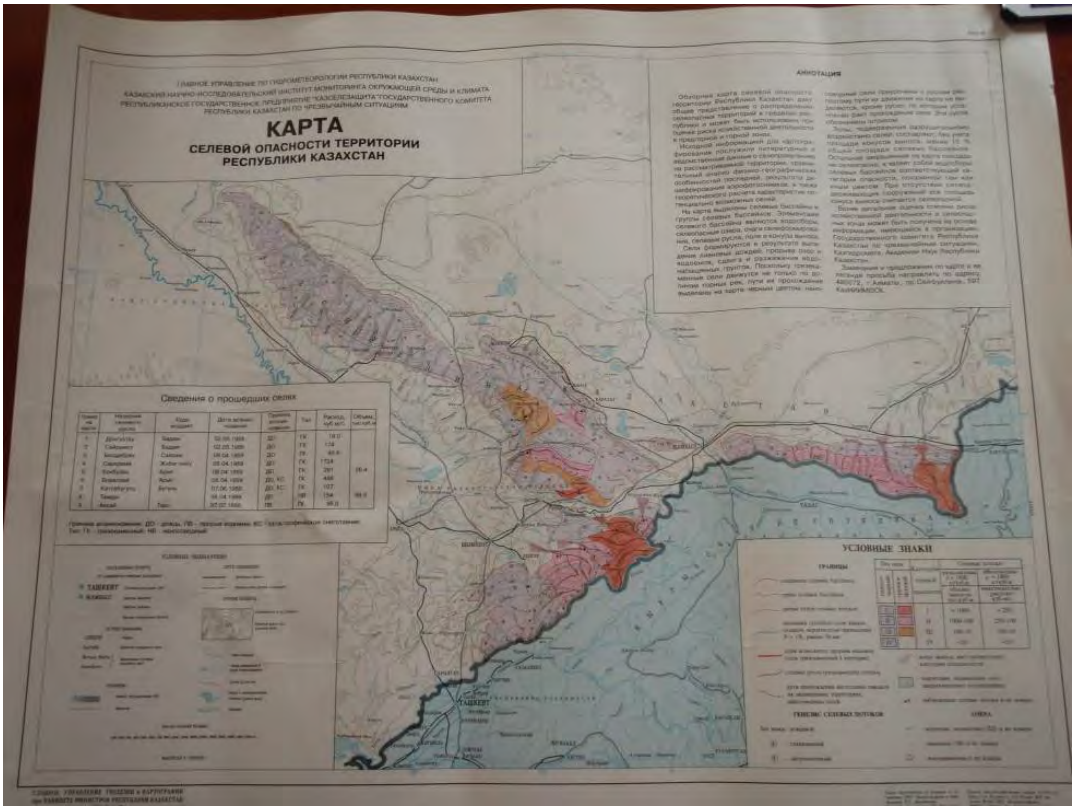
(1) Preparation of Flood Hazard Maps

1) Current condition of flood hazard maps preparation

A small-scale hazard map of the whole country has been drawn up, but detailed hazard maps are yet to be prepared. Behind this lies the fact that Kazakh authorities have failed to use hazard maps for urban planning and infrastructure development because of insufficient understanding of the necessity of hazard maps. Large-scale hazard maps are only prepared when necessary, e.g., for preliminary surveys for the construction of certain facilities; and such large-scale maps cover hazards affecting only the facilities concerned. Also, flood hazard maps are not available to the general public.

In most cases, hazard maps of various kinds are prepared by the Institute of Geography upon the orders of the Ministry of Emergency Situations (MES) and private companies. In 2014-15, however, KazHydromet plans to prepare flood hazard maps independently.

A sample flood hazard map developed by the Shymkent Branch of Kazselezashita is shown in Figure 9.1.



Note: 1:1,000,000 map, indicating areas with different levels of flood hazard on a scale of 1 to 4, as well as that of sediment disaster hazard on a scale of 1 to 3.

Source: JICA Study Team

Figure 9.1 Flood Hazard Map Owned by the Shymkent Branch of Kazselezashita

2) Present state of disaster records

According to interview surveys, the department-in-charge at the MES central office maintains an archive of disaster-related data since 1997, and the regional branches of the ministry keep records of various disasters on paper but generally dispose of such documents after three years. The Astana Branch of MES is currently working on digitizing paper records (creation of database).

Issues:

- Preparation of medium- and large-scale (detailed) flood hazard maps,
- Sharing and effective use of hazard maps, and
- Building of a database on disasters.

(2) Land use planning and regulations

Land use regulations prohibit the construction of buildings within 6 m of small water channels, and designate areas within a 20 m radius as environmental protection areas. However, the illegal construction of residential houses along convenient channels and rivers never ceases. It is particularly conspicuous in provincial cities, where crowds of houses are frequently seen along channels. Many of these houses have fragile clay walls and are vulnerable to floods (see photographs in the opening section).

Issues:

- Strengthening of land use regulations, and
- Land use planning responding to disaster risks.

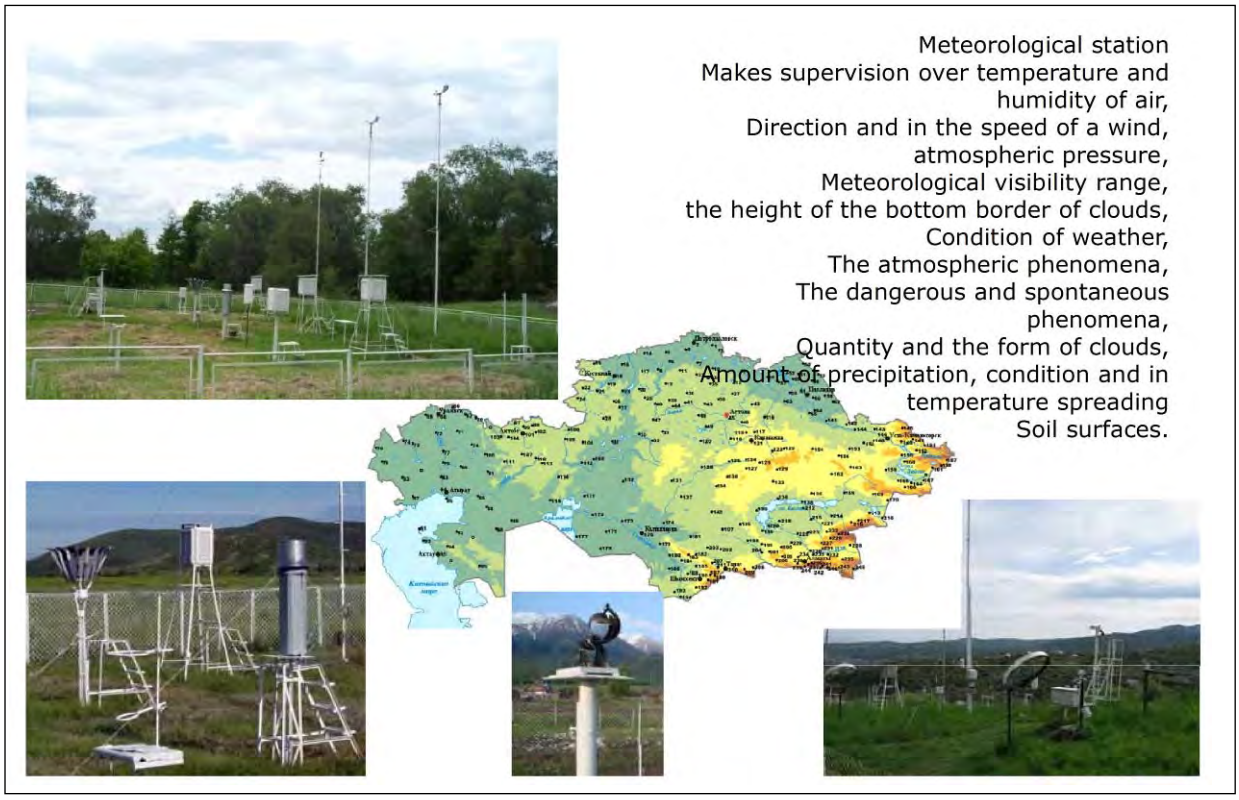
9.3 Current Condition and Crucial Issues of Monitoring and Forecasting

(1) Monitoring system and network

According to interview surveys, there are 298 hydrological posts, 277 meteorological stations, and nine atmospheric observation stations across the country. These monitoring facilities are operated and managed by KazHydromet (refer to Figure 9.2). Each meteorological station conducts a total of 20 types of measurements including that of air temperature, humidity, atmospheric pressure, rainfall, wind speed, wind direction, hours of sunshine, dew point temperature, and soil temperature. Ninety of them are automated and send data to the head office of KazHydromet in Astana every three hours. Observation posts, which are smaller than meteorological stations, are also installed to automatically measure these items every 12 hours.

Hydrological posts, on the other hand, monitor the river water levels, water temperature, flow, transparency, frozen condition, and other items, but are less automated. Most of them rely on manual measurement.

KazHydromet sends daily and weekly reports on meteorological and hydrological information to regional branches of MES and Kazselezashita for information sharing. Because information is distributed by fax, one must request KazHydromet to be able to gain access to raw data (paid service).



Source: Materials on the website, JMA/WMO Workshop on Quality Management in Surface, Climate, and Upper-air Observations in RA II (Asia), released by KazHydromet

Figure 9.2 Outline of KazHydromet's Meteorological Observation Facilities

Issues:

- Improvement and upgrading of automatic meteorological monitoring systems,
- Introduction of automatic hydrological monitoring systems, and
- Creation of database and archive of observed data.

(2) Technologies for analysis

KazHydromet uses runoff analysis program software packages, such as the Danish Hydraulic Institute's (DHI's) MIKE 11, which is an inland water simulation software package covering hydrological, water quality, sediment transport, and irrigation system simulations. At the moment, KazHydromet does not have a model that would enable it to forecast snowmelt floods it plans to start the development of such model in 2014. On the other hand, the Institute of Geography and Kazselezashita rarely conduct flood simulations.

KazHydromet also uses satellite images captured by EUMETSAT, Meteosat (Meteosat Second Generation, or MSG), China's A4, the US NASA's LANDSAT, etc. The Space Research Institute, a

special organization for satellite image analysis, uses satellite images captured by the US TerraAqua and NPP, and India's IRS, as well as images from RADARSTAT-2 in times of emergency. As for image processing software, it uses Earth Resources Data Analysis System (ERDAS), ENVI, ArcGIS, PCI Geomatics, and other software packages. Kazakhstan has a plan to launch high precision meteorological observation satellites in 2014 in collaboration with Astrium, a French-German joint venture.

Issues:

- Improvement and dissemination of flood analysis technologies for simulations and satellite image analyses, and
- Training of experts (young engineers in particular).

(3) Public services

KazHydromet publishes nationwide weather forecasts on its website. Its Almaty branch's website carries detailed weather forecast of the city, information on areas with hazards of snowslides and debris floods, snow conditions, etc. However, no hydrological data or past meteorological data is available from these websites. In order to obtain raw observation data, one has to purchase it from the public service department of KazHydromet. The fee is expensive at approximately JPN 80,000 for data on daily mean temperature and daily rainfall for a period of three months, and it takes a week or so to obtain the data.

Issues:

- Improvement of quality of public services, and
- Publication of meteorological and hydrological data (to contribute to agriculture, research and other activities).

9.4 Current Condition and Crucial Issues of Structural Countermeasures

In Kazakhstan, Kazselezashita is for the most part in charge of structural countermeasures against large-scale floods, while local governments undertake countermeasures against small- and medium-scale floods. The following sections outline the specific structural countermeasures in the surveyed areas:

(1) Astana City

With the relocation of the capital in 1997, the Ishim River, which runs through Astana City, was renovated. The waterway was excavated while embankments were built to a maximum height of 13 m and bank protection works were conducted. A dam with a capacity to hold 450 million m^3 of water has

been built upstream from Astana to adjust the flow of the river and protect the city. The river used to be flooded prior to the relocation of the capital but no floods occurred since the construction of embankments.

(Left: improved state of the river within Astana City; Right: storage dam outside the city)

Source: JICA Study Team for the photo on the left and, for the photo on the right, materials for MES presentation (Seminar on the UN Development Programme "Strengthening the national capacity for risk assessment, prevention and response to natural disasters").

Figure 9.3 Improvement of the Ishim River in Astana City

On the other hand, road flooding occurring in limited areas in the city frequently causes problems in Astana. The new part of the city is built on the south (left bank) of the Ishim River, whereas the old part is located in the north. Inappropriate connection of drainage facilities and sewerage pipes of residential houses between the old and new parts of the city often cause water leaks resulting in road flooding.

(2) Almaty City

Almaty is located on an alluvial fan, and behind it is the Kuznetsk Alatau range. Rivers running through the city are normally facilitated in the manner shown in the photographs in Figure 9.4 below. In the photographs, small dams are placed across water channels for the purpose of slowing the flow when the water amount increases because of snowmelt and maintaining the scenery attractive during the dry season by holding water.

Source: JICA Study Team

Figure 9.4 Improved River Channel in Almaty City (Photo Taken in October 2014)

According to interviews with relevant organizations, there has never been a large-scale flood that affected a wide area of Almaty City. However, the construction of proper drainage system does not keep up with the expansion of Almaty's urban area; therefore, there is a risk of local flooding in the suburbs of the city in the future.

(3) Shymkent City (provincial city)

The photographs in Figure 9.5 below the show rehabilitation works that were carried out after a flood in Zabadam Village on the outskirts of Shymkent City. The village had suffered from flooding in February 2012 and the city of Shymkent undertook countermeasures (bank protection works and installation of small weirs). However, although only a year or so has passed after the completion of the countermeasures, sediments that swept in from both banks have accumulated inside the water channel, deforming it. It is uncertain if the channel design was based on an appropriate survey, and workmanship was rough.

D2

(Construction of drainage channel and floodgates)

Source: JICA Study Team

Figure 9.5 Rehabilitation Works After a Flood on the Outskirts of Shymkent City

The photographs in Figure 9.6 below show Ordabasy District of South Kazakhstan Province, where flooding occurred in February 2012. For rehabilitation, bank protection works were carried out and small weirs were installed in the Naiman Canal, which caused flooding. On the upper course of the canal, a storage dam was constructed. Rehabilitation works were financed by the *akimat* of South Kazakhstan Province and supervised by the Shymkent Branch of MES. However, no monitoring devices are installed at the weirs or the storage dam, and although only recently constructed, the weir gate operating device has already rusted. According to interview surveys, the flood in Taldykorgan in March 2010, which killed 44 people, was attributed to failure to discharge water due to a malfunction in the storage dam's water discharging mechanism. There appear to be issues that need to be addressed in the operation and management of weirs and storage dams once they are constructed.

(Left: bank protection and small weirs, Right: a house affected by the flood)

Source: JICA Study Team

Figure 9.6 Improved Canal in Ordabasy District

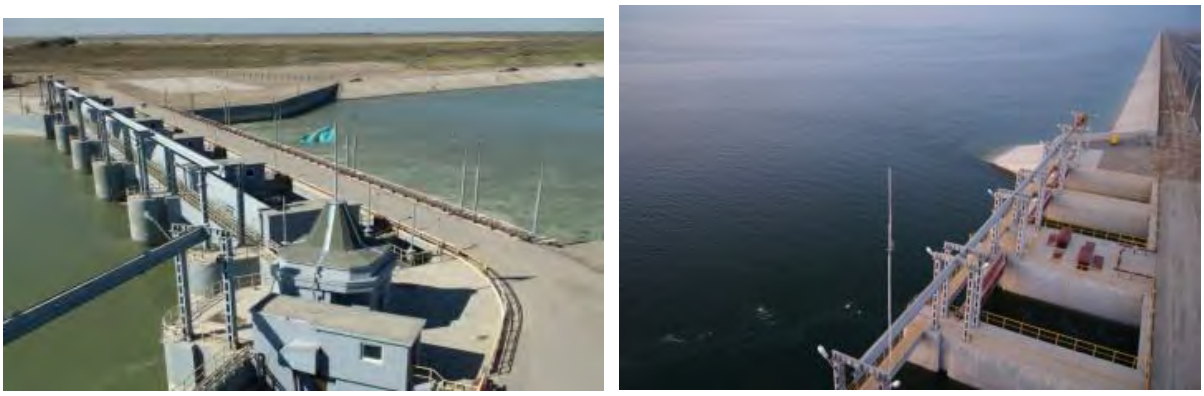
Source: JICA Study Team

Figure 9.7 Storage Dam Built on the Upper Course of the Canal in Ordabasy District

(4) Syr Darya River

Floods have been frequent along the Syr Darya River in the past. There was a large-scale flood in 2008 which prompted the plan to construct the Koksarai Reservoir. The reservoir was completed and started

operating in 2011, a mere three years later (Figure 9.8). Kazselezashita was the main authorizing party for the construction project, while Kazgiprovodkhoz, a government-owned company undertaking construction works on a project basis, was in charge of the design, while Kazakh contractors undertook the construction works. The Koksarai Reservoir has the capacity to hold 3 billion m^3 of water, and the construction cost, excluding survey costs, was approximately KZT 48 billion (approximately JPY 31 billion). The reservoir is surrounded by a natural landscape (adjacent to a mountainous area) in the east, and by embankment (of 11-12 m in height) of 46-47 km in length in the west. A remote monitoring system by a Korean company (i.e., Geotechnical Monitoring Ltd.) was introduced here. The system monitors air temperature, water level of the reservoir, pore pressure of the dam body, and discharged water flow in real time. Kazselezashita is in charge of its operation and management, and always stations its officers on site.



Source: Materials for MES presentation, Seminar on the UN Development Programme "Strengthening the national capacity for risk assessment, prevention and response to natural disasters"

Figure 9.8 Koksarai Reservoir Constructed on the Syr Darya River in 2011

Issues:

- Improvement of designing and construction technologies (in particular, those of local branches of MES and local governments),
- Enhancing capacity to operate and manage reservoirs,
- Construction and expansion of urban drainage facilities, and
- Introduction of disaster (flood) management concepts into urban development plans.

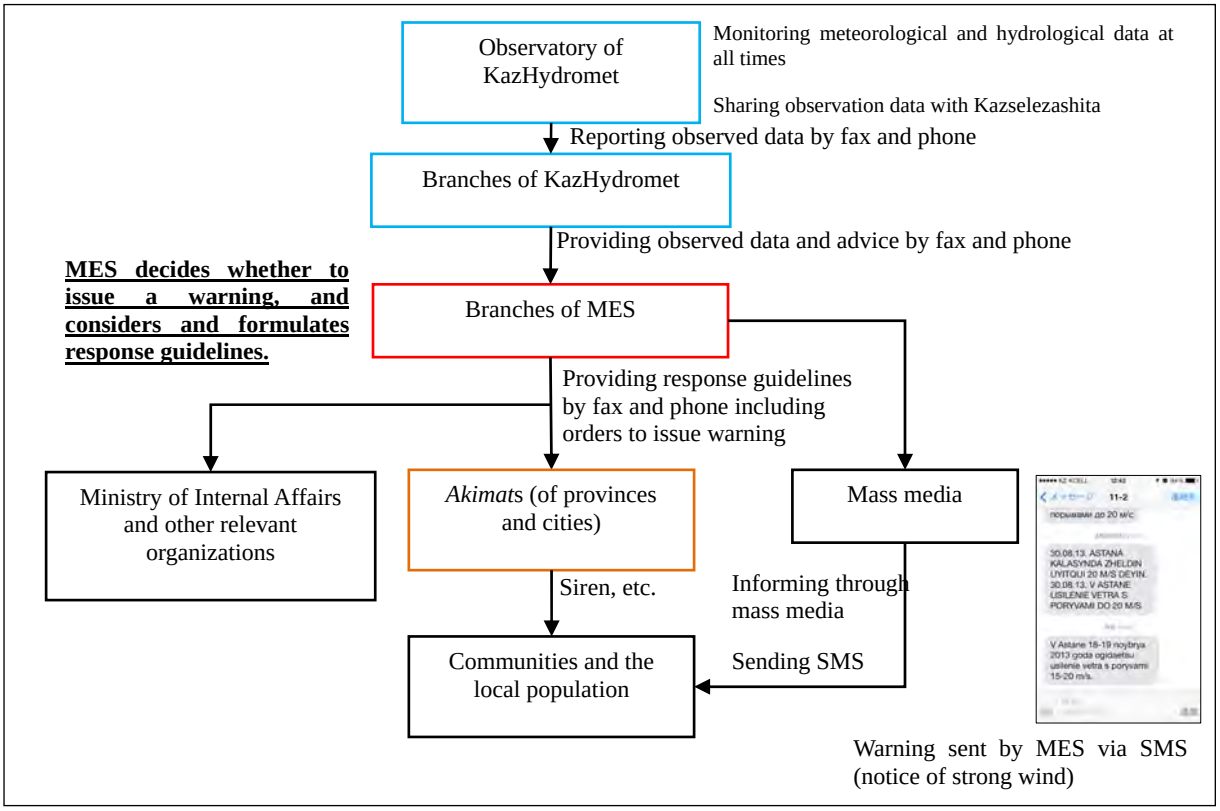
9.5 Current Condition and Crucial Issues of Non-structural Countermeasures

(1) Early warning systems

At times of flood disaster, information about floods is passed on in the manner described below.

