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## **Country Report of Japan\***

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\* Submitted by: Hidekatsu SAITO, Deputy Director, International Affairs Division,  
Planning Department, Geospatial Information Authority of Japan (GSI).

# Country Report on Geospatial Information Development of Japan

This report describes the national policy and development of geospatial information infrastructure including introduction of related international activities and technical cooperative activities in recent years of Japan.

Most of the geospatial information in Japan is developed under the Survey Act. Main objectives of the act are to coordinate various survey activities efficiently, to standardize accuracy and to avoid duplicated work.

Surveying and mapping projects managed by public organizations are mainly classified into two categories by the act. One is the Basic Survey carried out by the Geospatial Information Authority of Japan (GSI), and the other is the Public Survey done by the other public organizations including for local governments.

In light of growing interest in all sectors on the utilization of geospatial information, the Government established “Committee for the Advancement of Utilizing Geospatial Information” to enhance close coordination/cooperation and comprehensive and effective promotion on the use of geospatial information among government-affiliated organizations. Furthermore, the Government enacted a new act for utilizing geospatial information in 2007 and began to promote the use of geospatial information in the public administration based on the new act and the Survey Act.

## 1. National policy of Geospatial Information

### 1.1 Basic Act for the Advancement of Utilizing Geospatial Information

The Government enacted a new act “Basic Act for the Advancement of Utilizing Geospatial Information” (hereinafter, “NSDI Act”) in May 2007. The purpose of this act is to advance policies concerning the Advancement of Utilizing Geospatial Information (hereinafter, “AUGI”) in a comprehensive and well-planned manner by establishing basic principles and clarifying the responsibilities of national and local governments as well as specifying basic elements for measures on AUGI, in view of the fact that AUGI is essential in establishing the economy and society in which the people can lead a safe and quality life at present and in the future.

Given that geospatial information, including geospatial framework information, statistical information and geo-imagery, provides essential infrastructure for the improvement of the quality of the people’s living and the sound development of the national economy, the NSDI Act provides that AUGI shall be conducted based on the comprehensive and systematic implementation of policies including accurate and proper development and distribution of digital geospatial information, promotion of technologies like the Geographic Information System (GIS) and Satellite-Based Positioning (SBP), capacity building, enhancement of coordination among national and local governments and related institutions.

### 1.2 Basic Plan for the Advancement of Utilizing Geospatial Information

In order to carry out policies concerning AUGI in a comprehensive and well-planned manner in accordance with the provision in the NSDI Act, the Committee for the AUGI developed “Basic plan for the Advancement of Utilizing Geospatial Information” in 2008 (Cabinet decision on April 15, 2008). In the Basic Plan, basic strategies for the policies concerning AUGI, measures related to GIS and policies related to Space-based Positioning, Navigation and Timing (Space-based PNT) are

stated. The period of the Basic Plan is set for fiscal years 2008-2011.

To promote measures formulated in this Basic Plan, the Action Plan for the Advancement of Utilizing Geospatial Information (G-Spatial Action Plan) was enacted in August 2008. Under the G-Spatial Action Plan, the GSI is carrying out a number of various important measures including preparation, improvement, upgrading, provision, and standardization of geospatial information such as Fundamental Geospatial Data.

## **2. Development of Geospatial Information Infrastructure**

### **2.1 Developing and updating Fundamental Geospatial Data**

Maps that accurately represent current land conditions are indispensable for land administration by the national and local governments and various socioeconomic activities. The use of Information and Communications Technology (ICT) -based maps is becoming widespread and demand for digital maps of a larger scale is growing. In this connection, provision is made in the NSDI Act, that Fundamental Geospatial Data (FGD) be developed and maintained so that people can use such common framework data to easily integrate and share their own geospatial information. The GSI took the initiative of developing FGD in 2007.

