

**DATA COLLECTION SURVEY
FOR
DISASTER RESILIENT URBAN PLANNING
IN
TURKEY**

**FINAL REPORT
(SUMMARY)**

MAY 2014

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS CO., LTD.

NIKKEN SEKKEI LTD.

INTERNATIONAL TOTAL ENGINEERING CORPORATION

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Marmara Region



Turkey



**Center of Bursa City
Location Map**

Abbreviations

AFAD	Disaster and Emergency Management Center
AFADEM	Disaster and Emergency Training Center
AFOM	Disaster Coordination Center, Red Crescent
AKOM	Disaster Coordination Center
ASCE	American Society of Civil Engineers
BAYM	Regional Disaster Management Directorate
BBB	Bursa Metropolitan Municipality
BCP	Business Continuity Plan
BPT	Brownian Passage Time
BUSKI	The Bursa Water Supply and Sewerage Administration
CASBEE	Comprehensive Assessment System for Built Environment Efficiency
CBRN	Chemical Biological Radiological Nuclear
CCU	Coronary Care Unit
CSSD	Central Sterile Supply Department
CT	Computed Tomography
DEMP	AFAD (Disaster and Emergency Management Center)
DMC	Disaster Management Complex
DMI	General Directorate of State Meteorological Service, Ministry of Forestry and Water Affairs
DOSAB	Demirtas Organize Industrial Zone Organization of Businessmen and Industrialists
DMAT	Disaster Medical Assistant Team
DRM	Disaster Risk Management
DSI	State Hydraulic Works
EEW	Earthquake Early Warning
EMIS	Emergency Medical Information System
EQAS	Earthquake Quick Alarm System
FREQL	Fast Response Equipment against Quake Load
HF	High Frequency
GDCD	General Directorate of Civil Defense
GDDA	General Directorate of Disaster Affairs
GDP	Gross Domestic Products
GHI	General Healthcare Insurance
GIS	Geographical Information System

GONAF	A Deep Geophysical Observatory at North Anatolian Fault
GPRS	General Packet Radio Service
GVA	Gross Value Added
HCU	High Care Unit
HDP	Hospital Disaster Plan
HQ	Head Quarters
ICT	Information Communication Technology
ICU	Intensive Care Unit
IT	Information Technology
ITU	Istanbul Technical University
JCI	Joint Commission International
JICA	Japan International Cooperation Agency
JST	JICA Study Team
KENTGES	Integrated Urban Development Strategy and Action Plan 2010-2023
LED	Light Emitting Diode
LGWAN	Local Government Wide Area Network
METU	Middle East Technical University
MOD	Ministry of Development
MOEU	Ministry of Environmental and Urbanization
MOH	Ministry of Health
MOLSS	Ministry of Labour and Social Security
MONE	Ministry of National Education
MOSIT	Ministry of Science, Industry and Technology
MOTMAC	Ministry of Transport, Maritime Affairs and Communications
MOI	Ministry of Interior
MOENR	Ministry of Energy and Natural Resource
MOFAL	Ministry of Food Agriculture and Livestock
MOFSP	Ministry of Family and Social Policy
MOF	Ministry of Finance
MOYS	Ministry of Youth and Sports
MRI	Magnetic Resonance Imaging
MTA	Mining Exploration Institute
NATO	North Atlantic Treaty Organization
NGO	Non-Governmental Organization

NICU	Neonatal Intensive Care Unit
ODA	Official Development Assistance
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
PPP	Public Private Partnership
SAKOM	Health Disaster Coordination Center
SCU	Staging Care Unit
SEGE	Socio-Economic Development Ranking Survey of Provinces and Regions
SGK	Social Security Institution
SMS	Short Message Service
SSB	Single Sideband
SSK	Social Insurance Institution
TAMP	Turkey Disaster Response Plan
TCIP	Turkish Catastrophic Insurance Pool
TEMAD	General Directorate of Emergency Management of Turkey
TL	Turkish Lira
TTS	Telegraphic Transfer Selling
TOKI	Mass Housing Administration
UEDAS	Uludag Electricity Distribution Company
UMKE	NMRT: National Medical Rescue Team
USGS	United States Geological Survey
VHF	Very High Frequency
VSAT	Very Small Aperture Terminal
WHO	World Health Organization
YAYS	Local Disaster Management Chieftaincies

1. Survey Background

1.1. Survey Background

The Anatolia peninsula, which covers a large part of the Republic of Turkey (hereinafter referred to simply as Turkey), is a seismically active region due to its location at the boundary of the Eurasian plate in the north and the African and Arabian plates in the south. Earthquakes of magnitude 7.6 and 7.2 occurred in 1999, the Kocaeli earthquake and the Düzce earthquake respectively, only 12 years before the 2011 Van Province earthquake of magnitude 7.1. These large earthquakes claimed many victims. In addition to the frequency of earthquakes, the vulnerability to disasters is growing because of the rapidly developed urban area fueled by the remarkable economic development in recent years in Turkey.

Turkey is a seismically-active country with a long history of seismic countermeasures. Disaster risk management was established in the “Tenth National Development Plan (2007-2013)”. Hazard mapping and seismic retrofit of buildings and infrastructure are underway in accordance with the “National Earthquake Strategy and Action Plan 2012-2023” published by the Prime Ministry Disaster & Emergency Management Presidency (AFAD) in April 2012. In addition, demolition and redevelopment/rebuilding of vulnerable buildings have been underway since October 2012.

In the event of a disaster, the Bursa Province, located on the opposite bank of the Sea of Marmara from Istanbul, is expected to perform supplementary economic and administrative functions. The Japanese International Collaboration Agency (JICA) has provided much technical assistance, such as the “Project of Earthquake and Tsunami Disaster Mitigation in the Marmara Region and Disaster Education in Turkey”, “School-based Disaster Education Project”, and “Capacity Development toward Effective Disaster Risk Management”, in order to achieve “Resilient Urban Development” promoted by the United Nations Office for Disaster Risk Reduction (UNISDR).

Because of the increasing number of disasters in many regions and countries around the world such as Turkey, the UNISDR recommends an increase in the risk governance capacity and an improved commitment to cross-sectoral risk management to reduce disaster risk.

The key to effective disaster risk reduction is to engage actors and coordinate measures at all levels: central government, local government, private sector and individual citizens. Disaster prevention measures included in urban planning maximize the effectiveness of investments. This Data Collection Survey report (report) examines supporting nationwide programs for disaster prevention sectors, in line with AFAD’s focus on nationwide projects related to disaster resilient urban planning. Additionally, this report provides guidance for medium- and long-term disaster resilient urban planning at a regional level through a case study of the Bursa region. This report supports the effort for cooperation of Japan and Turkey on disaster prevention, as stated by the Vice Prime Minister of Turkey and the Ministry of Land, Infrastructure, Transport and Tourism of Japan during the Turkish Prime Minister’s visit to Japan in January 2014.

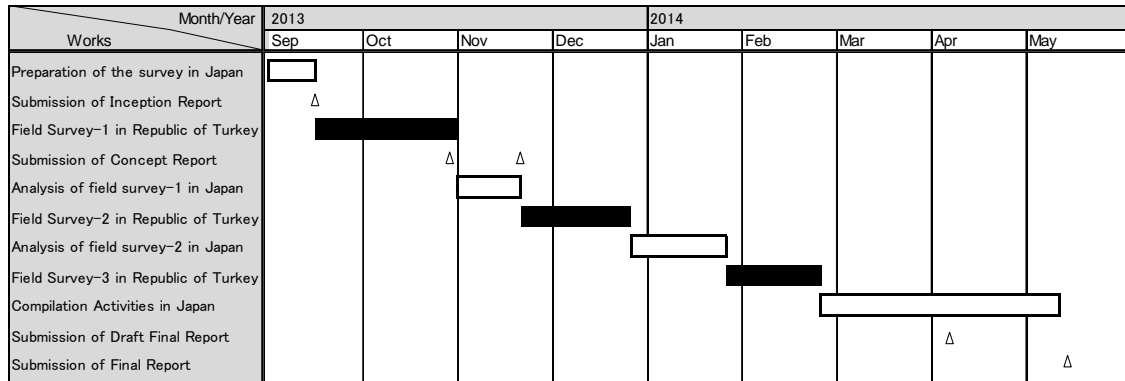
1.2. Survey Objectives

The purpose of this Data Collection Survey (Survey) is to propose a resilient urban planning concept for Bursa province. This report includes a list of projects proposed to implement this concept, and for high priority projects, this report includes a description of the projects and associated estimated costs.

The concept and projects are proposed based on current expertise and technology in Japan and Turkey, as well as past experience of projects conducted under the oversight of JICA.

1.3. Survey Schedule

The overall schedule of the Survey is shown in the figure below.



Source: Prepared by the JICA Study Team

Figure 1.1 Overall Survey Schedule

1.4. Implementing Agencies

The Survey was conducted with the counterpart, AFAD (Disaster and Emergency Management Presidency). We collected information from a wide range of organizations relevant to disaster resilient urban planning. The source of information includes; Ministry of Health (MOH) and Ministry of National Education (MONE) in the national level, Bursa Metropolitan Municipality, Provincial Directorate of Health in Bursa, and MONE Bursa in the provincial level and District in Bursa Province in the district level, respectively.

2. Current State of the Disaster Prevention Sector in Turkey

2.1. AFAD

Turkey has gone through many earthquakes and has revised its laws and institutions after each recent major earthquake.

Currently, an institution is responsible for disaster prevention in Turkey. This institution is the Disaster and Emergency Management Presidency (AFAD). AFAD was established in accordance with the May 2009 Law no. 5902 on the "Organization and Duties of the Disaster and Emergency Management Presidency," often referred to as the Establishment the AFAD Law.

With the establishment of AFAD, the three general directorates (the General Directorate of Emergency Management of Turkey [TEMAD], the General Directorate of Disaster Affairs [GDDA], and the General Directorate of Civil Defense [GDCCD]), were abolished and absorbed into AFAD.

Provincial AFADs operated under control of the provincial governorship until February 27th, 2014 when they were transferred to the direct control of Central AFAD after revision of the AFAD Law.

2.2. Revision of the AFAD Law

The AFAD Law was revised on February 27th, 2014. Major revisions are shown below.

Organizational Structure	AFAD is composed from a Central AFAD and Provincial AFADs.
Provincial AFADs	<ul style="list-style-type: none"> ◆ Provincial AFADs are established as provincial field services agency under provincial governors. Provincial governors are responsible for the administration of the provincial AFADs and for the management of the disaster and emergency response within the provinces. ◆ Provincial AFAD presidents are appointed by the Prime Minister or Vice Prime Minister. Other management personnel are appointed by the province governor among the permanent staff of the provincial AFADs. ◆ Budget of provincial AFADs is distributed from the Central AFAD budget. ◆ Any legal actions related to the works and operations of the provincial AFADs are transferred to the province governorship. ◆ Duties of each provincial AFAD are as follows: <ul style="list-style-type: none"> - To identify disaster and emergency hazards and risks in the province, to implement related disaster and emergency prevention activities - To establish, apply, and ensure the application of provincial plans for disaster and emergency risk reduction, response and enhancement in cooperation and coordination with local governments and state institutions and organizations - To manage provincial disaster and emergency management centers, to ensure uninterrupted and safe communication - To evaluate or ensure the evaluation of losses and damages resulting from

	<p>disaster and emergency situations</p> <ul style="list-style-type: none"> - To conduct or ensure the execution of training activities regarding disaster and emergency - To carry out the accreditation and certification of nongovernmental organizations - To set up and manage warehouses for food, equipment, and tools to be used to meet sheltering, nutrition, and healthcare needs of the public and equipment needs for the necessary search and rescue teams in disaster and emergency situations - To carry out military tasks specified in the related legislation including mobilization, war preparedness activities, and civil defense services - To coordinate risk reduction, prevention, and response activities with other agencies and institutions - To conduct secretarial activities for the provincial disaster and emergency coordination committees - To implement activities for the determination, identification and purification of CBRN substances and other technological substances, to ensure cooperation and coordination among related agencies and institutions - To implement annual working programs designated by the Presidency, to prepare and submit for the approval of the Presidency annual activity reports - To prepare the annual budget proposal for Central AFAD's review and approval - To conduct other tasks given by the Presidency and the provincial governor <ul style="list-style-type: none"> ◆ Search and rescue teams are established under provincial AFADs at the provinces specified by Central AFAD ◆ Search and rescue teams are under the control of provincial AFADs. The number of search and rescue teams must not exceed twenty. ◆ Personnel Affairs of AFAD <ul style="list-style-type: none"> - Employment plan of additional human resources related to provincial AFAD : Personnel 6,419 people(Provincial AFAD Director, AFAD Search & Rescue Unit Director, Urban Planner, Engineer, Operator of Data Preparation and Control, Lawyer, Doctor etc) and Researcher 92 people, total is 6,511 people. - Change of belonging of provincial AFAD and search and rescue team personnel, government employment qualification and provisions of the age limit of search and rescue personnel etc. ◆ AFAD Property : Settlement of property from provincial AFAD to central AFAD
Seismic Activity Monitoring	Universities, local governments and all agencies and institutes which monitor seismic activity are required to provide monitoring data to AFAD. AFAD is the only authorized institution to publically release data.

This revision was published at the end of February 2014. Changes in the structure and operation standards will be implemented in accordance with the revision from now on. While the governor is responsible for managing provincial level activities in times of disasters, the system of provincial disaster and emergency directorates will be under AFAD in normal times. This will allow AFAD to build a stronger structure because the development of human resources and facilities will be done at AFAD's directions using AFAD's budget.

2.3. National Disaster Management Strategy

Under the National Development Plan, a national level disaster prevention strategy is stipulated in the Turkey Disaster Management Strategy Paper, which includes the three national disaster prevention plans (Turkey Disaster Mitigation Plan, Turkey Disaster Response Plan, and Turkey Disaster Recovery Plan).

