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**REPORTS ON ACHIEVEMENTS IN GEOGRAPHIC INFORMATION IN ADDRESSING NATIONAL, REGIONAL AND GLOBAL  
ISSUES, INCLUDING: STRATEGY, POLICY, ECONOMIC AND INSTITUTIONAL ISSUES**

**Technical Cooperation in Surveying, Mapping and  
Charting by Japan**

**(Submitted by Japan)\*\***

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# **TECHNICAL COOPERATION IN SURVEYING, MAPPING AND CHARTING BY JAPAN**

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Technology  
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## **SUMMARY**

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 was completed in 2003, and the new group training course "Global Mapping-Contribution to Global Mapping Development by GIS" was started in 2004. The number of participants of the former course from 1994 to 2003 was 58 people from 34 countries. The new course aims at capacity building to promote Global Mapping project through transferring technologies of remote sensing and Geographical Information Systems (GIS).

Table 1 The number of participants in the Global Mapping course for the last five years (JICA.)

Country	2000	2001	2002	2003	2004	Total
Bangladesh	1				1	2
Cambodia					1	1
China			1		1	2
Colombia	1					1
Fiji				1		1
Ghana		1				1
Guatemala					1	1
India				1	1	2
Iran			1			1
Laos		1				1
Mongolia	1					1
Myanmar		1				1
Nicaragua		1				1
Oman				1		1
Pakistan			1			1
Philippines				1		1
Samoa					1	1
Saudi Arabia			1			1
Sri Lanka	1					1
Slovakia	1					1
Thailand				1	1	2
Tunisia					2	2
Uganda		1				1
Viet Nam			1			1
Total	5	5	5	5	9	29

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

## **(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 2004 were 41 people from 23 countries.

This training course, upon completion of the five-year cooperation term in FY 2004, is to be newly started in FY2005 with a strengthened focus on survey administration management under the same name of "Planning and Management of National Mapping and Surveying".

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

Country	2000	2001	2002	2003	2004	Total
Bangladesh	1	1		1	2	5
Burkina Faso	1					1
Bolivia			1			1
China			1	1		1
Cuba					1	1
Ghana	1					1
Kenya			1		2	3
Laos		1	1			2
Mali			1	1		2
Micronesia	1					1
Mongolia				1		1
Myanmar			2			2
Philippines	1	1		1		3
Senegal	1	1	1			3
Sri Lanka	1	1				2
Swaziland				1		1
Syria					1	1
Tanzania	1	2			1	4
Thailand				1		1
Uganda					1	1
Vanuatu				1		1
Viet Nam		1				1
Zambia		1				1
Total	8	9	8	8	8	41

#### (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, 10 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 2000-2004

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 months)
Bangladesh	Mapping Technology Surveying and Mapping Technology	2000 (4 months) 2002 (3 months) 2004 (4 months)
Kenya	Training Administration Training Administration Management Cartography Map Reproduction	2000 (3 months) 2000 (2 months) 2000 (1.5 months) 2001 (6 months) 2001 (6 months)

## 1.2. Training Courses in Hydrographic and Oceanographic Department

(1) From F.Y. 2000 to 2004, the HOD conducted two group training courses and several individual training courses under the JICA scheme as follows:

### (1-1) 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 May to December 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, 8th edition, 1997.
  - Lecture: Approx. 77 days
  - Practice: Approx. 10 days
  - Field/shipboard training: Aprox. 36 days
  - Observation and study tour: Approx. 12 days

Table 4 Number of participants accepted to Group Training in Hydrographic Survey (2000-04):

Country	2000	2001	2002	2003	2004	Total
Bangladesh				2	1	3
China					1	1
Egypt					1	1
Fiji	1	1	1			3
Indonesia	1	1		1	1	4
Kenya			1	1	1	3
Malaysia	1	1	2	2	1	7
Mauritius	1	1	1	1	1	5
Pakistan	1	1		1	1	4
Philippines	1	1	1	1	1	5
Sri Lanka	1	2	1		1	5
Tanzania	1	1	1			3
Thailand			1			1

Tonga	1					1
Viet-Nam	1	1	1			3
Total	10	10	10	9	10	49

### (1-2) 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 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) Individual Training

The HOD conducted individual training as shown in Table 6.

Table 6 Individual Training conducted in 2000-2004

Country	Subject	Term
Malaysia	Oceanographic Data Management	2000 (2 weeks)
Mauritius	Establishment of Hydrographic Unit	2001 (10 days)
	Smooth Sheet Verification	2002 (7 weeks)
	Chart Compilation	2003 (2 months)
Philippines	Hydrographic Survey	2000 (6 months)
	Electronic Navigational Charts (ENC) System Management	2001 (1 month)
		2002 (1 month)
	Mapping Policy Administration	2002 (1 week)

		20031(3 months)
	ENC Data Producing	2002 (3 months)
		2003 (3 months)
	Management of ENC Updating	2003 (1 month)
	Planning and Management of ENC	2003 (2 weeks)
	Operator of ENCs Updating	2004 (3 months)
	Manager of ENCs Updating	2004 (1month)

(2) From F.Y.2000 to 2004, the HOD conducted a group training course under the auspices of Japan-UNESCO Funds-in-Trust scheme as follows:

### **IOC/WESTPAC Training Course on NEAR-GOOS Data Management**

a.Purpose: This course is to provide personnel currently involved in oceanographic data management in the WESTPAC Member States with basic concept of the International Oceanographic data and Information Exchange (IODE) system and its function, NEAR-GOOS Real Time and Delayed Mode Data Base, and acquisition, procession and compilation of oceanographic data including how to operate “Resource Kit” set up by IODE as self-training tools.

b. Duration: From October to November every year.

c. Curriculum: Approx. 12 days

Table 7 Number of participants accepted to IOC/WESTPAC Training on NEAR-GOOS Data Management (2000-04)

Country	2000	2001	2002	2003	2004	Total
China	1	1	1	1		4
Fiji			1			1
Indonesia	1		1	1		3
Rep. of Korea	1	1	1	1		4
Malaysia	1		1			2
Philippines		1		1		2
Russian	1	1	1	1		4
Thailand		1	1	1		3
Vietnam		1		1		2
Total	5	6	7	7		25

\*The course in 2004 has been canceled due to overlap with other meeting.

### **1.3. Training Courses in Geosciences**

Training of technical personnel from developing countries in geosciences is conducted as part of the technical activities at Geological Survey of Japan (GSJ/AIST), and GSJ accepts researchers in the general fields of geology geoinformation and geo-engineering.

## **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 34 senior, experienced engineers as technical assistance experts. 23 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.

Table 8 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 –
Morocco	Mapping	GSI	1994 – 1999
Bangladesh	Advisor, Survey of Bangladesh	GSI	1999 – 2003
Senegal	Expert in Mapping Technology, Survey of Bangladesh	GSI	2003-
	Geographic Information Management	GSI	2001 – 2003
Philippines	GEO-Spatial Data Administration, NAMIRIA	GSI	2004-

## 2.2 Experts in Hydrographic and Oceanographic Department

From F. Y. 2000 to 2004, the HOD sent 29 staff members as experts in the field of hydrography, oceanography. 21 staff members of them were dispatched as short-term experts.

Table 9 Dispatching of long-term experts after 2000.

Country	Subject	Term
Malaysia	Oceanographic Data Management	1998-2001
Philippines	Electronic Navigational Charts	1999-
	Hydrographic Survey	1999-2001
	Electronic Navigational Charts Database	2001-
Mauritius	Adviser to Hydrography	1999-2003

## 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 geo-scientific and geo-technical assistance programs cover a broad spectrum of the geosciences, not only for mineral and energy resources but also for groundwater management, environment, environmental geology, geohazards, and geoinformation technology.

### 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 10 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 <sup>2</sup>
(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 <sup>2</sup>
Hazard mapping	1 : 50,000    1 : 10,000	3,700 km <sup>2</sup>
Gambia (Establishment of Geographic Database) 2001 – 2002		
Digital Topographic Mapping	1 : 50,000	11,295 km <sup>2</sup>
Preparation of Basic GIS Data	1 : 50,000	11,295 km <sup>2</sup>
Cambodia (A Study on the Establish of GIS Base Data) 2001 – 2003		
Preparation of Basic GIS Data	1 : 50,000	101,000 km <sup>2</sup>
Myanmar (Establishment of Comprehensive geographic database system) 2002 – 2004		
Digital Topographic Mapping	1 : 50,000	27,000 km <sup>2</sup>
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 <sup>2</sup>
Kenya (Study for Establishment of Spatial Data Framework for City of Nairobi) 2003 - 2005		
Digital Topographic Mapping	1 : 2,500	170 km <sup>2</sup>
	1 : 5,000	415 km <sup>2</sup>
Spatial Data Framework	1 : 2,500	170 km <sup>2</sup>
	1 : 5,000	415 km <sup>2</sup>
Aerial Photo	1 : 15,000	700 km <sup>2</sup>
Model GIS		15 km <sup>2</sup>

Bosnia and Herzegovina (Establishment of Digital Topographic Map) 2003 – 2005		
Digital Topographic Mapping	1 : 25,000	51,000 km <sup>2</sup>
Aerial Photo	1 : 40,000	51,000 km <sup>2</sup>

### 3.2 Technology Department for ENC Projects

In response to the request of the Government of Republic of the Philippines, a technical cooperation project is conducting from 2000 to 2005 to carry out technology development for Electronic Navigational Charts (ENCs). The purpose of the project is to produce the ENCs and Electronic Notices to Mariners in the Philippines, under JICA's technical cooperation scheme.

Since the dispatch of the preliminary study team to Philippines in 1999, the HOD is involved in the project. In accordance with the agreement between the relevant authorities concerned of the two governments, the five-year project started in 2000. Government of Republic of the Philippines published the nine ENCs and three Electronic Notices to Mariners until December 2004 as the products of the project.

### 3.3 Geoscientific Research Projects

Geological Survey of Japan (GSJ/AIST) is actively engaged in international geoscience programs in collaboration with many foreign countries. Japan belongs to the region of East Asia where recent economic growth is very rapid, hence we are facing with some global science issues stemming from the social changes, such as environmental protection, mitigation of natural hazard, not to mention the geological assessment /exploration of energy and mineral resources.

Seeking the solutions for these issues through an international research network is one of the important goals of GSJ's research programs.