KazHydromet constantly checks meteorological and hydrological observation data to see if any emergency event (mainly flood disaster) may occur. If data is found to exceed a reference value for warning, this will be reported to MES. KazHydromet is responsible for setting the reference water levels

for issuing warnings. However, in case of large rivers, these levels are decided upon after consulting with the relevant local governments. MES, on the other hand, is responsible for considering and formulating response guidelines, and deciding whether to actually issue warnings. MES notifies municipalities, the Ministry of Internal Affairs, and other relevant organizations of the response guidelines that were formulated. If necessary, MES also passes the relevant information to mass media or to the general public via SMS. Upon instructions from MES, *akimat*s alert the local population through sirens and other means.



Source: JICA Study Team based on interviews

Figure 9.9 Flow of Flood Information at a Time of Emergency

While the emergency contact system is well established as illustrated above, there are several problems that must be solved. The sirens in Almaty City are manually turned on and have not been retrofitted for 30 years, and many members of the public do not understand the meaning of sirens. In Shymkent City, the *akimat* gives warning to people by letters; therefore, it takes a long time for the people to receive emergency information. Another problem is the lack of criteria for issuing warnings based on forecasting.

Issues:

- Development of swift and reliable early warning systems, and
- Making sure early warning systems are widely known to the public.

(2) Emergency response and community-based disaster management

Activities related to emergency response (e.g., initial response) and community-based disaster management (e.g., establishment of an evacuation system) are common to all kinds of disasters, which are covered in Chapter 11.

Chapter 10 Current Conditions and Crucial Issues in Sediment Disaster Management

10.1 Summary of Current Condition and Crucial Issues in Sediment Disaster Management

Table 10.1 summarizes the current conditions and crucial issues in sediment disaster management in Kazakhstan.

Table 10.1 Current Conditions and Crucial Issues in Sediment Disaster Management in Kazakhstan

Major Items	Minor Items	Current Conditions	Issues
Sediment disaster risk assessment	Preparation of sediment disaster hazard maps	・Small-scale hazard maps of the whole country have been prepared. ・ Detailed hazard maps have not been well prepared. ・ The urban district of Almaty City has been expanding, and the areas requiring hazard maps have also been expanding. ・ Hazard maps are not available to the local residents. ・ Disaster records are not kept systematically nor chronologically.	・ Preparation of medium- and large-scale (detailed) hazard maps. ・ Sharing and effective use of hazard maps. ・ Building of database on disasters.
	Strengthening of land use planning and regulation	・ Residential zones in the mountainous area in the southeastern part of Almaty City have been expanding. ・ In potentially hazardous areas that are vulnerable to sediment disasters, the number of illegal residents has been increasing.	・ Strengthening of land-use regulations. ・ Land use planning responding to disaster risks.
Monitoring and forecasting	Improvement of monitoring systems	・ Meteorological observation is being gradually automated. ・ Almost all hydrological observations are conducted manually. ・ Monitoring of glacier lakes is manually conducted.	・ Improvement and upgrading of automatic monitoring systems (for meteorological and hydrological phenomena, glacier lakes, debris flows, landslides, and snowslides). ・ Creation of database and archive of observed data.
	Improvement of analysis technologies and human resources development	・ Debris flow simulation, landslide analysis, and other analysis technologies are insufficient. ・Damage situation in a wider area at the time of a disaster is difficult to understand.	・ Improvement and dissemination of analysis technologies related to sediment disasters, glacier lakes, and snowslides. ・ Training of experts (young engineers in particular).

Structural countermeasures	Preparation of structural countermeasures against sediment disasters	・The Small Almaty River basin has been mostly protected with structural countermeasures against debris flow. ・ Kazselezashita intends to focus on the preparation of structural countermeasures in the Large Almaty River basin. ・ Tourism-oriented land development is underway in the Large Almaty River basin. ・Debris flow capturing nets made by Japan's Tokyo Rope MFG. CO., Ltd are planned to be installed. Rockfall protection nets have also been experimentally installed.	・ Preparation of countermeasures in the Large Almaty River basin. ・ Dissemination of new technologies.
		・ Knowledge and awareness about standards on design and construction works are low.	・ Improvement of design and construction technologies.
		・ Sediments accumulated on anti-debris dams remain unattended. ・ Aging urban infrastructures lead to sediment disasters (water leaks from drainage pipes cause landslides in the mountainous areas on the outskirts of Almaty City).	・ Maintenance of existing anti-debris facilities. ・ Upgrading of decrepit infrastructures. ・ Formulation of medium- and long-term debris protection plans.
Non-structural countermeasures	Improvement and expansion of early warning system	・ An organizational scheme for early warning has been set up. ・ Notification services for meteorological and hydrological information are provided to the general public through short message service (SMS), among other means. ・ Almaty City has a warning system that uses manually-operated sirens, which have not been retrofitted for 30 years. ・ The general public does not know the meaning of sirens. ・ In Shymkent, warnings are passed from Kazselezashita to municipalities, and then from municipalities to the local public through letters.	・ Development of swift and reliable early warning systems. ・ Ensure early warning systems are widely known to the public.
	Emergency response	Common to all kinds of disasters (see Chapter 11).	Common to all kinds of disasters (see Chapter 11).
	Community-based disaster management	Common to all kinds of disasters (see Chapter 11).	Common to all kinds of disasters (see Chapter 11).

Source: JICA Study Team

The following sections detail the individual items listed in the table above:

10.2 Current Conditions and Crucial Issues of Disaster Risk Assessment

(1) Preparation of sediment disaster hazard maps

The current condition of sediment disaster hazard maps preparation is completely the same with that of flood hazard maps described in Section 9.2. A small-scale hazard map of the whole country has been drawn up, but medium- and large-scale (detailed) hazard maps have yet to be prepared. Also, sediment hazard maps are not made available to the general public.

The present state of disaster records management is also the same as that of flood records detailed in Section 9.2.

Issues:

- Preparation of medium- and large-scale (detailed) sediment disaster hazard maps
- Sharing and effective use of hazard maps
- Building of a database on disasters

(2) Land use planning and regulation

As shown in the photographs in the opening section, residential areas on the hilly outskirts of Almaty, along with the growth of the city`s population, have been expanding in recent years. Inappropriate earth-cutting and landfilling due to housing land development have lately caused landslides and slope failures.

Moreover, in the mountainous areas, a few people have illegally built residential houses and restaurants near riverbeds to make their lives more convenient. Such areas have a high risk to induce debris flows.

Issues:

- Strengthening of the land use regulations
- Land use planning responding to disaster risks

10.3 Current Condition and Crucial Issues of Monitoring and Forecasting

(1) Monitoring system and network

Meteorological and hydrological monitoring is covered in Section 9.3.

Kazselezashita is in charge of monitoring sediment disasters and snowslides. It has 36 control and contact offices and 120 observation stations across the country, with approximately 700 employees involved in monitoring. In the area under the control of the South Kazakhstan Branch of Kazselezashita, there are 13 full-time observation stations and several stations that are used for emergency purposes. These are different from the monitoring facilities owned by KazHydromet.

1) Monitoring of debris flow

At each observation station, monitoring staff manually measure rainfall, air temperature, river water flow, and snowfall twice a day—in the morning and in the evening—in order to monitor debris flow. Monitoring staff pass the observed data, via emergency response centers (relay points), to the regional headquarters of Kazselezashita by radio or mobile phone. When the risk of debris flow becomes higher, the frequency of collecting data becomes higher of up to every two hours.

As described above, monitoring of debris flow is basically conducted manually, However, the Almaty Branch of Kazselezashita plans to build an automatic observation station in 2014 in the upstream area of the Small Almaty River basin. Aiming to install and operate the station independently for the purpose of maintaining control over the basin, Kazselezashita wishes to introduce more automatic monitoring facilities and shows great interest in Japan's automatic observation system.

2) Monitoring of landslides

No particular monitoring activity is being performed for landslides.

3) Monitoring of glacier lakes

For monitoring of glacier lakes, three monitoring employees are stationed at each glacier lake during the snow-melting period from June to September. The monitoring employees manually measure water level, flow, water temperature, transparency, and air temperature; and then pass the observed data to the headquarters by radio. Data are normally collected three times daily at 7:00, 15:00, and 19:00; and every two hours during emergency. In addition to these, rainfall and other meteorological data are shared by KazHydromet.

When the water level rises, it is manually lowered by means of siphoning through water pipes rather than power-driven solutions.

Sources: Left: from the website of Kazselezashita, Right: materials obtained from the Almaty Branch of MES

Figure 10.1 Monitoring of Glacier Lakes (Left: Observation Camp, Right: Water Level Gauge)

Source: Kazselezashita Website

Figure 10.2 Adjustment of Water Level of Glacier Lakes Using Water Pipes

4) Monitoring of snowslides

In the territory supervised by the Almaty Branch of Kazselezashita, two snowslide observation stations and two observation posts are placed near major roads and resort areas with skiing grounds. At these stations and posts, air temperature, humidity, snowfall, snow quality, etc. are manually measured and monitored. Currently, snowslide censors independently developed in Kazakhstan are experimentally placed in the Large Almaty River basin as a model project. The automated censors take hourly measurements of the ground and air temperatures and snowfall, and record them in data loggers. The intention is to apply such censors to the observation of debris flows and landslides as well in the future.

Issues:

- Introduction and upgrading of automatic monitoring systems (meteorological and hydrological phenomena, glacier lakes, debris flows, landslides, and snowslides)
- Creation of database and archive of observed data

Kazselezashita is aware that the introduction of automatic monitoring facilities including those for glacier lakes is a pressing issue.

(2) Technologies for analysis

No simulation analysis is being conducted for debris flows, and there are no technologies for observation, mechanism analysis, or stability analysis of landslides. According to the Space Research Institute, satellite images are not used for monitoring glacier lakes because of the low resolution currently used in Kazakhstan.

Issues:

- Improvement of analysis technologies for sediment disasters and glacier lakes
- Training of experts (young engineers in particular)

10.4 Current Condition and Crucial Issues of Structural Countermeasures

In Kazakhstan, Kazselezashita plays the central role in implementing structural countermeasures against sediment disasters. The sections below outline specific structural countermeasures against sediment disasters of different types.

(1) Design standards

According to interviews with the relevant organizations, regulations related to design, construction works, and materials for various structures including buildings, infrastructure, and lifeline facilities are based on the Seismic Building Codes (SNiP).

Design for structures against sediment disasters is required to comply with hydrological standards, which seem to relate to hydrological phenomena in general, rather than to sediment disasters in particular. When questioned about these standards, the relevant organizations failed to provide clear answers, nor could the organizations governing the standards be established. It can be concluded that all these organizations have limited knowledge and awareness about design standards.

(2) Countermeasures against debris flow

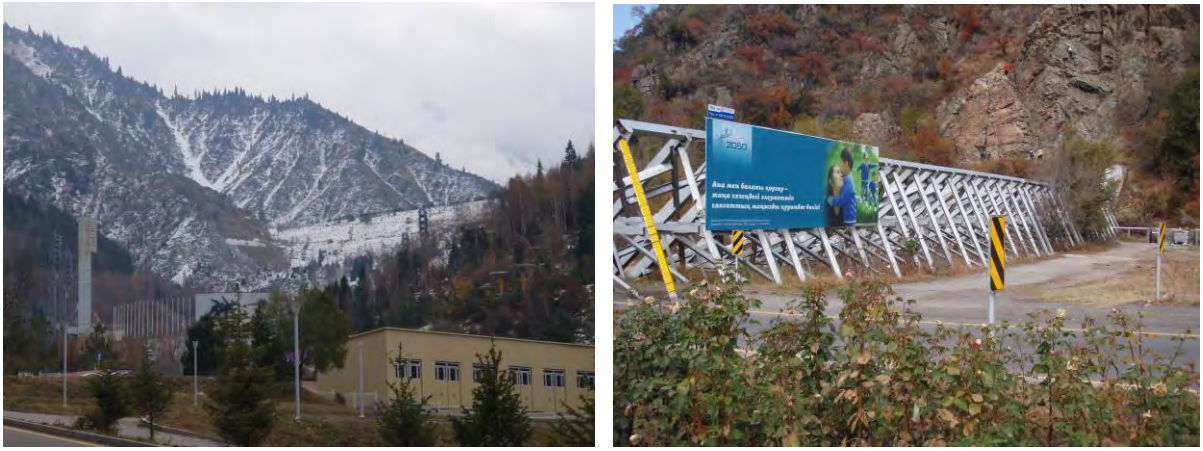
1) Areas surrounding Almaty City

Kazselezashita views debris flow as the top priority in sediment disaster management in Kazakhstan and is therefore working on introducing structural countermeasures for such. In particular, such countermeasures are being implemented in the areas around Almaty City, which have suffered from debris flows on many occasions in the past. The city is located at the base of the Large Almaty River and the Small Almaty River basins. The Almaty Branch of Kazselezashita considers these river basins to be top priority areas for countermeasures.

In the Small Almaty River basin, two permeable steel slit dams were constructed in 1956 and a 150 m-high anti-debris gravity dam (Medeu Dam) was constructed in 1973 in the upstream area, as shown in Figures 10.3 and 10.4.

Source: JICA Study Team

Figure 10.3 Model Map of the Anti-debris Facilities Around Almaty City (at the Almaty Branch of Kazselezashita)



Source: JICA Study Team

Figure 10.4 Anti-debris Dams Along the Small Almaty River (Left: Medeu Dam, Right: Permeable Steel Slit Dam)

These dams prevent debris generated in the upstream of the Small Almaty River to reach the urban district of Almaty City. However, the upstream area of Medeu Dam has a skiing ground, access roads, ropeway, etc., and this area has suffered from debris flows on many occasions, as shown in Figures 10.5 and 10.6. In dealing with debris flow, Kazselezashita is planning to improve the river basin by applying trapping structures (such as wire nets), which are to be procured from a Japanese manufacturer.

According to interviews, there are plans to place these nets at nine points along the tributaries of the Almaty River.

Source: Almaty Branch of Kazselezashita

Figure 10.5 Debris Flow Generated on a Tributary of the Small Almaty River in August 2013

Source: Almaty Branch of Kazselezashita

Figure 10.6 Example of Debris Flow Trapping Net to be Installed Along the Small Almaty River

On the other hand, channel protection gabions have been installed along the downstream of Medeu Dam, as shown in Figure 10.7.

Source: JICA Study Team

Figure 10.7 Channel Protection with Gabions

As described above, countermeasures against sediment disasters have already been taken to a certain extent in the Small Almaty River basin. The Large Almaty River basin, on the other hand, is only protected by a large anti-debris dam in the downstream and channel protection structures constructed by Japanese detainees in the upstream, which cannot be considered sufficient. Tourism-oriented land development in the Large Almaty River basin has progressed in recent years, and a number of accommodations, food and drinking establishments, and residential houses have been constructed along the river course upstream from the existing anti-debris dam. Currently, there is also a plan to construct a skiing resort in between the Large Almaty River and Small Almaty River basins. The preparation of anti-debris facilities in the Large Almaty River basin is now a pressing issue, which is recognized by the Almaty Branch of Kazselezashita. Although there is a plan to construct a new concrete anti-debris dam upstream from the existing one along the Large Almaty River and its feasibility study has already been completed, construction has not yet started because of the inability to secure the necessary budget.

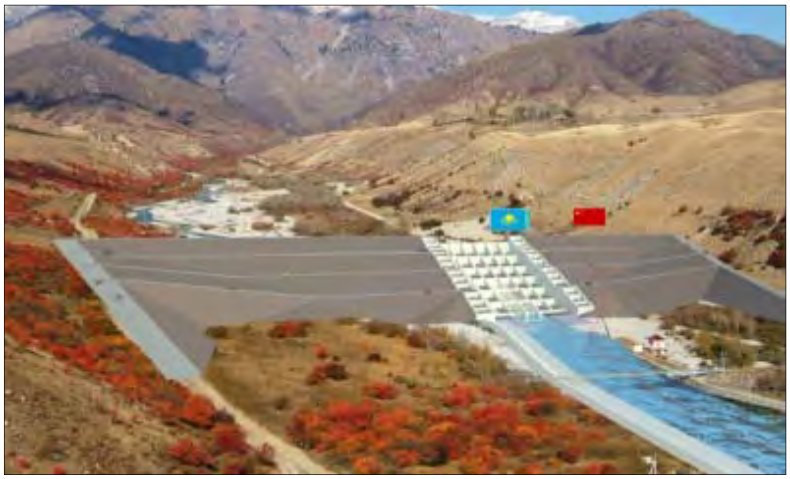
The existing anti-debris dam, as shown in Figure 10.8, was built nearly 50 years ago. The problem of aging facilities and the accumulated sedimentation together with the task of efficient maintenance is another issue to consider.

Source: Mudflow Phenomena in the Southeast Kazakhstan, A.R. Medeu, 2011

Figure 10.8 Existing Anti-debris Dam in the Large Almaty River Basin

2) Other regions

There is a plan to construct an anti-debris dam on the Korgos River running along the Chinese border in the southeastern part of the country in order to prevent debris flows and floods (refer to Figure 10.9).



Source: Presentation materials of MES for Seminar on the UN Development Programme, "Strengthening the National Capacity for Risk Assessment, Prevention, and Response to Natural Disasters"

Figure 10.9 Anti-debris Dam to be Constructed on the Korgos River Running Along the Chinese Border

(3) Countermeasures against landslides and slope failures

Retaining walls have been built in some areas as countermeasures against slope failures along the roads in the country. In addition, as seen in Figure 10.10, drainage pipes have been installed and gabions piled up as countermeasures against sediment disasters in the residential areas in the hilly districts. The renovation of drainage pipes (replacement of decrepit infrastructure) is another pressing issue in the hilly districts on the outskirts of Almaty City, where landslides are caused by water leakage of decrepit drainage pipes.

Among the landslide countermeasures, Kazakhstan had experiences of counterweight earth filling and groundwater drainage and pile works, but not anchor works.

Source: Almaty Branch of MES

Figure 10.10 Countermeasures Against Steep Slope Failures Using Gabions (Left: During Construction, Right: After Construction)

(4) Countermeasures against falling rocks

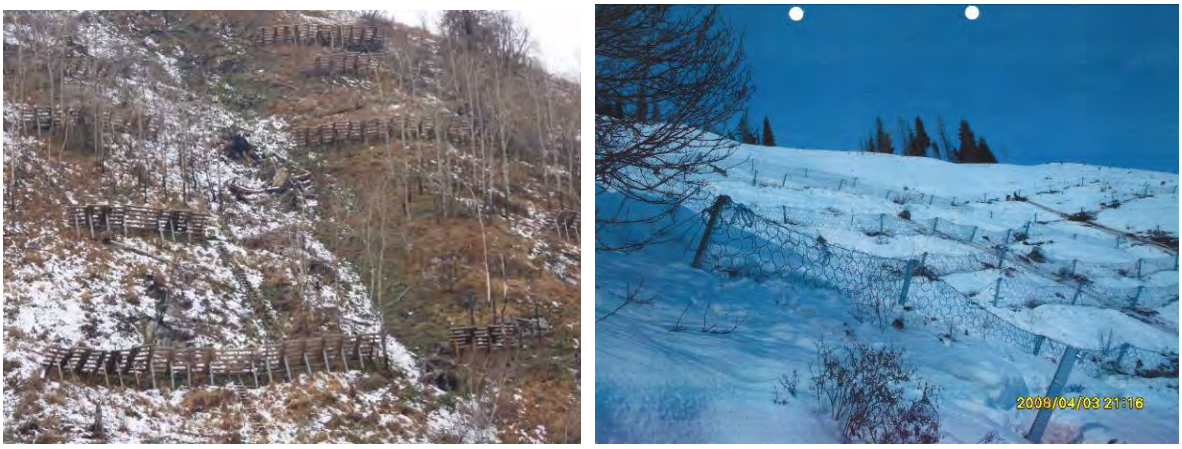
Basically, no slope protection works are done on the mountain roads in Kazakhstan. The common approach is to respond to an emergency when it occurs, e.g., urgently clean the roads from sediments after a disaster. On the other hand, Kazselezashita is currently testing a Japanese rockfall protection technology (Mighty Net made by Tokyo Rope MFG. Co., Ltd.) installed on the slopes in some areas of the road between Almaty City and Medeu Dam in order to verify its applicability in Kazakhstan (see Figure 10.11).

Source: JICA Study Team

Figure 10.11 Japanese Rockfall Protection Technology Test Site

(5) Countermeasures against snow avalanches

Kazselezashita regularly performs blasting operations to prevent snow avalanches. Countermeasures against snow avalanches have also been taken for the road near Medeu Dam on the outskirts of Almaty City. Traditionally, wooden materials had been mainly used as countermeasures; however as many structures were burnt down by mountain fires, Korean-made steel snowslide protection fences have been introduced nowadays.