Tenth National Development Plan (2014-2018)	Disaster risk management is an important improvement to be included in each sector
National Disaster Management Strategy	This is not documented yet.
Turkey Disaster Mitigation Plan	This is not documented yet.
Turkey Disaster Response Plan	TAMP has been planned to specify the division of ministries and facilities roles, relationships between national and local governments and the action policies of ministries and facilities in a disaster.
Turkey Disaster Recovery Plan	This is not documented yet.
AFAD strategic plan for 2013-2017	AFAD has structured its strategic plan in goals and objectives. The five goals are the following: Goal 1. Being a Constantly Developing and Learning Organization Goal 2. Establishing a Risk-Centered Integrated Disaster Management System Goal 3. Generalizing Disaster Management Standards Goal 4. Launching an Educational Campaign for Disaster Preparedness Goal 5. Being a Leading Organization in the International Arena
National Earthquake Strategy and Action Plan 2012-2023	The three principal goals that have shaped objectives and strategies for this plan are: "Learning about earthquakes", "Earthquake safe settlement and construction" and "Coping with the consequences of earthquakes".

Although all these plans seem to have covered various fields comprehensively, there are still challenges as explained below.

- Since the disaster prevention plan are being made without conducting detailed analysis in Turkey, some of the plans are considered not very effective. Therefore, risk analysis should be carried out at an early stage.
- Despite the undeveloped Turkey Disaster Management Strategy Paper which is supposed to come at the head of Turkey's National Disaster Prevention Plans, the Individual Strategy (on a prefectural level) have been formulated. Thus, there is a possibility that it might be necessary to reflect the result of the before-mentioned risk

analysis as well as to re-examine the current plan and adjust it to the content of Turkey Disaster Management Strategy Paper when it is developed in the future.

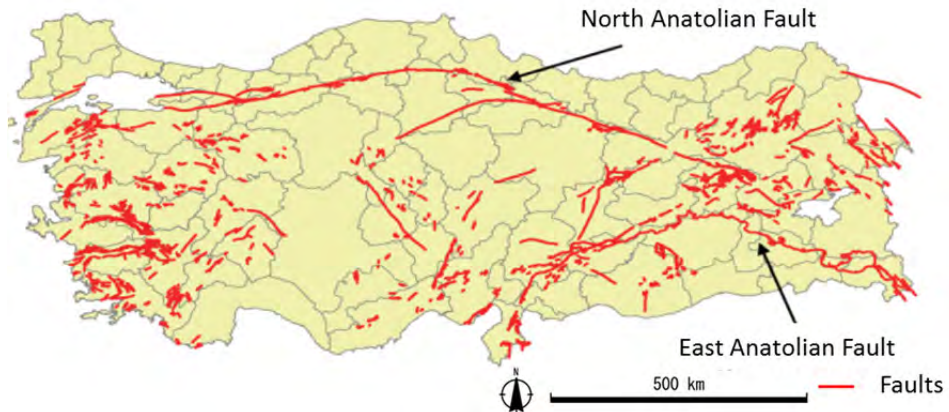
- On the one hand, Turkey focuses on disaster response while on the other, plans for mitigation and rehabilitation have not been developed yet, resulting bias. Therefore, it is a challenge to create both plans at an early stage In order to realize a resilient urban development..

3. Review of the Current Situation in Turkey

3.1. Natural Disaster Potential

(1) Earthquake Potential

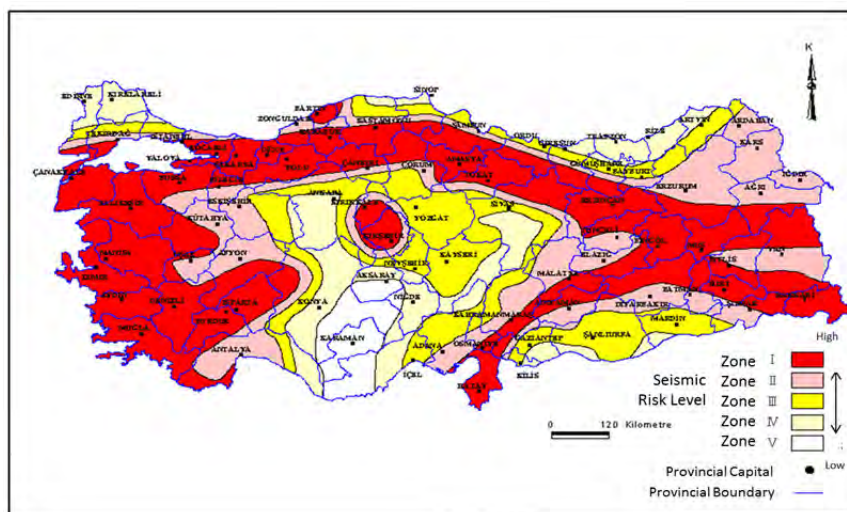
Anatolia, which covers most of Turkey, is located at the boundary of the African Plate and the Arabian Plate in the south and the Eurasian Plate in the north. Among the many active faults in Turkey, the East Anatolian Fault and the North Anatolian Fault are the most notable for their length. Shorter active faults are generally concentrated in the westernmost and easternmost provinces of Anatolia.



Source: Survey on overseas earthquake insurance system (Turkey 2006)

Figure 3.1 Active Faults in Turkey

Since 1900, 73 earthquakes were record with a magnitude of M6.0 or higher in Turkey. The two largest earthquakes were the Erzincan Earthquake of 1939 (M7.8) and the Kocaeli Earthquake of 1999 (M7.5). Figure 3.2 shows the Seismic Hazard Map prepared by GDDA (now AFAD) in 1996. In this map, the land area in Turkey is divided into five categories of seismic hazard. The areas along the North Anatolian Fault, the South Anatolian Fault, and the Aegean Sea have the highest potential for earthquake.



Source: AFAD HP

Figure 3.2 Seismic Hazard Map for Turkey

(2) Other Natural Disasters

The following table summarises the risks from other natural disasters.

Type of Disaster	Potential Area
Flooding	A high frequency of flooding is observed in Central Anatolia, Eastern Anatolia and the Black Sea Region, and a relatively small frequency of flooding is the Marmara Region, the Aegean Region and the Mediterranean Region.
Tsunami	Five tsunamis have been recorded since 1900, one of which was caused by the 1999 Kocaeli Earthquake. The other four tsunamis were caused by earthquakes in the Black Sea.
Landslide	Landslides are common along the coastal area of the Black Sea and in mountainous areas of Eastern Anatolia.
Rock fall	Rock falls occur over the entire country, although they are concentrated in the mountainous areas of central Anatolia.
Avalanche	Avalanches are typically limited to eastern Anatolia and some parts of the Black Sea area.
Volcanic Eruption	Pretty much no volcanic eruptions have occurred in recent years and no statistics on volcanic activities were identified.

3.2. Distribution of Population and Metropolises

In 2013 the population in Turkey was approximately 76.5 million. Due to the tendency for the urban populations to steadily increase over time, there are significant differences between population sizes in metropolitan areas, and rural areas. 20 of the 81 provinces accounted for 66% of the total national population.

Metropolitan Municipality Law

In 2004, the Turkish Government established the Metropolitan Municipality Law (No. 5216). As a result, 29 metropolitan municipalities were created with 750,000 or more inhabitants. A revision came into effect at the end of March 2014. This revision expands the area of the metropolitan municipalities to the provincial boundaries and provides greater authority to the metropolitan municipalities, including the authority to demolish buildings presenting a high disaster risk based on assessment of buildings by municipalities.

Urban Development Strategy

In response to the rapid development and expansion of urban areas due to the increase in urban populations, the Ministry of Public Works and Settlements (now MOEU) published the "Integrated Urban Development Strategy and Action Plan 2010-2023 (KENTGES)" in 2010. Accordingly, challenges and development goals in urban planning in Turkey are shown below.

Table 3.1 Challenges and Development Goals in Urban Planning in Turkey

Common Challenges	New Challenges
<ul style="list-style-type: none"> • Urban Problems and Uncontrolled Growth of Cities • Migration to Cities • Illegal Housing and Squatter Houses due to Migration to Cities • Urban Areas Vulnerable to Disasters • Development of urban infrastructure has not reached the desired level required for the population increases in the urban areas and causes environmental problems • Urban transportation problems and urban expansion caused by increasing prosperity and proliferation of vehicle ownership. • Inefficiency in in the area of spatial planning • Capacities of Local Government 	<ul style="list-style-type: none"> • Climate Change: • Urban Transformation: • Sustainable City and Energy Efficiency:

Source: KENTGES

As shown in the above table, the uncontrolled expansion of the urban areas, illegal housing, and squatter settlements, along with the vulnerable areas generated by these expansions, are the challenges that many cities in Turkey are facing. “Urban transformation projects” to tackle these issues have started in various locations in Turkey. Particularly, the improvement of vulnerable areas, including illegal buildings and squatter settlements, has become a major focus in Turkey, and led to the “Urban Transformation Law (Law No. 6306)” approved and put into force in 2012.

Goals of this law are the following:

- To build a healthy and safe nation by the redevelopment of high-risk areas and removing high-risk buildings
- To avoid the loss of life and property due to earthquakes through removal of high-risk buildings

To implement this Urban Transformation Law, the Department of Infrastructure and Urban Transformation (IUT) was established under MOEU in April 2013. Furthermore, provincial level IUT units under the direct control of MOEU were also established in major provinces.

In response to growing demand for urban residences, some ministries started transferring public facilities to suburban areas. For example, the MOH has been implementing “city hospital projects”, and will establish a new hospital complex to provide high level medical services by combining several public hospitals. The MONE has been working on “school campus projects” by the Public-Private-Partnership (PPP). These projects aim to improve the efficiency of operation and management by combining several facilities. As these school campuses and hospital complexes require large lands, it is difficult to find adequate properties within the city, and hence locations in suburban areas are selected.

3.3. Disaster Risk Management in Japan

(1) Disaster Risk Management Strategy in Japan

In the past two decades, Japan experienced two catastrophic disasters: the Great Hanshin Awaji Earthquake in January 1995 and the Great East Japan Earthquake in March 2011. Learning from these experiences, Japan has strengthened its disaster risk management in recent years.

Through experiencing disasters of extreme severity, Japan is aiming to build a disaster resistant and resilient society by developing and taking risk mitigation measures at every stage (phase) of any field (sector) in a comprehensive, synthetic, and continual manner, assuming that disasters of various scales will occur.

A disaster-resilient society can be rephrased as a society that will not suffer irreversible damage, can minimize damage, and can quickly recover from a disaster.¹

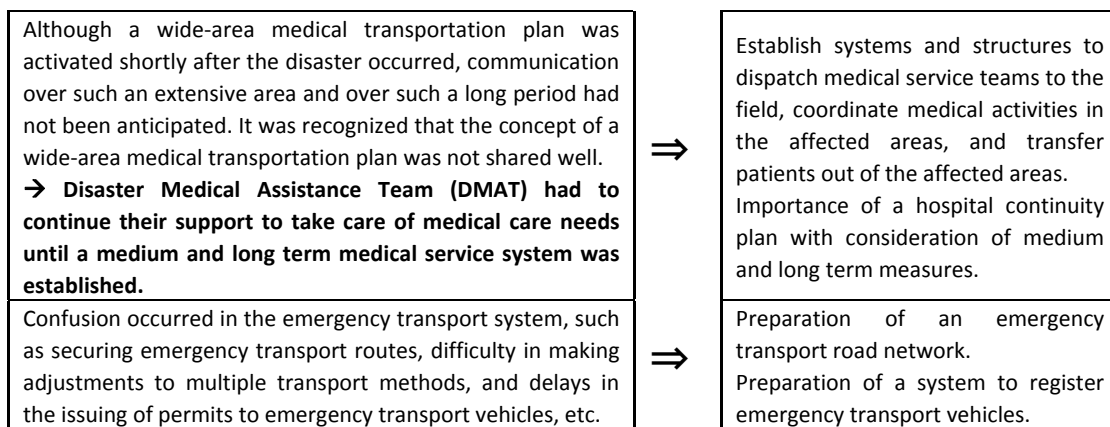
(2) Lessons related to Urban Planning learned from the Great East Japan Earthquake

As mentioned earlier, the importance of town-building with disaster prevention in mind has been strongly recognized through an experience of the Great East Japan Earthquake. Specific lessons related to urban planning are shown below.

Table 3.2 Challenges and Lessons learned from the Great East Japan Earthquake

Challenges in the Great East Japan Earthquake	Lessons
<p>Many local government buildings were stricken by the disaster; employees were affected, and communication was cut due to damage to communication equipment.</p> <p>→ The delay in the communication of information caused a delay in decision making for relief activities and countermeasures.</p>	<p>⇒</p> <p>Select strategic locations for government buildings. Establish a communication system that cannot be disrupted by compound disaster</p>
<p>Since the disaster affected a very large area, search & rescue activities were performed by units from various agencies, which had to determine on-site how to collaborate.</p> <p>→ Operations were carried out without enough information. There are difficulties in coordination and collaboration with some rescue teams sometimes.</p>	<p>⇒</p> <p>Establish upstream coordination among related agencies and organizations as a part of disaster preparedness</p>
<p>Confusion arose regarding acceptance of support (personnel and supplies) from other areas and from overseas.</p>	<p>⇒</p> <p>Establish a management system for receiving, sorting, and distributing support from outside and from overseas.</p>
<p>A shortage of fuel, disruption of transportation routes, delayed shipments of goods from base, and stagnation of supplies.</p> <p>→ Shortage of fuel, disruption of timely transportation.</p>	<p>⇒</p> <p>Establish a logistic center to receive and distribute relief supplies received from outside the disaster area. Establish back-up energy supply systems (electricity and heating sources).</p>
<p>Due to the extensive disaster, planned evacuation centres were also affected, and buildings not originally designed for that purpose were used as refuge shelters. Therefore, some refugee shelters were not adequately equipped with suitable facilities or supplies.</p> <p>→ Misunderstanding of the location and situation of evacuation centres. Provision of support to evacuation centres was delayed and insufficient for the operation of the evacuation centres.</p>	<p>⇒</p> <p>Specify evacuation centres with necessary supplies and equipment. Specify secondary evacuation plans.</p>

¹ JICA Research Report “Mainstreaming of Disaster Prevention”, March 2013



Source: JICA Study Team prepared based on documents of the Cabinet Office

From these experiences, the effectiveness and importance of a disaster management complex that can cope with wide-area disasters has been recognized again.

