

CAPACITY BUILDING IN GEO-INFORMATION SECTOR (A CASE OF KATHMANDU UNIVERSITY)

Subash Ghimire

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Abstract: Capacity building in Geo information is the empowerment that encompasses the ability, skills to initiate, manage, undertake, organize and evaluate Geo-information activities. The capacity building includes major elements such as education, training, research, informal approaches such as networking, refresher courses, seminar/ conference. This paper aims to highlight the role of Kathmandu University (KU) for capacity building in Geo information sector in Nepal. It is committed to develop a center of excellence in Geo- information sector by providing quality education, research, training etc. Kathmandu University, Geomatics Engineering program has collaboration with academic and nonacademic organizations to strengthen the quality of geo-information education, research and internship. KU has also planned for the capacity building of faculty and students through its faculty development plan and student exchange program with other collaborating Universities. Geo spatial lab and other important advanced survey; Geodesy, remote sensing, photogrammetry lab etc. will be developed in near future at KU premises. LMTC and KU are also jointly establishing the necessary infrastructure required for the Geomatics Engineering program in the vicinity of these two organizations.

1 INTRODUCTION

The capacity building in Geo information sector is the empowerment which encompasses the ability, will and skills to initiate, plan, manage, undertake, organize, budget, monitor/supervise and evaluate Geo information activities. The capacity and capability building are related to the organizational and functional levels as well as to individuals, groups and institutions. The capacity building includes major elements such as Education, training, research, informal approaches

like networking, refresher courses, seminar/ conference. Institutional capacity building includes networking (Collaborations), Development of infrastructure and human resources. In this context, Kathmandu University (KU) is playing an important role on capacity building in Geo information sector.

KU is an autonomous, not-for-profit, non - government institution dedicated to maintain high standards of academic excellence and is located in Dhulikhel Municipality, about 30 kilometers east of Kathmandu.

It is committed not only to develop leaders in professional areas through quality education but also to develop as a centre of excellence in education and research. KU has successful collaboration with more than fifty universities and institutions. KU offers various graduate and undergraduate courses in different discipline through its seven schools; School of Engineering, School of Management, School of Science, School of Arts, School of Medical Sciences, School of Education and School of Law. Geomatics Engineering program is under the Department of Civil and Geomatics Engineering within the umbrella of School of Engineering. On the basis of Memorandum of Understanding signed-in between School of Engineering, Kathmandu University and Land Management Training Centre (LMTC) in 2007, 2011 and 2015, KU is conducting a four year BE course.

2 GEOMATICS ENGINEERING EDUCATION

Kathmandu University, Geomatics Engineering program is successfully running following programs in its central premises at Dhulikhel, Nepal.

2.1 Diploma in Geomatics Engineering

KU has started Diploma in Geomatics Engineering (3 year's course) from 2015 in collaboration with LMTC and CTEVT and is running under the framework of MoU signed among KU, LMTC and CTEVT. The total intake of the student is 48. The students are selected based on the competitive entrance exam and interview.

2.2 Bachelor in Geomatics Engineering

The first and second memorandum of Understanding (MoU) between KU and LMTC under the framework of which the Geomatics program has been running is now completed and the new MoU has been signed on 2015. Under the previous MoU, Ministry of Land Reform and Management had already provided financial support for 7 years for four batches. In this case 75% of total fee was waived out for 24 students. In the second MoU, a 100% tuition fee is waived for two students from government employee in the engineering services under survey group category, a 50% fee is waived for eight students from four Development Regions except the central regions of Nepal and 33% of tuition fee is waived for 10 students passing the Kathmandu University Common Admission Test (KU-CAT) entrance exam on merit basis. In third MoU, 35% scholarship of total tuition fee is provided to 20 students from all development regions, 4 students from each development region.

The first, second, third, fourth and fifth batch Geomatics Engineers are now in the market. The current status of the number of students with category is tabulated as follow.