#### **- Fundamental Geospatial Data**

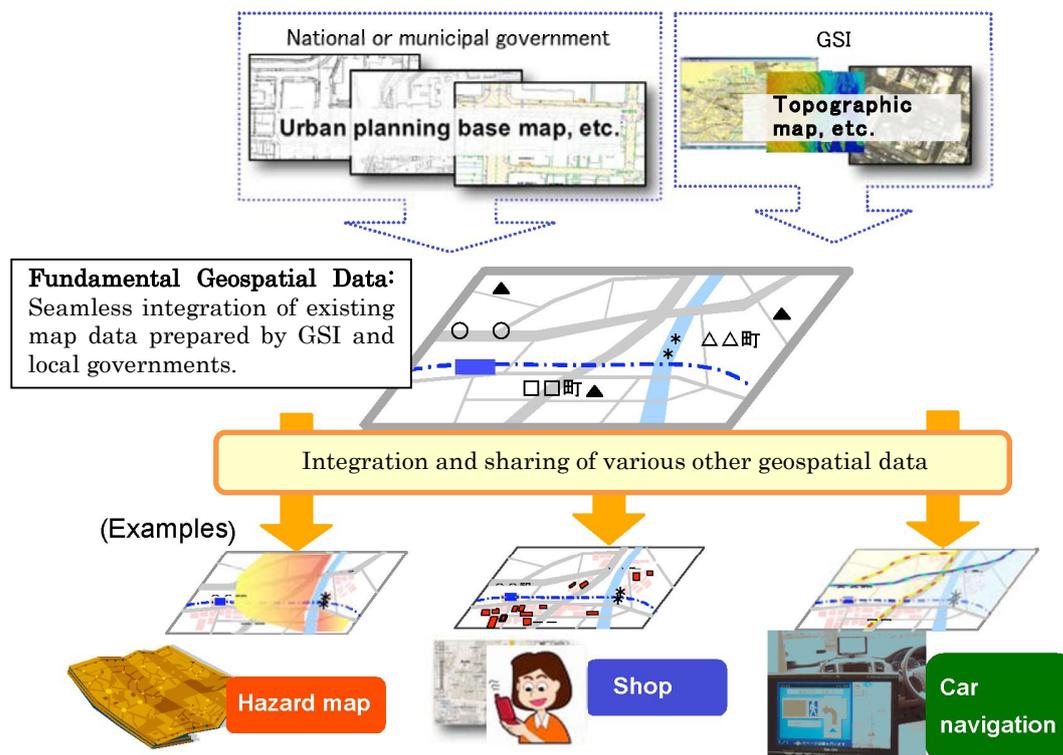
FGD are reference information on which the positions of all other geospatial information are based. They are common outline map data that anyone can use with GIS. Since 2007, the GSI has been seamlessly integrating large-scale (not smaller than 1:2,500) map data prepared primarily by local governments for urban areas and medium-scale (not smaller than 1:25,000) map data for the whole country, and providing them via the Internet free of charge.

The development of FGD will be mostly finished by the end of fiscal year 2011. The updating will start in fiscal year 2012.

#### **- Grand Design for Fundamental Geospatial Data**

In order to avoid duplicated efforts and make maximum use of existing map data instead of developing from scratch, FGD are developed and updated under the initiative of the GSI and through close cooperation with local governments in employing their urban planning maps and other large scale maps. This cooperation needs to be sustainable if the update of FGD is to be guaranteed. Such sustainability can be achieved when the local governments can benefit from employing FGD while providing latest large-scale maps they prepare in their ordinary administrative activities.

To realize such sustainable cooperation, the GSI developed “Grand Design for Fundamental Geospatial Data” (available only in Japanese) in which how the GSI should cooperate with local governments while improving the quality of FGD in terms of the spatial accuracy and the update frequency, so that the data will become the truly “fundamental” framework for the whole geospatial information community in Japan.



Fundamental Geospatial Data provide common framework for interoperability among geospatial information.