The economic impact of a disaster of extreme severity is expected to be extremely serious in regions with urban areas that are demographically and industrially concentrated. Core DMCs are established to provide rapid recovery and minimize damage caused by the disaster in the area and will be essential for the construction of a resilient society in those areas.

3.4. Proposal for Resilient Urban Planning in Turkey

3.4.1. Basic Concept

Considering challenges in urban planning in Turkey and Japan as well as the importance of disaster risk mitigation and DMCs, the issues in disaster prevention urban planning for a resilient city are summarized in the following table.

“A resilient city” is defined in this report as a city that will not suffer irreversible damage in a disaster, can minimize damage, and can quickly recover from a disaster. It is a city that is ready to manage disaster risks.

Table 3.3 Challenges in Urban Planning in Turkey

Components of Disaster Resilience in Urban Plans	Proposal for Disaster Resilient Urban Planning in Turkey	Challenges in Disaster Resilient Urban Planning in Turkey
Disaster resistant urban structures (Resilient Urban Structure)	Improvement of vulnerable areas. Construction of disaster resistant urban structures including buildings and infrastructure.	Illegal housing due to migration to cities; urban areas vulnerable to disasters Urban infrastructure has not reached the level required for the urban population increase
High-efficiency energy use (Smart Community)	Incorporation of efficient energy use measures in urban developments. Coordination among relevant authorities.	Uncontrolled growth of cities, leading to inefficient infrastructure due to the lack of coordination among relevant authorities
Intensive urban structure (Compact City)	Preparation of plans for intensive city through strategic city planning.	Construction of public facilities and residences in rural areas at the boundary of urban areas Urban expansion caused by increasing population and proliferation of vehicle ownership.

Focusing on a resilient system, and based on the lessons learned from the Great East Japan Earthquake, the following are proposed for Turkey: construction of Disaster Management Complex, and establishment of a DMC network supported by resilient infrastructure

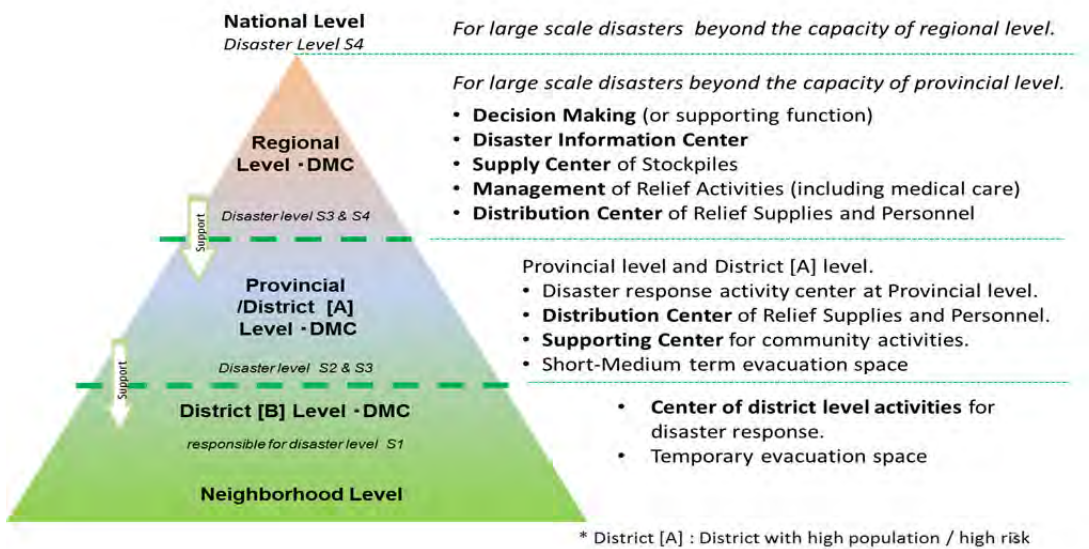
(transportation, logistics, communication, etc.). In addition, it is proposed to integrate the disaster prevention facilities built independently by the various ministries.

The realisation of the proposed DMCs is expected to contribute to establishing a disaster response system and command system in the event of a disaster, both of which AFAD has already planned in TAMP.

3.4.2. Proposed Network of Disaster Management Complexes for Turkey

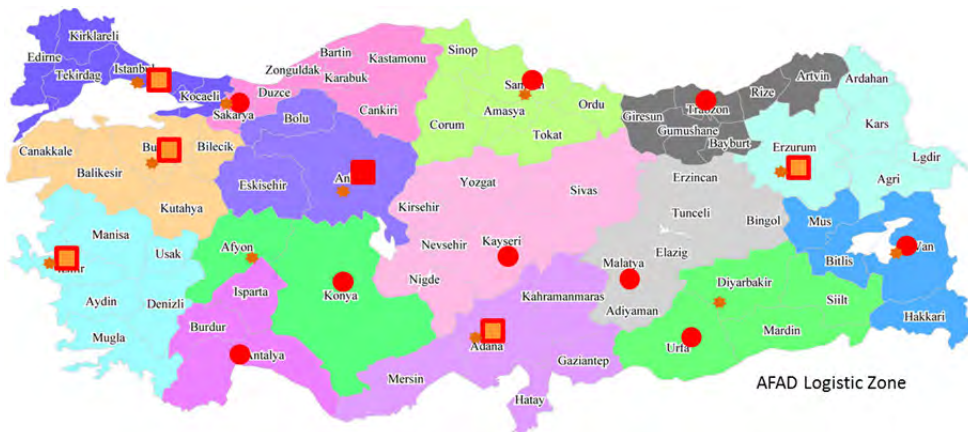
Coordination of DMCs of different levels promotes effectiveness. This study recommends that DMCs in Turkey be established at national, regional, provincial, district, and community levels. The term “region” used in this report refers to the 15 AFAD logistic zones, each of which covers several provinces as shown below. DMCs are proposed to be established for each of the 15 regions.

Some large districts in large metropolitan areas are proposed to also have some comprehensive facilities to serve their large populations.



Source: JICA Study Team

Figure 3.3 Proposed Levels of Disaster Management Complexes



Source: Map of AFAD Logistic Zone from TAMP.

Figure 3.4 Proposed Conceptual Distribution of Regional Level DMC

3.4.3. Proposed Concept of Disaster Management Complexes for Turkey

(1) Concept of DMC

The DMC has two roles, one is to be a center for disaster response and recovery activities in the event of a disaster, and the other role is to promote disaster awareness, dissemination of information about disasters, human resource development, research & development etc. during normal periods.

More than simply a space; a DMC is equipped with facilities and equipment appropriate for disaster management. One of the important roles of DMC is to create an environment and system which will help relevant authorities to work smoothly in the event of a disaster, which includes preparation of an operation plan and a personnel management plan including acceptance by and training of support teams from related organizations.

This DMC will be located in a large open space containing facilities related to disaster management. It will also provide support to AFAD and other disaster related authorities' relief activities, such as information gathering, search and rescue, relief aid, recovery, etc. As a system to support AFAD's activities, it is proposed to establish DMCs in every region/province.

The aim of constructing DMCs is to support AFAD's efficient and effective management of disaster relief activities in the event of a disaster. Also the establishment of close relationships among the related disaster risk management organizations through communication during normal periods, will result in smooth coordination and collaboration during a disaster.

Advantages for Grouping Facilities

The advantages for grouping disaster management facilities and functions into a DMC are as follows:

- Close proximity of facilities will allow direct communication among staff of the institutions located in the DMC, which is crucial for efficient disaster management in the event of a disaster
- Flexibility in sharing facilities among institutions within the DMC. Facility use can be adjusted according to demand before, during or after a disaster.
- Efficient use of back-up energy supply by having a common system shared by the different institutions and groups responding to disasters.
- Cost savings from sharing facilities related to disaster prevention (e.g. water reservoir, septic tank, heliport) and from planning, operating, and maintaining uninterrupted infrastructure with auxiliary systems like satellite communication system.
- Constituting a central location related to disaster risk management to help spread the concept of disaster prevention to the general public and enhance public awareness.
- Direct communication during normal periods will enable smooth communication during a disaster.
- Sharing redundant infrastructures among relevant authorities.



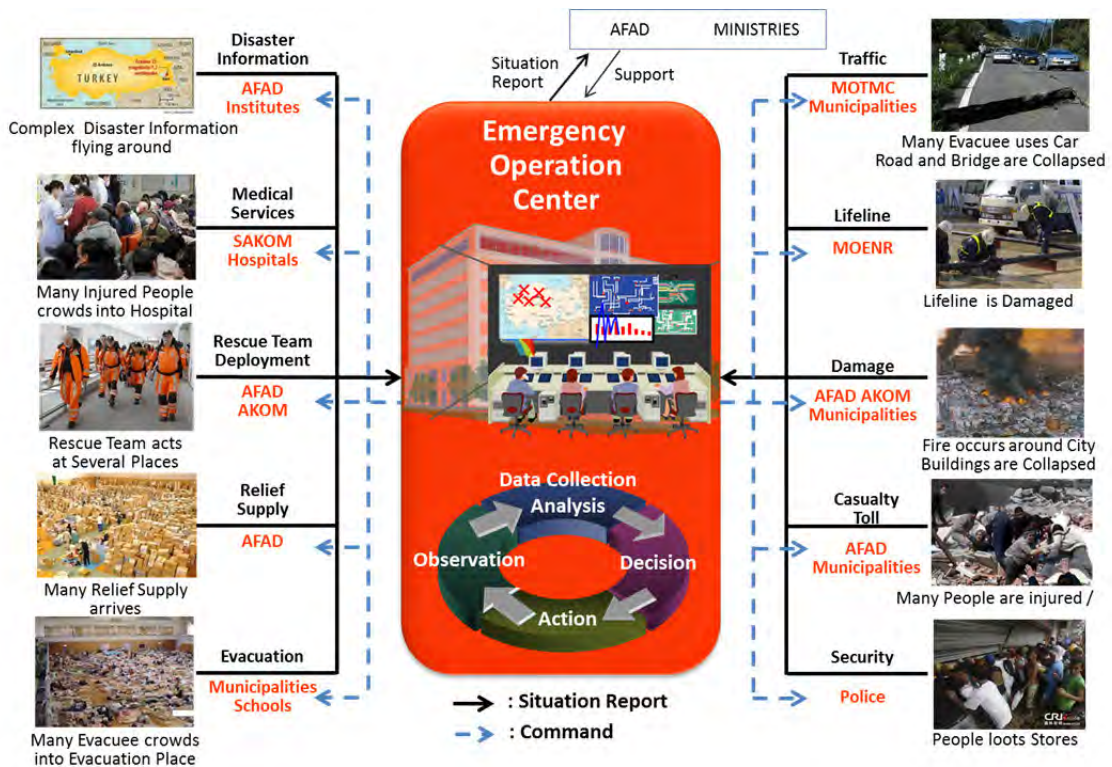
Source: JICA Study Team

Figure 3.5 Roles of DMC

The Role of Disaster and Emergency Management Center and the Importance of coordination

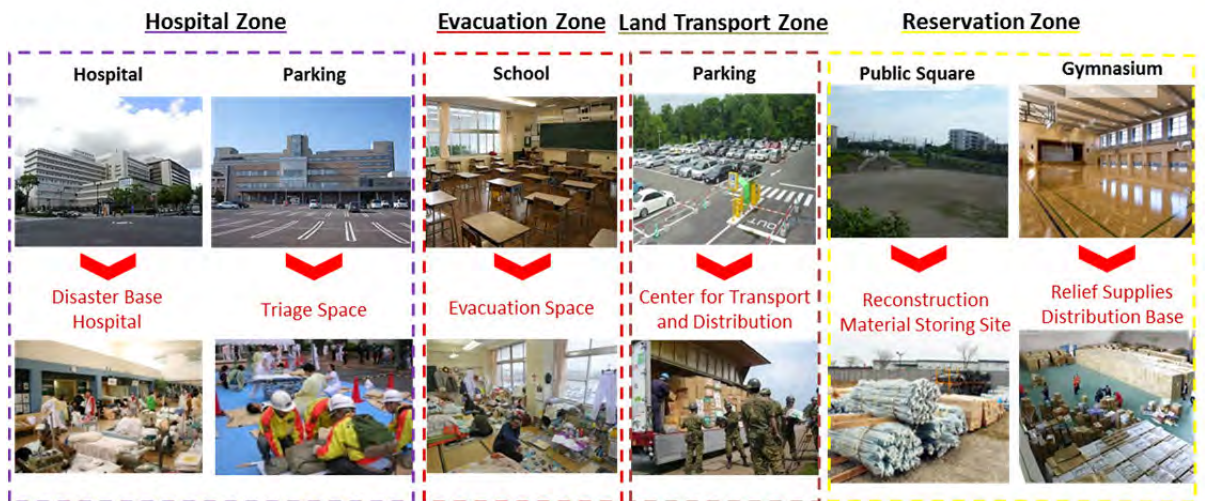
The role of Disaster and Emergency Management Center functioning as the central facility in disaster response is shown below. It is necessary for the Disaster and Emergency Management Centre to coordinate with the relevant entities in order to collect information, analyse the situation, make decisions and give commands.

Establishment of an operation structure and coordination among the related entities during the normal period are important for smooth collection of information in the event of a disaster. The establishment of DMC can support AFAD for coordination among related entities.



Source: JICA Study Team

Figure 3.6 Proposed Disaster and Emergency Operation Centre Coordination



Source: Map was prepared by JICA Study Team based on documents from the cabinet office

Figure 3.7 Conceptual Image of DMC

(2) Component/Facilities of Disaster Management Complex

As mentioned above, it is advisable for a DMC to group various facilities. Details on the facilities are shown in the following table. Several organizations are involved in establishing and operating the DMC.

