

PHOTOGRAMMETRIC TRAINING IN SURVEY OF INDIA - A REPORT

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ABSTRACT

Survey of India introduced organised training in 1950s. It was in 1970, that the Survey Training Institute (STI) in its present form under Ministry of Science & Technology came into existence with the assistance of UNDP. The Institute offers about 50 basic, refresher, advanced and user-oriented courses in various disciplines of surveying and mapping. There are four courses devoted solely to Photogrammetry. In addition, there are four courses with a large component of Photogrammetry and 18 courses with low component of Photogrammetry. Advanced Course is of one year duration while the rest are for 3 to 6 months duration.

So far, in the field of Photogrammetry, about 80 have been trained at executive level, 60 at supervisory level and 800 at operator level. With the help of this manpower and around 160 machines, mapping has been completed on 1:50,000 scale in a period of 20 years. Photogrammetric training continues to be organised to meet manpower needs for 1:25,000 mapping and other commitments. To keep pace with technological developments, STI had introduced Integrated Digital Mapping Production System (IDMPS) Course and initiated restructuring of courses. The main objective of this paper is to present brief details of the efforts being made by Survey of India in organising training programme to meet the training needs in the field of Photogrammetry.

KEY WORDS: Training, Photogrammetry, Modernisation.

INTRODUCTION

Balanced regional development through decentralised planning is a part of Directive Principles of the Indian Constitution. Increasing demands for land-related information are giving rise to new challenges for the national Surveying and Mapping Agency, i.e. Survey of India. In U.S.A. between 1950 and 1980 the percentage of workers engaged in information jobs increased from 70% to around 85% (Groot R, 1990). In India, the work force engaged in information jobs can be estimated to be less than 20%. As per figures of 1980, Europe has mapping coverage of more than 90% on 1:25,000 and larger scale as compared to 11% in Asia (without USSR). It is, therefore, necessary to develop the mapping information base on a larger scale in India to aid the planning and development process.

Human resources development is a major task in any organisation. A human being is a source of ideas, decisions, actions, innovations and many others. Having recognised this need for human resource development to meet Land Information needs, Survey of India introduced formal training programmes in 1950s. Survey Training Institute (STI) in the present form came into existence in Survey of India under the Department of Science & Technology, Government of India, in 1970 with the assistance from United Nations.

This Institute, a major training centre in Asia is located inside a sprawling lush green campus spread over 40 hectares of land. Pilot Map Production Plant with modern Reproduction Unit, Research & Development Directorate and Digital Mapping Centre located in the same campus have improved the effectiveness of Survey Training Institute.

SURVEY TRAINING INSTITUTE (STI)

The mission of the Institute is to develop and nurture human talent and skill in the fields of acquisition, processing and presentation of earth's spatial information mostly in graphic form.

In pursuance of this mission, STI offers about 50 basic, refresher, advanced and other user-oriented courses in various disciplines of Surveying and Mapping including Management with emphasis on survey management. Eleven courses out of these are run more than once in a year. Most of the Courses in STI are mainly meant for meeting the inhouse training needs in Survey of India.

The entire country has been mapped on 1:50,000 scale in 20 years during the period from 1965 to 1985 covering about 5,000 sheets. This was possible because of the adoption of Photogrammetry and appropriate use of around 160 photogrammetric machines and organised systematic training in Photogrammetry.

STI has five units under it, each entrusted with the responsibility of imparting training mainly in a particular discipline. One such unit is for imparting training through Photogrammetric courses.

The courses offered by STI are shown in the Annexure (STI Training Programme, 1992). Four courses have high component and 18 courses low component of Photogrammetry content as indicated in the same Annexure.

The position of in-house training provided so far in the four Photogrammetry courses is given in Table-1.

Table-1 showing position of in-house training in Photogrammetry at Survey Training Institute, Survey of India:

Course Number and Name	LEVEL			Total
	Execu- tive	Super- visor	Operator	
710 Advanced Photogrammetry	80	40	-	120
560 Photogrammetry Technologist	-	12	65	77
450 Photogrammetry Control Supervisor	-	2	169	171
445 Photogrammetry Operator	-	6	565	571
TOTAL:	80	60	799	939

In Survey of India, there is a strength of about 3000 technical manpower inclusive of all levels but excluding about 1500 employed on non-photogrammetric jobs like drafting and others. A fair number of personnel trained in photogrammetry have retired. About 20% of the technical manpower trained in photogrammetry is available for productive work.

The break-up of theoretical and practical content of the four photogrammetric courses is shown in Table-2.

Table-2 showing content break-up of 4 Photogrammetric Courses at Survey Training Institute, Survey of India.