Sources: JICA Study Team (Left), Almaty Branch of Kazselezashita (Right)

Figure 10.12 Snow Avalanche Protection Structures in Kazakhstan (Left: Wooden Fences, Right: Steel Fences)

Issues:

- Improvement of design and construction technologies, and dissemination of new technologies
- Introduction of structural countermeasures in the Large Almaty River basin
- Maintenance of existing anti-debris facilities
- Renovation of decrepit infrastructures

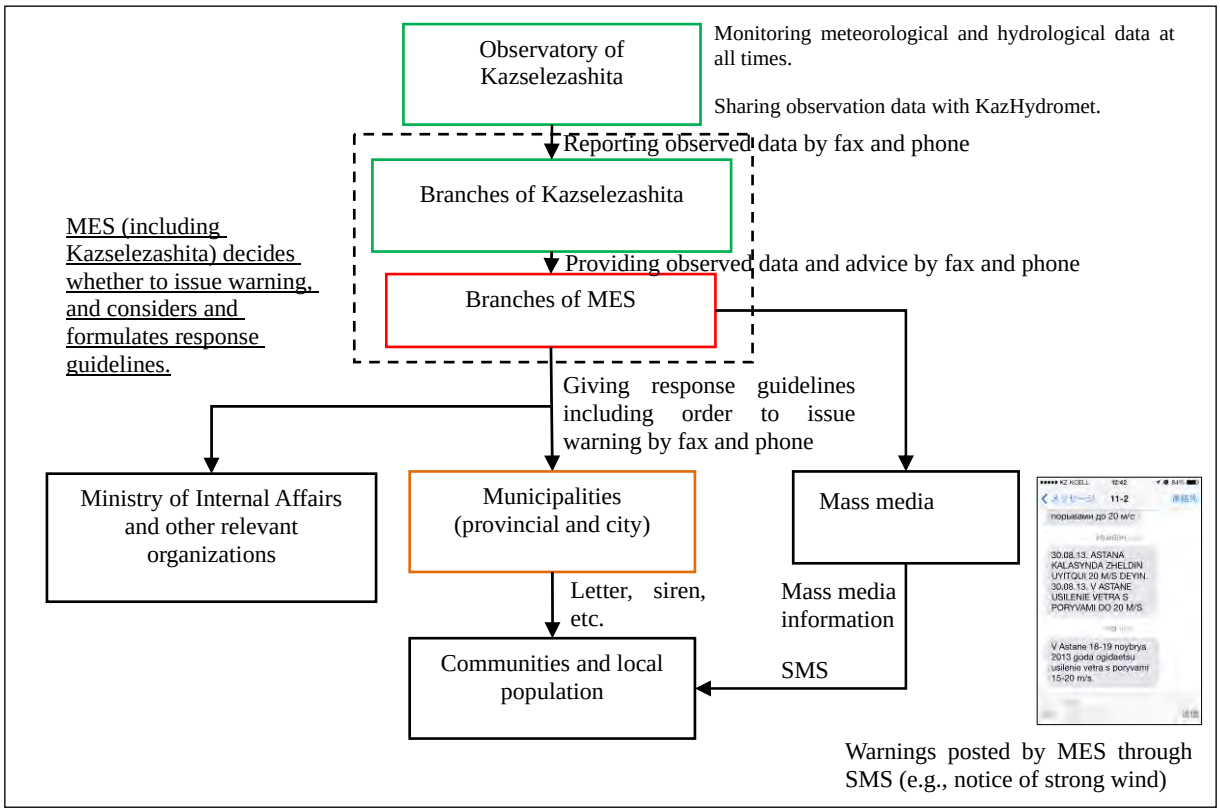
10.5 Current Condition and Crucial Issues of Non-structural Countermeasures

(1) Early warning systems

Similar to the case of floods covered in the previous chapter, information about sediment disasters during emergencies are passed on in the following manner:

Kazselezashita constantly checks observed meteorological and hydrological data to see if any natural event leading to disaster (mainly sediment disaster or snowslide) may occur. If the observed data exceeds a reference value for warning, Kazselezashita then formulates response guidelines together with the Ministry of Emergency Situations (MES) and notifies *akimat*s, the Ministry of Internal Affairs, and other relevant organizations. MES (including Kazselezashita) is responsible for issuing warnings (notification) to the local population and mass media, and informs the general public via SMS. When instructed by MES, *akimat*s alert the local population through sirens or by letters. The Ministry of Internal Affairs then makes the necessary arrangements, such as setting up road blocks.

The standards for issuing warnings are based on those formulated during the Soviet Union era but are updated to meet the recent circumstances. The flow of information dissemination is shown in Figure 10.13.



Source: JICA Study Team based on interviews

Figure 10.13 Flow of Information about Sediment Disasters During Emergency

As for floods, Almaty City uses sirens as its early warning system. The sirens are manually operated and have not been replaced for 30 years. Another issue is that many members of the public do not understand the meaning of sirens. In Shymkent City, letters are used as a means of warning the local population, which requires time to convey the information. The country does not have a warning system linked to monitoring facilities at areas vulnerable to debris flows or landslides, and there are no criteria for issuing warnings based on the results of forecasting.

Issues:

- Development of swift and reliable early warning systems
- Making sure early warning systems are widely known to the public

(2) Emergency response and community-based disaster management

Activities related to emergency response (e.g., initial response) and community-based disaster management (e.g., establishment of an evacuation system) are common to all kinds of disasters, which are covered in Chapter 11.

Chapter 11 Current Conditions and Crucial Issues on Emergency Response and Community-based Disaster Management

11.1 Current Conditions and Crucial Issues of Emergency Response

Based on the results of the field survey (interviews with concerned personnel and collection of relevant information/data), as well as information collected over the internet, the current conditions and crucial issues on emergency response are described in Table 11.1.

Table 11.1 Current Conditions and Crucial Issues on Emergency Response

Category	Subcategory	Issues	Proposed Countermeasures
Emergency Response	Organization for initial response	・At times of emergency, the Ministry of Emergency Situations (MES) Regional Offices and the local governments (Committee of Emergency Situations) perform the main roles. ・MES performs its activities independent from local governments, and directly controls the region concerned.	・Clarify the roles and responsibilities of MES and the local governments
	Organization for assistance	・The MES Central Office undertakes logistics support and arranges assistance together with the MES Regional Offices upon receipt of the request from the respective regional office. ・If a destructive disasters occurs, the deputy minister will directly be in command of the situation at the place of disaster.	・Enforce public relations regarding activities of MES
	Organization for early warning	・There is no automated early warning dissemination system such as the earthquake early warning system being used in Japan. ・The warning system was formed based on technology from the 1970s to 1990s. Modernization of the system is ongoing. ・Warning information is disseminated through existing telecommunication means (TV, radio, cell phone such as text messaging system, siren, and emergency vehicles such as fire engines and patrol cars).	・Modernize methodologies for early warning and telecommunications
	Others	・The MES Regional Office buildings and telecommunication infrastructure are likely to have low earthquake resistance. It seems that the MES Regional Office buildings, which have been utilized as major activity centers, are obsolete and are not earthquake-proof.	・Renew and modernize telecommunication facilities, equipment, and infrastructure in the MES Regional Offices (including earthquake-proofing)

Source: JICA Study Team

(1) Organization of initial response

At the state level, the MES Central Office analyzes information and processes requests from the regional

offices and then directs transboundary assistance for logistics support to the regional offices in other territories as required. If a destructive earthquake occurs, the deputy minister will travel to the place of disaster to give instructions directly. However, in principle, it is considered that military personnel or persons with experience in firefighting should direct and manage the initial response and related activities.

The MES Regional Offices has prepared a plan on initial response considering particular disasters in the region and takes actions based on such. (Note: on-desk practice with maps is conducted periodically.) The assumed damage and locations of control and evacuation centers are illustrated on the maps. However, these are considered confidential and taking pictures of such is prohibited.

At the local government level (provincial, city, and district governments), the Committees of Emergency Situations, chaired by the heads of local governments (provincial governors, city mayors, and district heads) are formed and perform initiatives as an administrative body. Since staff of the MES Regional Offices undertake actions for initial response, the roles of the committee are focused on recovery and restoration activities after relief, rescue, and evacuation stages.

With regard to human resources, the organization for initial response is likely composed of well-trained and organized staff.

(2) Organization for assistance

When a disaster occurs, the MES Central Office, upon receipt of request from the MES Regional Office, arranges assistance for the requesting regional office. Should a large-scale disaster occur, the deputy ministers will take command of the situation at the place of disaster. In some cases, a system of cooperation is organized among neighboring local governments in order to cope with the situation.

(3) Organization for early warning

In general, dissemination of early warning and information to the people is conducted in accordance with predetermined regulations and procedures through existing means of communication (such as TV, radio, mobile phone text services, sirens, and emergency vehicles with microphones and speakers).

Early warning systems for flood and sediment disasters are described in Chapters 9 and 10, respectively.

(4) Others

Many MES Regional Offices reside in old buildings constructed during the Soviet Union era, and are therefore questionable in terms of earthquake resistance. Furthermore, earthquake resistance of infrastructure such as for telecommunications is unknown. There are many unclear factors if such important infrastructure including warning systems would properly work should a disaster occurs.

Crucial Issues:

- Clarify the roles and responsibilities of MES and local governments.
- Modernize methodologies for early warning and telecommunications.
- Enforce public relations regarding activities of MES.
- Involve private companies and citizens.
- Update and modernize telecommunication facilities, equipment, and infrastructure of the MES Regional Offices (including earthquake-proofing of buildings).

11.2 Current Conditions and Crucial Issues of Community-based Disaster Management

The current conditions and crucial issues of community-based disaster management are shown in Table 11.2.

Table 11.2 Current Conditions and Crucial Issues of Community-based Disaster Management

Category	Subcategory	Issues	Proposed Countermeasures
Community-based Disaster Management	Main organization	・The MES Regional Office has initiative for evacuation of people at times of emergency. ・The MES Regional Office prepared evacuation systems such as evacuation centers. ・Countermeasures for self-defense of people is still under development.	・Strengthen disaster awareness of citizens ・Promote evacuation by citizens' own initiative
	Capacity at the community level	・Community self-defense associations in residential communities are not organized. ・Condominium associations or groups (such as KSK) are composed of aged people and lack disaster prevention activities. ・In conformity with the civil defense laws, people are obliged to coordinate with the government in disaster prevention activities during emergencies. ・Disaster prevention education is provided by units in offices and schools. ・Disaster prevention drill sponsored by MES is conducted in regions annually. ・It was reported that the local people are well-informed on evacuation places for disaster occurrence. ・Signs showing the route and location of evacuation centers are not provided.	・Strengthen disaster prevention in areas inhabited by aged people ・Activate KSK and strengthen disaster management ・Conduct highly realistic disaster management drills ・Train leaders of self-managed disaster prevention organizations ・Store/reserve materials for disaster prevention through the people's initiative ・Utilize the outcome of the JICA Study in 2007-2009

	Coordination with NGOs, and other relevant organizations	・Disaster prevention activities of NGOs are low. ・The Red Crescent Society plays crucial roles for humanitarian assistance. ・After the independence of the Republic of Kazakhstan, UNDP has been cooperating in the disaster prevention sector. ・UNDP is undertaking the DIPECHO VII and IV projects (DIPECHO V and VI were completed in 2010 wih their respective target regions and villages).	・Clarify the roles and responsibilities among MES, donors, NGOs, communities, and stakeholders ・Strengthen the cooperation of stakeholders on disaster countermeasures ・Disseminate the outcome of the UNDP DIPECHO IV Project
	Others	・Windows for consultation by people is set up at each MES Regional Office. ・No structure exists that collects people's opinions on disaster administration. ・BCP prepared by private companies does not exist.	・Promote disaster administration and prepare disaster preparedness plan by coordination between the local administration and the citizens. ・Prepare BCP by private companies

Source: JICA Study Team

(1) Main organization

As for relief, rescue, and evacuation activities, the MES Regional Office performs its initiative independently and directly at the area damaged by disasters (in accordance with the previously discussed plans for evacuation and rescue).

(2) Capacity at the community level

There is no self-governed association for disaster management in the residential communities (or no activity is conducted even if such exists). Among the units at the community level that are operating during daytime on weekdays are condominium associations (KSK), offices, and schools. Members of KSK are mostly pensioners or aged people who find it difficult to take part in disaster management activities at the community level. In addition, it was reported that their desire for disaster prevention is relatively low (JICA Study 2007-2009).

(3) Coordination with NGOs, and other relevant organizations

There is no community association at the residential district level which ordinarily coordinates with the local government and NGOs. However, offices and schools maintain coordination in disaster administration through disaster prevention education and training organized by MES. In accordance with laws on civil defense, the citizens of Kazakhstan are obliged to cooperate in disaster prevention. In this sense, disaster prevention drills are conducted periodically with the guidance of MES and are participated by offices, communities, schools, the Red Crescent Society, and other people. MES provides education and training for leaders and management staff of each organization. Learning about disaster management is an obligatory subject in schools for students.

Although groups for productive activities such as water user associations exist in villages, they have no

function for disaster prevention in local cities where population and housing density is low.

11.3 Efforts for Community-based Disaster Prevention by International Donors and NGOs

The results of disaster management activities by NGOs are relatively low in Kazakhstan. Therefore, the Red Crescent Society is expected to perform most of the roles of NGOs, especially for emergency response, evacuation systems, and humanitarian assistance.

UNDP has been implementing support for community-based disaster prevention projects (refer to Table 11.3 for some projects). However, these projects were conducted under administrative framework rather than as voluntary activities with community participation.

Many residents still have the mentality of government dependency such as during the Soviet Union era, and the base of voluntary disaster prevention in communities is still vulnerable today.

(1) UNDP DIPECHO VII Project

UNDP is carrying out the DIPECHO VII project in 2010-2015 in Almaty State and South Kazakhstan State. The project, with MES as the counterpart, is aimed at improving community-based disaster management in order to promote self-help efforts such as first aid and evacuation system preparation. The abstract of the project is in Table 11.4.

This project particularly targets mountainous and remote areas where administrative services are insufficient. It is believed that these areas have high potential in affecting comprehensive natural disasters such as direct damages caused by earthquakes like collapses and landslides, and secondary disasters by debris flows caused by snow melting and rainfall.

UNDP is planning to expand the mechanism of community-based disaster management to the whole of Kazakhstan through MES by applying the DIPECHO VII project as a model case.

Table 11.3 List of Community-based Disaster Management Projects in 2007-2009

Donor	Project	Abstract	Target Groups	Partners
UNDP	Kazakhstan Natural Disaster Prevention Preparedness Plan (1998-2000)	Recognition of gaps in adjusting and proposing the national plan. Actions for preparation.	Emergency response organizations of disaster management agencies	Emergency response organizations Red Crescent Society
UNDP	Support to the Local Community Affected by the Earthquake in South Kazakhstan (2003-2004)	Through participation in reconstruction of southern Kazakhstan, capacity building of local communities will be promoted as follows: 1 Training to construct more secure buildings, 2 Training for preparedness plan, 3 Discussions with civil society, and 4 Lessons learned from the Dzhambul earthquake report.	Citizens Students in Dzhambul State	Red Crescent Society (Main) Earthquake Research Institute (Report) Local government organizations in Dzhambul State, local NGOs, and others related to emergency response
UNDP	Regional Disaster Risk Management in the Earthquake Zones of Kazakhstan (2004-2007)	Capacity building of the community on preparation against earthquake, further understanding of the preparatory activities for decision makers, and raising awareness of residents. - Community-based disaster management (CBDM) 1) Development of training modules, textbooks, publications and TV shows. 2) Implementation of the pilot project.	CBDM Schools Private sector Residents	MES Red Crescent Society Red Crescent Society (USA) ADRC GEF Local NGO Man & Element and the Red Crescent Society are subcontracted
USAID	Central Asia Earthquake Safety Initiative (2002-2005)	Development of teaching materials. Training for local companies, residents, NGOs, and public institutions in Uzbekistan, Kazakhstan, and Tajikistan.		Local NGO Man & Element

Source: JICA Study, 2007-2009

Table 11.4 Abstract of the UNDP DIPECHO VII Project

Title of the project	DIPECHO VII: Community-Based Disaster Risk Reduction in South-East and East Kazakhstan			
Principal objective	Reduced loss of lives, livelihoods and developmental assets to natural disasters by developing community capacities for disaster risk reduction and by further mainstreaming community-based DRR into national disaster management and sectoral development planning			
	Intervention Logic	**Objectively verifiable indicators**	**Sources of verification**	**Risks and Assumptions**
Specific Objective	Succesful demonstration of community-based disaster risk reduction leads to a reduced loss in livelihoods and assets and builds the case for further DRR mainstreaming	- Introduction of community-based disaster risk reduction into national DRR methodologies - Capacity for local, regional and national stakeholders on DRR and livelihood linkages improved - Mechanisms for stakeholder coordination and involvement in DRR developed and applied	- National guidelines, national and regional preparedness plans, risk assessments, statistics and other relevant documentation - Project reports and documents, project evaluation, project articles, cost-sharing agreements and new projects initiated - Project reports and documents, reports on DRR mainstreaming, development and sectoral plans, guidelines	- All stakeholders actively engaged and coordinated - Authorities (emergency, land use and environmental) are ready to involve communities into disaster management and preparedness - Involved parties understand the linkages between disaster risk reduction and development (including livelihood creation and natural resources management) - Communities are not affected by large-scale disaster during the project's implementation
Results	1. Disaster risks addressed and reduced at community level	Indicator 1.1: Availability and accessability of comprehensive and applicable data and analysis on hazards in mountainous regions Indicator 1.2: Numbers of households with improved capacities for disaster response leading to reduced risk to lives, homes, livelihoods and assets Indicator 1.3: Attraction of financial resources mobilized for community-based DRR from state and regional resources	- Disaster maps - List of participants in civil society (Red Crescent Society) trainings and NGO-led activities - Budget allocations, MoUs and cost-sharing agreements	- Participants at all levels willing to be actively involved in DRR mechanisms; authorities willing to engage communities - Local partners, organizations and institutions are willing to submit information and take an active part in DRR activities - All stakeholders actively engaged and coordinated - Involved parties understand the linkages between disaster risk reduction and development (including livelihood creation and natural resources management)
	2. Community based disaster risk reduction replicated and mainstreamed at all levels	Indicator 2.1: Improved public awareness at local, regional and national levels: skills and knowledge on DRR and its linkages to development Indicator 2.2: Number of plans and guidelines at regional and national level updated to include community-based DRR Indicator 2.3: Number of lessons-learned, case studies and best practices disseminated to stakeholders by CACDRRR Indicator 2.4: Number of mobilized communities involved in DRR projects (through SGP and others)	- Public information on DRR distributed through authority, CACDRRR and CSO/NGO channels, training and capacity assessment reports - Regional preparedness plans; national, regional and sectoral development plans; project documents and dissemination materials including DRR aspects - Lessons-learned, case studies and best practices - Project documents, cost-sharing agreements	- Participants at all levels willing to be actively involved in DRR mechanisms - Involved parties understand the linkages between disaster risk reduction and development (including livelihood creation and natural resources management) - Local partners, organizations and institutions are willing to submit information and take an active part in activities - CACDRRR actively engaged
	3. Improved disaster preparedness through raised capacities of remote communities and National Society	Indicator 3.1: Number of functional Local Disaster Management Committees (LDMC) that are part of community Disaster Management (DM) structure/mechanism Indicator 3.2: Established and well trained DR school teams composed by the school teachers conducting trainings and competitions for schoolchildren Indicator 3.3: At least 60% of community members, schoolchildren and teachers gain lifesaving skills through training in Disaster Preparedness (DP), First Aid (FA), rules of behavior during emergency situations Indicator 3.4: National Society capacities are improved through conducting trainings at national and branches levels for project staff and volunteers and strengthening material and technical equipment (transport and office equipment for 2 branches)	- List of LDMCs members. Training agenda for LDMC. - Lists of participants, Volunteer records, Monitoring reports, Trainers reports, Training agenda. - Acceptance notes, Inventory	- Participants at all levels willing to be actively involved in DRR mechanisms; authorities willing to engage communities - Local partners, organizations and institutions are willing to take an active part in National Society DRR activities - All stakeholders actively engaged and coordinated
Activities	(for Result 1) - Comprehensive risk assessment conducted at to determine extent of the problem and develop an integrated vision of the solution; taking into account the potential impacts of climate change (this will be done through the UNDP Climate Risk Management programme using parallel resources) - Organization of dialogue with local authorities and public service - Integration of DRR into development planning (as part of town plans and budgets) will be conducted, based on risk assessments - Priority mitigation measures will be piloted on the basis of risk assessments in three identified priority areas, including for example: water efficiency, structural measures, mountain pasture rehabilitation, or other as appropriate - Piloting preparedness measures leading to increased preparedness to respond to disasters among local authorities and communities in identified three pilot areas: contingency/emergency planning and training and/or development of early warning systems - Evaluation of long-term risk reduction value of risk reduction measures			
	(for Result 2) - Community-led DRR included into national risk assessment methodologies and regional preparedness plan - Improved development planning on the basis of risk assessments (awareness raising and integration of risk assessment into decision-making processes of local and regional authorities) - Trainings on linkages between disaster risk reduction and sustainable livelihoods, and their linkages to climate change, conducted at local, national and regional levels - Long-term risk reduction value of priority measures (water efficiency, structural measures, mountain pasture rehabilitation, or other as appropriate) assessed and disseminated - Opportunities for including land reclamation / disaster risk reduction / carbon offsetting activities into existing and new microfinancing and/or carbon setting funds analyzed - Disaster risk reduction practices mainstreamed into appropriate sectors (district authorities and relevant ministries and/or private sector entities) as well as into natural resource management; conducted as part of ongoing initiatives - Improved awareness on the opportunities to reduce disaster risks through sustainable environmental practices among authorities and communities - Replication of project lessons learnt through ongoing national and regional initiatives			
	(for Result 3) - LDMCs and trainings conducted for LDMC and community population - LDMCs equipped with disaster preparedness sets - Piloting early warning systems (EWS) operated by the communities - Exit strategy agreed to achieve LDMC's sustainability - School DR teams established, trained and equipped with DP sets - Improved DP/FA knowledge and skills of schoolchildren - Production and dissemination of DP/FA visibility and information materials - National Society staff and volunteers trained and training modules updated - Equipment and transport procured and supplied to branches and HQ for project implementation purposes			

Source: UNDP

(2) Others

The local bureaus of MES provide consultation services and receive petitions for disaster management administration, but basic services are corresponded to individually. Thus, a system for reflecting public opinions on disaster management administration has not been implemented.