Table 3.4 Proposed Facilities for the Regional, Provincial, and District-Level DMC

Facilities	Function & Role	Organization in charge	Approximate Required Area, in hectares (ha)		
			Regional Level	Provincial Level	District Level (I,II)
Disaster Management Center 	<p>【Normal Period】</p> <ul style="list-style-type: none"> • Staff training for disaster response • Education for disaster preparedness <p>【Disaster Period】</p> <ul style="list-style-type: none"> • Decision making and command function • Data collection • Distribution of support goods and human resources 	AFAD	1ha	1ha	-
Disaster Base Hospital 	<p>【Normal Period】</p> <ul style="list-style-type: none"> • General hospital • Training for disaster & emergency medical service <p>【Disaster Period】</p> <ul style="list-style-type: none"> • Base for medical service activities 	MOH	2ha	2ha	1ha
DRM related facilities 	<p>Base for emergency relief activities including search & rescue or patient transfers: AKOM, Fire Station, Police Station, 112</p>	Municipality MOH	1ha	1ha	1ha
Logistic Center 	<p>【Normal Period】</p> <ul style="list-style-type: none"> • Stock of water, food, household goods • Stock of materials for construction, mechanical and electrical works <p>【Disaster Period】</p> <ul style="list-style-type: none"> • Distribution of stock supplies • Base to receive/distribute support items from outside 	AFAD	1ha	1ha	1ha
School 	<p>【Normal Period】</p> <ul style="list-style-type: none"> • School <p>【Disaster Period】</p> <ul style="list-style-type: none"> • Evacuation area • Temporary housing 	MONE	3ha	1ha	2ha
Sports Facility 	<p>【Normal Period】</p> <ul style="list-style-type: none"> • Sports hall • Store stockpiles <p>【Disaster Period】</p> <ul style="list-style-type: none"> • Receipt and distribution of stockpiles 	Municipality / MOYS	1ha	-	-

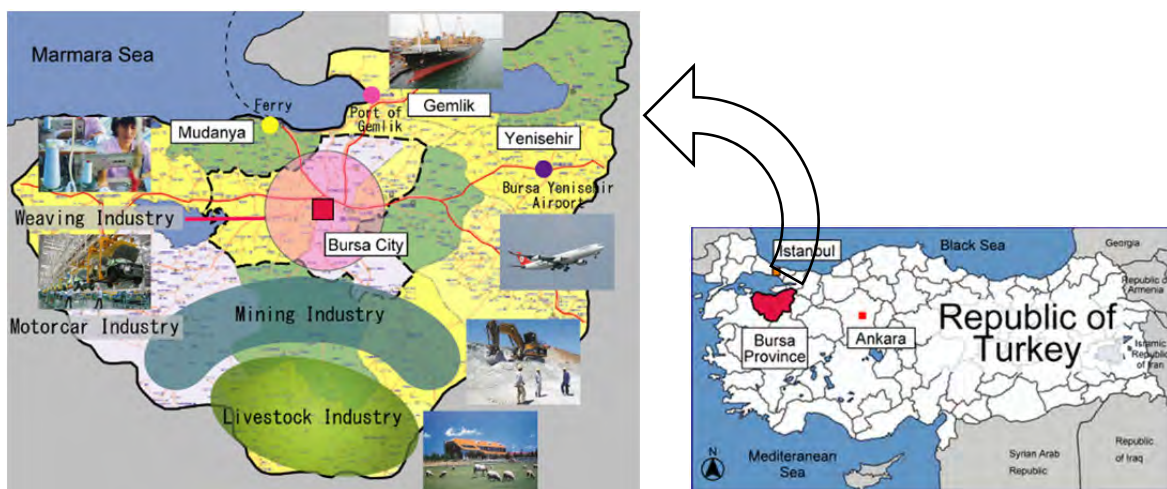
<p style="text-align: center;">Heliport</p> 	<p style="text-align: center;">【Normal Period】</p> <ul style="list-style-type: none"> • Port for helicopter <p style="text-align: center;">【Disaster Period】</p> <ul style="list-style-type: none"> • Port for helicopter 	AFAD	900m ²	900m ²	
<p style="text-align: center;">Park/Open Space</p> 	<p style="text-align: center;">【Normal Period】</p> <ul style="list-style-type: none"> • Park, playground <p style="text-align: center;">【Disaster Period】</p> <ul style="list-style-type: none"> • Base camp of search & rescue teams • Receipt of support items • Evacuation area 	Metropolitan Municipality	30ha	10ha	5ha
<p style="text-align: center;">Waste Incineration Plant</p> 	<p style="text-align: center;">【Normal Period】</p> <ul style="list-style-type: none"> • Incineration plant for waste <p style="text-align: center;">【Disaster Period】</p> <ul style="list-style-type: none"> • Provide back-up energy for DMC 	Metropolitan Municipality	1ha	1ha	-
<p style="text-align: center;">Education Center for Disaster Prevention</p> 	<p style="text-align: center;">【Normal Period】</p> <ul style="list-style-type: none"> • Education on disaster prevention for the public <p style="text-align: center;">【Disaster Period】</p> <ul style="list-style-type: none"> • Base for volunteer activities 	AFAD	1ha	1ha	-
<p style="text-align: center;">Search and Rescue Center</p> 	<p style="text-align: center;">【Normal Period】</p> <ul style="list-style-type: none"> • Training for search and rescue (professional and semi-professional) <p style="text-align: center;">【Disaster Period】</p> <ul style="list-style-type: none"> • Base for search and rescue activity 	AFAD	1ha	1ha	-
<p style="text-align: center;">Research and Development Center</p> 	<p style="text-align: center;">【Normal Period】</p> <ul style="list-style-type: none"> • Development of earthquake resistant technology, etc. 	AFAD	1ha	-	-
Total Approximate Area			43ha	19ha	10ha

4. Case Study in Bursa Province

The case study for disaster risk management and resilient urban planning in Bursa is described in this Chapter.

4.1. General Background Information and Structure of the City of Bursa

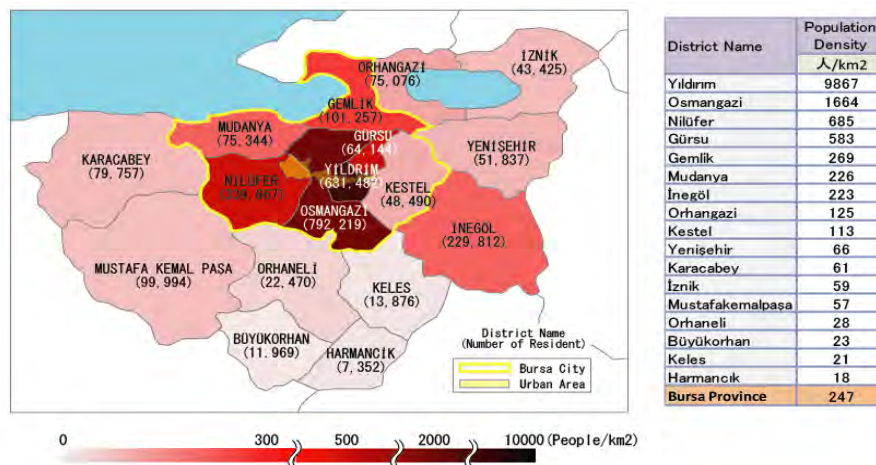
Bursa is located across from Istanbul on the Marmara Sea. Bursa is the 4th largest province in Turkey by both population and industry production. With the revision of Law No. 5216 in March 2014, the boundary of Bursa Municipality was expanded to the boundary of the province. In this report, “Bursa Municipality” refers to the original City boundaries which covered the densely inhabited districts of Bursa Province. The main industries are automobile, textile, mining, food processing, agriculture and tourism. There are two sea ports in Bursa, one in Gemlik and the other in Mudanya. Gemlik is the 5th port in Turkey in terms of its cargo transportation capacity.



Source: JICA Study Team

Figure 4.1 Location of Bursa and Distribution of its Main Industries

A big portion of Bursa is covered by mountainous areas. The highest mountain of the Marmara region is Uludag Mountain in Bursa Province, with an elevation of 2,543 m. Bursa city is on soft ground, which may lead to liquefaction during an earthquake.



Source: JICA Study Team Data from Turkish Statistical Institute 2013

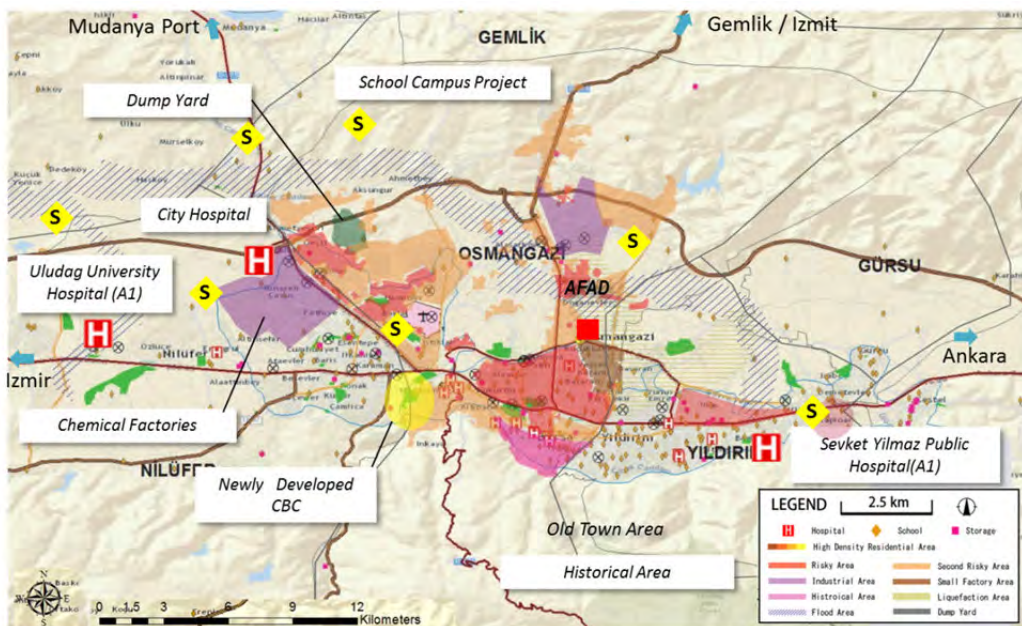
Figure 4.2 Population Density Distribution in Bursa Province

Bursa province is composed of 17 districts, 7 of which form the City of Bursa. With the growth of the economy, the population of the Bursa province increased from 1.6 million in 1990 to 2.7 million in 2012. The unorganized and uncontrolled rapid expansion of urban areas led to high-density residential areas and mixed-use areas with residences and industries. The Osmangazi and Yildirim districts are the most populated, with 53% of the total population of the province.

4.1.1. Characteristics in the city of Bursa

- Bursa City has the 4th largest population in Turkey. As a result of the rapid population growth and growth of industrial activities in recent years, there are high-density residential and industry-residential mixed areas with vulnerable buildings constructed without obtaining construction permits.
- The city is located on a long basin-shaped flatland stretching east to west (including areas at risk of liquefaction and flood) at the foot of Mount Uludağ (including areas at risk of landslide).
- Since Bursa is a historical city, historical cityscapes are seen in the old town area. Although the historical city was built on solid ground, many buildings were built before the current building code or without permission, particularly on the mountain side, and are likely to collapse or suffer significant damage in the event of an earthquake. Also there are areas with no access route for emergency vehicles.
- Bursa is a major center for the thriving automobile industry in Turkey, and is also famous for its textile and food processing industries. Currently 13 large industrial zones are located in Bursa Province. In case of a large earthquake, possible secondary disasters may occur due to chemical factories and oil-related facilities. Damage to the industries and transportation network may also cause a big impact on the supply chain and consequently on Turkey's economy.
- As traffic in Bursa is concentrated on a major arterial road that crosses the city center from west to east, it is important to provide alternative routes. With many rivers in Bursa, more bridges are needed. To improve the road network, Bursa Metropolitan Municipality recently developed a transportation master plan for 2030 in coordination with Germany. The plan includes the construction of additional roads and bridges as alternative routes. A part of the plan has already started implementing.
- There are two sea ports in Bursa. The Gemlik Port Zone, ranked fifth to sixth in Turkey in terms of the export amount, is the entrance to Bursa, and supports the industry of Bursa. The Mudanya Port Zone connects Istanbul and Bursa by ferry.
- There are several active faults in Bursa, and Bursa is located in the zone 1 of the Earthquake Risk Map in Turkey. Two earthquakes, M7.1 and M6.7, occurred in 1855 close to Bursa city. The events were considered having a return period of 180-200 years and, therefore, there is a high possibility of the occurrence in the near future.
- The event may directly affect Bursa, which would not be able to provide its full support to Istanbul for disaster response and recovery.
- Multi-hazards and compound hazards should be taken into consideration. The flood hazard in Bursa province is due to the limited volume capacity and shape of the rivers and to the presence of dams, which if they collapsed, would cause flooding in Bursa province. There is a high risk of landslide in Inegol district.

- New urban areas are expanding to the suburbs and the city has been extended. North of the Ankara-Izmir highway, and expanding from east to west, there is a mixed use residential and industrial area and a large densely-built residential area with many buildings unlawfully occupied and/or not structurally sound. There is a high necessity for improvement in the safety of this area from a disaster prevention perspective.
- Local governments started an evaluation of building structures in each district with respect to the Urban Transformation Law; however, it has not been completed yet. A redevelopment project has been launched in an area of about 500 ha in Yildirim District. In Osmangazi District, risk assessment of buildings has been completed. Redevelopment plans for areas of high priority are now being prepared.
- Although a number of medical facilities, such as hospitals, are located in populated urban areas, A1 class hospitals, which can provide advanced medical services, are located on either side of the city in the east and west, away from the city centre. The new City Hospital is planned to be located in a suburb to the northwest of the city.
- The majority of high schools are planned to move to the suburbs in accordance with the planned school campus projects, aiming to improve the beyond capacity situation of schools within the city. Rearrangement of primary and secondary schools is progressing in the city.



Source: JICA Study Team

Figure 4.3 Perception of Structure of Bursa City

If a disaster of extreme severity hits Bursa, the densely populated old town with many dilapidated buildings at the foot of the mountain and highly populated residential-industrial mixed use area (the centre of it is designated as a risky area) will have high need for search & rescue operations.

