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COUNTRY REPORTS ON THE CURRENT STATUS AND ISSUES OF SURVEYING, CHARTING AND MAPPING AT THE NATIONAL LEVEL: NEEDS AND REQUIREMENTS VERSUS REALITY IN THE REGION

Cartographic activities in Thailand

Paper submitted by Thailand**

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COUNTRY REPORT AND PROGRESS, DURING 1991 - 1993 BY THAILAND

This report summarizes all prominent cartographic activities in Thailand since the twelveth conference in 1991. The report states the activities done in the field by various Thai goverment agencies : the Royal Thai Survey Department, the National Research Council of Thailand, the Department of Land, the Department of Land Development, the Agricultural Land Reform Office, the Office of Agricultural Economics, the Royal Irrigation Department, the Royal Forest Department, the Deparment of Mineral Resource, the Department of Energy Development and Promotion, and the Electricity Generating Authority of Thailand.

THE ROYAL THAI SURVEY DEPARTMENT

During the reporting period, the Royal Thai Survey Department (RTSD) carried out a great number of cartographic works in geodetic survey, mapping, map information service, and technical assistance.

Ground Control Survey

After the RTSD had conducted conventional ground control survey mostly in 1991, the department employed the global positioning system (GPS) to establish major control networks. The department surveyed conventionally 35 first-order traverse stations, and 3 astronomic Laplace stations. Meanwhile, the department established an adjusted network of 310 GPS stations in the North and the Northeast.

In respect of geodetic leveling, the RTSD ran two projects of first-order leveling. The first project is to densify the existing vertical control network in the South while the second one is to continue investigation of land subsidence in Bangkok.

The relative gravity data at a total of 679 stations were observed in the North and the South during the reporting period and others 17 stations were as well observed and connected by the Peninsular Malaysia Gravity Standardisation Net. The gravity data were also observed at 267 BMPs of First Order Leveling as part of the reported results.

Aerial Survey

Using three RTSD's aircraft, the department took aerial photographs for nineteen projects. Three projects were aimed to revise topographic maps. Seven projects were intended for national planning and developing by the Royal Household Bureau. The other projects were controled by the Royal Irrigation Department, the Electricity Generating Authority of Thailand, and the Department of Fishery.

The RTSD also supported aerial photographs and photomosaic to other government agencies. The department reproduced five-hundred thousand copies of 9"x9" paper photographs, almost twenty thousand copies of 30"x30" paper photographs, and two-hundred thousand copies of 9"x9" diapositives.

Topographic Mapping

The RTSD has constantly maintained two topographic map series : series L7017, 1/50,000 and part of series 1501, 1501A,

1/250,000. From 830 sheets of the first series, 381 sheets were revised using photogrammetric techniques with aerial photographs and 234 sheets were revised using projectors with SPOT satellite imagery. From 53 sheets of the second series, 19 sheets were revised.

In 1993, a new series, L7017S, was launched for general public use. This series was compiled and published along with the official series, L7017.

A complete set of automated mapping system was installed at the end of 1993. Four 1/50,000 topographic map were digitized and scanned initially as prototyped digital maps. Other 96 map sheets will be converted into digital maps by the end of 1994. The digital maps were intended not only for fast and flexible map production but also for GIS base layers.

Thematic Mapping

During the reporting period, the RTSD revised ten of fifty-two topics of the National Resources Atlas of Thailand and also revised the four-volume topographic atlas into the two-volume edition.

Two road maps were published. The first was Bangkok Metropolis map at the scale of 1/50,000 and the second was Thailand tourist map at the scale of 1/1,000,000.

Map Information Center

Geographic name collection of the Thai geographical name gazetteer was completed. The name list was at the approving process.

According to the National Board on Survey and Mapping, a national cartographic information center was approved and will be established soon at the RTSD.

Technical Assistance Program

During the reporting period, a number of Loatian officers were trained at the RTSD, Bangkok, under the Thai-Loatian technical assistance program as follows:

1. In 1992, five officers attended a photogrammetric mapping course.

2. In 1993, two officers attended a thirty-day map reproduction course and other two officers attended a thirty-day topographic survey course.

NATIONAL RESEARCH COUNCIL OF THAILAND

Thailand Remote Sensing Center (TRSC), an operational branch of the National Research council of Thailand, is the principal national remote sensing body and acts as the secretariat of the National Remote Sensing Coordinating Committee.

The TRSC operated a ground receiving station which received and processed Landsat TM, SPOT and NOAA HRPT data. The Center station was upgraded to receive and process ERS-1 SAR, MOS-1 and JERS-1 data.

