

# DEVELOPMENT OF THE KENYA INSTITUTE OF SURVEYING AND MAPPING

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## ABSTRACT

Kenya Institute of Surveying and Mapping (KISM) was established in January 1996 under the project-type technical cooperation between Survey of Kenya, the Ministry of Lands and Settlement and Japan International Cooperation Agency (JICA). In addition, under the Japanese Government Grant Aid Program, construction of physical facilities and provision of equipment were completed in 1998.

KISM is implementing pre-service Diploma courses (three years) on land surveying, cartography, photogrammetry and remote sensing and map reproduction, and in-service Higher Diploma courses (two years) on land surveying, cartography and photogrammetry and remote sensing.

Shortage of qualified personnel is a common problem among the countries within the eastern and central Africa, which do not have good training institutions in surveying and mapping similar to KISM. Therefore, KISM, in conjunction with JICA, has offered Third Country Group Training Programmes on GPS Surveying and on GIS annually since 1998. Every year, fifteen participants from thirteen countries of the region have participated in both programmes respectively.

KISM also offers various short-term courses for people outside the Institute in the disciplines of surveying, mapping and information technology. In addition, KISM offers professional productive and consultancy services to meet the individual demand in all the sectors in the field of surveying and mapping.

In order to improve its technical capacity, KISM has conducted various research projects. Among those projects, the monitoring of crustal movement of Kenyan Rift Valley, promoted jointly with Hokkaido University in Japan, has been generating remarkable results to determine the spreading rate across the Rift Valley.

KISM project as the project-type technical cooperation was terminated successfully in September 2001. KISM is expected to continue, or expand, its capacity to undertake all these tasks with ease for its sustainability through the transition to a semi-autonomous institution.

## 1. INTRODUCTION

Surveying and mapping are the basic tools necessary for orderly national development. The precise maps, aerial photos and other geospatial data are indispensable for planning and implementation of development projects. Cadastral surveys are also vital to land development. They are the basis of land sub-division, consolidation, adjudication and registration. Delays in cadastral surveys might cause illegal squatters.

The production of up-to-date and accurate maps and promotion of cadastral surveys require well-trained manpower. In Kenya, like many other African countries, the number of the surveyors and mapping engineers with modern techniques and knowledge is far from being sufficient. H.E. Daniel Arap Moi, the former President of the Republic of Kenya, expressed his view that "Kenya needs to train one thousand surveyors every year" in 1987.

In order to solve this problem, the Government of Kenya requested a technical cooperation with Japan concerning the establishment of training organization in the field of surveying and mapping in 1992.

The cooperation between Kenya and Japan in surveying and mapping has a long history. In 1975, Japan International Cooperation Agency (JICA), an implementing body for the Official Development Assistance (ODA) by the Government of Japan, initiated a Study on Topographic Mapping in Eastern Kenya. A joint study team from a Japanese private surveying company and a public sector was formed and implemented the study. As the results of this study, 1:50,000 topographic maps that covered about 27,000 km<sup>2</sup> around Tsavo and Malindi areas were prepared.

This study was followed by a Study on Thematic Mapping in East Kenya (1981-1983), to prepare land use maps of above-mentioned areas, and a Study on Topographic Mapping in South Kenya (1987-1990) to prepare 1:50,000 topographic maps that covered about 30,000 km<sup>2</sup> around Mombasa.

As Japanese side considered that the technology transfer to the staff of Kenyan counterpart organization, i.e. Survey of Kenya (SOK) as an essential part of these studies, a number of SOK staff were invited to take training courses at the Geographical Survey Institute (GSI), a national mapping organization in Japan.

Before 1980, British experts from the Directorate of Overseas Survey (DOS) of the United Kingdom had stationed at SOK. After the termination of this scheme, Kenyan Government requested Japan to dispatch long-term experts to SOK. Japan responded to this request by sending a total of nine long-term experts on geodetic survey during the period of 1981 to 1991.