Additionally, the road network consists mainly of east-west highways, so traffic at the time of a disaster is likely to be heavily congested. Some of the areas on the mountainside are inaccessible by emergency vehicles, which will also be a cause of traffic congestion.

4.1.2. Proposed Improvements for Disaster Prevention and Disaster Mitigation in the Bursa Province

Based on the current status, important issues in making the resilient city in Bursa province (i.e. developing the city that is capable of quickly recovering from functional breakdown caused by disasters) are summarized as follow.

We set the following 5 items that based on the charter on measure against the earthquake directly strikes the south Kanto region under “Tokyo Metropolitan White Paper“ to evaluate issues in the resilient urban planning.

(1) Disaster Risk Assessment:

Disaster risk and vulnerability assessment should be a base for a disaster prevention plan; however, information for disaster risk assessment is not yet available in Turkey. Currently, JICA’s technical cooperation project "Capacity Development toward Effective Disaster Risk Management“ is ongoing with AFAD, and AFAD has been working on information gathering and risk assessment through collaboration with relevant authorities and universities. The assessment of hazardous areas should be conducted as the first step, especially for the resilient urban planning in Bursa.

(2) Reduction of Disaster Risks in the Urban Areas:

In Japan, “Disaster Risk Mitigation“ is a key concept for disaster risk management. Based on this concept, the improvement of vulnerable areas that are at high risk of disaster is the second step for disaster resilient urban planning.

As a result of the rapid influx of people into urban areas, along with the illegal occupation of land and unpermitted housing, highly dense and vulnerable residential areas are commonly seen in large cities in Turkey. Improvement of vulnerable areas with reinforcement or reconstruction of existing buildings and utilities are urgently required. Through the enactment of the Urban Transformation Law in 2012 (Law No.6306), the Turkish government has been working on redeveloping these areas in order to improve.

(3) Formation of a Disaster Resistant Urban Structure:

In order to mitigate disaster risk and make the city resilient, the formation of an urban structure that will withstand disasters is also important and should be done in parallel with efforts to improve vulnerable areas. The key components of disaster resistant urban structure are: to create centres/bases for disaster response activities (Disaster Management Complexes); to establish an emergency road network. In addition, it is important to build a DMC network connected by an emergency transport road network and to secure alternative transportation routes by land, sea, and air to ensure that routes to receive support and supplies are available when needed.

(4) Disaster Management System Development:

In order to realize the above mentioned measures, the development of a disaster risk management (DRM) system is required. This includes many supporting components, such as institutional development, legislation arrangement, disaster response system development, human resources development, etc.

(5) Enhancement of Public Awareness regarding Disaster Risk Management:

Enhancement of public awareness and education to teach basic knowledge of disaster prevention are essential elements for disaster prevention and mitigation.

To strengthen the resilience of the city, this study focuses on the five improvements proposed above. Issues and challenges related to these improvements are as follows:

(1) Disaster Risk Assessment:

1) Review of Seismic Risk and Hazardous Estimates

Assessments of disaster risks, vulnerability, and hazards have not been conducted since the latest one in 1985. Collection and analysis of updated information would contribute to an effective disaster prevention in urban planning.

(2) Reduction of Disaster Risks in the Urban Areas:

2) Regeneration of Vulnerable Residential Area

Regeneration of vulnerable urban areas is currently in progress pursuant to the Urban Transformation Law. Despite different approaches taken by each municipality, the basic method is redevelopment of housing. Safety of the urban area will be comprehensively improved by creating a public disaster management complex combined with some open space amid the redeveloped area.

3) Establishment of Disaster-Resistant Infrastructure Network

Disaster risk mitigation measures taken for each infrastructure are not satisfactory, and destruction and/or breakdown are anticipated for infrastructure such as ports, roads, transport system, supply, and processing facilities. Investment into both hard and soft ware is needed in order to establish a disaster-resistant infrastructure network that can recover its functions quickly after disaster.

(3) Formation of a Disaster Resistant Urban Structure

4) Establishment of Disaster Bases

It is necessary to establish disaster bases in a strategic manner and to clarify the main bases for each district and region, taking into account the risks specific to Bursa city such as geographic character of Uludag mountain, vulnerability of densely populated areas, and large scale manufacturing complexes.

5) Security of Road Network for Evacuation and Implementation of the Disaster Response Activities

Traffic in Bursa tends to heavily depend on the east-west transport link because of the limited road network. Since there is only a very limited number of alternatives, fundamental weaknesses exist in the road network system.

6) Security of Gemlik Port

availability of Gemlik Port in times of disasters, as it is an indispensable hub for business continuity in Marmara region. Gemlik Port is also an important base to receive relief supplies and it is expected to be a major source of assistance if Istanbul is hit by a serious disaster.

7) Enhancement of Evacuation Points and Addition of Command Function

Bursa boasts plenty of green spaces, and some residential areas have a historic building (referred to as Külliye in the old Ottoman era) at the center of community with a mosque and community facilities. However, these sites are not always well prepared in a comprehensive and strategic manner, with their functions not being uniformly provided.

Therefore, it is assumed that the safety of the urban area will be enhanced by the following measures: 1) secure evacuation points accessible on foot in the densely populated areas,

ensure their safety, and clearly identify the evacuation routes 2) add disaster prevention facilities to these evacuation points.

It is also recommended to establish open spaces and public disaster bases in the redevelopment activities conducted pursuant to the 2012 Urban Transformation Law.

8) Emergency Medical System and Enhancement of its Functions in the Populated Area at the time of Disaster

Although a number of hospital construction projects are planned, due to the limitation of land availability, actual constructions are limited to major hospitals in the suburbs. Construction or expansion of hospitals in the densely populated area, especially in the old town, is not taking place.

In consideration of the expansion and improvement of medical system in the event of disasters, new approaches will be desired with consideration of the anticipated damages, such as upgrading existing core hospitals within the city from the viewpoint of protecting human lives from a major disaster.

9) Maintain Flexibility for Possible Expansion of Evacuation Spaces by using School Facilities

Despite the claim by the MONE Bursa that the anti-seismic reinforcement works of school facilities is complete, some damages to buildings constructed before 1999 can be expected in the event of a major disaster.

As the city is likely to receive numerous refugees and injured people in such an event, it is imperative to maintain flexibility for expanding evacuation space as needed. Utilization of school facilities will be an effective measure to that effect.

It will also be beneficial from the perspective of disaster management to incorporate the possibility in the planning process of the construction, taking into account possible usage of evacuation points.

10) Development of a Sustainable City Resilient to Disaster

The infrastructure investment has not been able to meet the demand from increased residential development in proportion to the population. Development of a sustainable society with low-carbon footprint, energy-efficient systems, and limited waste of resources will increase its tenacity against the regional isolation expected at the time of a major disaster.

(4) Disaster Management System Development:

11) Collection of Disaster Information and Clarification of Command Structure to Avoid Confusion

Regarding disaster management at the provincial level, concerned parties are to congregate at the disaster command room of the provincial AFAD and take necessary measures. Disaster management at the district level is under the district administration. The DMC, which is to oversee the evacuation points, is supposed to always receive and dispatch information related to disaster prevention, and conduct effective and immediate disaster relief efforts as well as evacuation activities while avoiding confusion.

12) Enhancement of Training Facilities for Search & Rescue Team Members

Although AFAD already has some training facilities, they are not sufficient to provide technical training. It is believed that the establishment of a model facility is required to develop and train search and relief rescue specialists in such as for lifesaving efforts, etc.

(5) Enhancement of Public Awareness regarding Disaster Risk Management:

13) Establishment of a Promotion Center for Educational Activities of Disaster Prevention and Disaster Mitigation (Initiatives on soft component)

It cannot be said that the citizens awareness of disaster prevention is high. Although an education center for disaster prevention (Bosaikan) were built and children have been taught about disaster prevention at school, regular practices of disaster prevention drill at many levels of the society will be indispensable to raise their awareness of the importance of disaster prevention on a daily basis.

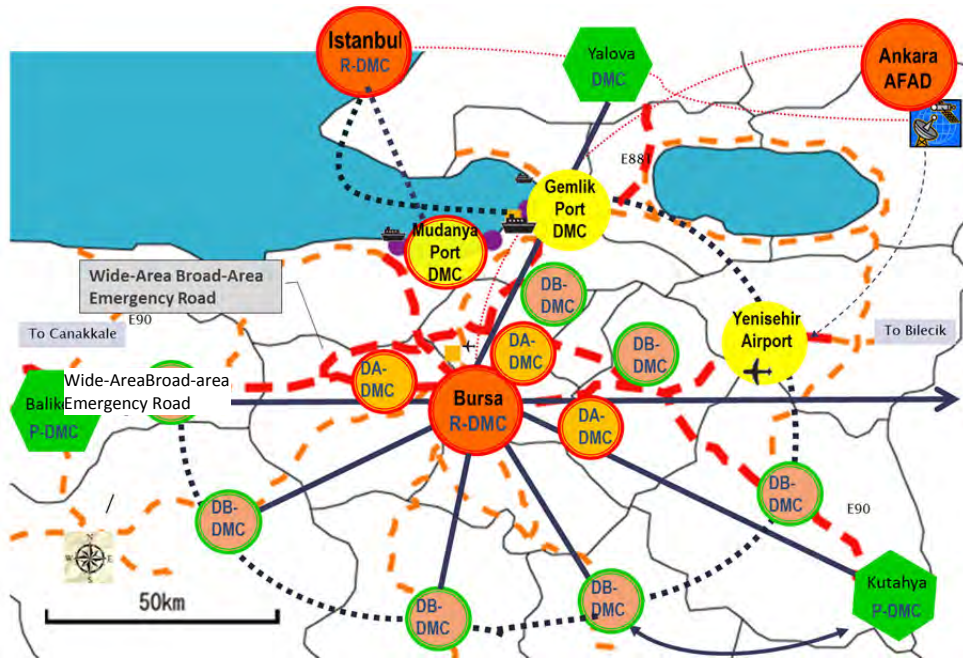
Disaster prevention awareness activities at the community level such as MAG in Gemlik have not been widely conducted so far. At the moment an earthquake strikes, such community level activities are highly effective. Hence, in addition to training and facility development, further awareness of community level organizations is required.

In order to fix the problems listed above, we propose the deployment of a structured DMC as well as the establishment of "Disaster-Resilient Infrastructure," which is to support the DMC operations in Bursa Province.

4.2. Proposal for Improving Bursa's Resiliency to Natural Disasters

It is essential to take an integrated approach, incorporating the following listed points, in urban planning in order to increase the resilience of the urban area in Bursa:

- A regional-level DMC will be established at the center of Bursa, which is at the center of the South Marmara region.
- The regional-level DMC and district-level (I) DMCs (in Osmangazi, Yildirim, and Nilüfer) will be established in close connection to each other and located with good access to the transportation system, while being relatively close to the city centres, where population is concentrated with a higher risk of damages from disasters.
- An information communication network with Ankara and Istanbul should be secured, along with a redundant system so as to maintain connectivity under normal and disaster circumstances.
- Bursa city centre should be connected to Gemlik port, Mudanya port, and Yenişehir airport through a disaster-resistant road network. Coastal DMCs are proposed to be set up both in Gemlik and Mudanya.
- Establish district-level (II) DMCs in Kütahya, Balıkesir, and Karacabey.
- Establish an emergency road network with disaster-resistant roads to connect various DMCs to support coordination of disaster relief activities among DMCs.
- Set up an environment to enhance public awareness on disaster prevention, and to foster specialists and leaders of disaster prevention activities.



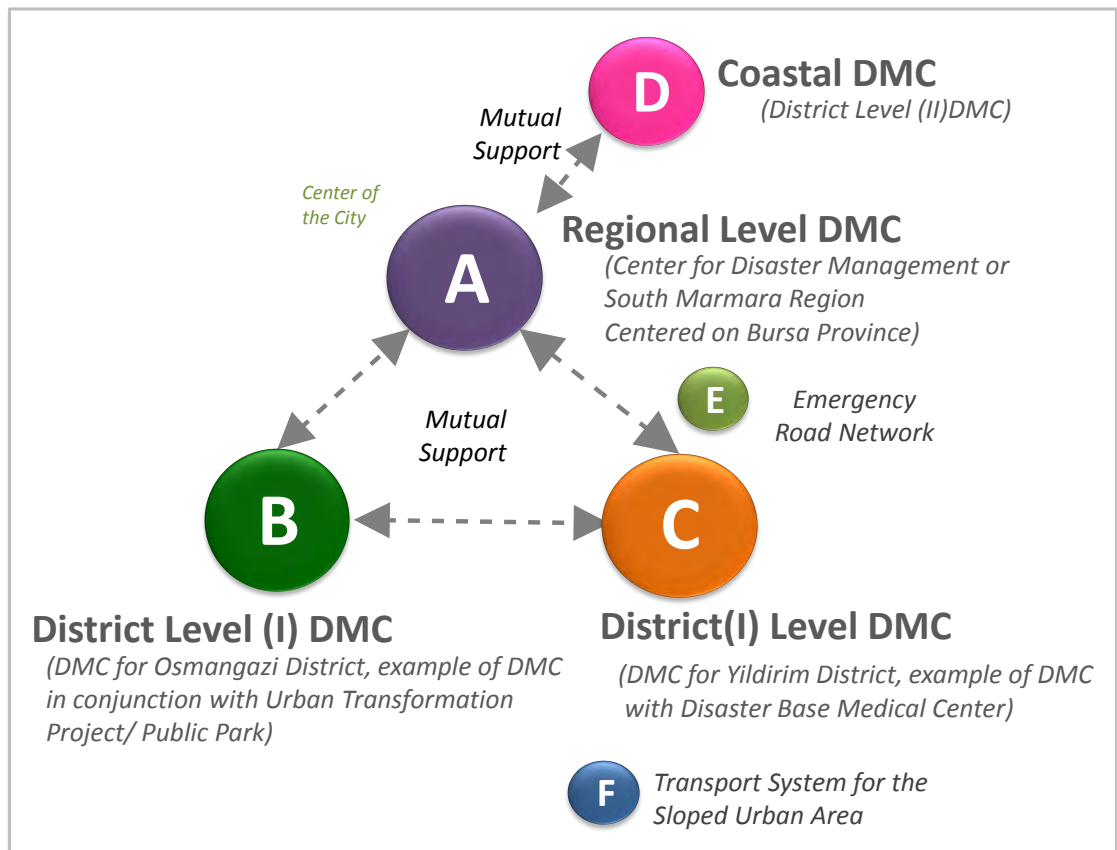
Source: JICA Study Team

Figure 4.4 DMC network in Bursa province

The following figure shows the stratified DMC structure deployment proposed in Chapter 3 with a regional DMC in Bursa Province.

