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**Reports on achievements in surveying, mapping and charting
in addressing national, subregional, regional and global issues,
including policy and institutional issues**

Technical cooperation in surveying, mapping and charting

Paper submitted by Japan**

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** Prepared by the Geographical Survey Institute, Hydrographic Department, Geological Survey of Japan, National Land Agency and the Japan International Cooperation Agency.



I. Training

I.1 Training Courses in Surveying and Mapping

(1) Group Training Course in Surveying and Mapping

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. The number of participants in the new course in 1999 was seven people from seven countries.

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

Country	1997	1998	1999	Total
	Former course	Former course	New course	
Azerbaijan			1	1
Bangladesh	1	1	1	3
Brazil		1	1	2
China	1			1
Estonia		1		1
Fiji		1		1
India			1	1
Indonesia		1	1	2

Iran			1	1
Malaysia	1			1
Philippines	1	1		2
Palau		1		1
Tanzania	1		1	2
Total	5	7	7	19

*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.

(3) 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 1997, 25 trainees from 22 countries were accepted.

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

Table2. Individual Training conducted in 1997-2000

Country	Subject	Term
Ghana	Survey Administration	1997(0.5 month)
	Mapping	1998(1.5month)
China	Information Processing	1997(1.5 month)
	GIS	1999(2 month)
	Remote Sensing	1999(4 month)
Saudi Arabia	Digital Mapping	1997(1.5 month)
	GIS	1997(1 month)
Colombia	GIS	1997(1 month)
		1998(1.5month)
Cambodia	GIS	1997(2 month)
		1998(1 month)
Uganda	Mapping	1998(1 month)
Fiji	Mapping	1998(2 month)
Angola	Mapping	1998(1 month)
	GIS	1998(0.5 month)
Poland	Development of Industrial Technique	1998(0.5 month)
Madagascar	GIS	1998(0.5 month)
		1999(1 month)
Slovak	Environmental Management Plan	1998(1.5 month)
Kazakhstan	Digital Mapping	1999(0.5 month)
		1999(1 month)
Indonesia	Natural Hazard Mitigation System Survey	1999(0.5 month)
Laos	Digital Mapping	1999(2 month)
		2000(2 month)
Burkina Faso	Mapping	1999(0.5 month)
Mali	Mapping	1999(1 month)
Senegal	GIS	1999(2 month)
Mozambique	Aerial Triangulation	2000(1 month)
Swaziland	Digital Orthophoto	2000(1 month)
El Salvador	GIS	2000(1 month)
Bangladesh	Mapping	2000(1 month)

Kenya	Land Survey	}	1997(6 months × 4 persons)
	Cartography		1998(6 months × 4 person)
	Map Reproduction		1999(6 months × 4 persons)
	Photogrammetry		

1.2. Training Courses in Hydrography and Oceanography

From F.Y. 1997 to 1999, the HD conducted three group training courses and several individual training courses under JICA 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 upgrade 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

Table 3. Number of participants accepted to Group Training in Hydrographic Survey (1997-99)

Country	1997	1998	1999	Total
Bangladesh	1	2	1	4
Cambodia	1			1
Egypt	1	1	1	3
Fiji	1	1	1	3
Indonesia	1			1
Iran	1			1
Korea	1		1	2
Malaysia	1		1	2
Maldives			1	1
Pakistan	1	1	1	3
Philippines	1	1	1	3
Sri Lanka	1	1	1	3
Suriname			1	1
Tanzania		2		2
Viet-Nam		1	1	2
Total	11	10	11	32

(2) Group Training Course in Oceanography and Data Processing

a. Purpose of the course is 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.

(3) Group Training Course in Nautical Charting

a. Purpose: To teach participants modern theories of nautical charting based on the format established by the International Hydrographic Organization and provide knowledge and techniques in drawing thematic charts.

b. Duration: From November to March, conducted alternately with the Group Training Course in Physical Oceanographic Survey, every year.

c. Curriculum:

- Lectures: Approx. 34 days
- Practice: Approx. 22 days
- Field/shipboard training: Approx. 10 days
- Observation and study tour: Approx. 10 days

d. Remarks: This Group Training Course and Physical Oceanographic Survey Course was redesigned to Oceanography and Data Processing Course.

Table 4. Number of participants accepted into Group Training Course in Nautical Charting (NC) and in Oceanography and Data Processing Course (OD)

Country	1997(NC)	1998(OD)	1999(OD)	Total
Bangladesh	1	1		2
Chili		1		1
China	1			1
Costa Rica	1			1
Egypt	1	1	1	3
Fiji	1			1
Indonesia	1		1	2
Korea	1	1	1	3
Malaysia		1	1	2
Pakistan	1		1	2
Peru		1		1
Philippines	1	1	1	3
Sri Lanka		1		1
Thailand		1	1	2
Viet-Name			1	1
Total	9	9	8	26

(4) Individual Training

The HD conducted individual training as shown in Table 5.

Table 5. Individual Training conducted in 1997-1999

Country	Subject	Term
Fiji	Nautical Charting	1997(6 months)
ditto	Ditto	1998(6 months)
ditto	Improvement of Operation and Management of	1998(1 month)

	Hydrographic Services	
Korea	Hydrographic Survey	1998(1 month)
ditto	Ditto	1999(1 month)
Malaysia	Oceanographic Data Management	1998(1 month)

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. GSI has accepted several researchers in the field of geosciences every year, for example 8 in 1996, 7 in 1997, 10 in 1998 and 11 in 1999.

