Technical Cooperation in Surveying, Mapping and Charting by Japan

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In the Japanese government, several organizations are responsible for fundamental surveying, mapping and charting projects. Basic geodetic surveys are carried out mainly by the Geographical Survey Institute (GSI) and the Hydrographic and Oceanographic Department (HOD), and various cartographic works are conducted by the GSI, the HOD, the Ministry of Land, Infrastructure and Transport (MLIT), which the National Land Agency (NLA) was integrated into due to the governmental restructuring in 2001, the Geological Survey of Japan/AIST (GSJ/AIST) and other organizations. In order to provide technical assistance and implement the transfer of technology in the field of cartography, these bodies are actively engaged in various technical cooperative projects, implemented by Japan International Cooperation Agency (JICA), which is commissioned by the Ministry of Foreign Affairs.

Technical cooperative activities in the fields of surveying, mapping, hydrography, oceanography and geoscientific research can be grouped into three categories: namely, acceptance of trainees, dispatch of experts and cooperative projects.

1. Training

1.1 Training Courses in Surveying and Mapping

(1) Group Training Course in Surveying and Mapping (JICA)

At the Second United Nations Regional Cartographic Conference for Asia and the Far East held in Tokyo in 1958, the importance of professional education in surveying and mapping for technical personnel of developing countries was recognized. As an outcome of this conference, Japan started, after a five-year preparation period, a group training course in surveying and mapping in 1963. The curriculum of the course has been reconsidered and improved when necessary.

With recent rapid progress in surveying and mapping technology such as Global Positioning System (GPS) and Geographic Information System (GIS), every engineer in the field of surveying and mapping is required to have vast knowledge of the latest technology. In addition, the importance of management in surveying and mapping projects is recognized more and more these days. Responding to these requirements, this group training course was largely reorganized in 1992 to cover all fields of surveying and mapping technology including geodesy, photogrammetry, cartography and map reproduction as well as GPS, GIS and remote sensing.

The purpose of this course is to contribute to upgrading the knowledge and skills of the participants in the field of surveying and mapping so as to enable them to play important roles in nationwide surveying and mapping projects, conduct quality control and process control, and apply advanced technologies in surveying and mapping processes.

This course has been completed by 371 participants from 62 countries since 1963.

(2) Group Training Course in Global Mapping (JICA)

The group training course in Global Mapping (Environment) was completed in 1998, and the new group training course in Global Mapping was started in 1999. The former course was designed to introduce the significance and the technical background of the Global Map, and the number of participants from 1994 to 1998 was 30 people from 18 countries. The new course is designed to support developing countries or regions to prepare the Global Map, and participants in the course are expected to enhance technical skills for producing the Global Map.

Table 1 The number of participants in the new course on Global Mapping (JICA.)

Country	2000	2001	2002	Total
Bangladesh	1			1
China			1	1
Colombia	1			1
Ghana		1		1
Iran			1	1
Laos		1		1
Mongolia	1			1
Myanmar		1		1
Nicaragua		1		1
Pakistan			1	1
Saudi Arabia			1	1
Sri Lanka	1			1
Slovakia	1			1
Uganda		1		1
Viet Nam			1	1
Total	5	5	5	15

*In all tables in this report, year represents Japanese fiscal year which starts from April of the year and ends in March of the next year.

Table 2 The number of Planning and Management of National Mapping and Surveying (JICA)

Country	2000	2001	2002	Total
Bangladesh	1	1		2
Burkina Faso	1			1
Bolivia			1	1
China			1	1
Ghana	1			1
Kenya			1	1
Laos		1	1	2
Mali			1	1
Micronesia	1			1
Myanmar			2	2
Philippines	1	1		2
Senegal	1	1	1	3
Sri Lanka	1	1		2
Tanzania	1	2		3
Zambia		1		1
Viet Nam		1		1
Total	8	9	8	25

(3) Group Training Course in Planning and Management of National Mapping and Surveying (JICA)

The group training course in Planning and Management of National Mapping and Surveying was started in 2000. The new course is designed to support developing countries or regions to learn good practices of survey administration and project management, namely, laws and regulations, project planning and management, education and dissemination of information. The numbers of participants from 2000 to 2002 were twenty-five people from sixteen countries.