Fig. 1: Preparation of Fundamental Geospatial Data

## 2.2 Developing and Updating the Digital Japan Basic Map

In view of facilitating the use of FGD in various geospatial information applications as well as the conventional map applications, the GSI is developing a new basic map database, Digital Japan Basic Map, by incorporating FGD with conventional basic map information. The Digital Japan Basic Map is composed of three layers of information, i.e., map information, geographical name and ortho-imagery. The map information is built on FGD with additional basic map features. The ortho-imagery is developed by digital aerial photographs taken by the GSI. The geographical name is to facilitate locational searches for the map information and ortho-imagery. The details of these layers are described below.

### - Map information

In addition to the features included in FGD, the map information layer includes other geospatial features that commonly appear on national basic maps. Conventionally, the GSI has been maintaining 1:25,000 scale topographic maps as the national basic maps of Japan, but these maps are replaced by Digital Japan Basic Map and will be the primary basic map information for the country. The original database of the map information layer will be published in the near future after all attributes and topological details are completed. In the meantime, it is made available on the web map service.

### - Geographical name

The names of natural geographic features such as mountains, rivers and islands and names of inhabited areas such as towns are compiled and integrated into the name layer that can be used for various purposes. It serves as the base

for displaying and managing the territories, and as a location search key, making it essential for assisting the use of geospatial information.

- **Ortho-imagery**

The GSI has been developing an ortho-imagery (orthophoto) archive using digital aerial photographs in the city planning areas and their environs. Ortho-imagery is indispensable for the creation and updating of the map information because the map information can be overlaid onto ortho-imagery for efficient change detection.

**2.3 Aerial Photography**

The GSI archives more than a million of aerial photograph frames. They cover all over Japan and have been taken since 1936. All photographs are available for browsing at the reference room of the GSI, and their printed copies can be ordered from the designated organizations. Most photographs (shown in Table 1) are also available on the web (Figures 2 and 3).

Table 1: Number of archived aerial photographs made available on the Internet (As of August 2011)

Period (Year)	Number of frames (Approx.)
1936 - 1945	17,000
1946 - 1960	144,000
1961 - 1970	138,000
1971 - 1980	393,000
1981 - 1990	56,000
1991 - 2000	71,000
2001 -	189,000