Business continuity plan (BCP) of the private sector has been prepared for emergency response and evacuation system. However, it is believed that it is still in the development stage in view of business continuity.

Crucial Issues:

- Awareness of residents on disaster prevention.
- Promotion of voluntary evacuation by residents.
- Disaster prevention measures for the aged population.
- Activation of KSK and development of function for disaster prevention.
- Implementation of highly realistic emergency drills.
- Cultivation of leaders for voluntary disaster prevention organization.
- Voluntary stocking of resources for disaster by the community.
- Information on escape routes and evacuation places (by installation of billboards and signs).
- Clarification of roles and responsibilities between stakeholders such as MES, donors, NGOs, and the community.
- Strengthening of joint disaster prevention measures by stakeholders.
- Dissemination of the results of the DIPECHO VII project.
- Promotion of disaster management administration and planning of disaster management by cooperation between the residents and the government.
- Preparation of BCP by the private sector.

Chapter 12 Analyses of Survey Results

12.1 Analysis of Survey Results and Evaluation of Priority

In order to arrange the reference material for examination of cooperation program with Japan on disaster prevention sector in the future, four evaluation pillars for the issues identified in each field up to the previous chapter are set. In view of the four evaluation pillars, namely, "Status of Accomplishment", "Sustainability", "Relevance", and "Impact", of which under the present status (previous stage of program formulation), the two latter pillars taken from DAC 5 indexes[1] are possible to apply, and analysis was conducted and priority of issues was evaluated. Explanation on the evaluation pillars are presented in Table 12.1.1.

Table 12.1 Evaluation Pillars for Development Priority

Evaluation Pillar	Contents
Status of Accomplishment(1	Status of implementation and/or current status of the issues concerned by the related agencies, donors, and nongovernmental organizations (NGOs) in Kazakhstan.
Relevance(2	Degree on consistency with national and local level policies and direction regarding the disaster prevention sector.
Impact(2	Direct and indirect negative/positive changes due to assistance.
Sustainability(1	Possibility of continuation of self-improvement even after provision of assistance

Source: (1, Considered by the JICA Study Team、(2, "New JICA Evaluation Guideline, Version 1 (June 2010)" (Ref: Footnote)

The results of analyses for the issues on each sector are shown in the tables below. Furthermore, after verifying the opinions of Kazakhstan, the priority between sectors will be decided and the proposed plans will be duly realized.

[1] In the project evaluation of JICA, the "five pillars of evaluation" were adopted as principles to assess value judgment. The "five pillars of evaluation" are the evaluation criteria for development assistance, which was advocated by the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD) in 1991. The criteria consist of (1) Relevance, (2) Effectiveness, (3) Efficiency, (4) Impact, and (5) Sustainability. (Source:"New Evaluation Guideline Version 1", June 2010)

Table 12.2 Results of Analysis on Issues in Disaster Administration (Central Office, MES) (1/2)

Categories	Subcategories	Issues	Evaluation Items: Current Status ◎: Not yet done ○: Partially ongoing △: Ongoing	Necessity ◎: High ○: Moderate △: Low	Impact ◎: High ○: Moderate △: Low	Sustainability ◎: High ○: Moderate △: Low	Priority ◎: High ○: Moderate △: Low
Policy and Plan	Policy	・Clarify coordination with other agencies in the disaster preparedness plan ・Verify the effectiveness of coordination through joint drill ・Improve the know-how on planning of countermeasures based on risk assessment ・Share the knowledge on risks due to climate change and apply it on the disaster preparedness plan	◎ ○ ◎ ◎	◎	◎	◎	◎
	National Development Plan	・Keep the consistency of policies and activities for disaster prevention considering disaster management cycle ・Clarify with responsible agencies for disaster mitigation and recovery/restoration in respective sectors ・Introduce technology for hazard map preparation and risk assessment	◎ ◎ △: Partly implemented by Kazakhstan	◎	○	◎	◎
Organization and Institutions	Coordination	・Strengthen the technology for planning and design (structural and non-structural measures) by attached agencies	○: Conducted by donors and developed countries	◎	◎	○	◎
	International framework	・Prepare CESDRR's Action Plan at the earlier stage and implementation of promoting joint assistance with UNDP	△: Under project implementation by UNDP	○	△	△	△
Resources	Budget	・Simplify and clarify the budgeting process	◎	◎	○	○	○
	Rescue technology	・Strengthen technology on rescue activities and trainings of experts	◎	◎	○	○	○
	Procurement of goods	・Simplify and expedite procedure on approval of release of stored goods	◎	○	○	○	○
Information and Telecommunication	Storage and dissemination of information	・Establish an interagency communications network (including related institutes and attached agencies) ・Introduce advanced technology and base-isolating technology (earthquake disaster prevention) ・Promote remote sensing technology with the use of satellites ・Improve awareness on importance of sharing information (including related agencies) ・Develop disaster database system and public system available on the internet	◎ ◎ ◎ ◎ ◎	◎	◎	◎	◎

Table 12.2 Results of Analysis on Issues in Disaster Administration (Central Office, MES) (2/2)

Categories	Subcategories	Issues	Evaluation Items				Priority
			Current Status ◎: Not yet done ○: Partially ongoing △: Ongoing	Necessity ◎: High ○: Moderate △: Low	Impact ◎: High ○: Moderate △: Low	Sustainability ◎: High ○: Moderate △: Low	◎: High ○: Moderate △: Low
Information and Telecommunication	Dedicated communication system	・Develop dissemination technology of disaster information (hardware and software) ・Modernize telecommunication infrastructure (e.g., dedicated telecommunication lines in MES and securing redundancy)	◎ ◎	◎	◎	◎	◎
Disaster Education and Training	Disaster education	・Develop a curriculum for education on disaster prevention ・Increase specialists and staff with expertise on disaster prevention ・Develop a systematic program where local people can participate in disaster preparedness planning	○: Implement by UNDP ○: Conducted by MES ◎	◎	○	◎	◎
	Training	・Develop systematic programs to teach trainers	◎	◎	○	○	○
	Awareness on disaster prevention	・Involve awareness enhancement program in the disaster preparedness plan ・Enforce regular meetings of MES and mass media and promote exchange of information for awareness raising	◎ ◎	◎	◎	◎	◎

Source: JICA Study Team

Table 12.3 Results of Analysis on Issues in Disaster Administration (Regional Office of MES and Local Government)

Categories	Subcategories	Issues	Evaluation Items				Priority
			Current Status ◎: Not yet done ○: Partially ongoing △: Ongoing	Necessity ◎: High ○: Moderate △: Low	Impact ◎: High ○: Moderate △: Low	Sustainability ◎: High ○: Moderate △: Low	◎: High ○: Moderate △: Low
MES Regional Offices	Astana	・Prepare a disaster database system and extend its storage period (for all disaster categories) ・Strengthen public services for disaster management in remote areas (vulnerable, aged people, handicapped, and children) ・Improve technologies for disaster relief operation in cold districts ・Establish a dedicated communication network firmly functioning during emergencies	◎ ○: DIPECHO VII ○ ◎	○	○	○	○
	Almaty	・Clarify the roles and responsibilities of MES and local government ・Clarify the budget allocation and approval procedures ・Establish a dedicated communication network during emergencies	◎ ◎ ◎	◎	○	◎	◎
	South Kazakhstan	・Prepare manuals for training on disaster prevention ・Establish a dedicated communication network during emergencies	◎ ◎	◎	○	◎	◎
Province	South Kazakhstan	・Clarify the roles and responsibilities of MES and the local government ・Clarify the budget allocation and approval procedure	◎ ◎	◎	○	○	○
City	Almaty	・Clarify the roles and responsibilities of MES and the local government ・Develop guidelines for hazard map preparation and enforce distribution of the guidelines ・Prepare manuals for training on disaster prevention	◎ ◎ ◎	○	○	○	○
	Shimkent	・Clarify the roles and responsibilities of MES and the local government ・Develop guidelines for hazard map preparation and enforce distribution of the guidelines ・Prepare manuals for training on disaster prevention	◎ ◎ ◎	○	○	○	○

Source: JICA Study Team

Table 12.4 Results of Analysis on Issues in the Earthquake Disaster Sector (1/2)

Categories	Subcategories	Issues	Evaluation Items				Priority
			Current Status ◎: Not yet done ○: Partially ongoing △: Ongoing	Necessity ◎: High ○: Moderate △: Low	Impact ◎: High ○: Moderate △: Low	Sustainability ◎: High ○: Moderate △: Low	◎: High ○: Moderate △: Low
Observation Systems	Organizations	Foster collaboration of related organizations	◎	○	△	△	△
	Observation Networks	Replace or update the existing observation network Enhance the coverage of the observation network	◎Supplement of spare parts ◎	◎	○	◎	◎
	Staff/Researchers	Encourage young researchers in universities and/or related organizations	○Support for KNDC specialist course ◎KazGASA, etc.	◎	○	◎	◎
Understanding of Seismic Hazard and Risks	Hazard Maps	Update the nationwide seismic hazard maps based on the latest data Update the seismic hazard map of Almaty City	○ ○Implemented by the Institute of Seismology	○	◎	◎	◎
	Risk Assessment and Damage Estimation	Estimate earthquake damages based on the latest data	○	○	◎	◎	◎
	Active Faults	Study and estimate the activities of faults in connection with earthquakes	◎Implemented by foreign researchers	△	○	○	○
Preparedness and Countermeasures	Responsible Organizations	Define the roles and responsibilities of MES and local governments in case of emergency due to earthquake disasters	○Implemented by UNDP	○	◎	◎	◎
	Aseismicity of buildings	Implement aseismic measures for existing public important buildings Implement aseismic measures for existing private buildings Develop new aseismic measures to be suitable to Kazakhstan's architecture Implement model project for constructing earthquake-resistant buildings Control illegal construction of buildings Control quality of geotechnical investigations	○Implemented by KazNIISSA ◎Difficult due to economic reasons ○Implemented by KazNIISSA; Japan has technologies ◎Sharing of Japanese technology ○Controlled by the government ○Necessary to improve methods	◎	◎	○	◎

Table 12.4 Results of Analysis on Issues in the Earthquake Disaster Sector (2/2)

Categories	Subcategories	Issues	Evaluation Items				Priority
			Current Status ◎: Not yet done ○: Partially ongoing △: Ongoing	Necessity ◎: High ○: Moderate △: Low	Impact ◎: High ○: Moderate △: Low	Sustainability ◎: High ○: Moderate △: Low	◎: High ○: Moderate △: Low
Preparedness and Countermeasures	Aseismicity of Infrastructures and utilities	Strengthen the aseismicity of aging water pipes Strengthen the aseismicity of road bridges Strengthen the aseismicity of dams Construct multipurpose underground utility conduits	◎Almaty City, etc. ◎Ditto ◎ ◎Constructed in Almaty City, etc.	◎	◎	○	◎
	Urban Planning	Incorporate disaster management concepts into urban planning	◎	◎	◎	○	○
	Disaster Management Resources	Take fire prevention measures for evacuation routes and facilities in order to raise awareness on disaster management; install signboards and inform about access routes to evacuation areas Store disaster management resources	◎ ○Implemented by MES	△	◎	○	○
Selected Cities	Astana City	Observe seismic activities; Evaluate seismic hazard potential and risks	◎Due to low geological activity	△	○	△	△
	Shymkent City	Observe seismic activities; Evaluate seismic hazard potential and risks	◎Due to low geological activity	△	◎	○	○
	Almaty City	Apply the JICA Study (2007-2009) results Introduce disaster management concepts in urban planning Prepare seismic hazard/risk maps for the city suburbs Update the 1978 seismic hazard map	◎Assist in disaster management planning ◎: Assist urban development master plans ○Implemented by the Institute of Seismology ◎ Require new maps based on the latest technologies and data	◎	◎	○	◎

Source: JICA Study Team

Table 12.5 Results of Analysis on Issues in the Flood Disaster Sector

Categories	Subcategories	Issues	Evaluation Items: Current Status ◎: Not yet done ○: Partially ongoing △: Ongoing	Necessity ◎: High ○: Moderate △: Low	Impact ◎: High ○: Moderate △: Low	Sustainability ◎: High ○: Moderate △: Low	Priority ◎: High ○: Moderate △: Low
Flood Risk Assessment	Preparation of flood hazard maps	・ Preparation of medium- and large-scale (detailed) hazard maps ・ Sharing and effective use of hazard maps ・ Building of database on disasters	○: KazHydromet plans to prepare in 2014 to 2015 (area and scale are unknown) ◎ ○: Partially implemented by MES	◎	○	○	○
	Strengthening of land use planning and regulation	・ Strengthening of land-use regulations ・ Land use planning responding to disaster risks	◎ ◎	○	○	△	○
Monitoring and Forecasting	Improvement of monitoring systems	・ Improvement and upgrading of automatic meteorological monitoring systems ・ Introduction of automatic hydrological monitoring systems ・ Creation of database and archive of observed data	○: Partially implemented by KazHydromet ◎ ◎	◎	◎	○	◎
	Improvement of analysis technologies and human resources development	・ Improvement and dissemination of flood analysis technologies involving simulations and satellite image analysis. ・ Training of experts (young engineers in particular)	◎ ◎	◎	○	◎	◎
	Improvement of public services	・ Improvement of the quality of public services ・ Publication of meteorological and hydrological data (to contribute to agriculture, research, and other activities)	○:Partially implemented by KazHydromet ○:Partially implemented by KazHydromet	△	○	△	△
Structural Countermeasures	Preparation of structural countermeasures against floods	・ Development and improvement of urban drainage facilities ・ Introduction of disaster (flood) management viewpoints into urban development plans ・ Flood-control planning ・ Improvement of design and construction technologies ・ Improvement of capacity in operating and managing reservoir dams	○:Partially implemented by MES and Local Authorities ◎:Yet to be done in Almaty City ○:Partially implemented by MES and others ◎ ◎	○	◎	○	○
Non-structural Countermeasures	Development of early warning systems	・ Development of swift and reliable early warning systems ・ Introduction of early warning systems widely to the public	○: Partially implemented by relevant organizations ◎	◎	◎	◎	◎

Source: JICA Study Team

Table 12.6 Results of Analysis on Issues in the Sediment Disaster Sector

Categories	Subcategories	Issues	Evaluation Items: Current Status ◎: Not yet done ○: Partially ongoing △: Ongoing	Necessity ◎: High ○: Moderate △: Low	Impact ◎: High ○: Moderate △: Low	Sustainability ◎: High ○: Moderate △: Low	Priority ◎: High ○: Moderate △: Low
Sediment Disaster Risk Assessment	Preparation of sediment disaster hazard maps	・ Preparation of medium- and large-scale (detailed) hazard maps ・ Sharing and effective use of hazard maps ・ Building of database on disasters	◎ ◎ ○ : Partially implemented by MES	◎	○	○	○
	Strengthening of land use planning and regulation	・ Strengthening of land use regulations ・ Land use planning responding to disaster risks	◎ : ◎ :	○	○	△	○
Monitoring and Forecasting	Improvement of monitoring systems	・ Improvement and upgrading of automatic monitoring systems (for metrological and hydrological phenomena, glacier lakes, debris flows, landslides, and snowslides) ・ Creation of database and archive of observed data	○ : Partially implemented by Kazselezashita ◎	◎	◎	○	◎
	Improvement of analysis technologies and human resources development	・ Improvement and dissemination of analysis technologies in relation to sediment disasters, glacier lakes, and snowslides ・ Training of experts (young engineers in particular)	◎ ◎	◎	○	◎	◎
Structural Countermeasures	Preparation of structural countermeasures against sediment disasters	・ Preparation of countermeasures in the Large Almaty River basin ・ Dissemination of new technologies ・ Improvement of design and construction technologies ・ Maintenance of existing anti-debris facilities ・ Upgrading of decrepit infrastructures ・ Formulation of mid- and long-term debris protection plans	○ : Partially implemented by Kazselezashita ○ : Partially implemented by Kazselezashita ◎ ◎ ◎ ◎	◎	◎	○	◎
Non-structural Countermeasures	Improvement and expansion of early warning system	・ Development of swift and reliable early warning systems ・ Ensure early warning systems are widely known to the public	○ : Partially implemented by relevant organizations ◎	◎	◎	◎	◎

Source: JICA Study Team

Table 12.7 Results of Analysis on Issues in Emergency Response and Community-based Disaster Management

Categories	Subcategories	Issues	Evaluation Items				
			Current Status ◎: Not yet done ○: Partially ongoing △: Ongoing	Necessity ◎: High ○: Moderate △: Low	Impact ◎: High ○: Moderate △: Low	Sustainability ◎: High ○: Moderate △: Low	Priority ◎: High ○: Moderate △: Low
Emergency Response	Organization for initial response	・Clarify the roles and responsibilities of MES and local government	○: Promoted by UNDP	◎	○	○	○
	Organization for assistance	・Enforce public relations regarding activities of MES	○: Same as above	○	○	△	△
	Organization for early warning	・Modernize methodologies for early warning and telecommunications	◎: Researching partners by MES	◎	◎	○	◎
	Others	・Renew and modernize facilities, equipment, and infrastructure for telecommunications in MES Regional Offices (including earthquake-proofing)	◎: Obsolete facilities in MES Regional Offices	◎	◎	◎	◎
Community-based Disaster Management	Main organization	・Strengthen disaster awareness among citizens ・Promote evacuation by citizens' own initiative	○: Promoted by UNDP	◎	◎	◎	◎
	Capacity in community level	・Conduct disaster prevention in areas inhabited by aged people ・Activate KSK and strengthen disaster management ・Conduct disaster management drills with vivid reality ・Train leaders of self-managed disaster prevention organizations ・Store materials for disaster prevention through people's initiative ・Utilize the outcomes of the JICA Study in 2007-2009	○: Partially implemented by UNDP ○: Experienced by a JICA project in the past ◎: Using computer graphics, simulators, etc. ○: Partially implemented by MES ○: Partially implemented by UNDP? ◎: Not yet done	◎	◎	○	◎
	Coordination with NGOs, etc.	・Clarify roles and responsibilities among MES, donors, NGOs, communities, and stakeholders ・Strengthen the cooperation of stakeholders on disaster countermeasures ・Disseminate the outcome of UNDP-DIPECHO IV Project	○: Promoted by UNDP ○: Implemented by UNDP, etc. ○: Implemented by UNDP	◎	○	◎	◎
	Others	・Promote disaster administration and prepare disaster preparedness plan through coordination between the local administration and citizens	○: Partially implemented by UNDP	○	○	○	○

Source: JICA Study Team

12.2 Important Issues and Recommendations for Overall Disaster Administration

Based on the results of analyses on the current status presented in the previous chapters, the following four important issues were noted as crucial factors in overall disaster administration:

1. Strengthen national- and local-level functions for disaster prevention (clarification of priority areas)
2. Strengthen the capacity of response and develop evacuation system in communities
3. Coordinate among concerned agencies and strengthen the organization for emergency response
4. Establish and expand the telecommunications system for disaster management

1. Strengthen national- and local-level functions for disaster prevention	
Comments/Remarks	
Assist in the preparation of a comprehensive disaster management plan	Clarify the roles and responsibilities of disaster administration at central (among central government agencies) and regional levels (MES Regional Offices and local governments). Clarify the agency responsible for recovery and restoration to be consistent with disaster management policy taking into account the disaster mitigation cycle.
Update and strengthen planning know-how on countermeasures for disaster prevention	Strengthen the capacity of concerned responsible agencies on planning and design (structural and non-structural measures) particularly on technology for hazard mapping and risk assessment in parallel with preparation of plans for measures.

2. Strengthen the capacity of response and develop evacuation system in communities	
Comments/Remarks	
Strengthen the capacity for community-level disaster response	Develop programs for improving disaster awareness of citizens and strengthen community-level activities through implementation of the programs. Develop comprehensive program for disaster mitigation measures in areas inhabited by aged people and education of leaders of self-defense organizations. Create systematic programs for promoting participation of citizens in disaster prevention activities.
Education of staff having expertise and	Train/educate staff on professional knowledge and disaster characteristics for strengthening disaster prevention in the regions.

knowledge, and promotion of employment	Establish and develop systematic educational programs for disaster mitigation and persistent academic unit of disaster prevention engineering in universities (e.g., open seminars/courses in universities).

3. Coordinate among concerned agencies and strengthen the organization for emergency response	
Comments/Remarks	
Strengthen early warning system and initial response organization	Strengthen communications between MES and other relevant agencies upon occurrence of disaster. Modernize methodology of early warning system and telecommunications, and introduce new technologies. Strengthen public relations for associated activities mentioned above.
Update and modernize disaster prevention facilities	Modernize and update obsolete facilities and equipment, particularly at MES Regional Offices, in order to enforce the response organization during emergency.

4. Establish and expand the telecommunications system for disaster management	
Comments/Remarks	
Accumulation and dissemination of disaster information	Expedite preparation of archives and database system of disaster information and establish an open structure on the internet for the access of concerned agencies and common citizens. Promote and strengthen disaster awareness on the importance of information sharing.
Improve and enforce dedicated information system	Establish networking among central government agencies and between central and regional governmental agencies (including concerned research institutes and attached agencies). Expedite the development of the abovementioned system in considering the current status of telecommunication infrastructure in Kazakhstan. Extend assistance in view of medium- and long-term concepts with adopting Japan's advantages.

12.3 Important Issues and Recommendations (Earthquake Disaster Management)

The important issues and recommendations for earthquake disaster management are mentioned below.