(4) Individual Training

The individual training program is prepared in order to meet the needs of each trainee and his/her home government. The training period lasts one to six months. Through 2000, 9 trainees from 4 countries were accepted.

NLA(MLIT) has been contributing to training of cadastral surveying as a part of these programs.

Table 3 Individual Training conducted in 2000－2002

Country	Subject	Term
Kazakhstan	GPS data processing and analysis-study on exceptional cases	2002 (1 month)
Senegal	New Technology for Surveying and Mapping (GPS/GIS)	2002 (3 month)
Bangladesh	Mapping Technology Surveying and Mapping Technology	2000 (4 month) 2002 (3 month)
Kenya	Training Administration Training Administration Management Cartography Map Reproduction	2000 (3 month) 2000 (2month) 2000 (1.5month) 2001 (6 months) 2001 (6 months)

1.2. Training Courses in Hydrography and Oceanography

From F.Y. 2000 to 2002, the HOD conducted three group training courses and several individual training courses under the JICA scheme as follows:

(1) Group Training Courses in Hydrographic Survey

This Group Training Course has been authorized by the FIG/IHO International Advisory Board as Category B Course pertaining to Specialization in Nautical Charting and Port and Near Shore Surveys since June 1, 1988.

a. Purpose: This course is designed to improve the knowledge in modern theory and techniques of hydrographic surveying for technical personnel currently engaged in port and near shore surveying.
b. Duration: From April to November every year.
c. Curriculum: The curriculum of the course includes lectures and practical components strictly complying with the requirements under the International Standards of Competence for Hydrographic Surveyors, 7th edition, 1994.
   - Lecture: Approx. 74 days
   - Practice: Approx. 17 days
   - Field/shipboard training: Aprox. 33 days
   - Observation and study tour: Approx. 19 days

(2) Group Training Course in Oceanography and Data Processing

a. Purpose: The course aims to provide the participants with: skills of effective oceanographic survey and preannouncement computational skills based on the result of the survey; technique to enforce and supervise environmental preservation; and data processing and numerical simulation techniques by using a computer.
b. Duration: From November to March
c. Curriculum:
   - Lectures: Approx. 48 days
   - Practice: Approx. 5 days
   - Fields/shipboard training: Approx. 9 days
   - Observation and study tour: Approx. 11 days
d. Remarks: This group Training Course was conducted from 1998, in accordance with demands, suggestions, requests, etc. made by developing countries which have been sending participants to this course. This course has been completed in 2001.

Table 4 Number of participants accepted to Group Training in Hydrographic Survey (2000–02):

Country	2000	2001	2002	Total
Fiji	1	1	1	3
Indonesia	1	1		2
Kenya			1	1
Malaysia	1	1	2	4
Mauritius	1	1	1	3
Pakistan	1	1		2
Philippines	1	1	1	3
Sri Lanka	1	2	1	4
Tanzania	1	1	1	3
Thailand			1	1
Tonga	1			1
Viet-Nam	1	1	1	3
Total	10	10	10	30

(3) Individual Training

The HOD conducted individual training as shown in Table 5.

Table 5 Number of participants accepted into Group Training Course in Oceanography and Data Processing Course (OD)

Country	2000(OD)	2001(OD)	2002	Total
Brazil	1			1
China		1		1
Egypt	1	1		2
Fiji		1		1
Indonesia	1			1
Malaysia	1			1
Maldives		1		1
Mauritius		1		1
Pakistan	1			1
Peru	1	1		2
Philippines	1	1		2
Thailand	1	1		2
Total	8	8		16

1.3. Training Courses in Geosciences

Training of technical personnel from developing countries in geosciences is conducted as a part of the technical cooperation scheme of the Japanese Government. GSJ/AIST has accepted several researchers in the field of geosciences every year.