4.3. Suggestions for Making City of Bursa Resilient to Disasters

Taking account the situations stated above and focusing on development of a disaster-resistant urban structure, in order to make the urban area more resilient to disasters, the following suggestions to develop DMCs and a road network connecting the DMCs are proposed. To make disaster prevention mainstream and to incorporate disaster prevention into ordinary construction, projects of buildings and infrastructure are also considered. Particularly, following A-F components are considered in priority.



Source: JICA Study Team

Figure 4.5 Proposed Components for Strengthening Disaster Risk Management of the Urban Structure of Bursa Province

A DMC network should be set up with DMCs at the regional level (also serve as a provincial DMC) as a center of the South Marmara Region and district levels.

For an establishment of the district level DMC, Osmangazi and Yildirim Districts, which include the old historical area with dense population, residential and industrial mixed area and vulnerable areas with illegal occupation should be prioritized.

Since the road network will be unserviceable in the event of a disaster, ocean transportation over the Marmara sea is being utilized during the normal period due to geographical features and Gemlik Port support is essential for the economy of Bursa, coastal DMC should be developed together with enhancement of Gemlik Port as the entrance point of relief supply from outside.

At the neighborhood level, temporary evacuation spaces should be established, within walking distance of communities and connected to emergency transportation routes. Additionally, DMCs of district and regional level should be connected by emergency transportation routes. This report includes some proposals for the densely populated area located in the southern part of Osmangazi and Yildirim districts and extending to the slope of the Uludag mountain.

5. Project Proposals for Disaster Resilient Urban Planning

5.1. Long List of Proposed Projects

The proposed projects that are expected to contribute to disaster resilient urban planning in Turkey and Bursa are listed and summarized in the project long list. The projects are listed in accordance with five key categories for disaster resilient urban planning of Japan, with consideration for AFAD’s current initiatives regarding disaster risk management in Turkey and the disaster risk management system in Japan.

While formulating the list of projects, expectation of multiple effects by combination of various kinds of aspects were also kept in mind.

5.2. Criteria for Selection of Priority Projects

Priority Projects (high emergency and importance) were evaluated and prioritized according to the following criteria: (1) their expected contribution to disaster resilient urban planning and (2) their relative feasibility. These criteria were applied in two areas as detailed below: [1]nationwide projects and [2]projects in Bursa.

Table 5.1 Criteria for Shortlisted Project

(1) Expected Contribution	Effectiveness :Expected to contribute to the formulation of disaster resilient urban plans. Collaboration with other projects or contribution to the realization of disaster resilient urban plans.
	Urgency: Necessity to be implemented in the earliest stage, at the earliest time.
(2) Feasibility of the Project	Implementation Agency: Implementation agency and its capability: availability of human resources and technical level
	Maturity of the Project Maturity of the project, intentions of the Turkish side, and consistency with AFAD’s plan.
	Project Cost: Approximately estimated project cost
	Technical Feasibility: Availability of technology or knowledge in Turkey or Japan.

(1) Expected Contribution to Disaster Resilient Urban Planning

1) Effectiveness

This criteria assesses the degree of contribution to the Disaster Resilient Urban Planning in Turkey for [1] nationwide projects and [2] case study projects in Bursa:

[1] Nationwide Projects

- a) Projects expected to contribute to strengthening the disaster and emergency management system targeted in the TAMP (Turkey Disaster Response Plan). In particular, projects expected to support AFAD’s role of coordination with the relevant authorities at the national and provincial levels, gathering information, providing instructions, and managing activities for search and rescue and recovery is important.

- b) Projects expected to contribute to strengthening the function of the provincial level AFADs which were transferred from provincial governorship to AFAD through the revision of Law No.5902.

[2] Case Study in Bursa

- a) Projects expected to support the strengthening of disaster & emergency management systems, including the cooperation systems among relevant authorities in Bursa Province.
- b) Projects expected to be effective and have a ripple effect in making Bursa City more resilient.

2) Urgency

Projects studied herein need to be promptly implemented because either a potential risk in the event of disaster is great, these projects are expected to help directly in the disaster response, or these projects are supposed to be implemented prior to other projects.

(2) Feasibility of the Project

1) Implementation Agency

The implementation agency is the agency that will be in charge of the implementation. Its capacity is based on the availability of human resources and their technical level.

Nationwide projects that will be implemented by AFAD appear more feasible than projects implemented by various government agencies or ministries, as AFAD is the body for disaster preparedness and response, and as a single agency, internal coordination is seamless. Because there is difficulty in coordination among the different ministries, as determined by the study of the organizations, their roles, and the collaboration systems for disaster management of the relevant authorities, nationwide projects that will be implemented by AFAD were selected for the priority projects.

Similarly, for Bursa, implementation of projects involving multiple agencies will likely take more time and effort than projects run entirely by one organization. We propose to start with a limited number of organizations, only AFAD and Bursa Metropolitan Municipality at first, both of which will be key players for the establishment of DMCs, with the expectation of gradual involvement of other agencies in the future.

2) Maturity of the Project:

The maturity of a project is assessed based on the intention of the implementation agency, consistency with the plan of the AFAD (or plan in Turkey), financial status in Turkey, etc.

3) Estimated Project Cost:

One of the indicators for the possibility for implementation is project cost.

The costs of proposed projects were estimated according to the unit cost of each facility set based on the construction costs in Turkey and Japan.

4) Technical Feasibility

As one of the purposes of this study, the possibility and likelihood of introducing technologies and utilizing experiences of Japan to projects are evaluated. Particularly in prioritizing projects, this study focuses on projects that would benefit the most from Japanese technologies.

5.3. Priority Nationwide Projects

Nationwide projects are expected to cover the whole country, to be executed in all provinces in Turkey, or to contribute to national-level activities. Projects of facility development and ICT

in high priority are selected in accordance with the criteria above and analyzed based on their functional aspects

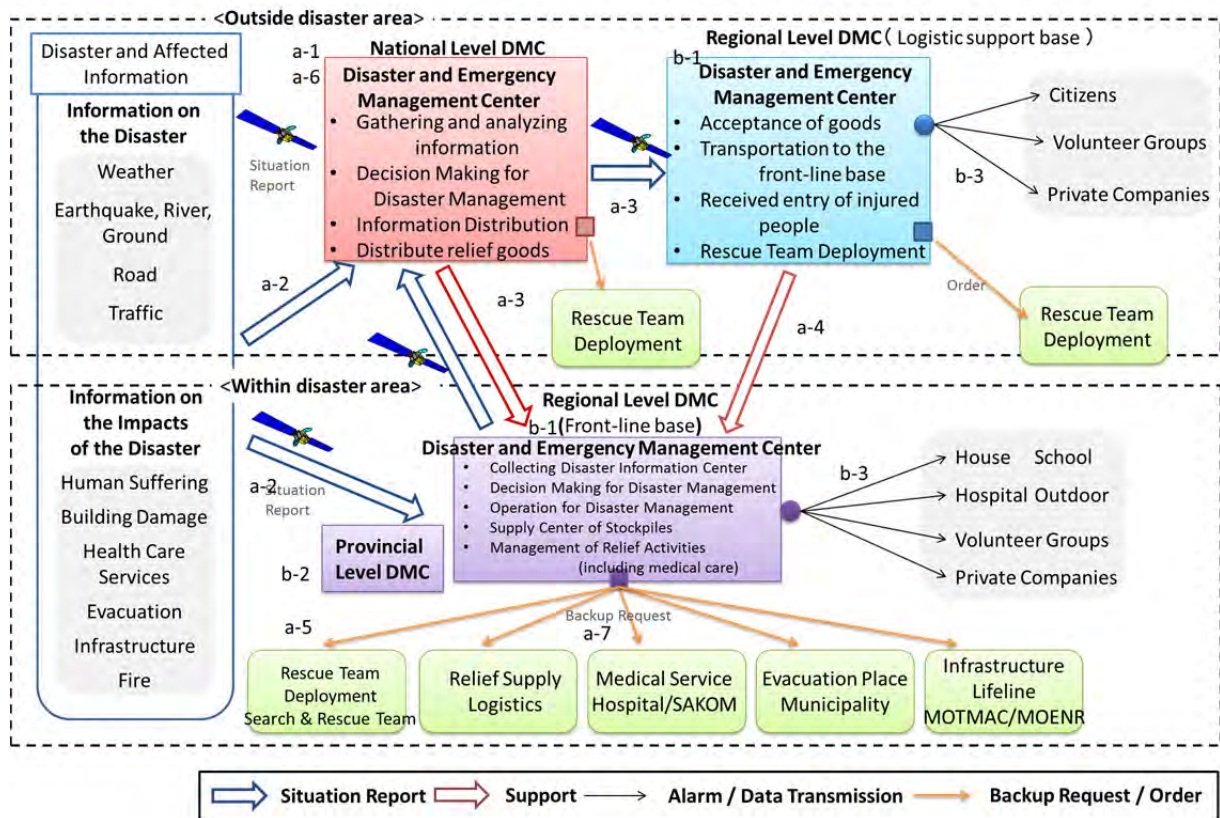
(1) Assessment of projects with a criteria of Effectiveness

A disaster response system is planned for the national level in the TAMP and includes establishment of a AFAD Disaster and Emergency Management Center (AADYM), coordination with Ministries' disaster and emergency management centers, and establishment of a command system of disaster response activities for the operation service groups. At the provincial level, the establishment of Provincial Disaster and Emergency Management Center (VALI) which will coordinate with the national level organization is also planned. However, the construction of the system seems still on the way and not complete yet.

AFAD developed a plan for the disaster response system of national/provincial in TAMP (Figure 2.2.3). To achieve disaster resilient urban planning, the Study Team proposes several systems including the establishment of DMCs with the regional disaster operation center, a collaboration system with back-up supports and relevant ministries, and an information gathering system that will function when a disaster strikes.

The DMC proposed herein is the main base to respond to large scale disasters, consisting of the disaster operation center in its heart and additional relevant facilities. It is a hub for rescue activities, information, relief supplies, and volunteers.

This study proposes that DMCs should be established at all of the national/regional/provincial levels. Regional DMCs established in the 15 logistic zones of AFAD are expected to be the bases responding to large scale disasters hitting across provinces. The location of the 11 search and rescue teams is also proposed to match the location of the regional DMCs.



Note) Number in the figure is referred following items

Figure 5.1 Develop the Disaster Response System

(1) Proposal in functional aspects

(a) Proposal for the disaster countermeasure coordination system

After the disaster, national level DMC at the out of affected areas will be become the disaster emergency headquarters, we propose the following enhancements items.

a-1 National Emergency Response Headquarter (information analysis, countermeasure evaluations, decision making and instruction)

a-2 Prompt information gathering capacity in the event of disaster

a-3 Collaboration among national, regional, and provincial emergency response headquarters as well as relevant ministries. This corresponds to the triangle collaboration system proposed by TAMP: national level/ministries/provincial level.

a-4 Emergency support system between neighboring provinces (Support system between neighboring provinces proposed to TAMP)

a-5 Disaster response capacity of search and rescue teams(11 in nationwide)

a-6 Disaster prevention capacity of personnel in AFADs (national/provincial).

a-7 Disaster prevention capacity of personnel in relevant institutions.

(b) Proposal for the functions and roles of provincial AFADs

b-1 Emergency response headquarters in regional/provincial level (information gathering, negotiation with the national level headquarter, command, and management)

b-2 Disaster prevention capacity of personnel in provincial AFADs.

b-3 Awareness of disaster prevention for the public

(2) Proposal for Disaster Information System

When a large scale disaster strikes across provinces, it is especially important to promptly gather information from stricken areas as well as quantitative information from relevant institutions including the metrological agency, DSI, and seismometers. Information should be analyzed and utilized to estimate the damage and decide on an appropriate disaster response.

According to TAMP, a collaboration system has been planned so that, in the event of a disaster, relevant ministries and response members in stricken areas will take measures in collaboration led by the disaster and emergency management center. The disaster and emergency management center may request support from outside of the stricken provinces and call for appropriate measures to counterparts (including other ministries). The disaster management center at the national level serves as a base for this collaboration and its construction is already in progress. For a sound judgement and decision making, a set of systems to gather, analyze and broadcast precise information is also vital.

Regional DMCs in the stricken area are front-line bases for collaboration. They collect and share bottom-up disaster information and evaluate measures in collaboration with the national level DMC and organizations. They are also the hub for relief supplies and volunteers from outside the stricken area.

Meanwhile, DMCs outside the stricken area are bases for logistics supports; accepting injured individuals and sending relief supplies and volunteers as needed.

For these collaborative disaster response systems to work, it is essential to build a secure communication network which is accessible at the time of disaster. AFAD has been already working on such a network. Particularly, satellite fixed stations to connect relevant national and provincial organizations are essential. Additionally, visual images of the stricken area would be very effective to get a specific and precise understanding of the situation and of the disaster damage. Hence, equipping each province with portable satellite facilities that are capable of sending visual images in real time has significant importance.

Information gathered via the above technologies is also effective to alert and prevent secondary damage.

In addition, to fulfill the capacity of these disaster response systems, regular base activities are also important such as research and development to enhance the functional capacity of the disaster management center, training for search and rescue teams and municipality personnel, and activities for public awareness of disaster prevention.