1. **Enhance seismic observation systems and capacities of related organizations and researchers**
2. **Update seismic hazard potential/risks based on the latest data and technology**
3. **Improve aseismicity of infrastructures and utilities for preparedness against earthquake**

disasters **4. Incorporate disaster management concepts into urban development master plans**

1. Enhance seismic observation systems and capacities of related organizations and researchers	
Contents/Remarks	
Enhancement of the coverage of the observation network outside Almaty City	Enhance the nationwide seismic observation network more densely, especially in the provinces of West Kazakhstan, South Kazakhstan, Zyambyl, Almaty, and East Kazakhstan; and improve the quality of data.
Development of human capacity	Establish departments on seismology in major universities and train young researchers through training courses such as KNDC's training facility.

2. Update seismic hazard potential/risks based on the latest data and technology	
Contents/Remarks	
Update of the information on seismic hazard and risks	Update seismic hazard maps, risk information, and damage estimations especially for densely populated areas, such as Almaty City, by conducting in-situ geological or geophysical investigations of active faults such as trench surveys.

3. Improve seismicity of infrastructures and utilities for preparedness against earthquake disasters	
Contents/Remarks	
Improvement of earthquake-resistance of infrastructures	Implement projects to strengthen earthquake resistance of old infrastructure that lack aseismicity, or replace them with new ones.
Improvement of earthquake-resistance of public utilities	Implement projects to strengthen earthquake resistance of public utilities, such as water pipes, gas pipes, and transmission lines, or replace them with new ones.
Pilot projects	Implement pilot projects to realize improvement in earthquake resistance of social infrastructure and public utilities.

4. Incorporate disaster management concepts into urban development master plans	
Contents/Remarks	
Incorporation of disaster management concepts into urban development master plans	Incorporate disaster management viewpoints into urban development master plans by introducing the plans or recommendations shown in the JICA Study (2007-2009).
Pilot projects	Implement the disaster management master plan with the action plan suggested by the JICA Study (2007-2009)

12.4 Important Issues and Recommendations (Flood and Sediment Disaster Management)

The important issues and recommendations for flood and sediment disaster management are mentioned below.

1. Enhance capacity building and human resources for flood and sediment disaster risk assessment
2. Upgrade monitoring system and analysis technology
3. Strengthen the capacity for design, construction, operation and maintenance, and management of structural countermeasures
4. Maintain and improve early warning systems

1. Enhance capacity building and human resources for flood and sediment disaster risk assessment	
Contents/Remarks	
Enhance capacity building and human resources for flood and sediment disaster risk assessment	Enhance capacity building for understanding disaster risks through preparation of detailed hazard maps and risk assessment methods. It is important to share the results of risk assessment and utilize them in several sectors. However, it is necessary to first recognize the effectiveness and importance of risk assessment.

2. Upgrade monitoring system and analysis technology	
Contents/Remarks	
Upgrade monitoring and forecasting systems for hydrology and meteorology	Enhance capacity for analyzing (forecasting) hydrometeorological information by improving automatic monitoring system and utilizing simulations and remote sensing data. In addition, it should be recognized that future measures can be planned more effectively and economically by obtaining detailed monitoring data.
Improve and upgrade automatic monitoring system	Improve and upgrade automatic monitoring systems for glacier lakes, debris flow, landslide, and snow avalanche. Enhance the capacity in analyzing (forecasting) the abovementioned disasters by utilizing simulations and remote sensing data.

3. Strengthen the capacity for design, construction, operation and maintenance, and management of structural countermeasures
Contents/Remarks

Strengthen the capacity for design, construction, operation and maintenance, and management of structural countermeasures	Enhance design and construction capacities through dissemination of design standards and pilot projects. The target should not only be for specialized authorities but also for MES local offices, state offices, and city administrations. In addition, it is also necessary to strengthen maintenance capacity in order to effectively continue the operation and management of existing flood control facilities (such as water storage dams) and sabo dams.

4. Maintain and improve early warning systems	
Contents/Remarks	
Improve and upgrade early warning systems for floods	Adapt Japanese technology for Kazakhstan's early warning system for flood (co-development) taking account of the types and actual conditions. A low-cost system will be implemented at first, and the system will be gradually upgraded.
Improve and upgrade early warning systems for debris flows	Adapt Japanese technology for Kazakhstan's early warning system for debris flow (co-development) taking account of the types, patterns, and actual conditions. A low-cost system will be implemented at first, and the system will be gradually upgraded.

Chapter 13 Recommendations for Strengthening the Disaster Prevention Sector in Kazakhstan

Through the survey works, the analyses of current status and crucial issues were conducted, as explained in the previous chapters, based on the collected information on the disaster prevention sector (central and regional levels of disaster administration, earthquake disaster sector, and flood/sediment disaster sectors). Then, the direction for cooperation in the future is presented. Accordingly, important points for implementing assistance programs in each sector are concluded as recommendations as follows:

13.1 Basic Principles for Cooperation

In order to implement the assistance programs, four basic principles are considered and recommended. The four principles are described thoroughly as follows:

Principle 1: Aim step-by-step improvement from a long-term point of view

It is more desirable to implement assistance programs with monitoring accomplishment rather than to apply numerical targets in the national development plan of Kazakhstan, i.e., Kazakhstan 2050. The target level to be accomplished will be discussed and set with the Kazakh side. Then, effective assistance programs will be formed and selected in order to solve the crucial issues in each sector by means of combining various schemes.

On the other hand, it was verified through the survey works that the interest in disaster prevention-related technologies is rather strong in Kazakhstan. However, relevant information on respective technologies is quite few and understanding on such technologies is not enough. Misunderstandings were also experienced in some parts. Consequently, the following step-by-step cooperation procedure, in parallel with sharing knowledge on effective technology and eliminating information gaps, is recommended in order to realize successful assistance:

Step 1	: Introduction of Japanese disaster prevention technology and research results in Japan
Step 2	: Study on outline of assistance and priority among concerned personnel in Japan and Kazakhstan
Step 3	: Implementation of joint research program and technical cooperation projects by Japan and Kazakhstan (focusing on the development of new technology and adaptation of disaster prevention-related technology in Japan)
Step 4	: Implementation of pilot project and projects related to infrastructure for disaster prevention

Principle 2: Emphasize human resources development to contribute to self-reliance in the future (particularly for the young generation)

After the collapse of the Soviet Union regime in 1991, the dispersion of human and physical resources into respective countries seems to have affected the development and progress of basic science and technology. Human resources training is quite essential to eliminate gaps in inheriting technology and to strengthen the foundation of central and regional disaster prevention capacity. Accordingly, the assistance program should be formulated and be set up its contents by taking into consideration activities for human resources development and technology inheritance.

Principle 3: Adapt technologies in disaster prevention and know-how used in Japan into field conditions in collaboration with Kazakhstan

Kazakhstan has shown keen interest in advanced technologies for disaster prevention. In order to apply and effectively utilize these technologies, it is recommended to have some modifications in order to adapt with the natural and social conditions in Kazakhstan. In the assistance programs, local materials, technologies, and human resources will be utilized by taking into account the characteristics of disasters and communities in Kazakhstan. Furthermore, the assistance programs are aimed to be implemented by utilizing the accumulated experiences and applicable technologies developed after the Great Hanshin-Awaji Earthquake Disaster and the Great East Japan Earthquake Disaster in Japan.

Principle 4: Synchronize with movements of international and regional cooperation framework on disaster prevention

It is expected to have an earlier official acceptance on the agreement for establishment of the Center for Emergency Situation and Disaster Risk Reduction (CESDRR) between Kazakhstan and Kyrgyz Republic. With Kazakhstan playing the main roles in strengthening disaster prevention management in Central Asia would bring political stability in the said area and would simultaneously contribute to sustainable economic development in Kazakhstan. Therefore, the assistance programs will be implemented by monitoring the movement of CESDRR and concrete activities of other donors.

13.2 Areas where Japan has Advantages

(1) Overall Disaster Administration

Based on the analyses of the issues in the overall disaster administration, the areas where Japan has advantages in comparison with other donors are shown in Table 13.1.

Areas where Japan has Advantages in Overall Disaster Administration

Introduction of Current Status and Knowledge on Disaster Education in Japan

(Introduction of activities at local governments, schools, companies, communities, common households, etc.)

High needs on all frameworks of disaster mitigation education in Japan and current operation of disaster prevention drills will be conducted by each level in societies and entities. Tools for disaster mitigation education technology and methodology used in Japan will be transferred to Kazakhstan.
Introduction of Recovery and Restoration Plans after the Great Hanshin-Awaji Earthquake and the Great East Japan Earthquake Disasters (Recovery and restoration activities are missing in the disaster administration function of MES) The path to recovery and restoration which Japan experienced after the disasters will be introduced to Kazakhstan, which has only a few experiences on such disasters. Then, the problems and crucial issues will be shared in order to realize the joint development of new technologies that can be adapted to Kazakhstan.
Emergency Radio Network (Centralization of disaster prevention function is underway in Kazakhstan. Under such situation, efficient collection of disaster information and appropriate dissemination are essential.) The know-how on installation and expansion of emergency radio network in Japan, which can work even during emergency after disaster occurrences, can be effectively utilized (e.g., information system for disaster mitigation at various levels in Japan).
Cooperation with Mass Media for Disaster Information Dissemination (Improvement of disaster information system based on widespread access of information and communication technologies.) The possible roles of mass media (TV, radio, Internet, etc.) will be confirmed and assistance will be conducted in pilot projects to disseminate effective disaster information.

Source: JICA Study Team

(2) Earthquake Disaster Sector

A tentative plan for applying Japanese technologies to Kazakhstan, based on the analysis of issues in the earthquake sector, is provided in Table 13.2 below.

Areas where Japan has Advantages in the Earthquake Sector

Sharing of Japan's experiences and lessons learned from past earthquake disasters To introduce examples of damages, responses, evolution of policies and guidelines, etc.
Hardware and software that are useful for earthquake disaster management To provide information on hardware and software that would be useful for Kazakhstan, and to conduct training in Japan.

Cooperative researches, seminars, and projects bilaterally To implement cooperative projects and works in Kazakhstan (e.g., development of earthquake-resistant measures applicable to Kazakh architecture.).
Development of human resources related to earthquake disaster management To educate young engineers and researchers (seismologists, civil engineers, architects, etc.), and update old facilities in related organizations, institutes, and universities.
Utilization of past JICA Study (2009) To utilize and apply the results of the JICA Study (2007-2009) in planning earthquake disaster management in Kazakhstan.

Source: JICA Study Team

(3) Flood and Sediment Disaster Sectors

In the flood and sediment disaster sectors, a progressive and rational implementation system for mitigation of flood and sediment disasters is one of the remarkable characteristics being applied in Japan, as shown in Table 13.3. This system includes analysis based on appropriate research and monitoring results, formulation of master plan based on the analyzed result, and implementation of countermeasures following the plan.

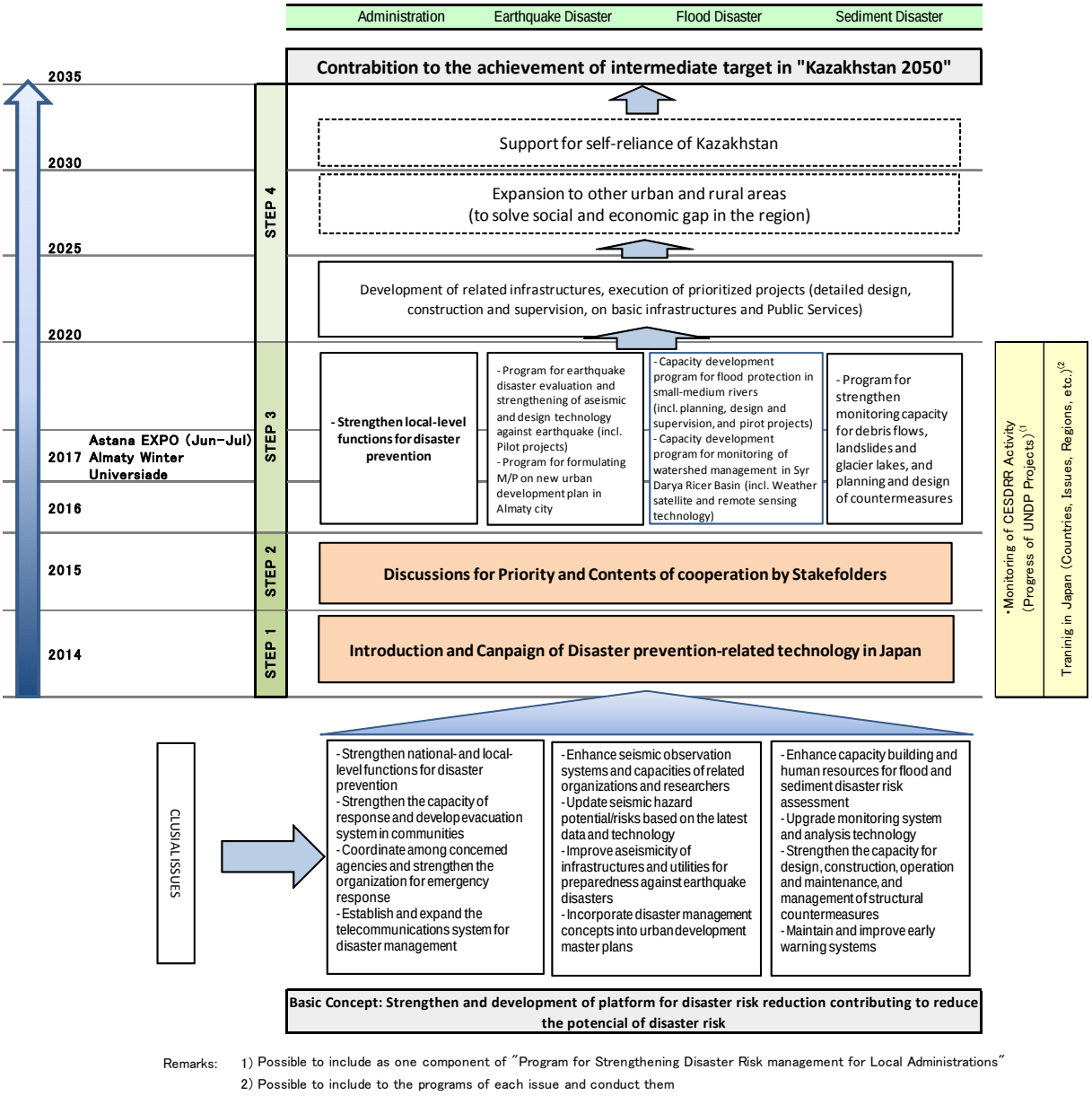
Areas where Japan has Advantages in the Flood and Sediment Disaster Sectors

Automatic Monitoring System (For monitoring meteorology, river, glacier lake, debris flow, snow avalanche, and landslide.) Monitoring equipment made in Japan are highly accurate and durable. Japanese manufacturers have much knowledge and experiences on advanced monitoring network system related to early warning system. Moreover, monitoring technology for colder regions in Japan may be applicable in Kazakhstan.
Simulation Analysis and Remote Sensing Technology using Satellite Imagery Research and practical application of simulation technology for floods and debris flow, and remote sensing technology for glacial lake monitoring and flood forecasting using satellite images are progressing. These will be aimed in cooperation with the satellite industry of Japan in the future.
Countermeasures Against Sediment Disaster In Japan, based on the history and technology of preventing sediment-related disasters, various countermeasures have been developed not only for stimulus countermeasures but also for workability, economy, landscape, and environmental impact. In addition, ensuring high quality and safety

management of construction works are among the remarkable characteristics being applied in Japan.
Early Warning System Japan has know-how and experience related to the construction and operation of early warning systems in conjunction with automatic monitoring systems. In addition, Japan has many community disaster prevention experiences connected with early warning systems.
Countermeasures Against Snow Disaster Japan has a region that experiences heavy snowfall wherein a valid approach against snowfall is undertaken. Japan, in particular, formulates a snowfall-resistant community, strengthens local disaster management capacity, and implements appropriate road traffic management.

13.3 Framework Plan (Draft)

A draft framework plan for strengthening the disaster prevention sector in Kazakhstan is presented in Figure 13.1.



Remarks: 1) Possible to include as one component of "Program for Strengthening Disaster Risk management for Local Administrations"
2) Possible to include to the programs of each issue and conduct them

Source: JICA Study Team

Figure 13.1 Framework Plan for Strengthening the Disaster Prevention Sector in Kazakhstan

APPENDIX

Appendix-1
Survey Schedule

Survey Schedule (1/2)

Date				1st Field Works Major Activities	Y.MOTOKI (Team leader/Disaster administration)	K.TANAKA (Earthquake disaster)	T.NISHIKAWA (Flood/Sediment disasters)
1	Y2013 Oct.	18	F	Departure	Narita–Seoul–Almaty		
2		19	S	Move Discussions	Almaty–Astana Discussion with the interpreter/confirmation of schedule		
3		20	S	Discussions/preparation			
4		21	M	Kick-off Meeting	・JICA Astana Liaison Office ・Ministry of Emergency Situations (MES) 1630–18:00: Inception Meeting		
5		22	T	Internal discussions	・10:30: JICA Astana Liaison Office (Ms.Yanagisawa and Mr.Murakami) ・14:30: Embassy of Japan (Mr.Niikua)		
6		23	W	Interviews at MES	・09:00 – 10:00: Department of Emergency Prevention ・10:35– 12:10: Department of Mitigation and Civil Defense ・15:00 – 16:15: MES, Department of Strategic Planning, Information and Analysis, Science and New Technology ・16:20 – 17:10: MES, Department of Information and Communication, and Department of Logistics		
7		24	T	Discussions Interviews	・09:00 – 10:00: JICA Astana Liaison Office ・Preparation of meeting memo	12:00–13:00: National Research and Engineering Center for Industrial Safety	・Preparation of meeting memo
8		25	F	Analysis of collected information Interviews	・Preparation of meeting memo ・16:00 – 17:10: MES Astana Regional Office, Dept. of Emergency Prevention		
9		26	S	Move	Astana–Almaty		
10		27	S	Preparation of Inception Meeting			
11		28	M	Explanation of schedule	・15:30 – 16:00: MES Almaty Regional Office		
12		29	T	Inception Meeting Interviews	・10:00 – 11:30: Kazakhstan Japan Center ・15:45 – 17:00: institute of Geography		
13		30	W	Interviews	・09:45 – 10:45: KazGIIZ (Tanaka) ・10:00 – 11:45: MES Almaty Regional Office (Motoki/Nishikawa) ・14:00 – 15:30: UNISDR Regional Office, Central Asia & South Caucasus (all) ・15:40 – 17:35: Kazakhstan National Data Center (all)		
14		31	T	Interviews	・14:15 – 16:00: KazHydromet Almaty Office	・Analysis of collected information, preparation of	・14:15 – 16:00: KazHydromet Almaty Office
15	Nov.	1	F	Interviews	・10:10 – 12:00: MES Almaty Regional Office, Emergency Situations and Prevention Section ・14:00 – 15:40: '– do –, Telecommunication System and Communication Section ・16:00 – 17:00: '– do –, Unified Dispatching Services Section	・09:45 – 10:45: KazNIISSA ・14:00 – 15:40: KazGAZA (Kazakh Leading Academy of Architecture and Civil Engineering)	・10:10 – 12:00: MES Almaty Regional Office, Emergency Situations and Prevention Section ・14:00 – 15:40: '– do –, Telecommunication System and Communication Section ・16:00 – 17:00: '– do –, Unified Dispatching Services Section
16		2	S	Site reconnaissance	・Suburban area of Almaty, Medeu Dam, Slit dam, and avalanche protection (protection net)		
17		3	S	Move	Almaty–Bishkek		
18		4	M	・JICA Kyrgyz Office, Application for re-entry visa	Stay at Bishkek		
19		5	T	Analysis of collected information	Stay at Bishkek		
20		6	W	Interviews	・09:00 – 10:30: UNDP Kyrgyz Office ・14:00 – 15:50: Ministry of Emergency Situations, Kyrgyz Republic		
21		7	S	(National Holiday in Kyrgyz)	Sta at Bishkek		
22		8	F	Analysis of collected information	Stay in Bishkek：Securing re-entry visa		
23		9	S	Analysis of collected information	Stay at Bishkek		
24		10	S	Move	Bishkek– Astana	Bishkek—Almaty	
25		11	M	Analysis of collected information	Stay at Astana	Stay at Almaty	
26		12	T	Interviews	・10:00 – 10:50: CESDRR (Chairman Mr.Okasov and others) ・15:30 – 16:30: MES, Department of Strategic Planning, Infrastructure and Analysis, Science and New Technology	・10:30 – 17:00: Kazselezaschita（Debris Flow Protection Center） （Medeu Dam, Big Almaty River basin）	
27		13	W	Interviews	・16:00 – 17:30: KazHydromet Head Office at Astana	・10:00 – 11:30: Institute of Hydrogeology and Hydroecology ・14:00 – 15:00: UNDP DIPECHO VII Project	
28		14	T	Interviews	・10:00 – 11:00: UNDP Kazakhstan Office ・11:50 – 13:00: Ministry of Regional Development, Architecture,	・10:10 – 11:10: Construction Agency, Department of State Architectural and Construction Control and Licensing of Almaty City ・14:30 – 15:30: Institute of Space Research	
29		15	F	Interviews	・10:30 – 11:30: World Bank South Kazakhstan Office ・17:00 – 18:30	・09:45 – 10:50: KazNIISSA ・17:45 – 18:20: Almaty City Gov.（Vice Mayor Mr. Ilin）	
30		16	S	Interviews Move	Analysis of collected information	・10:00 – 10:45: Almaty City Gov. Advisor Almaty – Shimkent	
31		17	S	Move	Astana–Shimkent		
32		18	M	Interviews	・10:30 – 11:15: MES South Kazakhstan Regional Office, Management staff ・11:30 – 12:30: MES South Kazakhstan Regional Office, Dept. of Emergency Prevention ・16:10 – 17:00: Shimkent (Vice Mayor other)、Site of drainage improvement in the City		
33		19	T	Interviews	・11:00 – 12:00: MES South Kazakhstan Regional Office, Dept. of Civil Defense, Site of flood protection		
34		20	W	Interviews	・09:45 – 11:45: Kazselezaschita South Kazakhstan Office ・16:00 – 16:30: South Kazakhstan Provincial Giv.	・16:00 – 16:30: South Kazakhstan Provincial Gov. Construction Dept.	・09:45 – 11:45: Kazselezaschita South Kazakhstan Office ・16:00 – 16:30: South Kazakhstan Provincial Gov.
35		21	T	Interview Move	・10:00 – 11:00: Yugvodkhoz Shimkent–Astana		
36		22	F	Interviews	・11:00 – 12:00: Ministry of Economy and Budget Planning		
37		23	S	Analysis of collected information	Stay at Astana		
38		24	S	Analysis of collected information	Stay at Astana		
39		25	M	Reporting before returning to Japan	・13:00 – 14:00: JICA Astana Liaison Office (Mr.Okazaki) ・14:30 – 15:30: Embassy of Japan (Ambassador Kamohara, Mr.Niikura)		
40		26	T	Move	Astana–Almaty		
41		27	W	Move(Return to Japan)	Almaty–Seoul–Narita		