Table 6 Individual Training conducted in 2000–2002

Country	Subject	Term
Malaysia	Oceanographic Data Management	2000 (2 weeks)
Mauritius	Establishment of Hydrographic Unit	2001 (10 days)
	Smooth Sheet Verification	2002 (7 weeks)
Philippines	Hydrographic Survey	2000 (6 months)
	Electronic Navigational Charts Management	2001 (1 month)
		2002 (1 month)
	Mapping Policy Administration	2002 (1 week)

2. Dispatching of Technical Experts

2.1 Experts in Surveying and Mapping

In 1964, GSI sent out four senior staff members to survey the national boundaries between Saudi Arabia and adjacent countries. Since then, GSI has sent 307 senior, experienced engineers as technical assistance experts. 247 of them were dispatched as short-term experts, who generally remain from several weeks to two months, to carry out particular projects based on requests to the Government of Japan from the recipient governments, while others are long-term experts who stay longer than one year and cooperate with their host governmental organization by providing technical assistance.

GSI and NLA(MLIT) have sent technical personnel as JICA experts to the Kenya Institute of Surveying and Mapping (KISM), which is being implemented as a project-type technical cooperation of JICA for the duration of five years starting in 1994. After the successful completion of the project in 1999, a two-year follow-up program is running with reduced number of experts from Japan.

2.2 Experts in Hydrography and Oceanography

From F. Y. 2000 to 2003, the HOD sent 7 staff members as experts in the field of hydrography, oceanography. One of them was dispatched as short-term experts.

Table 7 Dispatching of long-term experts (1997 –)

Country	Subject	GSI or NLA(*MLIT*)	Term
Kenya	Chief Advisor, KISM	GSI	1997 – 2001
	Geodetic Surveying, KISM	GSI	1997 – 2001
	Map Reproduction, KISM	GSI	1997 – 1999
	Photogrammetry and Remote Sensing, KISM	GSI	1997 – 2001
	Mapping, KISM	GSI	1997 – 1999
	Cadastral Surveying, KISM	NLA(*MLIT*)	1997 – 2001
	Advisor, Survey of Kenya	GSI	2002 – 2003
Morocco	Mapping	GSI	1994 – 1999
Bangladesh	Advisor, Survey of Bangladesh	GSI	1999 – 2001
Senegal	Geographic Information Management	GSI	2001 – 2003
Bangladesh	Advisor, Survey of Bangladesh	GSI	2001 – 2003

Table 8 Dispatching of long-term experts after 2000.

Country	Subject	Term
Philippines	Electronic Navigational Charts	2000–
	Hydrographic Survey	2000–2001
	Electronic Navigational Charts Database	2001–
Malaysia	Oceanographic Data Management	1996–2001
Mauritius	Adviser to Hydography	1999–

2.3 Experts in Geosciences

The GSJ/AIST is involved in technical cooperation programs of the Japanese Government. The activities of the Survey personnel in the scientific and technical assistance programs cover virtually all phases of the geoscientific spectrum. The length of these activities ranges from a few weeks to several years.

3. Cooperative Projects

3.1 Mapping Projects

In 1971, Japan started its first overseas mapping project in Indonesia to prepare national base maps of that country. Mapping projects in developing countries are conducted as technical cooperation by JICA. The role of the GSI in these overseas mapping projects is to give advice to both the authorities concerned in Japan as well as in the recipient countries on all aspects of surveying and mapping of the projects, and to supervise the survey project.

The projects are, in general, assigned to a survey company in Japan, by JICA for implementation. GSI provides technical guidance through the Advisory Committee and other meetings with authorities concerned.

Most of the projects are to prepare topographic maps as national base maps. In some cases, thematic maps such as land use maps are also made.