Each year TRSC offers a grant of three million baht (about $US 120,000) to remote sensing application projects proposed by national researchers as a means to promoting the application of this technology in the country. In FY 1992 there were 10 projects funded under this grant.

In terms of technical support, the Center has digital image

analysis systems, geographic information systems, and an optical projector for providing support to various government agencies in the conduction of remote sensing projects.

DEPARTMENT OF LAND

During the reporting period, the Department of Land (DOL) carried out extensive cartographic activities mainly for Land Title Project. Main activities were summarized in Table 1.

Table 1. Activities completed by Department of Land, Bangkok during 1991 - 1993

ACTIVITY	UNIT	FY1991	FY1992	FY1993
1. Photomap Production				
- Rural area (1/4,000)	sheet	3,539	5,575	3,493
- Urban area (1/1,000)	sheet	1,167	309	1,852
2. Survey Control				
- Transit Doppler	station	161	50	0
- Navstar GPS	station	427	585	488
- Major control	station	0	3,669	0
- Minor control	station	64,021	56,128	69,374
3. Automated Mapping	sheet	669	1,449	2,058
Transformation	parcel	114,390	139,476	174,875
4. Title Issuance				
Ajudicated by				
- Ground survey	parcel	233,072	335,585	192,395
- Aerial photograph	parcel	86,915	100,014	100,215
- Certificate of Util.	parcel	218,355	164,607	168,600

DEPARTMENT OF LAND DEVELOPMENT

The Department of Land Development (DLD) set up the Land Information Center in 1992. The Center was equipped with one minicomputer, nineteen terminals and four workstations.

The DLD produced land holding maps, soil suitability maps, land use maps, and land use planning maps at the scale of 1/2,000 and 1/4,000 for farming planning level. During the reporting period, the DLD produced these maps covering areas of 250,000 rai (or 40,000 hectars) annually.

With the support by ICA commission on Education and Training, the department is arranging a seminar on "Cartography in the context of GIS" which will be held at the department in June, 1994.

AGRICULTURAL LAND REFORM OFFICE

Agricultural Land Reform Office (ALRO) produced large-scale topographic maps for feasibility study, construction design, and certificate of utilization. Maps for feasibility study were produced at the scale of 1/10,000 and 1/5,000 with 1 meter contour interval. Maps for construction design were produced at the scale of 1/1,000 and 1/500. Last, cadastral maps used for certificate of utilization (ALRO401K) were produced at the scale of 1/4,000. Table 2 summarized mapping work completed during 1991 - 1993.

Table 2. Mapping work completed by Agricultural Land Reform Office during 1991 - 1993.

CATALOG	UNIT	1991	1992	1993
Map for planning				
- Topographic maps	sq.km.	807.3	745.8	442.5
- Cadastral maps	sq.km.	3,349.7	1,826.4	7,296.8
Map for implementation				
- Road	km.	216.4	306.8	99.6
- Canal	km.	-	-	51.5

OFFICE OF AGRICULTURAL ECONOMICS

During the reporting period, the Office of Agricultural Economics carried out some activities on remote sensing and GIS. First, the Office produced provincial agricultural resources maps using Landsat TM imageries and visual interpretation technique. The production was completed in 1991. Second, the Office employed geographic information system (GIS) for agricultural development planning at provincial level. Third, the Office has conducted a pilot project "Rice Monitoring Using ERS-1 SAR Data in Karnchanaburi Province". Last, the Office held three training courses on remote sensing. The first two courses were designed for participants within the Ministry of Agriculture and Cooperatives. The another course was designed for Thai and neigbouring country participants.

ROYAL IRRIGATION DEPARTMENT

The Topographic Survey Division of the Royal Irrigation Department is responsible for survey and mapping for project planning, design, construction, and improvement of water resources development projects.

The department employed the global positioning system (GPS) in 1991 to establish major horizontal control stations. A total of 794 GPS stations were surveyed by the end of September, 1993.

Topographic maps were produced by both conventional ground survey method and photogrammetric method. The topographic maps which were produced during the period covered about 10,100 square kilometers.

The department used 1/4,000 scale rectified photographs to facilitate property boundary and spot height survey in the field. Property boundary and contour maps on overlay were produced for the design of on-farm development. Coverage area of photomaps within the reporting period is approximately 1600 square kilometers.