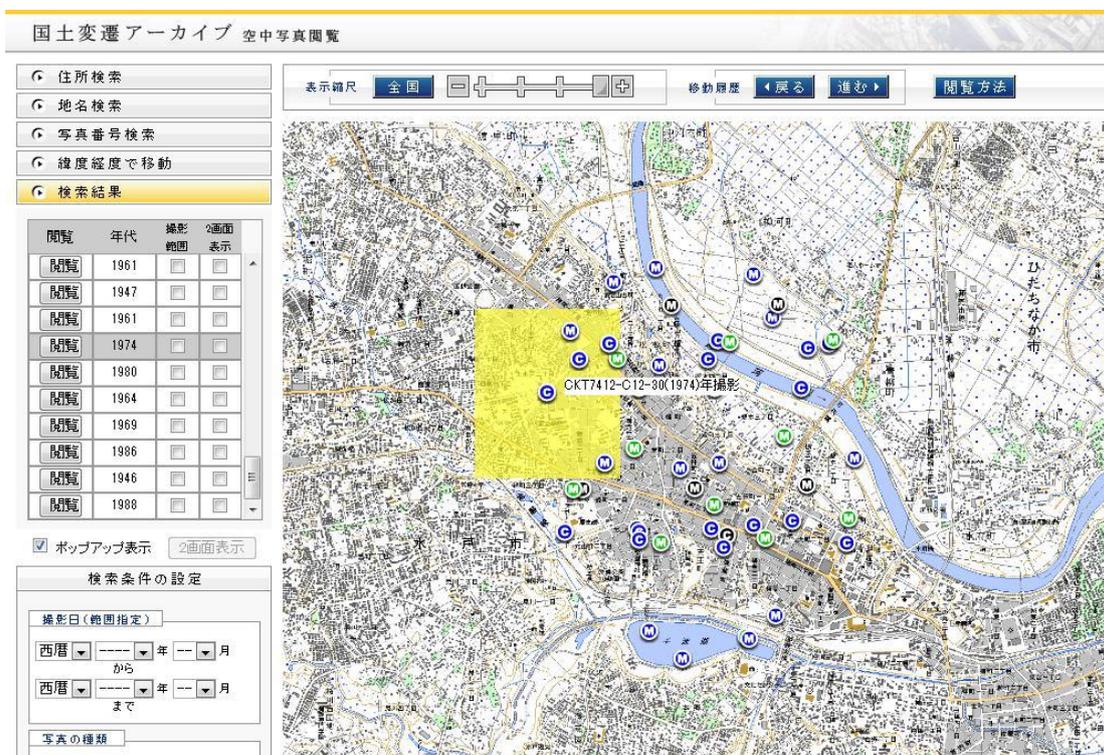


Fig. 2: Internet Browser for the Archived Aerial Photographs (Search Result)

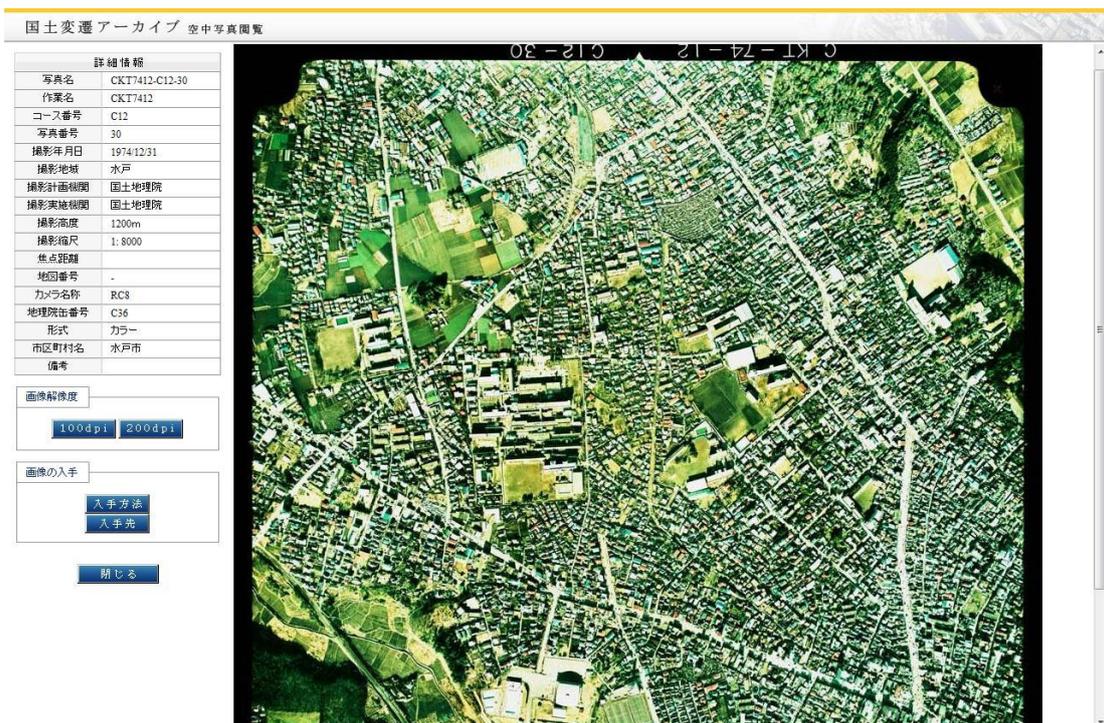


Fig. 3: An example of Archived Aerial Photographs shown on the web

## 2.4 Digital Japan and Digital Japan Web System

Digital Japan is a concept of a virtual geo-space where users can easily utilize geospatial information by selecting from data sets made available on the Internet by different organizations and integrating them for their purposes. Digital Japan is also considered as an information infrastructure that enables people to search and analyze geospatial information on their demand.