Table 9 Overseas Mapping Projects in progress as of 2002

Azerbaijan Republic (National Digital Mapping Project in Azerbaijan)				2000 – 2003
National Digital Mapping		1 : 50,000	60,000 km^2	
(To correct the secular changes in the existing topographic map)				
Guatemala (Establishment of base maps and hazard maps for GIS)				2000 – 2003
Topographic Mapping		1 : 50,000	30,000 km^2	
Hazard mapping	1 : 50,000	1 : 10,000	3,700 km^2	
Gambia (Establishment of Geographic Database)				2001 – 2002
Digital Topographic Mapping		1 : 50,000	11,295 km^2	
Preparation of Basic GIS Data		1 : 50,000	11,295 km^2	
Cambodia (A Study on the Establish of GIS Base Data)				2001 – 2003
Preparation of Basic GIS Data		1 : 50,000	101,000 km^2	
Myanmar (Establishment of Comprehensive geographic database system)				2002 – 2004
Digital Topographic Mapping		1 : 50,000	27,000 km^2	
Establish of GIS Base Data				
Formulate the guideline of the standard for GIS				
Bangladesh (The study on urban information management for greater Dhaka)				2002 – 2004
Digital Topographic Mapping		1 : 5,000	581 km^2	
Kenya (Study for Establishment of Spatial Data Framework for City of Nairobi)				2003 – 2005
Digital Topographic Mapping		1 : 2,500	170 km^2	
		1 : 5,000	415 km^2	
Spatial Data Framework		1 : 2,500	70 km^2	
		1 : 5,000	415 km^2	
Aerial Photo		1 : 15,000	700 km^2	
Model GIS			15 km^2	
Bosnia and Herzegovina (Establishment of Digital Topographic Map)				2003 – 2005
Digital Topographic Mapping		1 : 25,000	51,000 km^2	
Aerial Photo		1 : 40,000	51,000 km^2	

3.2 Hydrographic Projects

At the present time, there is not a technical cooperation project under the JICA technical cooperation scheme, However some projects had been conducted in the past under the JICA scheme.

3.3 Geoscientific Research Projects

Geological Survey of Japan/AIST conducts international research projects in collaboration with various foreign countries. Japan belongs to the east and south-east Asia regions where we are facing various global issues, such as environment, natural hazard, natural resources, and energy.

Seeking the solutions for these issues through an international research network is the major goal of our projects.

Research Title Foreign Institution Research Fund (Period)
Studies on comprehensive assessment of impacts of sea-level rise and adaptation Vietnam, Department of Geology and Minerals of Vietnam (DGMV) Ministry of the Environment (FY2000–2002)
Interdisciplinary study on environmental management, planning, and risk communication in gold rush regions Economic Commission for Latin America and the Caribbean (CEPAL, UN), University of the Philippines Ministry of the Environment (FY2000–2002)
Studies on origin and transport of aeolian dust and its impact on climate China, Institute of Atmospheric Physics, Chinese Academy of Sciences Ministry of Education, Culture, Sport, and Science and Technology (FY2000–2002)
Japan-U.S. joint research to quantify future earthquake potential for earthquake disaster mitigation USA, US Geological Survey Ministry of Education, Culture, Sport, and Science and Technology (FY2000–2001)
Unzen Volcano: International cooperative research with scientific driiling for understanding eruption mechanisms and magmaticactivity ICDP (International Continental Scientific Drilling Program) USA, University of Alaska, US Geological Survey Germany, GeoForshungs Zentrum, University of Bayreuth Ministry of Education, Culture, Sport, and Science and Technology (FY1999–2001)
Loading from the Changjiang River into the east China Sea and its impact on the marine ecosystem China, East China Normal University Ministry of the Environment (FY1999–2001)
Research Cooperation Project on the Exploration of Small-scale Geothermal Resources in the Eastern Part of Indonesia (ESSEI) Indonesia, Derectrate General of Geology and Mineral Resources of the Ministry of Mines and Energy (DGGMR) AIST(FY1997–2001)
Mineral systems of Northeast Asia USA, US Geological Survey AIST(FY2001)