Technical training of the staff is of crucial importance for SOK. Although there were some training institutions on surveying and mapping in Kenya such as the University of Nairobi, the Kenya Polytechnic, and the Training School of SOK, SOK felt it necessary to strengthen a training facility to equip middle level staff with modern skills. Thus, this led to a proposal to Japan to establish the Kenya Institute of Survey Training in 1989. This proposal was materialized as a mini-project on Survey Training, i.e. a dispatch of a team of Japanese experts at the Training School of SOK during 1991 and 1994, targeting an enhancement of the training capacity of SOK for middle level staff. This project was successful in preparing curricula and syllabi on geodetic survey, photogrammetry and mapping, as well as implementing model one-year training courses.

Through these various programmes supported by JICA, the relationship between Kenya and Japan in the field of surveying and mapping, especially between SOK and GSI, grew stronger. From 1975 to 1993, 14 long-term (stayed for more than one year) and 12 short-term Japanese experts were dispatched to SOK, 35 Kenyan counterparts participated in training courses in Japan, and a number of surveying equipment such as total stations and printing machines were provided to SOK.

Based on this long-standing and multi-scheme technical cooperation between Kenya and Japan, Government of Japan decided to assist the establishment of the Kenya Institute of Surveying and Mapping (KISM) in 1994 in response to a request by the Government of Kenya.

## 2. FRAMEWORK OF THE KISM PROJECT

Kenya Institute of Surveying and Mapping is a technical training institute under the Survey of Kenya, Ministry of Lands and Settlement. The collaboration to establish KISM (KISM Project) started in October 1994 as a project-type technical cooperation funded by JICA. The project-type technical cooperation then was JICA's largest scheme for technical transfer, composed of dispatch of experts, acceptance of trainees and provision of equipment (See <http://www.jica.go.jp/english/index.html/>). Initially, KISM Project was agreed to continue for five years, and later extended by two years as follow-up cooperation until September 2001. This project was accompanied by a grant aid cooperation for construction of physical facilities and provision of equipment in 1996 and 1997.

Department of Surveys, or SOK, is a national mapping organization of Kenya, which is one of the four departments of the Ministry of Lands and Settlement. It is responsible for all sorts of surveying and mapping including cadastral surveys. Since KISM was established by expanding the facilities of the former Training School of SOK, KISM is designated as one of the six branches of SOK, as well as Administration, Cadastral Survey, Land Adjudication Survey, Geodesy and Computer Services and Mapping. SOK has also Provincial and District Survey Offices throughout the country.

KISM is located in the suburbs of Nairobi City, about a 20-minute drive from the city center along with other branches of SOK except for the top executives, Administration and Cadastral Survey which are located in the building of the HQs of the Ministry in the city center. (Fig. 1).

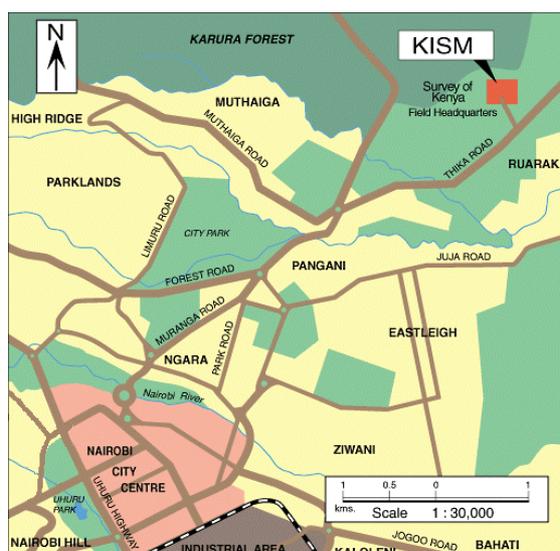


Figure 1. Location of KISM.

As the response of the request of the government of Kenya, JICA dispatched two missions, both headed by Mr. K. Nonomura, then Deputy Director General of the Geographical Survey Institute, a national mapping organization of Japan, to examine the feasibility and arrange the framework of cooperation in November 1993 and August 1994. The team had a series of discussions with the Kenyan authorities concerned. Both sides agreed to sign a Record of Discussion (R/D) and Minutes of Meeting (M/M) on 25th August 1994 as expressed in the Project Design Matrix (PDM) outlined below:

### **2.1 Overall Goal**

The required number of qualified officers in the fields of surveying and mapping will be satisfied;

### **2.2 Project Purpose**

The Kenya Institute of Surveying and Mapping (KISM) will be established as the training organization for fostering qualified officers in the fields of surveying and mapping;