To make Digital Japan into reality, the GSI implemented “Digital Japan Web System” in 2003, which enables people to set up their own web sites that overlay different types of geospatial information in the web environment on top of the data developed by the GSI and some local governments. As of the end of April, 2011, over 3,200 sites are using this system. The portal site’s URL of the system is <http://cyberjapan.jp/>, though available only in Japanese.

## 3. Standardization of Geospatial Information

### 3.1 ISO/TC 211 (Geographic information/Geomatics)

The GSI has actively participated in ISO/TC 211 since its foundation in view of the importance of standardization of geographic information, and has promoted to develop Japanese Standards for Geographic Information (JSGI) in accordance with the ISO/TC 211 standards.

The present version of JSGI 2.0 was published in March 2002. In addition, to promote the use of these standards, the GSI developed the Japan Profile for Geographic Information Standards (JPGIS) in January 2005, as a practical profile of JSGI.

JPGIS was revised based on the new set of standards of ISO/TC 211 in May 2009.

### **3.2 Metadata and Clearinghouse**

In Japan, the GIS Liaison Committee of Ministries and Agencies in the Government reached an agreement in 2000 to set up a Japanese clearinghouse with metadata. Japanese Metadata Profile (JMP) was developed to define the schema for this purpose. The current version of JMP 2.0 was released in May 2004 based on ISO 19115:2003. JMP 2.0 is composed of core metadata and additional elements such as keywords or distribution information to support clearinghouse functionality. Since 2008, the Japanese central government and local governments have been required to maintain metadata based on JMP 2.0, and to submit them to the GSI whenever they develop geospatial information through their public survey projects. The GSI has been tasked to add these metadata to its clearinghouse.

Each organization taking part in Japanese clearinghouse system maintains one or more node servers which support ISO 23950 as its retrieval protocol. The GSI provides server tools to support the Japanese language environment, and has operated the Japanese clearinghouse gateway since 2000.

As of 2011, there are 23 clearinghouse nodes in Japan:

- 16 nodes by 7 ministries of the central government
- 3 nodes by independent administrative institutions such as universities
- 4 nodes by private companies

The URL of the clearinghouse gateway is <http://zgate.gsi.go.jp/>, available only in Japanese.

## **4. International Activities**

### **4.1 Global Mapping Project**

Global Mapping Project is an international cooperation project of National Mapping Organizations (NMOs) and partners with them to develop a set of global geospatial data with verified quality based on consistent specifications.

The project has been steered and promoted by the International Steering Committee for Global Mapping (ISCGM) that was established in 1996. The GSI serves as the Secretariat. As of September 2011, 165 countries and 16 regions participate in the project, and Global Map data of 73 countries and 5 regions, which cover 60.4% on territorial basis and 52.9% on population basis of the whole land, have already been developed and are available for the public through the Internet from the website of the ISCGM (<http://www.iscgm.org>) or those of participating NMOs. The present status of the project is summarized in Fig. 4.

The GSI is developing not only Global Map data of Japan but also Global Map data of developing countries mainly in Asia and the Pacific region in cooperation with respective NMOs of the region. In addition, the GSI has developed the Manual for Development and Revision of Global Map, Global Map Metadata Editor, and Global Map Data Check Software. As the ISCGM Secretariat, the GSI will continue to make efforts to implement Global Mapping Project.