Facilities and infrastructures shown in the following figure are proposed for these reasons. The results of an evaluation of the effectiveness of the following facilities are also shown in the table: disaster operation center, provincial search and rescue team center, disaster prevention education center, R&D center, and VSAT (for the disaster information system).

Table 5.2 Proposed projects with high effectiveness

Proposed project components	Disaster & Emergency Management Center, Logistic Center, and Heliport		Training Center for Search & Rescue:—		Education Center for Disaster Preparedness		R & D Center	Satellite Network (VSAT)	Information Gathering & Dissemination System
	National Level (Under onstruction)	Regional Provincial Level	National Level	Regional Level	National Level	Regional Level	National Level		
(a) Projects expected to contribute to strengthening the disaster and emergency management system targeted in the TAMP.									
a-1. Strengthening IAADYM's function, such as (data collection, analysis, coordination with AADYM, ordering relief activities)	◎						◎	◎	◎
a-2. Support data collection, discussion of countermeasures, and decision making of AADYM.								◎	
a-3. Support coordination between AADYM and IAADYM	◎	◎						◎	◎
a-4. Strengthening the mutual support system among neighboring provinces	◎	◎		◎		◎			
a-5. Upgrading capacity of Search & Rescue Teams			◎	◎			◎		
a-6. Support capacity building of AFAD			◎	◎	◎		◎		
a-7. Upgrading DRM capacity of relevant authorities					◎	◎	◎		
(b) Projects expected to contribute to strengthening the function of the provincial level AFADs									
b-1. Capacity Building of provincial AFADs		◎		◎		◎			
b-2. HR Development of provincial AFAD							◎		
b-3. Upgrading disaster education of provincial AFAD								◎	
AFAD Strategic Plan	Goal2 2.3	Goal2 2.3	Goal2 2.4	Goal2 2.4	Goal4 4.2	Goal4 4.2	Goal1 1.4	Goal2 2.6	Goal2 2.6





Source: JICA Study Team

Notes: Disaster and Management Center in the national level is listed because it is one of the key facilities although this cannot be a proposed project as it is under construction now.

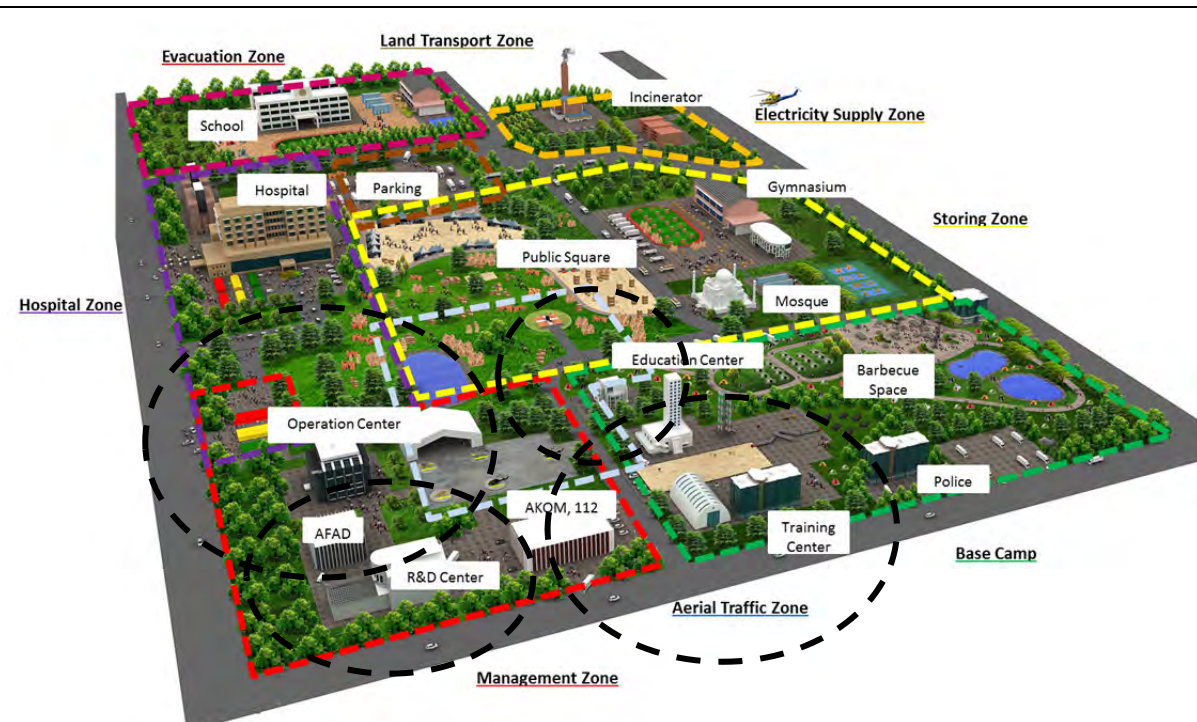
(3) Outline of the proposed projects and proposed planning level

Outlines of the above listed project components are summarized as follows. These proposed facilities are core facilities of the Disaster Management Complex as shown below.

Table 5.3 Outline of the Project Components (1) (facilities)

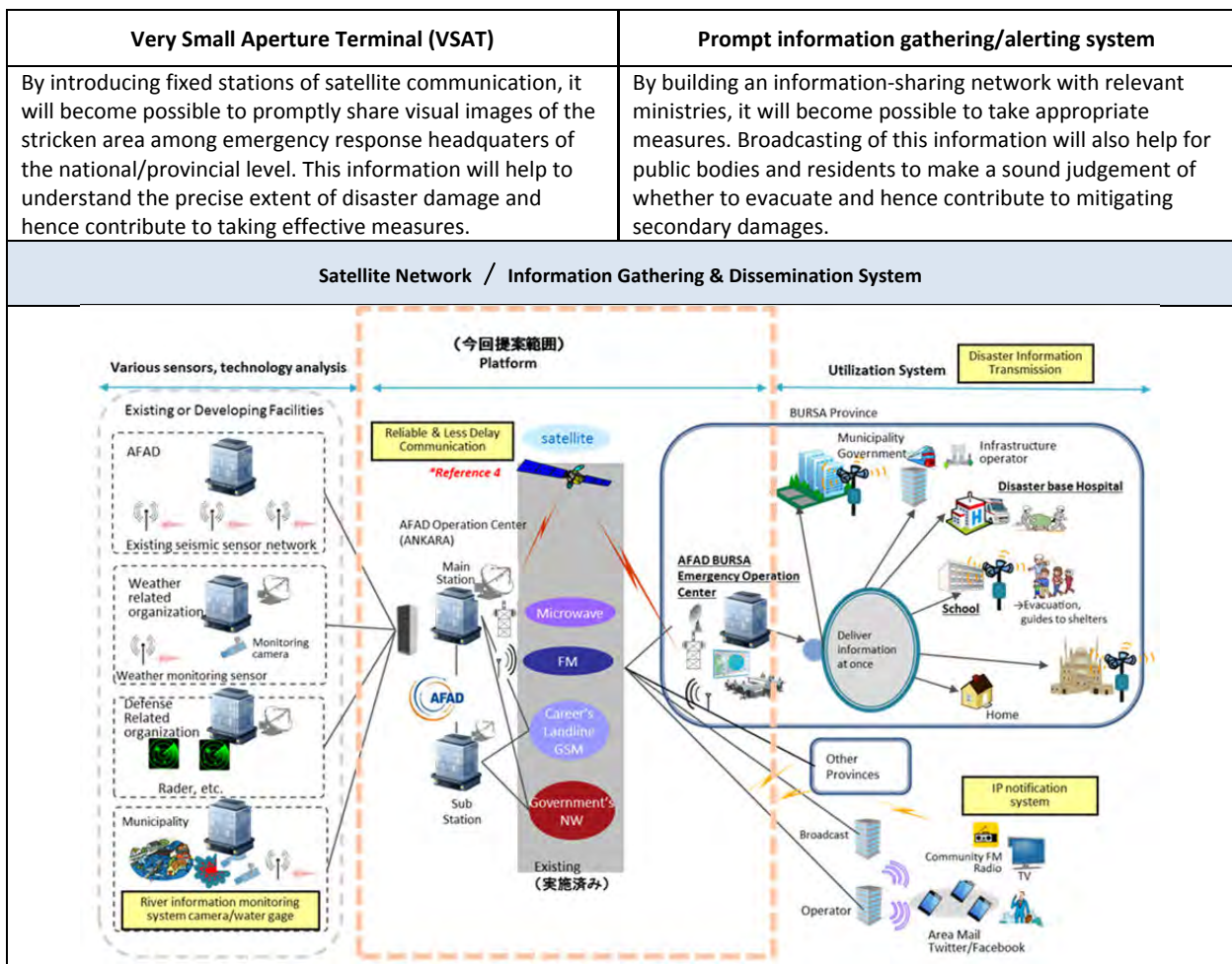
Disaster & Emergency Management Center	Training Center for Search & Rescue	Education Center for Disaster Preparedness	Research & Development Center
The center which has the functions of data collection, decision making, command for relief activities, management of support items/personnel etc.	Training center for experts in search and rescue. It will become a center for search and rescue activities in the event of disaster.	Education center which will provide education programs for the general public, students, leaders of the community etc. It will be used as a center for volunteer activities in the case of disaster.	R&D center to support AFAD's policy making, strategy for disaster response. Having experimental research facilities for seismic engineering, and disaster management archive system.
【Main facilities】 Operation room (large screen), meeting room, office space for relevant authorities, data room, dormitory, AFAD office, heliport, storage, etc.	【Main facilities】 Lecture room, auditorium, training facilities (rubbles, climbing, fire, transportation accidents, CBRN, etc.), library, dormitory etc.	【Main facilities】 Exhibition of disasters in Turkey, scientific information, experiencing simulation, prevention measures, workshop, library, education material development room, etc.	【Main facilities】 Archive center, research laboratory for disaster risk management policy, seismic engineering experimental apparatus, etc.
【Planning Level】 Required in national, regional and provincial levels. Focusing on regional and provincial levels in this project, as the national level center is now under construction. ● Regional Level ● Provincial Level	【Planning Level】 Because AFAD's search and rescue teams are currently stationed in 11 provinces, and the number of trainers is limited, it is proposed to upgrade the national level training center and establish regional level training centers. ● National Level ● Regional Level	【Planning Level】 With consideration of operation and maintenance cost and limited number of trainers, it is proposed to establish education centers at the national and regional levels in the beginning. Provincial level centers will be developed in the future. ● National Level ● Regional Level	【Planning Level】 In order to operate efficiently with a limited number of researchers and experimental apparatus, the R&D center is proposed in the national level only ● National Level
			

Concept of DMC



Source: JICA Study Team

Table 5.4 Outline of the Project Components (2) (Disaster Information System)



Source: JICA Study Team

(4) Priority Projects

Based on the prioritization of projects using the abovementioned criteria, the nationwide priority projects are shown below. These are core facilities of the Disaster Management Complex. In this project, the facilities under AFAD management were prioritized with consideration of ease in the implementation; however, the remaining facilities such as hospitals or schools are also expected to be developed in the future. Result of assessment is marked as A (high), B (medium), and C (low).

Table 5.5 Summary of Priority Nationwide Projects

Project	Effectiveness & Efficiency	Urgency	Implementation Agency	Maturity	Approx. Cost (100 million Yen)	Technical Feasibility
National Level						
1) Training Center for Search & Rescue: 11,700 m2	A	A	AFAD	A	15.6	○
2) National Education Center for Disaster Preparedness: 12,000 m2	A	A	AFAD	A	22	
3) Research & Development Center: 10,000 m2	A	B	AFAD	B	20	○
4) Satellite Network (VSAT)	A	A	AFAD	A	50	○
5) Information Gathering & Dissemination System	A	A	AFAD	B	150	○
6) Development of a network at each level of disaster management plans		A	AFAD		50	
7) Establish data base and archive system		A	AFAD		50	
8) Establishment of R&D institute for policy making		A	AFAD		19.4	
Regional Level						
1) Disaster & Emergency Management Center, Logistic Center, and Heliport: 6,000 m2	A	A	AFAD	A	14.8	○
2) Training Center for Search & Rescue: 11,700 m2	A	A	AFAD	A	15.6	○
3) Education Center for Disaster Preparedness (Regional level): 6,000 m2	A	A	AFAD	A	11	
4) Seismic risk assessment for buildings and utility infrastructure		A	AFAD			
5) Seismic performance assessment and strengthening of dam		A	DSI			
6) Redevelopment of risky area based on the result of risk assessment		A	MOEU /Municipalities			
7) Anti-earthquake measures for non-fixed components		A	MOH			
8) Seismic upgrading of buildings of central and local government.		A	MOEU /Municipalities			
9) Logistics center		A	AFAD		1.3	
10) Heliports for disaster prevention bases and medical centers		A	AFAD		2.2	
11) Construction of well and water tank for water supply in disaster		A	BUSKI Metropolitan Municipality			
12) Securing power supply by emergency power equipment for wide area disaster mitigation facilities		A	AFAD MOH			
13) Development of park/open space in regional/provincial DMC		A	MOEU		24.3	
14) Reinforcement of public port in Gemlik		A	MOTMAC		101	
15) Development of emergency road network and operation regulations for province level		A	Metropolitan Municipality		3.9	
16) Seismic strengthening and set-back of buildings along emergency road		A				
17) Road widening and seismic strengthening of buildings for the emergency road around DMC		A				
18) Seismic performance assessment and strengthening of subway station and tunnel		A				
19) Disaster Information network		A	AFAD		2	
20) Designation and development of regional/provincial level evacuation place		A	MOEU Municipality			
21) Institutional development for strengthening disaster management system		A	AFAD			
22) Development of emergency evacuation plans and guidelines		A				
23) Identification of safe evacuation routes		A	AFAD			
Provincial/ District Level						
1) Disaster & Emergency Management Center, Logistic Center, and Heliport: 6,000 m2	A	A	AFAD	A	14.8	○
2) Development of park/open space in regional/provincial DMC		A	MOEU		24.3	
3) Designation and development of regional/provincial level evacuation place		A	MOEU Municipality			

5.3.2. Projects with Potential Support from the JICA scheme

Based on the above discussions, possible projects to be supported by the JICA scheme in the disaster risk management sector are discussed in this section.