Table 1: Number of students in Bachelor in Geomatics Engineering at KU

Batch	Year	Female Students	Male Students	Total Students
2015	1st year	4	25	29
2014	2nd year	6	22	28
2013	3rd year	5	21	26
2012	4th year	0	33	33
Total enrolling students		15	101	116
2007-2011 GE Alumuni	1st - 5th batch	16	105	121

The students will carry out the internship for one and a half months in Geo information industry, engineering project works and field survey almost three and a half months during the study period. In the internship, students are sent in different organizations to carry out the real Geo information activities.

2.3 Master and PhD program in Land Administration

KU is also running two year's master degree program in Land Administration since 2013 in collaboration with LMTC. The main aim of running Master in land Administration course is to produce graduate level highly skilled and qualified professionals in the field of land Administration and to conduct and promote research and development activities in the field of land administration and management. The market study was carried out in 2010 and implementation plan was drafted in 2011 to start the master program. Land administration program at KU consists of multidisciplinary courses so that the intake will be from multidisciplinary background. The Government of Nepal has approved 100% scholarship to 10 candidates for government employee up to four batches. The financial aid is also available to selective full paying students in the form of graduate teaching assistantships as per the requirement of the Department.

The total nine (9) out of 12, Master in Land Administration students were recently graduated in 2015 and five students are enrolled in 2014 batch. The Memorandum of Understanding (MoU) between Kathmandu University, School of Engineering, Nepal and University of Twente, Faculty of Geo-Information Science and Earth Observation, the Netherlands had already been renewed to run the Land Administration program. Similarly, MoU is signed between Kathmandu University and Changan's University for strategic partnership in land Administration. KU is also running PhD course in Land Administration in

collaboration with UT/ITC, the Netherlands. KU is also planning to start B. Tech. Ed. in surveying in undergraduate level in collaboration with LMTC.

3 ACADEMIC AND APPLIED RESEARCH

The following academic and applied research has been carried out by Geomatics engineering program of Kathmandu University

Developing land valuation model for land acquisition focusing on livelihood supported by KU and NAST

Estimation of above ground biomass by using UAV funded by ICIMOD

Strengthening Geospatial Infrastructure and Research Capacity at Kathmandu University funded by ICIMOD

Developing Demonstration Model to Revive Springs for Enhancing Rural Water Security funded by Oxfam.

Land Surface temperature change analysis of Kathmandu Valley using Landsat images funded by UGC.

4 TRAININGS

The various training organized by Kathmandu University for Geo information sector is discussed in following sections.

4.1 UAV Training

Geomatics Engineering Program of Kathmandu University (KU) hosted 3 day Unmanned Aerial Vehicle (UAV) training at KU, Dhulikhel from September 23 to September 25, 2015. The training was organized together with Humanitarian UAV Network (UAViators), UAV manufacturer DJI, UAV data processing Software Company Pix4D and Kathmandu Living Labs (KLL). Thirty two participants from different organizations (Kathmandu University, Land Management Training Center, Survey Department, ICIMOD, Nepal Police, Practical Action Nepal, NSET, KLL etc.) learned UAV applications, UAV flying and data analysis skills.

Six DJI Phantom 3 Advanced and 6 smatisan smart phones were handed over to Kathmandu University by UAV manufacturer company DJI. Further, UAV data processing software company Pix4D handed over Educational license of Pix4D mapper to the university. Besides, the trainer team also prepared 3D model of Dhulikhel Hospital using UAV images captured during the training. Furthermore, UAV images of Panga (one of the earthquake badly affected area), Kirtipur were captured with DJI Phantom 3 Advanced and image mosaic of Panga was prepared. Local people did participatory mapping using the UAV image mosaic.

4.2 Web and Mobile based application development training

The android application development and web map application training were organized at Kathmandu University from July 17, 2015. The training was designed for Geomatics Engineering final year students. This training is an initiative to develop the skills of trainee regarding the use of geospatial technology in android platform.