## Progress of Global Mapping Project

As of 2011-09-02  
International Steering Committee for Global Mapping

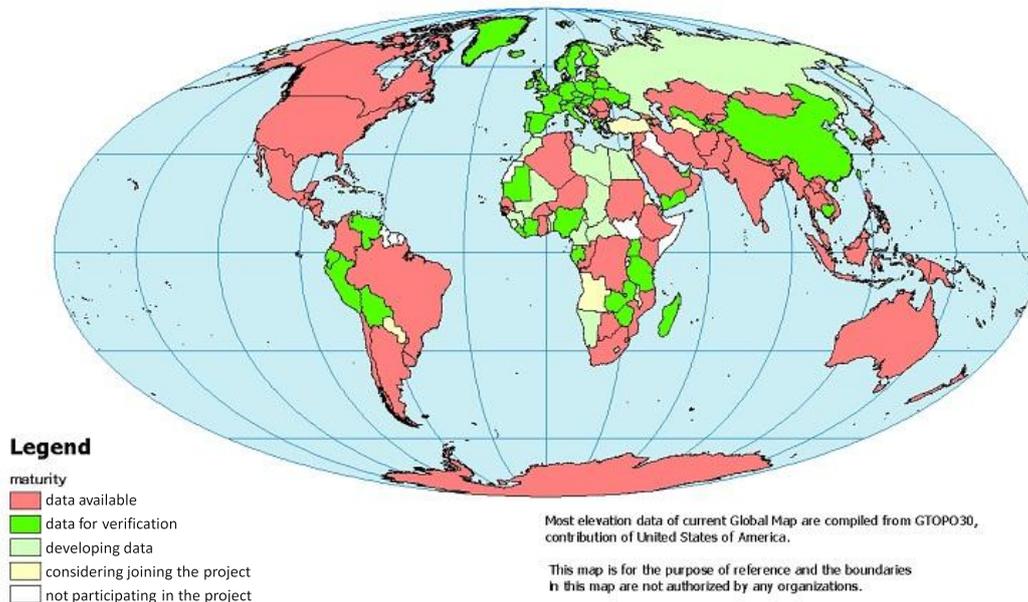


Fig. 4: Present Status of Global Mapping Project

### 4.2 United Nations Regional Cartographic Conference for Asia and the Pacific (UNRCC-AP)

Japan has been actively participating in this conference since the first conference in 1955, and the 2nd, 7th and 16th conferences were held in Japan. During the latest 18th UNRCC-AP held at UN Conference Center in Thailand in October 2009, the GSI made a presentation entitled “New NSDI and National Mapping Policy of Japan”. It introduced new NSDI legislation and the development of FGD in cooperation with local governments.

### 4.3 Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP)

PCGIAP was established pursuant to a resolution of the 13th UNRCC-AP to cooperate in the development of a regional geographic information infrastructure. The GSI took charge of the PCGIAP Secretariat between 2000 and 2006. After that, the GSI has served as Vice President of PCGIAP since 2006. The GSI also serves as the Chairman of Working Group 1 (WG1, Geodetic Technologies and Applications).

### 4.4 Preparatory Meeting of the Proposed United Nations Committee on Global Geospatial Information Management (GGIM)

The 1st preparatory meeting was held in October 2009 in conjunction with 18th UNRCC-AP. In the meeting, the GSI welcomed the UN initiative and expressed its interest in moving it forward. The GSI also attended the 2nd (New York, May 2010) and the 3rd (New York, April 2011) preparatory meetings. During the 3rd meeting, from the experiences of Great East Japan Earthquake, the GSI suggested that a framework of GGIM will help reinforcement of the international cooperation in large-scale disasters.

## 5. Technical Cooperation

In order to provide technical assistance and facilitate the transfer of technology in the field of geospatial information, the GSI has been actively engaged in various technical cooperation projects, primarily implemented by the Japan International Cooperation Agency (JICA), which is commissioned by the Ministry of Foreign Affairs.

Technical cooperation activities in the field of geospatial information can be grouped into three categories, namely: hosting of training programs for overseas trainees, dispatch of GSI employees to overseas countries as technical experts and providing technical support in technical cooperation projects.

### 5.1 Acceptance of Trainees

Currently the GSI has implemented the following two group training courses which are organized by JICA.

#### - **Planning Management of National Mapping and Surveying**

This course is designed for technical managers working at NMOs who envision an effective and efficient management approach of national surveying and geospatial information projects. This course was started in 1963 as “Group Training Course in Surveying and Mapping”, and has accepted a total of 432 participants from 76 countries until now.