Two criteria under “Effectiveness and Efficiency” for the selection of priority projects related to nationwide expansion or coverage were considered in the formulation of projects as discussed above (see (1)).

For the purpose of making a good example of a DMC network from the national level to the provincial level, the following three nationwide package projects were prepared:

Packages	Scenario
Package A	Establish a DMC network from national Level to regional Level as one package. Provincial level and lower level will be developed later.
Package B	Establish 6 core-regional DMCs and a provincial DMC in the zone where core-regional DMCs will be developed. (6 Core-regional DMCs will also function as back-ups for national level.)
Package C	Develop an example of national-regional-provincial network of DMCs in the 3 prioritized zones. (Establish model of DMC network within a zone)

These packages were compared in terms of effectiveness, efficiency, cost, and feasibility. The characteristics and the pros and cons of each package are also summarized in the following table.

Table 5.6 Summary of Proposed “Nationwide” Project Packages

		Package A	Package B	Package C											
General Description		DMC network from national to regional level will be established by construction of Regional DMCs (one Regional DMC in each logistic zone) and nationwide satellite communication system.	6 core-regional DMCs and one provincial DMC per each Regional DMC.	One Regional DMC and four Provincial DMCs (all provincial DMCs in zones) in each of the three prioritized zones.											
Expected Results	Pros.	Disaster management system with DMC will be established from national to regional levels. Training centres for search and rescue teams will be developed in all regions (logistic zones).	Higher-ranked Regional DMC may be a back-up for the national level DMC in the event of a disaster in Ankara. Model of National-Regional-Provincial DMC will be established.	Model of DMC network from national to provincial levels will be established in 3 zones, which can be examples for other zones. Logistic zones which have high risk can be selected as model zones.											
	Cons.	Since DMC at provincial and lower levels are not included, strengthening of the provincial level disaster management system will be limited.	Training centre for search & rescue teams will be limited to 6 centres. One regional DMC and one provincial DMC will be developed in each logistic zone.	Difference between targeted zone and others will be significant.											
National Level		<ul style="list-style-type: none"> • Training Centre for Search & Rescue • Education Centre for Disaster Preparedness • Satellite Network (VSAT) • Information Gathering and Dissemination System • R&D Centre 	<ul style="list-style-type: none"> • Training Centre for Search & Rescue • Education Centre for Disaster Preparedness • Satellite Network (VSAT) • Information Gathering and Dissemination System • R&D Centre 	<ul style="list-style-type: none"> • Training Centre for Search & Rescue • Education Centre for Disaster Preparedness • Satellite Network (VSAT) • Information Gathering and Dissemination System • R&D Centre 											
Regional Level		Regional DMC (13 centres*1) <ul style="list-style-type: none"> • Disaster & Emergency Management Centre (Including Operation Centre, AFAD office, Logistic Centre, Heliport) • Training Centre for Search & Rescue • Education Centre for Disaster Preparedness 	Regional DMC (5 centres*2) <ul style="list-style-type: none"> • Disaster & Emergency Management Centre (Including Operation Centre, AFAD office, Logistic Centre, Heliport) • Training Centre for Search & Rescue • Education Centre for Disaster Preparedness 	Regional DMC (3 centres*3) <ul style="list-style-type: none"> • Disaster & Emergency Management Centre (Including Operation Centre, AFAD office, Logistic Centre, Heliport) • Training Centre for Search & Rescue • Education Centre for Disaster Preparedness 											
Provincial Level		—	Provincial DMC (5 Provinces surrounding Regional DMC) <ul style="list-style-type: none"> • Disaster & Emergency Management Centre (Including Operation Centre, AFAD office, Logistic Centre, Heliport) 	Provincial DMC (12 Provinces surrounding Regional DMCs) <ul style="list-style-type: none"> • Disaster & Emergency Management Centre (Including Operation Centre, AFAD office, Logistic Centre, Heliport) 											
Facilities	Level	Quantity	Unit	Unit Cost (100 million Yen)	Total (100 million Yen)	Level	Quantity	Unit	Unit Cost (100 million Yen)	Total (100 million Yen)	Level	Quantity	Unit	Unit Cost (100 million Yen)	Total (100 million Yen)
1) Disaster & Emergency Management Centre: 6,000 m ²	Regional	13	Centre	14.8	192.4	Regional	5	Centre	14.8	74.0	Regional	3	Centre	14.8	44.4
	Provincial	0	Centre	14.8	0	Provincial	5	Centre	14.8	74.0	Provincial	12	Centre	14.8	177.6
2) Training Centre for Search & Rescue: 11,700 m ²	National	1	Centre	15.6	15.6	National	1	Centre	15.6	15.6	National	1	Centre	15.6	15.6
	Regional	13	Centre	15.6	202.8	Regional	5	Centre	15.6	78.0	Regional	3	Centre	15.6	46.8
3) Education Centre for Disaster Preparedness: 12,000 m ² (National), 6,000 m ² (Regional)	National	1	Centre	22.0	22.0	National	1	Centre	22.0	22.0	National	1	Centre	22.0	22.0
	Regional	13	Centre	11.0	143.0	Regional	5	Centre	11.0	55.0	Regional	3	Centre	11.0	33.0
4) Satellite Network (VSAT)	National	1	Set	50.0	50.0	National	1	Set	50.0	50.0	National	1	Set	50.0	50.0
5) Information Gathering & Dissemination System	National	1	Set	150.0	150.0	National	1	Set	150.0	150.0	National	1	Set	150.0	150.0
6) Research & Development Centre: 10,000m ²	National	1	Centre	20.0	20.0	National	1	Centre	20.0	20.0	National	1	Centre	20.0	20.0
		Total		795.8		Total		538.6		Total		559.4			

*1 : One DMC for each AFAD Logistic Zone= 15 DMCs minus 2 existing DMCs (Ankara and Istanbul). *2: Higher-ranked Regional level DMCs are proposed to be in the following 7 provinces: Ankara, Istanbul, Izmir, Bursa, Samsun, Adana, and Erzurum. Excluding Ankara and Istanbul. * Tentatively proposed at Bursa in the Western part of Turkey, Adana in the South-Eastern part of Turkey, and Erzurum in the Eastern part of Turkey. *4: Location of Regional DMC: provinces having the largest population in each logistic zone are selected as the location of the Regional level DMC.

5.4. Priority Projects for the Case Study of Bursa

Priority projects selected for the case study in Bursa are shown below.

(1) Assessment of projects with a criteria of Effectiveness

As mentioned above, the following points were taken into consideration as criteria of Effectiveness.

- a. Projects expected to support the strengthening of disaster & emergency management systems, including cooperation system among relevant authorities in Bursa Province.
 - a-1. Support to establish IAADYM with a system to collect data and manage disaster relief activities.
 - a-2. Capacity building of Provincial AFAD
- b. Projects expected to be effective and have a ripple effect in making Bursa City more resilient.
 - b-1. develop disaster management complex
 - b-2. secure route to receive support from outside
 - b-3. enhancement of disaster awareness
 - b-4. secure evacuation space at the neighbourhood level
 - b-5. become an example of an urban transformation project with consideration of DRM
 - b-6. establish disaster medical service

Basically, projects related to development of the DMC and its network were prioritized. The result of the assessment is summarised below.

Table 5.7 Proposed projects with high effectiveness

Proposed project components	Component A	Component b	Component C	Component D	Component E	Component F
Criteria and key points						
(a) Projects expected to support the strengthening of disaster & emergency management systems, including cooperation system among relevant authorities in Bursa Province.						
a-1. Support Provincial AFAD to establish IAADYM with a system to collect data and manage disaster relief activities.	⊙					
a-2. Capacity building of Provincial AFAD	⊙					
(b) Projects expected to be effective and have a ripple effect in making Bursa City more resilient						
b-1. Develop disaster management complex	⊙	⊙	⊙	⊙		
b-2. Secure route to receive support from outside				⊙	⊙	
b-3. Enhancement of disaster awareness	⊙	⊙	⊙		⊙	⊙
b-4. Secure evacuation space at the neighbourhood level		⊙	⊙			⊙
b-5. Become an example of an urban transformation project with consideration of DRM		⊙				⊙
b-6. Establish disaster medical service	⊙		⊙			

Source: JICA Study Team

5.4.2. Outlines of the proposed projects and proposed planning level

Outlines of the proposed projects are described in 4.3 and summarised below.

Table 5.8 Outline of the proposed projects

Components	Outline	Contents
Component A	Develop Regional Level DMC to cover Bursa and surrounding provinces. It will help AFAD to coordinate with other relevant authorities.	<ol style="list-style-type: none"> 1) Disaster & Emergency Management Centre, Logistic Centre, and Heliport: 6,000 m² 2) Training Centre for Search & Rescue: 11,700 m² 3) DRM related facilities (Fire Dept. /AKOM/112 etc.): 6,000 m² 4) Disaster Base Hospital: 140,000 m² (700 beds) 5) Park/Open Space: 10ha 6) Waste Incineration Plant: 22,500 m² (3,000t/day) 7) Seismic strengthening of bridge: main road 100m
Component B	DMC for Osmangazi.	<ol style="list-style-type: none"> 1) Disaster & Emergency Management Centre, Logistic Centre, Heliport: 6,000 m² 2) Sports Centre (Gymnasium, pool): 7,500 m² 3) Park/Open Space: 10ha 4) School: 3,500m²
Component C	DMC for Yuldirim, with A-1 class hospital	<ol style="list-style-type: none"> 1) Disaster & Emergency Management Centre, Logistic Centre, and Heliport: 6,000 m² 2) Renovation work for Şevket Yılmaz Hospital: 180,000m² (900 beds) 3) Extension work for Şevket Yılmaz Hospital: 30,000m² (150 beds) 4) Park/Open Space: 10ha
Component D	Seaside DMC at Gemlik port. It will be a base to receive support from outside.	<ol style="list-style-type: none"> 1) Seaside Disaster Management Complex: Gemlik port 10ha 2) Disaster & Emergency Management Centre, Logistic Centre, and Heliport: 6,000 m² 3) Park/Open Space: 10ha
Component E	Secure emergency access	<ol style="list-style-type: none"> 1) Emergency Road Network : 20km
Component F	Improvement of the mountainous area.	<ol style="list-style-type: none"> 1) Road Network : 5km 2) Park/ Open Space:2500m² 3) Stockpile Storage 4) Mini Monorail:250m

Source: JICA Study Team

5.4.3. Proposed Projects for JICA Scheme

The expected effects on disaster resilient urban planning from the implementation of these projects are summarized as follows:

- Through the process of developing DMCs, the coordination system between AFAD and related organizations is expected to be established, which will help smooth collaboration in the event of a disaster.
- DMCs will be a place to receive, sort, and distribute supporting goods and human resources from outside. By defining this role of the DMC, confusion will be avoided by outside institutions who are willing to support the disaster-struck areas and of recipients who are waiting for support.
- Construction of DMCs in the city will inform the general public about government efforts in disaster prevention. Parks in DMCs and education/training in DMCs will also help inform people about the roles and functions of the DMCs. This will be effective in enhancing public awareness for disaster preparedness.

- This set of projects in Bursa will showcase an example of a DMC through the planning process and promote it to the whole country.
- In collaboration with the Turkish Government's efforts for urban transformation, there is a potential to promote and disseminate the idea of creating DMCs nationwide.

As a result of the study, priority is shown in [] in the following table.

Table 5.9 Summary of Priority Projects (Bursa)

Project	Effectiveness	Urgency	Implementation Agency	Maturity	Approx. Cost (100 million Yen)	Japanese technology
Component A						
1) Disaster & Emergency Management Centre, Logistic Centre, and Heliport: 6,000 m2	A	A	AFAD	A	14.8	○
2) Training Centre for Search & Rescue: 11,700 m2	A	A	AFAD	A	15.6	○
3) DRM related facilities (Fire Dept. /AKOM/112 etc.): 6,000 m2	A	B	AFAD/Bursa Metropolitan Municipality	B	6.8	
4) Disaster Base Hospital: 140,000 m2 (700 beds)	A	B	MOH	B	437.7	○
5) Park/Open Space: 10ha	A	A	Bursa Metropolitan Municipality	A	24.3	○
6) Waste Incineration Plant: 22,500 m2 (3,000t/day)	B	B	Bursa Metropolitan Municipality	B	513.0	○
7) Seismic strengthening of bridge: main road 100m	B	A	Bursa Metropolitan Municipality	A	1.3	○
Component B						
1) Disaster & Emergency Management Centre, Logistic Centre, Heliport: 6,000 m2	A	A	Osmangazi	A	14.8	○
2) Sports Centre (Gymnasium, pool): 7,500 m2	B	B	MOYS	B	12.7	
3) Park/Open Space: 10ha	A	A	Bursa Metropolitan Municipality	A	24.3	
4) School: 3,500m2	B	B	MONE	B	1.5	
Component C						
1) Disaster & Emergency Management Centre, Logistic Centre, and Heliport: 6,000 m2	A	A	Yildirim	A	14.8	○
2) Renovation work for Şevket Yılmaz Hospital: 180,000m2 (900 beds)	B	B	MOH	B	89.9	○
3) Extension work for Şevket Yılmaz Hospital: 30,000m2 (150 beds)	B	B	MOH	B	95.3	○
4) Park/Open Space: 10ha	A	A	Bursa Metropolitan Municipality	A	24.3	○
Component D						
1) Seaside Disaster Management Complex: Gemlik port 10ha	A	B	Gemlik	B	101.0	○
2) Disaster & Emergency Management Centre, Logistic Centre, and Heliport: 6,000 m2	A	A	AFAD/ Bursa Metropolitan Municipality	A	14.8	○
3) Park/Open Space: 10ha	A	B	Bursa Metropolitan Municipality	A	24.3	○
Component E						
1) Emergency Road Network: 20km	A	A	AFAD/ Bursa Metropolitan Municipality	B	3.9	
Component F						
1) Improvement of Mountainous Area	A	A	Osmangazi	B	24.3	○