Source: Study Team

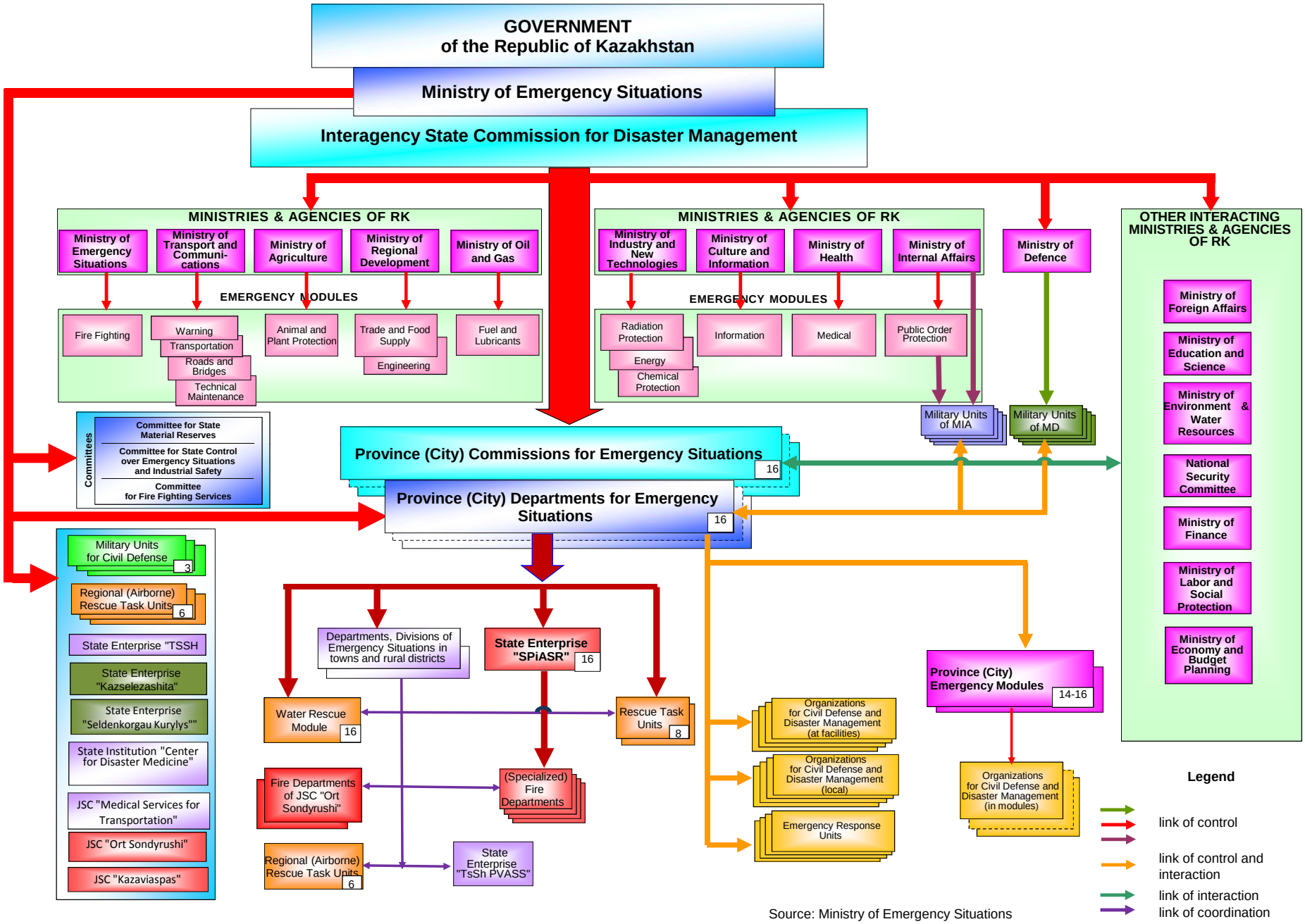
Survey Schedule (2/2)

Date				2nd Field Works Major Activities	Y.MOTOKI (Team leader/Disaster administration)	K.TANAKA (Earthquake disaster)	T.NISHIKAWA (Flood/Sediment disasters)
1	Y2014						
	Jan.	24	F	Move (Departure)	Narita-Seoul-Almaty		
2		25	S	Internal meeting and preparation for Draft Final Meeting	Stay at Almaty		
3		26	S	Internal meeting and preparation for Draft Final Meeting	Stay at Almaty		
4		27	M	Interviews	・10:00 – 12:00: Kazakhstan-Japan Center ・13:00 – 14:00: Discussions with Mr.Murakami, JICA (at Kazzhol Hotel) ・16:40 – 17:30: Meeting with Mr. Ilin (Vice Mayor of Almaty City)		
5		28	T	Draft Final Meeting Interviews Move	・10:00 – 12:20: Draft Final Report Meeting (KJC, Almaty) ・14:30 – 15:30: Meeting with Mr. Zhanat Aitleu, 1st Deputy Head, Department of Architect		
6		29	W	Courtesy to the Ambassador	・10:00 – 11:00: Discussions for preparation of Final Report (JICA Astana Liaison Office) ・14:30 – 15:30: Meeting with Ambassador Mr.Kamohara (Embassy of Japan)		
7		30	T	Draft Final Meeting	・Preparation of meeting memo and discussion with interpreter ・15:10 – 17:15: Draft Final Meeting (at MES Astana Office, 10FL)		
8		31	F	Move	Preparation of meeting memo, analysis of collected information Astana-Almaty		
9	Feb.	1	S	Move (Return to Japan)	Almaty－Seoul－Narita		

Date				KOICA-JICA Joint Seminar Major Activities	Y.MOTOKI (Team Leader/Disaster administration)
1	Y2014				
	Mar.	10	M	Move (Departure)	Narita-Seoul-Almaty
2		11	T	KOICA/JICA Mission Team Meeting	Preparatory meeting (KJC, Almaty)
3		12	W	Seminar	Participation as a lecturer (Intercontinental Hotel)
4		13	T	Seminar	Participation as a lecturer (Intercontinental Hotel)
5		14	F	Discussions with MES JICA/ KOICA Wrap-up Meeting	Wrap-up Meeting (KJC, Almaty)
6		15	S	Move (return to Japan)	Almaty-Seoul-Narita

Source: Study Team

Appendix-2
Organization Chart of Disaster Administration in Kazakhstan



Source: Ministry of Emergency Situations

Appendix-3
Chronological Events of Diplomacy in Central Asia of Japan (Latest 10 years)

Chronological Events of Diplomacy in Central Asia of Japan (Latest 10 years)

Year	Month/Date	Venue	Events	Particular Agenda, etc.
2004	August 28	Astana, Kazakhstan	"Central Asia plus Japan" Dialogue at Foreign Minister's Meeting	Two pillars of Japan's diplomacy toward Central Asia (speech by FM Kawaguchi:"Adding a New Dimension" in Tashkent) – Enhancing bilateral relationship – Promotion of dialogue with Central Asian countries as a whole
2004	December 7	Sofia, Bulgaria	"Central Asia plus Japan" Dialogue Meeting	
2005	March 4	Tashkent, Uzbekistan	1st Senior Officials' Meeting (SOM)	
2006	February 8	Astana	2nd Senior Officials' Meeting (SOM)	
2006	March 30	Tokyo	1st Tokyo Dialogue	"Prospect for Regional Integration in Central Asia" "Relations between Central Asia and Countries
2006	June 5	Tokyo, Japan	"Central Asia plus Japan" Dialogue 2nd Foreign Ministers' Meeting	Adoption of the "Action Plan" Five main fields of cooperation 1. Political dialogue 2. Inter-regional cooperation (counter Terrorism/Narcotics, Mines, Poverty Alleviation, Health, Environment, Disaster Prevention/Reduction, Energy/Water, Trade/Investment, Transportation) 3. Business promotion 4. Intellectual dialogue 5. Cultural and people-to-people exchange (including Tourism)
2006	September		Country Assistance Program to Kazakhstan (Min. of Foreign Affairs)	
2007	January 30	Tokyo	2nd Tokyo Dialogue	"Prospects for Regional Cooperation in Central Asia on Water Resources and Electric Power" "Prospects for Diversification of Central Asia's Energy Supply Routes"
2007	June 25-27	Astana	Asia Disaster Prevention Conference 2007	Sponsor : Government of Kazakhstan、Government of Japan (Cabinet Office)、UNISDR、UNDP、WMO and ADRC
2007	December 13	Dushanbe, Tajikistan	3rd Senior Officials' Meeting (SOM)	
2008	June 15	Tashkent	4th Senior Officials' Meeting (SOM)	
2009	February 20	Tokyo	3rd Tokyo Dialogue	"Environmental Cooperation for Soil Protection in Central Asia" "Effects of Climate Change on the Environmental in Central Asia and Countermeasures"
2010	February 25	Tokyo	4th Tokyo Dialogue	
2010	July 21	Tashkent	5th Senior Officials' Meeting (SOM)	
2010	August 7	Tashkent	"Central Asia plus Japan" Dialogue 3rd Foreign Ministers' Meeting	"Five pillars for regional cooperation in the Central Asia" 1. Environment, energy saving, renewable energy 2. Achieving the Millennium Development Goals (MDGs) and redressing disparities 3. Regional cooperation for stabilization of Afghanistan 4. Cooperation for disaster prevention 5. Trade and investment
2011	December 1	Tokyo	6th Senior Officials' Meeting (SOM)	
2012	May		Country Assistant Policy to Kazakhstan (Min. of Foreign Affairs)	
2012	November 21	Tokyo	"Central Asia plus Japan" Dialogue 4th Foreign Ministers' Meeting	"Future Improvement to Logistics Infrastructure in the Central Asia Region"
2013	March 15	Tokyo	5th Tokyo Dialogue	"The Role of Regional Cooperation in Trade and Investment Promotion in Central Asia: Lessons Learned from the ASEAN Experiences"
2014	?	Tokyo	"Central Asia plus Japan" Dialogue 5th Foreign Ministers' Meeting	

Source: Prepared by Study Team based on the information from JICA Kyrgyz Office

Appendix-4
2nd KOICA / JICA Joint Seminar on “Disaster Management”

2nd KOICA / JICA Joint Seminar on "Disaster Management"

１．**Date** : March 12 -13, 2014 (2 days)

２．**Venue** : Intercontinental Hotel, Almaty City, Kazakhstan

３．**Objectives** :

The objectives of the Seminar are as follow:

(1) Share policy examples of disaster management sector in the partner countries through utilizing local lecturers.

(2) Seek for adaptable policy and technology by visiting the sites of debris flow and related project sites.

(3) Promote this training program and enhance interests from the partner countries through enabling participation of high-level officials in disaster management organizations

(4) Share Korea and Japan's knowledge and techniques on disaster management

(5) Follow-up activities for ex-participants of each training (KOICA and JICA) course.

KOICA and JICA began the multi-year joint capacity development program over 3 years(2013 – 2015, 2012 trial year) in disaster management. This cooperation work aims to show the competitive advantage of Korea and Japan, each in coping with disaster issues to partner countries, to share various ideas and experiences in responding to them efficiently and at the same time to maximize the effects of training.

４．**Participants of Kazakhstan**

(1) Officials from Ministry of Emergency and Situations / Kazselezashita

(2) Ex-participants if KOICA and JICA training courses

(3) Officials from disaster management related agencies

(4) UN Agencies / NGOs / Media

(5) Representatives from Korea and Japan

５．**Participants from KOICA / JICA**

- Korea：KOICA HQ, Center Civil Defense and Disaster Management Institute, experts
- Japan：Embassy of Japan, JICA HQ, JICA Kansai, JICXA Astana Liaison Office, JICA Kyrgyz Office, Experts

６．**Participation from the Study Team**

As one of the experts from Japanese side, Mr. Yoshihiro Motoki (Team Leader/ Disaster Administration) of the Study Team participated and presented the results of the Survey in the seminar. In particular, since the contents of his presentation included the latest conditions and recommendations on the future directions for enhancement of disaster management sector in Kazakhstan, the participants showed their keen interests and conducted active discussions.

For instance, a participant of the Institute of Geography requested to JICA to provide training courses covering the following issues:

(1) Data collection and analyses methodology of automated- meteorological and hydrological monitoring stations
(2) Applied technology for utilization of data/information acquired by remote sensing
(3) Forecasting technology by utilization of numerical simulation models for flood and debris flow disasters

The participants of the seminar were approximately 65 persons for 1st day and 35 persons for 2nd day respectively (excluding KOICA / JICA related persons and experts of both countries). The detailed seminar program is presented in next page.

７． Site Visits

On the 2nd day of the seminar, the participants conducted site visits to acquire the knowledge on current disaster mitigation in the water shed of Small Almaty River basin by the guidance of the representative of Kazselezashita. Major target structures for the site visits are as follows:

- Debris flow protection : Medeu Dam, Steel slit dams, canalization by gabion
- Rock fall protection : Protection net on slope (to protect access road to Medeu dam)
- Snow avalanche protection :Protection (as safety measures to protect Medeu Skating Link)
- Protection for surface soil erosion: Reforestation (after 2011 devastated fire near Medeu Dam)

Medeu Dam (from upstream side)
（H=250m, completed in 1973）

Steel Slit Dam (from downstream side)

<Detailed Time Table (1st day)>

Date	Time	Program	Presenter	Remarks
12th March (Wed)	08:40~09:00	Registration		Astana Hall 1,2,3
	09:00~09:05	Opening / Introduction of Guests		
	09:05~09:30(25')	Opening Speech	EoK	BAIK Joohyeon, Ambassador
		Welcoming Remarks	Almaty Akimat, MES	Yuriy ILYIN, Vice Mayor Nurlan MADIYAROV Deputy Head of the Almaty Department of Emergency Situations
		Congratulatory Speech	JICA EoJ	OYAMA Takayuki Chief Representative NIIKURA Takayuki 1st Secretary
	09:30~10:20(50')	Introduction of Joint Training Program and Agency	KOICA JICA	SEONG Minkyung, Manager JEON Hyeonjeong Deputy Assistant Director
	10:20~10:50(30')	**Lecture1** : Emergency Management Situation of KZ	MES	Bakhtiyar M. OSPANOV Senior Expert, MES
	10:50~11:10(20')	Tea Break		
	11:10~11:50(40')	**Lecture2:** National Disaster Management System in Korea	KOICA 1	KWON Gihwan Deputy Director, NEMA
	11:50:~12:30(40')	**Lecture3:** Disaster Management Development Survey of KZ	JICA 1	MOTOKI Yoshihiro Chief Specialist, Nihon Koei
	12:30~13:30(60')	Lunch + Cultural Activity		Asian Café
	13:30~14:10(40')	**Lecture4:** Landslide Hazard Map	KOICA 2	OH Kyoungdoo, Professor Korea Military Academy
	14:10~15:20(70')	**Lecture5:** Iza! Kaeru Carvan	JICA 2	NAGATA Hirokazu President, +arts
	15:20~15:40(20')	Tea Break		
	15:40~16:20(40')	**Lecture6:** Investigation of Hazardous Slope	KOICA 3	CHO Taechin, Professor Pukyong National University
	16:20~17:00(40')	**Lecture7:** Hyogo Framework for Action in Kazakhstan	UNISDR	Abdurahim MUHIDOV Head, UNISDR Regional Office for Central Asia and Caucasus Region
	17:00~18:00(60')	Panel Discussion - **"Strengthening the Tri lateral Partnership to Establish KZ's Disaster Management System"**	All	(Presider) CHO Taechin, Professor
	18:00~19:30	Reception		Asian Café

<Detailed Time Table(2nd day)>

Date	Time	Program	Presenter	Remarks
13th March (Thu)	09:00~09:10	Opening / Introduction of Day 2		Astana Hall1,2
	09:10~09:40(30')	KOICA Ex-Participant Presentation	KOICA	Zhanar RAIMBEKOVA Expert-hydrologist Kazselezashita
	09:40~10:10(30')	JICA Ex-Participant Presentation	JICA	Zhanar TASTAMBEKOVA Expert, Kazselezashita
	10:10~11:00(50')	Panel Discussion - **"Challenges and Solutions for the Pending Issues of Action Plan"**	All	(Presider) Cho Taechin, JICA (Panelist) KOICA & JICA Ex-participants
	11:00~11:20(20')	Tea Break		
	11:20~12:10(50')	Introduction of Site (Study Visit)	MES	Talgat A. TAZHIBAEV Director, Kazselezashita
	12:10~13:10(60')	Lunch		Asian Café
	13:10~14:00(50')	Move to the Site		
	14:00~15:00(60')	Study Visit ('Dam Medeu', Avalanche area)	MES	Talgat A. TAZHIBAEV Director, Kazselezashita
	15:00~15:50(50')	Move Back to the Seminar Hall		
	15:50~16:10(20')	Tea Break		
	16:10~17:40(90')	Panel Discussion - **"Causes and Recovery Measurements of Landslide Hazards Area"**	All	(Presider) OH Kyoungdoo, Professor
	17:40~18:00(20')	Closing		

Японское Агентство Международного Сотрудничества

Совместный семинар KOICA/JICA в Казахстане Борьба со стихийными бедствиями

Исследование по сбору и анализу информации в сфере предупреждения и ликвидации последствий стихийных бедствий в Республике Казахстан

Алматы, 12-13 марта 2014
Йошихиро Мотоки
Nippon Koei Лтд

Содержание презентации

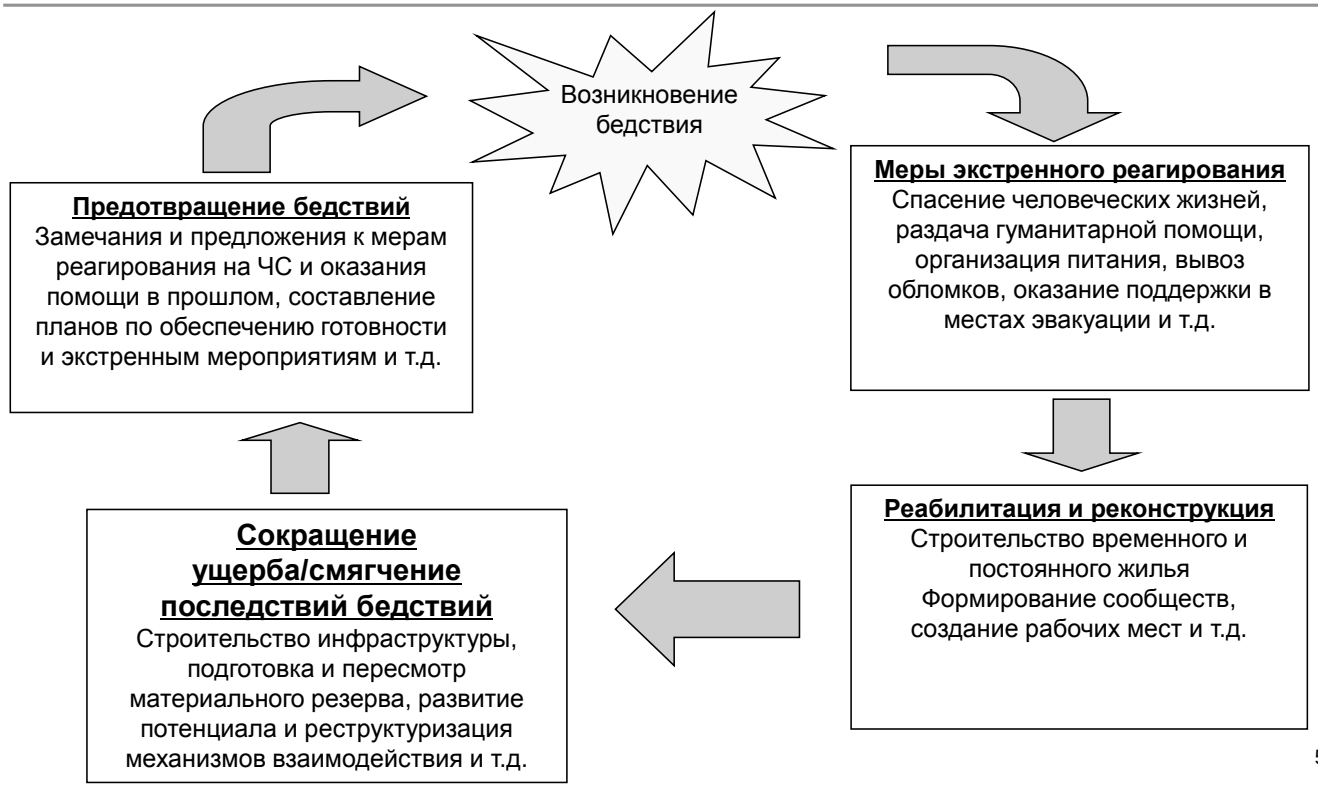
Краткий обзор Исследования JICA

- Цели
  - Изучить сектор предупреждения стихийных бедствий для определения направлений дальнейшего сотрудничества
- Целевые районы
  - Вся республика (города, запланированные для посещения: Астана, Алматы и Шымкент)
- Период Исследования (работы в Казахстане)
  - 1-й: 18 октября - 27 ноября 2013 года (41 день)
  - 2-й: 24 января - 1 февраля 2014 года (9 дней)
- Исследовательская группа
  - МОТОКИ Йошихиро (Руководитель группы/управление рисками стихийных бедствий)
  - ТАНАКА Кеничи (сейсмические бедствия)
  - НИШИКАВА Томоюки (наводнения, оползни и сели)