#### - **Global Mapping for Sustainable Development**

This course aims at capacity building to promote Global Mapping Project through transferring skills and knowledge including GIS, Remote Sensing and geographic information standards. Collectively, 105 participants from 59 countries have been accepted in this course from 1994 to 2011.

### 5.2 Dispatch of Technical Experts

Dispatch of GSI employees as technical experts is implemented through JICA, based on official requests from the recipient governments. In 1964, the GSI for the first time sent out four senior staff members to Saudi Arabia and adjacent countries. Since then, the GSI has sent 348 experienced technical experts. Among them 284 experts were dispatched as short-term (several weeks or months) experts to carry out particular projects. Also 64 engineers were dispatched as long-term (longer than one year) experts to cooperate with their host governmental organizations by providing technical assistance.

Table 2: Dispatching of long-term experts from the GSI in recent years

Country	Subject	Term
Philippines	GEO-Spatial Data Administration, NAMIRIA	2004 - 2007
Bangladesh	Expert in Mapping Technology, Survey of Bangladesh	2005 - 2007
Kenya	Advisor, Survey of Kenya	2006 - 2008
Timor-Leste	Advisor, Survey of Timor-Leste	2008 - 2010
Bangladesh	Chief Advisor, Mapping of Bangladesh	2009 - 2012

### 5.3 Technical Cooperation Projects

In 1971, Japan started its first overseas mapping project in Indonesia to prepare national base maps of the country. Since then, the Japanese Government has implemented mapping and related projects in over 40 countries. Ongoing technical cooperation projects by JICA are shown in Table 3. Recent projects have been

implemented with a focus especially on capacity building.

Table 3: Technical Cooperation Projects in progress by JICA

Country	Project	Term
Serbia	The Project for Capacity Development of Digital Basic State Mapping in Serbia	2009 - 2011
Bangladesh	Bangladesh Digital Mapping Assistance Project	2009 - 2012
Burundi	Project for Establishing Digital Topographic Database for Bujumbura City	2010 - 2012
Moldova	Project for Creation of Database for Base Map for Development of National Spatial Data Infrastructure	2010 - 2012
Sri Lanka	Digital Topographic Mapping Project for Reconstruction of Northern Region	2010 - 2012
Philippines	Topographic Mapping Project for Peace and Development in Mindanao	2010 - 2013
Senegal	Digital Topographic Mapping Project in Northern Senegal	2011 - 2013
Togo	Digital Topographic Mapping Project of Togo	2011 - 2013

- **Kenya Institute of Surveying and Mapping (KISM)**

Kenya Institute of Surveying and Mapping Project is a remarkable project, especially in terms of capacity building.

KISM was established in 1996 for the development of human resources in surveying and mapping under the project-type technical cooperation program by JICA that started in 1994. With the financial support from the Japanese Government Grant Aid Program, KISM was constructed and fully equipped with facilities by 1998, based on the request of the Government of Kenya. The project was successfully completed in 2001, with 207 successful applicants for National Examination.

Since 1998, about 150 trainees have been graduated every year from KISM either from a three-year Diploma course or from a two-year Higher Diploma course. The graduates equipped with practical ability are playing an important role in surveying and mapping in east Africa.

Furthermore, in order to provide the training opportunity for the officials of NMOs of neighboring 18 countries (Botswana, Burundi, Comoros, Ethiopia, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Seychelles, Sudan, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe and Kenya), KISM also has conducted Third Country Group Training courses on GPS surveying (1998-2002), GIS/LIS (2001-2005), African Reference Framework (2003-2007) and Remote Sensing for Mapping (2003-2008), under the support of JICA and the Kenyan Government. From 2009, KISM is conducting "Seminar on Geographic Information Science" with JICA, as a hub of South-South cooperation in eastern and southern African region.

The GSI has dispatched a total of 18 long-term and 52 short-term technical experts to KISM Project and Third Country Training Programs since 1994, including those for Survey of Kenya.