### **2.3 Outputs**

- Organization for KISM is to be established;
- Appropriate training facilities and equipment are to be installed;
- Sufficient number of Kenyan lecturers for KISM are to be upgraded;
- Guidelines, curricula and syllabi for the following courses are to be developed;
  - Pre-service Diploma course
    - Land Surveying (Geodesy and Cadastral Surveying)
    - Cartography
    - Photogrammetry and Remote Sensing
    - Map Reproduction
  - In-service Higher Diploma course
    - Land Surveying (Geodesy and Cadastral Surveying)
    - Cartography
    - Photogrammetry and Remote Sensing
- Text books and teaching materials for the above-mentioned courses are to be developed;
- Precise training in the fields of surveying and mapping are to be established.

The Diploma course was planned to accept secondary school graduates with annual enrollment of 103 in a three-year curriculum. The Higher Diploma course was planned to accept staff of SOK with annual enrollment of 30 in a two-and-half-year curriculum.

Following external assumptions were identified to link the Project Purpose with the Overall Goal, which are beyond control of the Project;

- Successful candidates of national examination for Diploma shall be employed by the Survey Department or other related organizations;
- Successful candidates of national examination for Higher Diploma shall be retained by the Survey Department or other related organizations.

The project-type technical cooperation was evaluated at the final stage of the initial five-year period in July 1999. The evaluation team recommended implementation of follow-up cooperation to enhance KISM's sustainability, and R/D on the follow-up cooperation for an additional two years was signed to enable KISM not only to conduct Higher Diploma courses with properly trained instructors but also to enhance its sustainability.

The R/D on the project-type cooperation signed in 1994 states that the Kenyan side would take necessary measures to provide land, buildings and facilities for KISM, whereas M/M noted that Kenya had already requested grant aid from Japan for the building, facilities and equipment. Basic Design for the grant aid started in October 1994. After deciding on the initial design in 1995, some modifications were made so as to lower the maintenance cost, and the Exchange of Notes (E/N) was finally signed between the two governments in 1996.

During the period of seven-year cooperative project, JICA deployed 22 long-term and 47 short-term Japanese experts, accepted 34 training participants in Japan, granted the construction of the building that consisted of classrooms, laboratories, hostels etc., and provided necessary equipment such as GPS receivers, total stations, analytical stereo plotters, computers with GIS software, printing machines.

During the initial 5-year period, seven to eight long-term experts were stationed at KISM. Most of the experts were dispatched from GSI, the National Land Agency of Japanese Government or JICA HQs. In the follow-up period, the number of experts was reduced to five. (Table 1)



Table 2. Diploma Course Contents.

Course	Major Topics
Land survey	Land Law, Surveying Instruments, Topographical Surveying, Cadastral Surveying, Engineering Surveying, Survey Control
Cartography	Applied Cartography, Cartographic Reproduction, Topographic and Cadastral Cartography
Photogrammetry and Remote Sensing	Photogrammetry, Photogrammetric Instruments, Aerial Triangulation, Basics of Remote Sensing
Map Reproduction	General Printing Studies, Printing Science, Print Origination, Photomechanical Processes, Machine Printing, Print finishing
Common for all courses	Social Studies, Entrepreneurship Education, Communication, Mathematics, Physics, Geography, Computer Sciences, Industrial Attachment, Project Work

Table 3. Number of Students in the Diploma Courses.

Intake Year	Entrance		Stage			National Examination		
	Applicants	Admitted	1	2	3	Applicants	Successful	Pass Rate
1996	586	85	75	70	67	67	64	96%
1997	708	85	79	77	74	72	45	63%
1998	810	103	98	90	87	87	71	82%
1999	909	103	89	80	77	75	64	85%
2000	479	98	88	83	80	74	51	69%
2001	425	103	72	68	72			
2002	248	147	82	88				
2003	386	92	91					