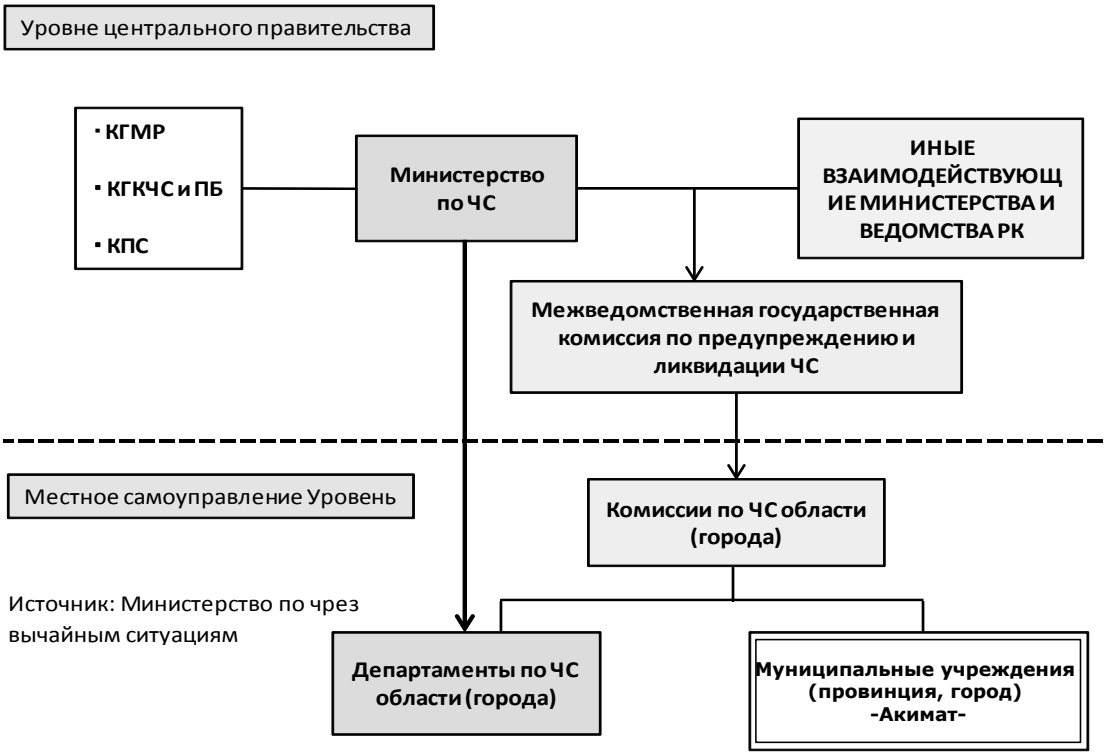
Перечень целевых организаций в рамках Исследования

Категория	Подкатегория	Наименование организации
Центральные исполнительные органы Правительства РК	Министерства	Министерство по чрезвычайным ситуациям (МЧС), Министерство регионального развития, Министерство экономики и бюджетного планирования
	Территориальные подразделения	ДЧС г.Алматы, ДЧС г.Астаны, ДЧС Южно-Казахстанской области
Международный Комитет		Центр по чрезвычайным ситуациям и снижению риска бедствий (ЦЧССРБ)
Местные исполнительные органы (акиматы)	Областные акиматы	Акимат Южно-Казахстанской области
	Городские акиматы	Акиматы городов Алматы и Шымкент
Подведомственные институты при Правительстве		ГУ «Казселезащита», АО «Казахстанский институт развития индустрии», РГП «Казгидромет», Комитет водных ресурсов, АО «КазНИИСА», Институт сейсмологии, Институт географии, РГП «ЮГВОДХОЗ» и т.д.
Университеты		КазНТУ, КазГАСА
Донорские организации		Международная стратегия ООН по уменьшению опасности стихийных бедствий, ПРООН, Всемирный банк
Прочие организации и учреждения		Казахстанский национальный центр данных, Институт космических исследований, КазГИИЗ, ТОО «Ана Жер Курылыс».

Общая концепция Цикла снижения рисков бедствий



Организации по предупреждению и ликвидации чрезвычайных ситуаций



Источник: Министерство по чрез вычайным ситуациям

Предлагаемые направления оказания содействия (в сфере управления рисками бедствий)

1. **Укрепление потенциала по управлению рисками бедствий на государственном и местном уровне (определение приоритетных районов для защиты)**
   - Разграничение функций центральных и местных исполнительных органов, в частности, в отношении реабилитации и реконструкции в рамках цикла снижения рисков бедствий.
2. **Укрепление потенциала реагирования на уровне местных сообществ и совершенствование систем управления эвакуацией**
   - Развитие потенциала работников, хорошо разбирающихся в региональных особенностях бедствий и обладающих специальными знаниями.
3. **Координация усилий между компетентными ведомствами и укрепление системы реагирования**
   - Модернизация телекоммуникационных систем и внедрение новых технологий для обеспечения эффективного раннего предупреждения.
4. **Усовершенствование и расширение телекоммуникационной системы для предупреждения и ликвидации последствий бедствий**

- Система баз данных, обеспечивающая рядовым гражданам доступ к информации через Интернет и т.д.

Предлагаемые направления оказания содействия (в сфере управления рисками землетрясений)

1. **Укрепление системы сейсмического мониторинга и наращивание потенциала**
   - Наращивание потенциала университетов (КазГАСА, КазНТУ и т.д.), содействие школе сейсмологии в КНЦД, обновление МТБ, развитие кадровых ресурсов и т.д.
2. **Обновление информации и обеспечение современных знаний о сейсмических опасностях и рисках**
   - Разведочные работы/полевые исследования потенциальных активных разломов, геологические и геофизические исследования на местах и т.д.
3. **Продвижение мер по повышению сейсмостойкости объектов инфраструктуры и жизнеобеспечивающих коммуникаций**
   - Дорожные мосты (путепроводы), водопроводные и канализационные системы и трубопроводы, многофункциональные трубопроводы (для жизнеобеспечивающих коммуникаций) и т.д.
4. **Внедрение концепции управления рисками бедствий в планы городского развития**
   - С расчетом на долгосрочную перспективу (10-20 лет)

Предлагаемые направления оказания содействия （в сфере управления рисками паводков и селей)

1. **Повышение уровня навыков оценки рисков паводков, оползней и селей**

2. **Модернизация систем мониторинга и технологий анализа данных**

3. **Повышение уровня навыков проектирования, выполнения работ, а также эксплуатации и технического обслуживания защитных сооружений**

4. **Модернизация систем прогнозирования и раннего предупреждения**

Базовые принципы оказания содействия

- Обеспечивать поэтапное развитие в сфере управления рисками бедствий в долгосрочной перспективе
  - «Казахстан – 2050» и т.д.
- Отдавать приоритет развитию кадрового потенциала для укрепления сектора управления рисками бедствий
  - Система образования по предупреждению бедствий и учебных курсов для сотрудников территориальных подразделений МЧС и др.
- Приводить японские передовые технологии и ноу-хау в соответствие с условиями Казахстана совместными усилиями
  - Комплексный план предупреждения и ликвидации последствий, План реабилитации и реконструкции и т.д.
- Обеспечить связь мероприятий со схемами международного и регионального (по Центральной Азии) сотрудничества в сфере управления рисками бедствий
  - HFA2, ЦЧССРБ, «Центральная Азия + Япония» и т.д.

Примеры программ содействия

- Развитие потенциала территориальных подразделений МЧС и компетентных учреждений
  - Укрепление потенциала управления рисками паводков, оползней и селей в приоритетных районах
  - Укрепление мониторинга бедствий в бассейне р. Сырдарья

- Укрепление потенциала реагирования и ликвидации последствий сейсмических бедствий
  - Оказание содействия в разработке Нового генерального плана развития Алматы с включением в план аспектов управления рисками бедствий
  - Обновление/подкрепление результатов прошлых исследований JICA 2007-2009 гг.
  - Принятие мер по сейсмоукреплению объектов инфраструктуры и жизнеобеспечивающих коммуникаций

Программы развития государства и система законодательства

- Программа развития государства: «Казахстан – 2050»
- Основные законодательные акты, касающиеся управления рисками ЧС

№	Дата вступления в силу	Наименование закона
19	5 июля 1997 г.	Закон «О чрезвычайных ситуациях природного и техногенного характера»
48	22 ноября 1996 г.	Закон «О пожарной безопасности»
87-1	27 марта 1997 г.	Закон «Об аварийно-спасательных службах и статусе спасателей»
100-1	7 мая 1997 г.	Закон «О гражданской обороне»
106-2	27 ноября 2000 г.	Закон «О государственном материальном резерве»
314	3 апреля 2002 г.	Закон «О промышленной безопасности на опасных производственных объектах»
580	7 июля 2004 г.	Закон «Об обязательном страховании гражданско-правовой ответственности владельцев объектов, деятельность которых связана с опасностью причинения вреда третьим лицам»

Источник: с официального сайта ГУ «Казселезащита»

Текущее положение дел с Министерством по чрезвычайным ситуациям (1/2)

Категория	Подкатегория	Текущее положение дел
Политика и планирование	Политика	• **Необходимо** разграничение сфер ответственности между министерствами и ведомствами • **Необходимо** более оперативное реагирование на крупные бедствия, превышающие по своим масштабам всевозможные прогнозы
	Национальный план развития	• Стратегический план подготовлен на базе стратегии «Казахстан – 2050» • **Необходимы** планы, касающиеся реабилитации и реконструкции • **Необходимы** ноу-хау, касающиеся составления карт опасностей
Организации и институцио-нальные механизмы	Координация	• Важная роль МЧС – предоставление докладов президенту, премьер-министру, Кабинету министров и т.д. • **Необходимо** проведение совместных учений с участием других министерств
	Схемы международного сотрудничества	• Участие в схемах международного сотрудничества по сокращению рисков бедствий • Необходим План действий для ЦЧССРБ
Ресурсы	Бюджет	• Сложная и длительная процедура исполнения бюджета **требует пересмотра**
	Технологии спасения	• **Требуется** внедрение современных технологий и повышение компетенции в области операций по спасению
	Обеспечение материальной помощью	• **Необходимо** повышение качества технического оснащения для проведения операций по спасению • **Требуется** ускорение процедуры выдачи/пополнения материального резерва

Текущее положение дел с Министерством по чрезвычайным ситуациям (2/2)

Категория	Подкатегория	Текущее положение дел
Информацион-ные и телеком-муникационные системы	Накопление и распространение информации	• **Необходимо** объединение в общую сеть главных управлений и объектов • Был составлен «Национальный атлас Казахстана» (2010 г.) • **Необходимо** развитие инфраструктуры в качестве приоритетной меры предотвращения бедствий в результате паводков, оползней и селей
	Специальные системы связи	• **Необходима** система для распространения информации о возникновении стихийного бедствия • **Необходимо** создание открытых систем баз данных, обеспечивающих доступ для рядовых граждан и других министерств
Обучение и подготовка в сфере управления рисками бедствий	Обучение	• Учреждена система обучения управлению рисками бедствий в учебных заведениях и на рабочих местах • **Необходимо** проведение учений и тренировок по эвакуации для рядовых граждан
	Подготовка	• Периодические учения в масштабах всей страны при совместном участии МЧС и территориальных подразделений • Проводятся учения по проведению спасательно-поисковых работ
	Осведомленность	• **Необходимо** проведение обучающих программ для повышения осведомленности населения в вопросах управления рисками бедствий

Текущее положение дел в сфере управления рисками бедствий в регионах

Категория	Подкатегория	Текущее положение дел
В целом		• Функции акиматов по управлению рисками бедствий переданы территориальным подразделениям МЧС: **необходимо** добиться ясности и оказать содействие в следующих вопросах – законодательная база, сферы ответственности, распределение бюджета, кадровое обеспечение и т.д. • Учреждены Комиссии по предупреждению и ликвидации ЧС
МЧС	Астана	• Действуют 3 районных управления • **Необходимо** создать базы данных о бедствиях и обеспечить более длительное хранение данных • **Необходимо** укрепление системы обслуживания на случай возникновения ЧС в удаленных районах для пожилых и престарелых граждан, лиц с ограниченными возможностями, детей и прочих наиболее уязвимых слоев населения
	Алматы	• Действуют 7 районных управлений • **Необходимо** обеспечить прозрачность распределения бюджетных ассигнований • **Необходим**а специальная телекоммуникационная сеть, которая сохраняла бы функциональность во время ЧС
	Южно-Казахстанская область	• **Необходима** подготовка руководств по проведению учений по ЧС • **Необходима** специальная телекоммуникационная сеть
Областной акимат	Южно-Казахстанская область	• **Необходимо** четкое распределение ролей между ДЧС Южно-Казахстанской области и областным акиматом
Городские акиматы	Алматы	• **Необходимы** конкретные методы и регламент по обеспечению готовности к ЧС
	Шымкент	• **Необходимо** разграничение сфер ответственности между МЧС и акиматом

Текущее положение дел с экстренным реагированием и управлением рисками бедствий на уровне местных сообществ

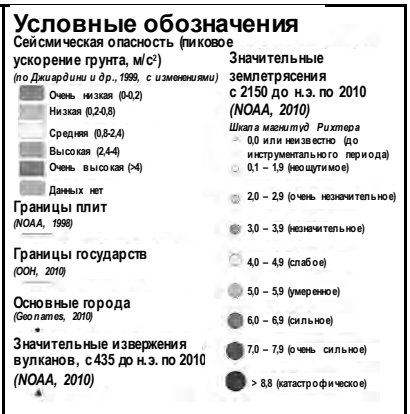
Категория	Подкатегория	Текущее положение дел
Экстренное реагирование	Организация мобилизации	• Ведущие роли отводятся территориальному подразделению МЧС и Комиссии по предупреждению и ликвидации ЧС • МЧС руководит работой по управлению рисками бедствий
	Организация содействия	• В случае необходимости центральный аппарат МЧС может запросить поддержку от близлежащих территориальных подразделений министерства
	Организация раннего оповещения	• **Необходимо** создание системы раннего оповещения о сейсмической активности по аналогии с Японией • **Требуется** обновление устаревшей системы оповещения и её технического оснащения
Управление рисками стихийных бедствий на уровне местных сообществ	Главная исполнительная организация	• Территориальное подразделение МЧС руководит эвакуацией местного населения • **Необходимо** преумножение собственных усилий местного населения по предупреждению бедствий
	Потенциал на уровне местных сообществ	• Необходимо принятие мер по предупреждению бедствий в районах с высокой долей пожилого населения • Необходимо использование результатов Исследования JICA (2007-2009 гг.)
	Координация с НПО и т.д.	• **Необходимо** четкое определение ролей и разграничение сфер ответственности всех заинтересованных сторон • **Необходимо** распространение результатов DIPECHO IV

Текущее положение дел с ЦЧССРБ

- Учрежден 17 мая 2013 года в Алматы.
- Соглашение между Республикой Казахстан и Кыргызской Республикой ожидает ратификации в обеих странах.
- В настоящее время в Центре, расположенном в Алматы, функционирует рабочая группа.
- При содействии ПРООН разрабатывается перечень задач Центра. (Подлежит уточнению.)
- Детальный План действий Центра будет составлен в 2014 году. (В рамках Проекта ПРООН?)
- МЧС продолжает искать содействия и поддерживает связь с донорскими организациями в вопросах активизации деятельности Центра. (Подлежит уточнению.)

Текущая ситуация со стихийными бедствиями (землетрясения)

Источник: ВОЗ



- Республика Казахстан расположена в зоне тектонической коллизии Евразийской и Индостанской плит.
- Потенциал сейсмической опасности очень высок в зоне, расположенной вдоль юго-восточной границы территории Казахстана, проходящей вдоль Тянь-Шанской горной системы.

Текущая ситуация со стихийными бедствиями (землетрясения)

Землетрясения в Казахстане и соседних странах

Дата землетрясения	Место возникновения	Магнитуда (M)	Название землетрясения
1865.3.22	В районе Мерке, Жамбылская область	6,4	Меркенское
1868.8.29	Село Южный Кастек, Алматинская область	6,4	Кастекское
1885.8.2	В районе озер Беловодск и Карабалты, Кыргызстан	6,9	Беловодское
1887.6.8	В районе Алматы	7,3	Верненское
1889.7.11	Возле сел Чилик и Чарын, Алматинская область	8,3	Чиликское
1911.1.3	Южная часть города Алматы	8,2	Кеминское
1921.	В районе озера Кульджа, Китай	6,5	Кульджинское
1929.6.3	Кызылкум, Кызылординская область	6,4	Чиликское
1938.6.20	В районе сел Джиль-Арык и Кызыл-Байрак, Кыргызстан	6,4	Кемино-Чуйское
1958.12.21	Горная цепь Джунгарского Алатау, Алматинская область	6,4	Джунгарское
1970.6.5	В районе города Пржевальск, Кыргызстан	6,8	Сарыкомышское
1971.5.10	В районе города Тараз	5,7	Жамбыльское
1978.3.24	Возле села Курменты, Алматинская область	6,8	Жаланаш-Тюпское
1979.9.25	В районе села Баканас, Алматинская область	6,1	Баканасское
1990.6.14	Северная часть города Зайсан, Восточный Казахстан	6,8	Зайсанское
1990.11.12	Горная цепь Заилийского Алатау, Алматинская область	6,3	Байсоорунское
1992.8.19	Горный хребет Киргизского Алатау, Кыргызстан	7,3	Суусамырское
1993.12.30	Возле села Текели, Алматинская область	6,1	Текелисское
2003.5.22	Село Луговое	5,0	Луговское
2003.9.27	Юго-Западная Сибирь, Россия	7,3	Алтай
2003.12.1	Возле села Сумбе, Алматинская область	6,1	Нарынкольское
2008.4.26	Село Рыбцех, Западно-Казахстанская область	5,0	Шалкарское
2009.6.13	Текели, Восточный Казахстан	5,4	Текели 2009

Источник: Институт сейсмологии, Казахстан

Текущая ситуация со стихийными бедствиями (землетрясения)

Source: JICA (2009) modified after GSHAP

Текущая ситуация со стихийными бедствиями (землетрясения)

В период с 2007 по 2009 гг. JICA провело «Изучение по управлению рисками землетрясений в г. Алматы».

Прогноз ущерба от землетрясения в городе Алматы был составлен по Сценариям землетрясений (представленным ниже)

Сценарии землетрясений	Количество обрушившихся и сильно поврежденных зданий		Человеческие жертвы	
	Многоквартирные дома	Индивидуальные дома	Погибшие	Раненые
Верненское землетрясение (1887 г.)	990	24 400	22 000	28 000
Чиликское землетрясение (1889 г.)	80	5 200	2 000	2 000
Кеминское землетрясение (1911 г.)	430	15 200	9 000	11 000

Источник: JICA, 2009г.