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 241 senior, experienced engineers as technical assistance experts. 197 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 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 6. Dispatching of long-term experts (1994 -)

Country	Subject	GSI or NLA	Term
Kenya	Chief Advisor, KISM	GSI	1994 -2001
ditto	Geodetic Surveying, KISM	GSI	1994 -2001
ditto	Map Reproduction, KISM	GSI	1994 -1999
ditto	Photogrammetry and Remote Sensing, KISM	GSI	1994 -2001
ditto	Mapping, KISM	GSI	1994 -1999
ditto	Cadastral Surveying, KISM	NLA	1994 -2001
Korea	GIS	GSI	1994 -1995
Malaysia	Geodetic Surveying	GSI	1991 - 1994
Panama	Map Reproduction	GSI	1993 - 1995
Morocco	Mapping	GSI	1994 - 1999
Bangladesh	Advisor, Survey of Bangladesh	GSI	1999 -

2.2 Experts in Hydrography and Oceanography

From F. Y. 1996 to 1999, the HD sent 5 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 after 1996

Country	Subject	Term
Philippines	Digitization and Databasing of Nautical Charts	1997-(2 years)
ditto	Development of technology for Electronic Navigational Charts	1999-(2 years)
Malaysia	Oceanographic Data Management	1996-(2 years)
ditto	Ditto	1998-(2 years)
Mauritius	Adviser to Hydrography	1999-(2 years)

2.3 Experts in Geosciences

The GSI 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.

The following list shows only the activities of long-term experts.

Table 8. Dispatching of long-term experts (GSI)

Country	Subject	Term
Pakistan	Geochemistry	1991-1997
Thailand	Geology	1995-1997
Mongolia	Geology	1997-1999
Thailand	Hydrogeology	1998-2000

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. 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 the Infrastructure Development Institute Japan (IDI) and 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 1999

Angola (Establishment of Comprehensive Geographic Database)			1997 - 1999
Digital Topographic Mapping		120,000 km ²	
Digital Geographic data for GIS	1 : 25,000	1,000 km ²	
Aerial photo	1 : 30,000	67,000 km ²	
Aerial photo	1 : 10,000	1,000 km ²	
Kazakhstan (Urgent Establishment of National Basic Geographic Data)			1997 - 1999
Mapping	1 : 200,000	150,000 km ²	
Mapping	1 : 100,000	22,500 km ²	
Mali (National Topographic Mapping in Kita Area)			1998 - 2000
Digital Topographic Mapping	1 : 50,000	31,000 km ²	
Madagascar (Establishment of Database for Geographic Information System of the Capital Area)			1998 - 1999
GIS Database	1 : 10,000	250 km ²	
Laos (Establishment of GIS Base Map for the Mekong River Basin)			1998 - 2001
GIS Base Map Data	1 : 100,000	214,000 km ²	
Burkina Faso (National Topographic Mapping)			1999 - 2001
Mapping	1 : 50,000	20,600 km ²	
Swaziland (Digital Mapping Project for the Smooth Implementation of the Development Plan)			2000 - 2001
Digital Orthophoto Map	1 : 10,000	17,363 km ²	
Senegal (Infrastructure Information Management System of the Dakar Metropolitan Area)			2000 - 2001
Establishment of Infrastructure Information Management System			
			200 km ²

3.2 Hydrographic Projects

a. Fiji

In response to the request of the Government of Republic of Fiji, a technical cooperation project was conducted from 1994 to 1999 to carry out hydrographic surveys and produce nautical charts in the northern Lau Islands region of the country, under JICA's technical cooperation scheme. Since the dispatch of the preliminary study team to Fiji in 1994, the HD has been involved in the project. In accordance with the agreement between the relevant authorities concerned of the two governments, the five-year project started in 1995. As a final product of the project, printed copies of three nautical charts was produced and forwarded to the Government of Fiji.

b. Straits of Malacca and Singapore

In response to the request of the Government of the Republic of Indonesia, the Government of Malaysia and the Government of the Republic of Singapore, the Government of Japan has decided to conduct jointly the "Re-Survey of Critical Areas and Investigation of Dangerous and/or Unconfirmed Shoals and Wrecks in the Straits of Malacca and Singapore" with the Littoral Countries, in accordance with the relevant laws and regulations in force in Japan. Above project was divided into 3 phases and conducted from 1996 to 1998.

3.3 Geoscientific Research Projects

Several cooperative research projects have been carried out with the national geological services of the recipient countries. Five of these projects are listed below:

a. East & Southeast Asia countries: Malaysia, Thailand, Vietnam, and others (1996-1999)

Cooperative research project has been carried out to compile digital geoscientific maps of East and Southeast Asian countries. This project is under the cooperation with CCOP (Coordinating Committee for Coastal and Offshore Geoscience Programs in East and Southeast Asia).

b. China (1997-2001): Lanzhou Institute of Geology

Cooperative research has been carried out to use remote sensing data for evaluations of Tibet geology.

c. Indonesia (1997-2001): Directorate General of Geology and Mineral Resources

Cooperative research has been carried out to establish exploration methods of small-scale geothermal resources.

d. China (1999-2001): Institute of Mineral Deposits

Cooperative research has been carried out to the mineral deposits associated with orogenic belts in China.

e. Mongolia (1994-1998): Geological Survey of Mongolia

Cooperative research has been carried out to evaluate the characteristics of geology and mineral resources in Mongolia.