Course No.	Duration	Photogrammetry		Other subj- ects	Total
		Theory	Prac- tical		
710	1 year	28%	49%	23%	100%
560	8 months	29%	52%	19%	100%
450	3 months	35%	65%	-	100%
445	3 months	14%	86%	-	100%

REQUIREMENT OF TRAINED MANPOWER

Based on the reports published by the Planning Commission, Government of India, the requirement of trained manpower in the utilisation of Remote Sensing technology in different fields like Agriculture, Geology, Forestry, Water Resources, Urban & Rural Studies, Oceanography, Soil & Land Uses works out to two thousand per year in

India (Planning Commission, 1988). This requirement is mainly for thematic mapping of medium and small scales which depend to a great extent on photogrammetrically produced topographical maps. Large scale surveys are carried out for Urban Development, Irrigation Projects, Town Planning, Cadastral records and others based on aerial photography. For cadastral and urban surveys, the normal scales of surveys/maps range from 1:4,000 to 1:8,000. The magnitude of cadastral surveys can be gauged from the fact that large scale surveys are required for about 5,76,000 villages in India covering an area of about 160 million hectares. Urban area requiring large scale maps is around 53,200 sq.km. If these large scale surveys required for various planning and development purposes are to be completed in a period of 10 years using photogrammetric methods, the requirement of trained manpower works out to approximately 3,000 per year.

The programme of completing topographical surveys on 1:25,000 scale covering about 19,700 sheets was taken up in late 1970s. By 1990, only 40% of the sheets could be completed. This task also needs substantial strengthening of photogrammetric potential including the training component.

The capacity of STI for training in Photogrammetry at different levels per year is about 120. A few universities are also offering Postgraduate programmes in Photogrammetry. This number is not only small but the knowledge gained in university atmosphere lacks practical orientation. Thus, it can be seen that there is a very wide gap between requirement of trained manpower and the manpower being trained at present.

According to a Departmental Report, the potential of Survey of India was found to be one-third the survey demands (Government of India Report, 1984). With the establishment of two Digital Mapping Centres and one Modern Cartographic Centre, with emphasis on restructuring training, there is hope that this mismatch would improve.

MODERNISATION

STI had always been alive to the technological and other changes taking place in the field of Surveying and Mapping. In view of the emerging digital environment, restructuring of STI courses has been attempted as a part of ITC-STI Modernisation Project in 1990. The rationale behind the idea of restructuring the courses was to introduce appropriate modifications in the curriculum to meet the rising demands in the country for correct, upto date and appropriate information needed for resource management. Restructuring was also intended to strengthen STI to fulfill its aim of educating Survey of India personnel in coping with the changing scenario. The course curriculum Board summarised the objectives of restructuring as follows:

- to prepare the trainees to make judgement and choices as to equipment, production processes and staff development in all disciplines contributing to the production of maps and other geo-information products.

- to ensure that the trainees master their particular discipline, in an integrated map and geo-information production perspective.
- to prepare the trainees to work within the particular culture of Survey of India with regard to surveying and mapping practices.

Some of the suggestions that came out are:

- i) Introduction of short refresher courses on DEM data acquisition and processing for 2 months for Executive level Officers in Survey of India.
- ii) Introduction of appropriate topics on computer technology with emphasis on Computer Assisted Cartography. The idea is to incorporate changes needed for switching over from Analogue Systems to Digital Technology.
- iii) Introduction of topics concerning image processing and use of Remote Sensing Data.

As a part of modernisation programme, a large number of existing Photogrammetric Analogue Plotters are being upgraded as Digital Work Stations by installing Encoders through indigenous technology. This would give a boost to the contemplated change from Analogue to Digital environment on a wider scale in the whole organisation.

In order to attract officers with talent and aptitude in teaching, a package scheme of incentives has been introduced in the department. This consists of 30% of salary as special training allowance, provision for accommodation on priority basis, choice of posting on completion of tenure in STI and other concessions.

IDMPS COURSE

With the emergence of computer applications in the field of Surveying and Mapping, a special course i.e. Integrated Digital Map & Geo-information Production System (IDMPS) Course has been introduced in STI in collaboration with Institute of Aerospace Survey & Earth Sciences (ITC), The Netherlands. The first course of one year duration started in January, 1990 consisted of 7 officers from Survey of India and 2 from other organisations. The following are the objectives of this course:

- i) to design and to establish an integrated Digital Map & Geoinformation Production System appropriate to an organisation.
- ii) to create data base for geoinformation system.
- iii) to utilise a geoinformation data base of other organisations.

Being an integrated course it encompasses important aspects of Photogrammetry, Geodesy, Cartography, Cadastral Survey and Thematic Applications at post-graduate levels making it the only course of its kind in India. Those successfully completing the course can create a Digital Data Base and a Geographic Information System (GIS) with thematic overlays for specific applications. The course participants make good use of satellite data obtained from Remote Sensing Satellites for image processing.

CONCLUDING REMARKS

The present training available in Survey of India meets only a fraction of the requirement in terms of numbers. The geoinformation needs for various planning and development projects are too huge as brought out in various published reports. Therefore, there is an urgent need to design new short-term and long-term courses for in-house training and also to meet the photogrammetric needs in other organisations. The present efforts of restructuring of STI as a part of modernisation programme needs to be further strengthened by expansion through phased recruitment. There is a great potential for STI to be shaped into a leading Institute of Photogrammetry and other allied subjects to effectively cater to human resource needs in this subcontinent.