4.3 Scientific Report Writing Training

Geomatics Engineering program under DCGE with a support from International Center for Integrated Mountain Development (ICIMOD) successfully organized two day; 7-8 July, 2015 workshop on Scientific Writing and Presentation training at Kathmandu University Dhulikhel. The training meets the objective of

1. Distinguishing scientific research, their audiences and how research material might be effectively presented.
2. Preparing scientific and technical papers.
3. Accepting constructive criticism and using reviewers' comments to improve quality and clarity of written reports.

The target audience was fourth year Geomatics students who are in a process of writing their final year project report.

4.4 Training of Trainers in Land Administration

The Transparency in Land Administration Capacity Building Programme is a joint initiative of Kathmandu University and the United Nations Human Settlements Programme (UN-HABITAT) Training and Capacity Building Branch (TCBB) and ITC, the Faculty of Geo-information Science and Earth Observation of the University Of Twente.(more specifically the United Nations University School for Land Administration Studies (UNU-LAS) of ITC). This programme is implemented under the aegis of the Global Land Tool Network (GLTN). A first phase comprising the development of a toolkit and a training guide for transparency in land administration parallel to the implementation of a training programme in Africa was successfully carried out in the period 2007-2008. Only in 2010, resources became available to carry out a second phase by rolling-out the programme in Asia, more specifically in South and Southeast Asia. The countries targeted to benefit from the second phase were Bangladesh, Pakistan, Nepal, Sri Lanka (for South Asia) and Vietnam, Lao PDR, Cambodia, Philippines and Indonesia (for Southeast Asia).

The three major outputs foreseen for this second phase included: 1. Case studies; which would be front and centre in the training and vitally important to localize domestic training; Eight short and eight long case studies were envisaged for the training workshops. 2. Expert Group Meeting; which would serve to understand land issues in the South and Southeast Asian region and tailor the Training of Trainers (ToT) training accordingly; identify areas of focus, build partnerships; and create local ownership; The EGM targeted fifteen (15) participants with knowledge of the state of land and governance in their respective countries. 3. Training events; Two (2) ToT workshops would serve to expose participants from South and Southeast Asia to land sector specific transparency principles, concepts and tools, including training delivery methods so that participants would be equipped to impart knowledge and skills to others in their respective countries; The workshops each targeted fifteen (15) trainers, formally or informally engaged in building capacities of people involved in land administration in their home countries. The second phase was implemented by the original partners of Phase 1 UN-HABITAT/TCBB and ITC/UNULAS expanded with three regional partners:

Faculty of Engineering, Universitas Gadjah Mada, Yogyakarta, Indonesia

School of Engineering, Kathmandu University, Dhulikhel/Kathmandu, Nepal

Faculty of Geography, Hanoi University of Science / Vietnam National University, Hanoi, Vietnam.

Adopting Geo ICT in Land Administration

International Institute for Geo-Information Science and Earth Observation (ITC), The Netherlands and School of Engineering, Kathmandu University (in collaboration with Land Management Training Center LMTC) organized short course on "Adopting Geo-ICT for land Administration" in Kathmandu University, Nepal on 15 – 19 June 2009. The resource persons from ITC and Nepal delivered lectures in the emerging areas such as:

Latest Geo-Information Technologies

Land administration: policy targets and Geo-ICT Sensors and Applications to Land administration
Land Information Systems: Development and experiences

Transparency in Land Administration

Research on transparency in Land Acquisition
Strategic planning for adopting Geo-ICT for Land administration

The courses were attended by participants from Nepal, Bhutan, Bangladesh, India, Sri Lanka, and Iran.

4.5 QGIS Training

The Geomatics Engineering Society, Departmental club of Geomatics Engineering program successfully organized a week long QGIS Training followed by JOSM training for various departmental students of KU from December 23, 2015 onwards at Kathmandu University, Department of Civil and Geomatics Engineering. The total participants were thirty. The resource people for the training were from Kathmandu University and Land Management Training center.