Текущая ситуация в сфере управления рисками землетрясений

Сети и системы сейсмического мониторинга

Категория	Подкатегория	Текущая ситуация
Сети и системы сейсмического мониторинга	Организации	• Ведущая роль отводится Институту сейсмологии (ИС) • Казахстанский национальный центр данных (КНЦД) предоставляет данные в республиканскую сеть мониторинга
	Система наблюдений	• Функционирует, главным образом, в г. Алматы. • КНЦД охватывает территорию всей страны • JICA предоставило ИС акселерографы сильных движений, высокочувствительные сейсмографы и GPS (1999-2002 гг.)
	Кадровые ресурсы	• **Необходимы** молодые научные работники и студенты • **Необходимы** системы обучения • КНДС вносит вклад в подготовку молодых инженеров-сейсмологов

Текущая ситуация в сфере управления рисками землетрясений

Оценка сейсмических рисков

Категория	Подкатегория	Текущая ситуация
Оценка сейсмических рисков	Карты опасности	• Составлены Институтом Сейсмологии (ИС)
	Оценка ущерба/рисков	• Карты сейсмической опасности (сейсмического районирования) по всей стране: составлены ИС • Крупномасштабная карта опасности (сейсмического районирования) для города Алматы: была подготовлена ИС в 1980-х годах • Исследование JICA, проведенное в 2007 – 2009 гг.
	Исследование активных разломов	• Таких исследований очень мало, в настоящее время они практически не проводятся

Текущая ситуация в сфере управления рисками землетрясений

Мероприятия по управлению рисками землетрясений

Категория	Подкатегория	Текущая ситуация
Меры	Основные организации	• МЧС и акиматы
	Сейсмостойкое строительство	• Ведущая роль отводится КазНИИСА • Проводится сейсмоукрепление общественных зданий (учебных заведений, медицинских учреждений и т.д.) • Сейсмоукрепление частных зданий практически не продвигается
	Сейсмоукрепление объектов инфраструктуры и жизнеобеспечивающих коммуникаций	• Многие объекты инфраструктуры в находятся в обветшалом состоянии • Еще не выполнено • Низкая сейсмостойкость
	Планы городского развития	• Планируется задействование парков и других пространств в качестве ресурсов управления рисками землетрясений • Выявлены потенциально опасные здания и зоны • Недостаточная реализация концепции управления рисками бедствий
	Прочее	• Проводится снос опасно обветшавших зданий

Текущая ситуация в сфере управления рисками землетрясений

Астана, Шымкент и Алматы

Категория	Подкатегория	Текущая ситуация
Основные города	Астана	• Сейсмические бедствия не принимаются в расчет
	Шымкент	• Сейсмические бедствия не принимаются в расчет
	Алматы	• Сильные сейсмические толчки каждые 100 лет • Очень высокий потенциал сейсмической опасности, что хорошо известно населению • Карты сейсмического районирования не охватывают районов новой жилой застройки • В 2007-2009 гг. JICA провело Исследование, результаты которого не находят применения в местной политике по управлению рисками бедствий

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками землетрясений)

Сети и системы сейсмического мониторинга

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Сети и системы сейсмического мониторинга	Организации	• Взаимодействие организаций, действующих в области сейсмологии	◎	△
	Сети и системы мониторинга	• Поставка запасных частей • Укрепление сетей мониторинга (по всей стране)	◎	◎
	Персонал/ кадровые ресурсы	• Учреждение учебных центров и наращивание потенциала (подготовка молодых научных работников)	○	◎

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками землетрясений)

Оценка сейсмических рисков

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Оценка сейсмических рисков	Карты опасности	• Обновление карт опасности • Обновление карт сейсмического микрорайонирования для г. Алматы	○	◎
	Оценка потенциального ущерба и рисков	• Обновление оценки	○	◎
	Исследования активных разломов	• Полевые исследования • Оценка активности разломов с точки зрения землетрясений	◎	○

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками землетрясений)

Меры управления рисками землетрясений 1/2

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Меры	Организации	• Четкое определение ролей и разграничение сфер ответственности	○	◎
	Сейсмостойкое строительство	• Обязательное проведение сейсмоукрепления • Разработка надлежащих методов • Реализация типовых проектов • Обязательная геологическая разведка	○ ○ ◎ ◎	◎
	Повышение сейсмостойкости объектов инфраструктуры и жизнеобеспечивающих коммуникаций	• Сейсмоукрепление водопроводов и систем водоснабжения, плотин • Многофункциональные подземные трубопроводы	◎ ◎	◎

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками землетрясений)

Меры управления рисками землетрясений 2/2

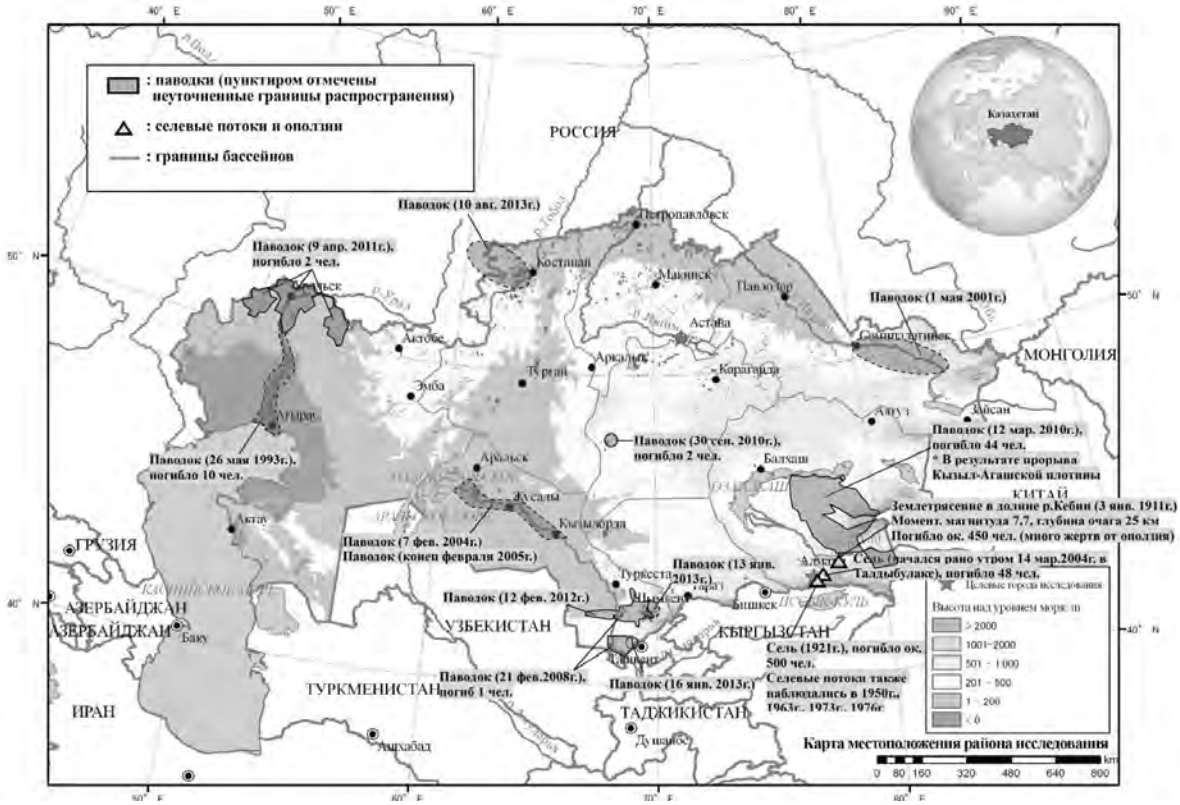
Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Меры	Планы городского развития	• Планирование объектов защиты от бедствий и их функций	◎	○
	Прочее	• Обеспечение огнезащиты и сейсмоукрепления ресурсных объектов управления рисками бедствий (включая эвакуационные пункты и маршруты, отделения МЧС) • Установка табличек для обозначений мест эвакуации и маршрутов	○ ○	○

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками землетрясений)

Астана, Шымкент и Алматы

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Основные города	Астана	• Сейсмический мониторинг • Составление карт сейсмического районирования	◎	△
	Шымкент	• Сейсмический мониторинг • Составление карт сейсмического районирования • Подготовка плана по управлению рисками землетрясений	◎	○
	Алматы	• Техническое содействие в реализации программ управления рисками бедствий в плане развития города (использование планов, приведенных в исследовании JICA (2009)) • Обновление карт сейсмического районирования	◎ ○	◎

Карта мест возникновения паводков и селей



Причины бедствий (паводков/оползней и селей)

Причины паводков

a.Дожди во время таяния снегов
b.Неэффективная эксплуатация плотин водохранилищ
c.Разные системы водопользования у каждой страны региона

Причины оползней и селей

a.Дожди во время таяния снегов
b.Землетрясения
c.Прорыв ледниковых озер
d.Застройка жилых массивов в предгорных районах
г. Алматы
e.Утечки воды из сточных труб в результате износа технических сооружений

Текущее положение дел в сфере управления рисками паводков

Оценка рисков паводков / Система мониторинга и анализ данных

Категория	Подкатегория	Текущее положение дел
Оценка рисков паводков	Карты опасности	• Карты паводковой опасности по всей стране: составлены Институтом географии • **Необходимы** региональные и крупномасштабные карты паводковой опасности • Разрастание зон жилой застройки г. Алматы • Население не имеет доступа к информации
	Регулирование в области землепользования	• Множество нелегальных жилых построек вдоль каналов и рек
Системы мониторинга и анализ	Системы мониторинга	• Установленные автоматические системы предназначены, главным образом, для метеорологических наблюдений • **Необходимы** системы для гидрологических наблюдений
	Анализ	• **Необходимы** навыки моделирования паводков • **Необходимы** навыки дистанционного зондирования
	Общественные услуги	• Услуги прогноза погоды на сайте «Казгидромет» • Население не имеет доступа к исходным данным

Текущее положение дел в сфере управления рисками паводков

Структурные и неструктурные меры защиты от паводков

Категория	Подкатегория	Текущее положение дел
Структурные меры защиты от паводков	Структурные меры	• **Необходимо** обеспечить применение директив и стандартов проектирования и строительства • Существуют проблемы с проектированием и выполнением работ, особенно в регионах • **Необходимо** обустройство и расширение городских водоотводных сооружений
Неструктурные меры защиты от паводков	Система раннего оповещения	• Учреждены организационные структуры раннего оповещения • Рассылка СМС населению • **Необходима** модернизация системы раннего предупреждения в Алматы • **Необходимо** обеспечить понимание населением важности раннего предупреждения

Текущее положение дел в сфере управления рисками паводков

В районе Шымкента

Текущее положение дел в сфере управления рисками оползней и селей

Оценка рисков оползней и селей / Система мониторинга и анализ данных

Категория	Подкатегория	Текущее положение дел
Оценка рисков оползней и селей	Карты опасности	• Карты селевой опасности по всей стране: составлены Институтом географии • Необходимы региональные и крупномасштабные карты опасности • Разрастание зон жилой застройки г. Алматы • Население не имеет доступа к информации
	Регулирование в области землепользования	• Разрастание зон жилой застройки в горных районах
Системы мониторинга и анализ	Система мониторинга	• Установленные автоматические системы предназначены, главным образом, для метеорологических наблюдений • **Необходимы** системы для наблюдений за гидрологическими условиями и селями
	Анализ	• **Необходимы** навыки моделирования селевых потоков и анализа оползней • **Необходимы** навыки дистанционного зондирования

Текущее положение дел в сфере управления рисками оползней и селей

Структурные и неструктурные меры защиты от оползней и селей

Категория	Подкатегория	Текущее положение дел
Структурные меры	Структурные меры	• Установлены основные защитные сооружения в долине Медеу • **Необходимы** дополнительные защитные сооружения в долине Большой Алматинки • Применены японские методики для защитных сооружений против камнепадов и селевых потоков • **Необходимо** обеспечить применение директив и стандартов для проектирования и строительства • Существуют проблема износа дамб и резервуаров для скопления наносов
Неструктурные меры	Система раннего оповещения	• Учреждены организационные структуры раннего оповещения • Рассылка СМС населению • **Необходима** модернизация системы раннего предупреждения в Алматы • **Необходимо** обеспечить понимание населением важности раннего предупреждения

Текущее положение дел в сфере управления рисками оползней и селей

Казселезащита применяет передовые методы для установки защитных сооружений против камнепадов, селевых потоков и снежных обвалов

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками паводков)

Системы мониторинга и анализ

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Системы мониторинга и анализ	Системы мониторинга	• Повышение уровня автоматических систем для метеорологии и гидрологии • Создание базы данных мониторинга	○ ◎	◎
	Анализ	• Развитие навыков моделирования и дистанционного зондирования	◎	◎
	Общественные услуги	• Повышения уровня общественных услуг	○	△

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками паводков)

Оценка рисков паводков

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Оценка рисков паводков	Карты паводковой опасности	• Обновление региональных и крупномасштабных карт паводковой опасности • Эффективное использование карт паводковой опасности	○ ◎	○
	Регулирование в области землепользования	• Ужесточение регулирования в области землепользования • Составление планов землепользования на основе карт опасности	◎ ◎	○

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками паводков)

Структурные и неструктурные меры защиты от паводков

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Структурные меры	Структурные меры	• Развитие навыков проектирования, строительства и эксплуатации защитных сооружений против паводков	◎	○
		• Планирование противопаводковых мероприятий	○	
		• Усовершенствование городских дренажных систем	○	
Неструктурные меры	Система раннего оповещения	• Создание оперативной и надежной системы раннего оповещения	○	◎
		• Обучение населения	◎	

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками оползней и селей)

Оценка рисков возникновения оползней и селевых потоков

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Оценка рисков оползней и селей	Карты опасности	• Обновление региональных и крупномасштабных карт опасностей	◎	○
		• Эффективное использование карт опасностей	○	
	Регулирование в области землепользования	• Ужесточение регулирования землепользования	◎	○
		• Планирование землепользования на основе карт опасностей	◎	

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками оползней и селей)

Системы мониторинга и анализ

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Системы мониторинга и анализ	Системы мониторинга	• Повышение уровня автоматических систем наблюдения за метеорологическими и гидрологическими условиями, а также за ледниковыми озерами, селями и т.д. • Создание базы данных мониторинга	○ ◎	◎
	Анализ	• Развитие навыков моделирования и дистанционного зондирования	◎	◎

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками оползней и селей)

Структурные и неструктурные меры защиты от оползней и селей

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Структурные меры защиты от оползней и селей	Структурные меры	• Установка дополнительных защитных сооружений в долине Большой Алматинки • Развитие навыков проектирования, строительства и эксплуатации защитных сооружений против оползней и селей • Содержание и техническое обслуживание существующих сооружений • Планирование противоселевых мероприятий	○ ◎ ◎ ◎	◎
Неструктурные меры	Система раннего оповещения	• Создание оперативной и надежной системы раннего оповещения • Обучение населения	○ ◎	◎

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками бедствий в целом)

Центральный аппарат Министерства по чрезвычайным ситуациям (1/4)

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Политика, планиро-вание	Политика	• Координирование усилий с другими ведомствами • Проверка работоспособности механизмов координации в ходе совместных учений и т.п. • Развитие ноу-хау разработки планов на основе оценки рисков • Применение знаний о климатических изменениях в планах управления рисками бедствий	◎ ◎ ◎ ◎	◎
	Национальный план развития	• Последовательное применение цикла управления рисками стихийных бедствий • Разграничение ответственности между компетентными организациями • Внедрение технологий составления карт опасности и оценки рисков	◎ ◎ △	◎

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками бедствий в целом)

Центральный аппарат Министерства по чрезвычайным ситуациям (2/4)

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Организации и институцио-нальные механизмы	Координация	• Развитие навыков планирования и проектирования (структурных и неструктурных мер)	○	◎
	Схемы международного взаимодействия	• Скорейшее составление Плана действий ЦЧССРБ	△	△
Ресурсы	Бюджет	• Упрощение и обеспечение прозрачности процесса выполнения бюджета	◎	○
	Технологии спасательных работ	• Укрепление технологического потенциала и подготовка специалистов для выполнения спасательных работ	◎	○
	Материальное обеспечение	• Упрощение процесса одобрения выделения материальных резервов и ускорение процедуры выполнения закупок	◎	○

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками бедствий в целом)

Центральный аппарат Министерства по чрезвычайным ситуациям (3/4)

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Информационно-коммуникационная система	Накопление и распространение информации	• Формирование межведомственной информационной сети • Передовые и виброизоляционные технологии • Технологии дистанционного зондирования с применением спутникового оборудования • Углубление понимания важности обмена информацией • Создание общедоступных баз данных по ЧС	◎ ◎ ◎ ◎ ◎	◎
	Специальные системы передачи данных	• Технологии распространения данных о бедствиях • Модернизация инфраструктуры	◎ ◎	◎

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками бедствий в целом)

Центральный аппарат Министерства по чрезвычайным ситуациям (4/4)

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Обучение и подготовка по управлению рисками бедствий	Обучение	• Разработка учебных программ для обучения управлению рисками бедствий • Увеличение штата экспертов и подготовка сотрудников, обладающих специальными знаниями • Разработка системной программы вовлечения граждан в планы управления рисками бедствий	○ ○ ◎	◎
	Подготовка	• Разработка системной программы подготовки инструкторов	◎	○
	Осведомленность	• Программы повышения уровня осведомленности • Развитие систем обмена информацией между МЧС И СМИ	◎ ◎	◎

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками бедствий в целом)

Департаменты по ЧС МСЧ РК и акиматы (1/2)

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
МЧС	Астана	• Создание базы данных по ЧС • Работа министерства по управлению рисками бедствий в удаленных районах • Технологии оказания помощи при бедствиях в районах с холодным климатом • Специальная сеть передачи данных	◎ ○ ○ ◎	○
	Алматы	• Разграничение сфер ответственности между МЧС и акиматом • Прозрачность информации о целях и процедуры одобрения использования бюджетных средств • Специальная сеть передачи данных	◎ ◎ ◎	◎
	Южно-Казахстанская область	• Подготовка руководств по проведению учений по предупреждению и ликвидации последствий бедствий • Специальная сеть передачи данных	◎ ◎	◎

Анализ задач и изучение приоритетных направлений оказания содействия (в сфере управления рисками бедствий в целом)

Департаменты ЧС МЧС РК и Акиматы (2/2)

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Областной акимат	Южно-Казахстанская область	• Разграничение сфер ответственности между МЧС и акиматом • Прозрачность информации о целях и порядке утверждения использования бюджетных средств	◎ ◎	○
Городские акиматы	Алматы	• Разграничение сфер ответственности между МЧС и акиматом • Подготовка директив по составлению карт опасности • Подготовка руководств по проведению учений по предупреждению и ликвидации последствий бедствий	◎ ◎ ◎	○
	Шымкент	• Разграничение сфер ответственности между МЧС и акиматом • Подготовка руководств по проведению учений по предупреждению и ликвидации последствий бедствий	◎ ◎	○

Анализ задач и изучение приоритетных направлений оказания содействия
(экстренное реагирование и деятельность местных сообществ по обеспечению готовности к ЧС)

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Экстренное реагирование	Организация мобилизации	• Разграничение сфер ответственности МЧС и акиматов	○	○
	Организация содействия	• Укрепление связей с общественностью в МЧС	○	△
	Организация раннего предупреждения	• Модернизация методов раннего предупреждения и передачи данных	◎	◎
	Прочее	• Модернизация МТБ территориальных подразделений МЧС	◎	◎

Анализ задач и изучение приоритетных направлений оказания содействия
(экстренное реагирование и деятельность местных сообществ по обеспечению готовности к ЧС)

Категория	Подкатегория	Задачи	Прогресс в решении задачи ◎: Еще не решена ○: Решается △: Решена	Приоритетность ◎: Высокая ○: Средняя △: Низкая
Деятельность местных сообществ по управлению рисками бедствий	Основная организационная структура	• Осведомленность в вопросах предупреждения бедствий • Поощрение мер самозащиты населения	○ ○	◎
	Потенциал реагирования на уровне местных сообществ	• Меры по предупреждению и ликвидации последствий бедствий в районах с высокой долей престарелого населения • Активизация деятельности кооперативов собственников квартир и развитие их функций по предупреждению и ликвидации последствий бедствий • Проведение учений с обеспечением высокой степени реалистичности • Воспитание лидеров добровольных товариществ по обеспечению готовности к ЧС • Самостоятельное накопление населением ресурсов для реагирования на ЧС	○ ○ ◎ ○ ○	◎
	Координация усилий с НПО и т.д.	• Разграничение сфер ответственности МЧС, донорских организаций, НПО и т.д. • Усиление координации между заинтересованными сторонами	○ ○	◎

Японские технологии, которые могут быть применены в Казахстане (в сфере управления рисками бедствий в целом)

1. Передача знаний, касающихся обучения в сфере управления рисками бедствий (местные органы исполнительной власти, школы, предприятия, местные сообщества, домашние хозяйства и т.д.)

2. Передача знаний и опыта по планированию реабилитации и реконструкции, накопленного Японией в результате землетрясения в Кобе и Великого восточно-японского землетрясения

3. Радио-сеть передачи экстренной информации
(надлежащая передача информации о стихийном бедствии в случае наступления чрезвычайной ситуации)

4. Взаимодействие со СМИ в целях распространения информации о бедствиях
(эффективное применение ИКТ для распространения информации при содействии СМИ)

Японские технологии, которые могут быть применены в Казахстане (в сфере управления рисками землетрясений)

1. **Передача опыта и уроков, полученных Японией в результате сейсмических бедствий**
(история бедствий, экстренное реагирование, совершенствование систем управления рисками бедствий, стандарты и директивы по сейсмостойкому строительству, исследования в области сейсмологии и т.д.)

2. **Предоставление информации о технологиях и инструментарии защиты от рисков сейсмических бедствий, а также тематические семинары и стажировки в Японии**

3. **Проведение двусторонних семинаров, исследований и проектов в Казахстане**

4. **Подготовка сейсмологов, специалистов по сейсмостойкому строительству и управлению рисками землетрясений и т.п.**

5. **Применение результатов прошлых исследований в управлении рисками бедствий в Алматы** (использование результатов Исследований JICA за 2007-2009 гг.).

Японские технологии, которые могут быть применены в Казахстане (в сфере управления рисками паводков, оползней и селей)

1. Автоматические системы мониторинга метеорологических и гидрологических условий, ледниковых озер, селей, оползней и снежных обвалов

2. Приемы моделирования и спутникового дистанционного зондирования

3. Передовые методы по реализации структурных мер для защиты от паводков, оползней и селей

4. Оперативная система прогнозирования и раннего предупреждения

5. Меры по защите от снежных обвалов

~ Спасибо за внимание ~

Любые комментарии принимаются

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