REFERENCES

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ANNEXURE SHOWING LIST OF COURSES AT SURVEY TRAINING INSTITUTE, SURVEY OF INDIA, HYDERABAD-INDIA

Sl. No.	Course No.	Name of the Course	Duration	Fee (US \$ approx.)
BASIC COURSES				
1.	500	Surveying Engineer	2 years	\$ 2000
2.	400	Surveying Supervisor	2 years	\$ 2000
3.	270	Control Surveying Computation	1 year	\$ 1000
4.	200	Control Surveying Technician	1 year	\$ 1000
5.	150	Surveying Technician	23 months	\$ 1500
6.	140	Cartography Technician	1 year	\$ 100
ADVANCED COURSES				
7.	750	Integrated Digital Map Production System	1 year	\$ 250
8.	740	Advanced Cartography	1 year	\$ 150
9.	710	Advanced Photogrammetry	1 year	\$ 200
10.	700	Advanced Geodesy	1 year	\$ 400
11.	630	Advanced Map Reproduction	3 months	\$ 150
GEODESY AND COMPUTER COURSES				
12.	670	Computer Programming for Group 'A' Officers	6 weeks	\$ 50
13.	570	Computer Programming	3 months	\$ 100
14.	470	Geodetic Surveying	6 months	\$ 400
15.	460	Electromagnetic Distance Measurement	11 weeks	\$ 350
16.	370	Computer Applications for Administration & Financial work	2 months	\$ 50
PHOTOGRAMMETRY COURSES				
17.	560	Photogrammetry Technologist	6 months	\$ 100
18.	555	Photogrammetry for Geologist	2 weeks	\$ 50
19.	554	Aerial Photo Interpretation and Basic Photogrammetry	3 weeks	\$ 50
20.	450	Photogrammetry Control Surveying	3 months	\$ 150
21.	445	Photogrammetry Operator	3 months	\$ 100
CARTOGRAPHY COURSES				
22.	640	Scribing for Group 'A' & 'B' Officers	3 weeks	\$ 40
23.	540	Cartography Technologist	6 months	\$ 100
24.	475	Scribing for Division I	4 weeks	\$ 50
25.	440	Cartography Supervisor	3 months	\$ 50
26.	275	Hill Shading	2 months	\$ 50
27.	250	Scribing for Division II	9 weeks	\$ 75
28.	161	Cartography	2 months	\$ 50
DIGITAL MAPPING COURSE				
29.	660	Digital Mapping for Users	6 months	\$ 100
MAP REPRODUCTION COURSE				
30.	430	Map Reproduction Supervisor	3 months	\$ 150

REFRESHER COURSES

31.	495	<i>Refresher Course for promoted Group 'B' Officers</i>	<i>3 months</i>	-
32.	480	<i>Middle Level Supervision</i>	<i>3 months</i>	\$ 50
33.	350	<i>Control Surveying</i>	<i>4 months</i>	\$ 400
34.	340	<i>Short Control Surveying Refresher</i>	<i>6 weeks</i>	\$ 250

MINE SURVEYING, CADASTRAL AND TOWN PLANNING COURSES

35.	510	<i>Cadastral Surveying</i>	<i>2 months</i>	\$ 200
36.	461	<i>Mine Surveying</i>	<i>14 months</i>	\$ 400
37.	415	<i>Command Area Development Surveying</i>	<i>4 months</i>	\$ 400
38.	410	<i>Cadastral Surveying Supervisor</i>	<i>6 months</i>	\$ 500
39.	405	<i>Town & Large Scale Surveying</i>	<i>6 months</i>	\$ 500
40.	330	<i>Civil Engineering Surveying</i>	<i>6 months</i>	\$ 500
41.	310	<i>Cadastral Control Surveying</i>	<i>6 months</i>	\$ 500

OFFICE MANAGEMENT AND SURVEY MANAGEMENT COURSES

42.	820	<i>Survey Management (Senior Level)</i>	<i>2 weeks</i>	\$ 25
43.	720	<i>Human Resources Management (Senior Level)</i>	<i>1 month</i>	\$ 50
44.	620	<i>Survey Management (Executive Level)</i>	<i>1 month</i>	\$ 50
45.	550	<i>Survey Management (Supervisor Level)</i>	<i>3 weeks</i>	\$ 30
46.	530	<i>Office Management</i>	<i>2 weeks</i>	\$ 25
47.	520	<i>Stores Management</i>	<i>2 weeks</i>	\$ 25
48.	115	<i>Office Management (Junior Level)</i>	<i>5 weeks</i>	\$ 30
49.	110	<i>Office Procedure</i>	<i>4 weeks</i>	\$ 40

SURVEY SEMINAR

50.	800	<i>Survey Appreciation Seminar</i>	<i>1 week</i>	\$ 40
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NOTE: Courses with high component of Photogrammetry are in bold type and low component in italics.