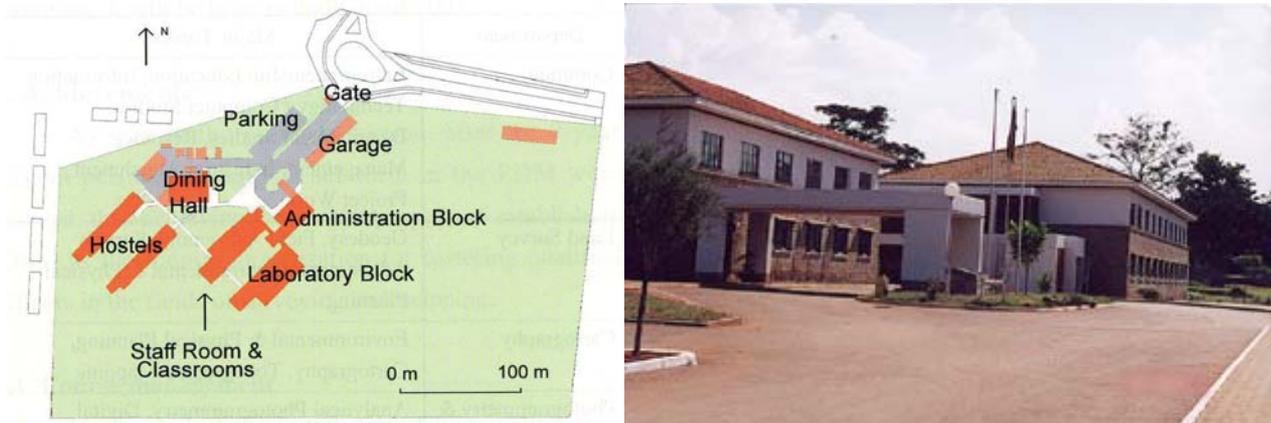


Figure 2. Plan of KISM Photo 1 Administration Block and Classrooms of KISM.

### 3.4 Higher Diploma Courses (1998 - )

Higher Diploma courses at KISM were the first of this kind in surveying and mapping fields in Kenya. Therefore, both the lecturers of KISM and the Japanese experts energetically tackled the development of the syllabi and curricula of the courses. Finally, KIE approved the syllabi in May 1998. Major Topics of each Higher Diploma course are shown in Table 4. Due to changes in education system in Kenya, the duration of Higher Diploma courses was shortened from two and a half years to two years only.

The Higher Diploma courses were opened in January 1998, one and a half year behind the initial schedule led by the delay of grant aid programme for construction of KISM buildings. Twenty-nine middle level staff of SOK were admitted to the first Higher Diploma courses in three disciplines; i.e. nine for Land survey, fifteen for Cartography and five for Photogrammetry and Remote Sensing. (Table 5).

Table 4. Higher Diploma Course Contents.

Course	Major topics
Land survey	Geodesy, Field Astronomy, Survey Adjustment, Environmental and Physical Planning
Cartography	Environmental and Physical Planning, Cartography, Topographic Mapping
Photogrammetry and Remote Sensing	Analytical Photogrammetry, Digital Photogrammetry, Remote Sensing Data Processing, Image Classification
Common for all courses	Entrepreneurship Education, Information Technology / Computer Studies, Development Studies, Resource Management, Industrial Attachment, Project Work

Table 5. Number of Students in the Higher Diploma Courses.

Intake Year	Admission	Stage		National Examination		
		1	2	Applicants	Successful	Pass Rate
1998	30	29	27	26	20	77%
1999	30	30	27	26	7	27%
2000	36	35	34	32	21	66%
2001	34	34	34			
2002	17	17				
2003						

### 3.5 Open Seminars (1998 - )

Commemorating the completion of the construction of KISM buildings, a Seminar on New Technology in Surveying and Mapping was held from 26 to 29 January 1998. More than 300 people participated in the seminar from various organizations such as the University of Nairobi, Kenya Polytechnic, Government ministries and local governments. Twenty papers were presented by Japanese short-term Experts, staff of University of Nairobi, lecturers of KISM etc..

Given the success of this seminar, other seminars and workshops were organized, including a GIS Seminar in August 1998, CAM Seminar in August 1999, a Remote Sensing Seminar in August 2001 and a Workshop on Application of Geospatial Information and GIS in March 2003.

In August 2000, a monthly KISM Seminar newly started as a forum for sharing information on new technology and dissemination the results of overseas training of KISM lecturers.

### 3.6 Third Country Training Programmes (1998 - )

Shortage of qualified personnel with an up-to-date technology in surveying and mapping is not only a problem in Kenya, but a common issue among the countries within the eastern and southern Africa, which do not have good training institutions as KISM.