ROYAL FOREST DEPARTMENT

The progress of forest thematic mapping during 1991 -1993 are as follows:

1. Mapping used Landsat TM data

Existing forest maps of 1991 covering the whole country (forestal and non-forestal area) were interpreted by visual technique have been produced at the scale of 1/250,000 and 1/1,500,000. Forest landuse, forest type and its environment

maps were analyzed and classified by digital image processing technique (EASI/PACE & ILWIS) in Chiang Rai, Ranong, Nakhonratchasima, and Burirum.

2. Mapping used large-scale aerial photographs

Aerial photographs at the scale of 1/15,000 were used to interpret the forest types and then transfered these data to the base maps of scale 1/250,000 for producing the forest type maps. This activity has been continually done at the amount of 20,000 - 50,000 sq.km. annually. In 1991 these maps of Loei, Lampun, Nakhonsawan and Khon Kaen provinces were completed.

DEPARTMENT OF MINERAL RESOURCE

Various kinds of geologic and geophysics maps were pulished and available as follows:

1. Five sheets of Mineral and Natural Fuel Resources of Thailand at the scale of 1/500,000.
2. Hydrogeological maps at the scale of 1/100,000.
3. Airborne geophysics maps of the whole country:
   3.1 Magnetic Contour Map at the scale of 1/250,000 and 1/1,000,000.
   3.2 Radiometric Contour Map at the scale of 1/250,000 and 1/1,000,000.
   3.3 Resistivity Contour Map at the scale of 1/50,000
   3.4 Electro-Magnetic Profile Map at the scale of 1/250,000.

DEPARTMENT OF ENERGY DEVELOPMENT AND PROMOTION

The Department of Energy Development And Promotion produced topographic maps at three scales: 1/2,000 scale with 2-meter contour interval, 1/4,000 scale with 1- or 2-meter contour interval, and 1/10,000 scale with 2- to 5-meter contour interval.

There were 13 hydropower projects which required maps at the scale of 1/2,000 and other 13 electrical pumping projects which required maps at the scale of 1/4,000.

In addition, three projects which required maps at the scale of 1/10,000 were Chiang Rai Project, Nam Songkhram Project Phase-II, and Khong-Chi-Mun Project Phase II.

ELECTRICITY GENERATING AUTHORITY OF THAILAND

The cartographic works in Electricity Generating Authority of Thailand (EGAT) could be classified according to hydro-power projects, thermal power projects, and transmission line & substation projects.

Hydro Power Project

There were six hydro power projects studied during 1991 - 1993 : Pak Mun, Lam Ta khong, Nam Yuam, Kiritan, Phrom-tara and Mae La Mao Projects.

The EGAT produced and used various kinds of maps on the projects. RTSD's topographic maps at the scale of 1/50,000 and 1/250,000 were used for site selection. While EGAT's topographic maps at the scale of 1/500 and 1/1,000 were produced for dam structural design and resettlement, EGAT's topographic maps at the scale of 1/5,000 were produced at reservior areas for volume calculation, flood protection and reservior operation. Orthophotos which were produced by the EGAT were used mainly for environmental study and land properties. Finally, all maps could

be digitized and used in geographic information systems if necessary.

Thermal Power Project

There were five thermal power projects studied during the reporting period. They were Mae Moh, Rayong, Bang Pakong, Nam Phong and Wang Noi thermal projects.

The EGAT produced 1/500 to 1/1,000 scale topographic maps for power plant designing and constructing stages, and also produced 1/5,000 scale topographic maps for power plant water supply planning.

Transmission Line and Substation Projects

The EGAT surveyed and produced profile plans along transmission lines and topographic plots of substation areas. During the reporting period, total length of transmission line was 5,750 km. and total number of substations was 60.

BANGKOK METROPOLITAN ADMINISTRATION

The Bangkok Metropolitan Administration (BMA) launched a pilot project called Bangkok Land Information System (BLIS) in 1989 and completed the project in 1992.

The BLIS was set up with two main objectives. The first objective was to check the possibility of utilizing computers to aid urban engineering works on planning, operation and maintenance for water supply, telephone, electricity and urban development planning. The second objective was to train the personnels on the computer aided geographic information technology (GIS).

At the conclusion of the pilot project, it was convincing that the GIS would be useful to the BMA in almost every department. However, these departments will have to be guided into the use of computers, electronic data managment and also to become more systematic in the work proceedings.

The works done in the pilot project will be continued with two distinctive projects for the whole area of Bangkok : the aquisition of a digital base map at the scale of 1/1,000 and the aquisition of a digital base map at the scale of 1/10,000. The planning and implementation of the projects will be assisted technically by the Goverment of Canada and the University of Melbourne.