5 REFRESHER COURSE

This 11-day Regional Refresher Course 2012 on "Building Flood Disaster Resilience of Cities-Meeting Internal and External Challenges of the Future" was organized jointly by the Department of Civil and Geomatics Engineering of School of Engineering, Kathmandu University Nepal and UNESCO-IHE Institute for Water Education in Delft, the Netherlands. The course began on 1st October and ends on 11th October 2012. Around 22 alumni were participating in this Refresher Course and 10 national and international experts were sharing knowledge with them.

The overall aim of the course was to strengthen knowledge and capacity of the alumni of UNESCO-IHE, working in the Asian region for the improved management of increased urban flood risk due to external and internal threats.

6 CONFERENCE/SEMINAR

Kathmandu University (KU) in collaboration with Survey Department (SD), Land Management Training Center (LMTC), University of Southern Queensland, Australia, and Global Spatial Data Infrastructure (GSDI) organized a pre-conference event, "Sharing SDI Research on Disaster Risk Reduction" at the central premises on 24 November 2015. Various national and international dignitaries presented on Geospatial Technologies and People: Respond and Recover Challenges and Opportunities in utilizing SDI and Crowd, Digital Innovation for Social Good, Next Generation of Disaster Management and UAV technology for Geospatial Data acquisition. The participants were young surveyors, Kathmandu University students and faculties and LMTC staffs and students.

7 AWARENESS RISING ACTIVITIES

Geomatics Engineering Society (GES), Departmental club of Geomatics Engineering program is celebrating GIS Day events every year at KU organizing various activities such as UAV demonstration, presentations,

exhibitions, publication of Journal etc. Mostly Awareness rising in Geo information sector activities will be displayed in the event. The various organizations actively participated in the event. GES also uses its social networking for promoting Geo information activities at KU.

8 BUILDING INSITUTIONAL CAPACITY

Kathmandu University, Geomatics program has Collaboration with academic and nonacademic organizations to strengthen the quality of geo-information education, research and internship. Geo spatial lab and other important survey, Geodesy, remote sensing, photogrammetry lab etc. will be established in near future. LMTC and KU jointly establishing the necessary infrastructure required for the Geomatics Engineering program in the vicinity of these two organizations. KU Geomatics program is also supporting faculties to explore the academic activities through faculty development plan and encourages participating in various activities such as participating and presenting in seminar, workshop, training, and refresher course etc. KU is also organizing various guest lectures and interactions programs with national and international experts for sharing the knowledge and expertise in Geo information sector. KU in collaboration with University of Tokyo is planning to establish the Continuous Operating Reference System (CORS) at KU, Dhulikhel.

9 FACULTY/STUDENT EXCHANGE

KU has also planned for the capacity building of faculty and students through its faculty development plan and student exchange program with other collaborating Universities. Some of our undergraduate Geomatics Engineering students and Master in Land Administration students carried out their final semester project, internship and research in foreign Universities having EMMA fellowship and exchange program.

10 CONCLUSION

Geomatics Engineering Program, under the Department of Civil and Geomatics Engineering, is the endorsement of mutual understanding between LMTC, Government of Nepal and KU. Till now 121 Bachelor in Geomatics Engineering and 9 Master in land Administration students are graduated including 5th batch of Undergraduate program and first batch of Master in Land Administration, out of which around 50 of our undergraduate students after graduation are working in Government of Nepal service, few in NGO/INGOs, few study abroad and few are in private consultancies and firms. Physical infrastructures and technical facilities are shared between KU and LMTC. KU is playing a very important and pioneer role for capacity building in Geo information sector in Nepal.

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Author's Information

Name:	Mr. Subash Ghimire
Academic Qualification:	Master of Science in Geoinformation Science & Earth Observation
Organization:	Kathmandu University
Current Designation:	Assistant Professor
Work Experience:	12 yrs.
Published Papers/Articles:	12
e-mail:	subash_ghimire@ku.edu.np