In order to provide the training opportunity for the eastern and southern African countries, KISM has conducted two Third Country Group Training courses. Third Country Training Programme is one of JICA's cooperation schemes, where a counterpart country transfers technology obtained through a JICA programme to neighboring countries under the financial and technical support of JICA and the Kenyan Government. This is an efficient way of benefiting the technology transfer as much as possible, and provides a good opportunity for KISM lecturers to demonstrate their command of transferred technology.

Third Country Group Training course on GPS Surveying has been conducted annually since 1998. It is needless to mention that GPS survey has become a standard tool for geodetic survey. Responding the increasing demand for GPS training in eastern and southern African countries, KISM requested the implementation of a Third Country training course on GPS Survey to JICA, which was accepted in 1998. Objectives of the course were designated as to; Understand the fundamental theory of Global Positioning System; Appreciate the wide applications of GPS; Carry out GPS surveys using Static, Kinematics and Stop and Go Surveys; Carry out GPS surveying for various applications; Carry out GPS data processing in their respective countries on various GPS projects. Fifteen surveyors from twelve countries participated the first course for three weeks in November and December 1998. With a little help from Japanese long-term and short-term Experts, lecturers of KISM made all the textbooks for the course, and gave most of the lectures, which were highly evaluated by the participants.

Since 1999, this programme has been implemented in August when the Diploma and the Higher Diploma students are in mid-term breaks. Every year, fifteen participants from eight to twelve countries of the region have participated in this course (Table 6). This course was designed to be continued annually for five years, and successfully completed in 2002. However, neighboring countries strongly request further continuation of the training of GPS. Therefore, KISM is requesting JICA to expand this programme for another five years.

Table 6. Number of Participants in the Third Country Group Training Course on GPS Survey.

Country	1998	1999	2000	2001	2002
Botswana	1	1	1	1	1
Ethiopia	1	1	0	1	1
Kenya	3	3	4	3	3
Lesotho	1	0	0	1	1
Malawi	1	1	2	1	1
Mauritius	1	1	0	0	1
Namibia	1	1	1	1	1
Seychelles	1	1	0	1	1
Swaziland	1	1	1	1	1
Tanzania	1	2	2	2	2
Uganda	2	2	2	2	1
Zambia	1	1	2	1	1

In August 2001, KISM started another Third Country Group Training Course on GIS. The number of participants and the invited countries of this course are the same as GPS course. Objectives of this course were to; Understand the concepts in GIS and spatial data; Create spatial data from maps; Carry out GIS analysis; Carry out various data presentation. It will be held annually until 2005.

Table 7. Number of Participants in the Third Country Group Training Course on GIS.

Country	2001	2002
Botswana	1	1
Ethiopia	1	1
Kenya	3	3
Lesotho	1	0
Malawi	1	1
Mauritius	1	1
Namibia	1	1
Seychelles	1	1
Swaziland	1	1
Tanzania	1	2
Uganda	2	2
Zambia	1	1

Based on the successful experiences of these courses, KISM considers expanding the Third Country Training courses to other disciplines. Thus, KISM is requesting JICA's support for starting another course on Remote Sensing for Mapping.

### 3.7 Accepting Foreign Students (2003 - )

Although Third Country Training Programmes are providing a good training opportunity for eastern and southern African countries in terms of GPS and GIS, it is obvious that these programmes are not enough for the participants to acquire overall knowledge on surveying and mapping. KISM has expressed that it is ready for accepting foreigners as students of Diploma courses, but practically there had been no foreign students.

In November 2002, the Principal of KISM and a Japanese Expert visited the Department of Lands and Surveys of Uganda and discussed on the possibility of accepting the staff of the Department as the trainee of KISM with the Commissioner of Lands and Surveys, Uganda. Consequently, KISM accepted one of the staff of Department of Lands and Surveys of Uganda as a student of Map Reproduction Diploma course starting from January 2003.

KISM wishes to extend the cooperation with surveying and mapping organization of other countries in the region through accepting their staff to become a regional training institute.

### 3.8 Short-term Courses (2000 - )

April, August and December are mid-term breaks for KISM. Using the vacant capacities of lecturers and classrooms of these breaks, KISM has been providing short-term courses in Information Technology, Land Survey, GPS and GIS since April 2000. Participants of these courses are from various Ministries, public organizations and private sectors. Information Technology and GIS courses are especially popular.

### 3.9 Professional Services

KISM offers professional productive and consultancy services to meet the individual demand in all the sectors in the field of surveying and mapping. Consultancy services include all kinds of surveying and mapping work and its applications. Production services include field surveying, mapping, map printing, sales of aerial photographs, textbooks and so on (Photo 2).



Photo 2. Some Examples of KISM Products.

## 4. RESEARCH ACTIVITIES OF KISM

Research activities are vital for a training institute to catch-up the development of technology and improve the training skill of its staff. From this point of view, Kenyan Government requested to establish so-called the Kenya Survey Institute of Training and Research at its initial proposal. However, through the discussion concerning the establishment of the Project in November 1993, both side agreed that the purpose of Project be concentrated on establishment of training facilities, considering the effectiveness of the Project.

Despite this decision, KISM voluntarily has conducted various kinds of research activities since its establishment, aiming to improve the ability of KISM lecturers through practical work.

The following are the themes of major research activities of KISM:

- Determination of transformation parameters between local (Clarke 1880) and global geocentric reference systems for GPS survey (1996)
- Production of Nairobi National Park Guide Map (1996 – 1999)
- Accuracy assessment of DCW – DEM one-kilometre grid elevation data (1996)
- Joint research with three Japanese universities on crustal movement of the Rift Valley by GPS observation (1998 - )
- Determination of GPS coordinates of airports in Kenya (1997 – 1998)
- Production of a city map of Nairobi and its environment (1998 - )
- Production of Lake Nakuru National Park Map (1999 - )

Among these, the joint research on monitoring of crustal movement of the Rift Valley has been generating remarkable results to determine the spreading rate across the Valley. This joint research was started in February 1998. It has been jointly sponsored by KISM and a Consortium of three Universities in Japan including Hokkaido, Tohoku and Hiroasaki. The Hokkaido University mainly finances and coordinates the research, and KISM mainly operates the monitoring. Ten GPS stations, six continuous and four periodic were established in safe areas and mostly on the rooftops of stable building. Preliminary result of the initial three-year observation and analysis indicates that the Rift Valley is spreading at a rate of 5 – 10 mm/year.

Production of Nairobi National Park Guide Map brought another remarkable achievement. It was completed in 1999, and is sold for 500 Kshs or about 7 USD. It is a dual-sided map at the scale of 1:40,000 covering all area of the Park with the explanation of the Park and animals on opposite side. All the production works including, control point survey, stereo plotting, compilation, and printing, were carried out by the staff of KISM. It is useful for visitors to Nairobi National Park.

## **5. ACHIEVEMENTS**

After the 7-year project period, all of the outputs set forth in the PDM were realized, thus achieving the project purpose of establishing KISM as the training organization for fostering qualified officers in the fields of surveying and mapping.

By the end of the initial project-type cooperation, September 1999, it was clear that the establishment of Diploma courses was successful. This was shown by the fact that 96% of the first Diploma students who graduated in December 1998 passed the national examination. As shown in Table 3, the pass rates of the Diploma graduates remain kept high. It suggests that KISM has already acquired a sustainable capacity to foster qualified pre-service Diploma level surveying and mapping engineers.

At that time, it was not possible to evaluate the achievement for the Higher Diploma courses because the firstly enrolled students of the courses had not completed their two-year training due to the delay of the start of the courses. Therefore, improvement of Higher Diploma courses was set forth as one of the objectives the follow-up cooperation. At the end of the project, September 2001, the Kenyan side was able to manage both courses with minimal assistance from Japanese Experts. According to the pass rates of the Higher Diploma graduates shown in table 5, performance of the 1999 incoming students is relatively low. The main reason for this is poor performance in mathematics, which was not assisted by Japanese Experts.

Successful management of the Third Country Training in GPS and GIS also confirms KISM's establishment as a training institute, and the good evaluation from participants of these courses indicates the future direction of KISM as a regional training center for surveying and mapping.

Another proof of the technical command of staff of KISM is their presentations at international conferences. Following papers have been presented:

- Accuracy Assessment of DCW-DEM one-kilometre mesh elevation data (International Cartographic Conference, Stockholm, Sweden, 1997)
- Observation of Crustal Movement of the Rift Valley by GPS (American Geophysics Union, Boston, USA, 1999)
- Informal Settlement Analysis Using GIS (AFRICA GIS, Nairobi, Kenya, 2001)
- KISM Project (AFRICA GIS, Nairobi, Kenya, 2001)
- Preliminary Report on Geodetic Measurements in the Kenyan Rift Valley (UN/USA Regional Workshop on the Use and Application of Global Navigation Satellite Systems, Lusaka, Zambia, 2002)
- Training on GPS Surveying at Kenya Institute of Surveying and Mapping (UN/USA Regional Workshop on the Use and Application of Global Navigation Satellite Systems, Lusaka, Zambia, 2002) (

## **6. CHANGES IN SOCIAL ENVIRONMENT AND KISM'S MEASURES**

Although the initial project purpose was achieved successfully, unexpected changes in social environment of Kenya might prevent the achievement of the overall goal and threaten the sustainability of KISM.

When KISM Project started, it was expected that graduates of KISM Diploma courses would be hired by SOK. However, that expectation has not applied so far due to the current strict government policy of reducing the number of government employees. Therefore, to achieve the overall goal of the Project, employment of the Diploma graduates by related organizations in the private sector will be necessary.

In order to attract people from private sectors and provide information on KISM to promote employment of KISM graduates, a seminar to commemorate the completion of the project was held in July 2001. Aiming at the same, KISM holds an Open Day annually. First Open Day was held in July 2001 with some 300 visitors.

Besides, KISM set up a web page in 1999 at <http://kism.iconnect.co.ke/index.htm>.

Thanks to such activities, about 20% of Diploma graduates have found jobs in the private sector so far.

Another major change in social environment is the pressure towards semi-autonomous status. Following the policy directives on structural reform by the World Bank and IMF, the Government of Kenya started to reform the public sector.

As a part of the reform, Ministry of Lands and Settlement proposed to change KISM to a semi-autonomous status in 1998. As a semi-autonomous organization, KISM would be mandated to generate income for its operation, while the government would provide it with salaries for its personnel. At the request by the Ministry, the Department of Personnel Management set up a team to make a report on semi-autonomous status of KISM in 2001, and the team submitted a draft report in 2002. In 2003, KISM established a Steering Committee on KISM Way Forward to discuss on the necessary measures to cope with transferring its status.

After semi-autonomy of KISM was proposed, KISM was forced to look for a means to increase revenues besides tuition fees. Currently, printing work, short-term courses, and sales of maps are the major additional sources of revenue. KISM is seeking to expand the sources from professional productive and consultancy services such as GIS design, GPS survey, conventional field surveying, mapping, map digitizing, map printing, sales of aerial photographs, textbooks etc..

## **7. CONCLUSION**

After seven-year project-type technical cooperation associated with the grant aid programme, KISM has become a well-established college-level training institution for surveying and mapping in Kenya. Through Third Country Training programmes, KISM is also serving as a regional training institution for eastern and southern African countries.

Experiences gained from the implementation of the project are valuable because this is the first project-type cooperation in the surveying and mapping fields assisted by Japan. These experiences are expected to further promote surveying and mapping activities in Kenya and to be widely applied to other countries for their national development.

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## Biography

Mr. Une has been serving as an Advisor for the Kenya Institute of Surveying and Mapping and the Survey of Kenya since May 2002.

He was born in Tokyo, Japan in 1958. After graduating from the Department of Geography, Faculty of Science, University of Tokyo in 1981, he was hired by the Geographical Survey Institute, Ministry of Construction, Government of Japan, and started his career as a cartographer. He has served as the Head of Information Systems Division, Head of International Affairs and Head of the Third Geographic Division. From 2000 to 2002, he was the Director for Environmental Geographic Information and worked for the Secretariat of International Steering Committee for Global Mapping. In May 2002, he was dispatched to Kenya as a JICA Expert in the field of surveying and mapping. Since then, he has worked as an Advisor for both the Kenya Institute of Surveying and Mapping and the Survey of Kenya.

His spatiality covers from geomorphological mapping, land use mapping, hazard mapping, Geographic Information Systems to Global Mapping.

He is a member of the Japan Cartographers Association, the Association of Japanese Geographers, etc.