Initiatives for Geomatics Education in Nepal

Baburam ACHARYA, and Keshav SHARMA, Nepal

Keywords: sustainable development, geo-professionals, Geomatics education, and donor agencies

SUMMARY

Nepal, being a developing nation, is seeking for the sustainable development. She has tremendous natural resources, which is neither explored, nor envisioned and substantial efforts are made yet. The overarching goal of the nation is to strengthen democracy and poverty reduction. Government has adopted numerous strategies for poverty reduction in the recent years but the level of poverty gap is exponentially increases day by day. It should not be measured merely by statistics but by the result that really matters.

Infrastructural development is a prime entity to mitigate poverty, must be guided by national policies and need to be well backed up by accurate & reliable spatial information. The base of spatial information system is solely depends upon geo-professionals, ultimately on the Geomatics education. In Nepal, a use of spatial information has not been emerged yet on real practices to enhance livelihood of the people, but on the name of GIS, fashionable trends for romancing expensive softwares and displaying colorful products. Negligible thinking and efforts in this regard, are being used in the micro level projects only. The necessity of geospatial information and its usefulness has not been realized yet. For the development and management of Geomatics education, Land Management Training Centre, an only governmental institution, has been giving her full efforts, but the most of the training practices are based on traditional methods and in the mean time, center’s single efforts isn’t sufficient to cop up the desired needs and changes. So the nation is in dire need of efficient and able geo-professional human resources to translate her deeper commitment and willingness to fully comply with the new technologies into a living reality and which can be only possible through quality Geomatics education. It is a high time to persuade and to make realize the state for the development of Geomatics discipline, and for it, concerning all have to take initiation including international GI-community, donor agencies, university and especially the organizations like FIG, FAO, EU, WB, UNEP, UN habitats and other UN agencies.

This paper aims to highlight the importance of Geomatics education and also to deliver a message for international donor community, the potentiality to work together for the advancement of Geomatics education in Nepal.
Initiatives for Geomatics Education in Nepal
Baburam ACHARYA, and Keshav SHARMA, Nepal

1. BACKGROUND

It is a real fact that twenty-first century is the age of information technology and now such technologies are playing vital role in providing stimuli to every activity and contributing towards the development of third world as well as developed countries around the globe. Numbers of technologies are evolving day by day and it is a fundamental truth that every technology must be fully backed up by related education system to accelerate the efforts for the maximum yields. Among the many applications of the information technology, Spatial Information System holds the potentiality of rendering significant contribution on policy-making, formulation of plans, infrastructure development, natural resource management and other development activities.

Nepal has already experienced its five decades of structured planning history. During the period, the major challenges, the country faced, are lack of basic services, safe drinking water, road access, health facilities, education, income opportunity, etc connecting with the vicious circle of poverty. Since the last decades, the government’s sole objective has been only to reduce the level of poverty but in reality, the data shows that approximately 38% of the people in Nepal are still living below the poverty line. The country has great diversity in geography, plenty of natural resources and large potentialities for the development, which are neither explored nor envisioned and substantial efforts are yet to be made. Whether it be in transportation, electricity, health services or in emergency services, accurate and reliable spatial information is needed for the structured planning process or designing any development program. The quality of the spatial data and the techniques/methods used in this regard are based on the skill, knowledge, capacity building and performance of geo-professionals and ultimately on the geomatics education.

Geomatics is the science and study of spatially related information and is particularly concerned with the collection, manipulation and presentation of the natural, social and economic geography of the natural and built environment. (extracted from RICS journal).

Geomatics is defined as: a field of activities, which, using a systematic approach, integrates all the means used to acquire and manage spatial data required as part of scientific, administrative, legal and technical operations involved in the process of production and management of spatial information. (Canadian Institute of Geomatics, 1995).

2. HISTORICAL DEVELOPMENTS AND CURRENT SCENARIO

Nepal has come a long path with the geomatics development but even now, the high skilled geo-professionals and Geomatics education are lacking and dependency on foreign experts, institutions and universities is increasing. If we go through the history of geomatic, in ancient
Malla era, land surveys were done by Dangol caste, a traditional occupation for them. After returning from the first world war, the Nepalese army (gurkhas) gained some knowledge on surveying and mapping and then government established the military compass school to provide training, called “compase” and later it was named as Nepal government survey goshwara. During that period greater cadastral survey program was launched and to assist that program, Amin training school was established under army office at Sundhara, Kathmandu. This program was run for three years and then stopped. In 1950, a political revolution happened and the government-planning program stressed for the land reform activities. In 1964, government announced the well known land reform program and then training on surveying and mapping were conducted to support the program in different parts of the country on ad hoc basis, especially for the preliminary record of private land in a island map as a public properties.

In this context, the contribution of foreigners, especially under the UNDP’s assistance program and Colombo plan, was very remarkable and valuable in the development of Geomatics. Truly speaking, the basic foundation of this field was established by the foreign experts. In February 1965, Mr. J. R.G. Harrop had handled the survey department as a Director. For the fulfillment of the human resources in this field, Mr. Harrop took initiation and the government established the Survey Training Center in 1967, under the survey department. At that time, he introduced two fold policies in human resource development, firstly training programs for the capacity enhancement of departmental candidates and secondly fresh candidates were sent aboard for academic degree courses under the Colombo plan especially in UK and India the Ministry of Education. At that time, he had noted the vision of survey engineering (Geomatics engineering) in coming 15 years, but in reality the concept was not fulfilled and which still needs to be addressed. Since then, the center has been conducting different types of long term as well as short term training programs in surveying and mapping. As the scope of surveying and mapping is increasing day by day, the government of Nepal, in 2000, has restructured the existing survey training center as a Land Management Training Center with a departmental status under the Ministry of Land Reform & Management.

Besides these, since 1979, space technology has adopted and national remote sensing center was established under the forest department. The first GIS laboratory in the country was established within the secretariat of planning commission in 1992. There are various government agencies like survey department, department of road, geology and irrigation, mine, urban housing and planning which introduced space technology from the last decade. Similarly, department of geography under Tribhuvan University, department of environment science under Kathmandu University, institute of forestry and agriculture and more specifically the International Center for Integrated Mountain Development (ICIMOD) are engaged in human resource development and training activities to promote the use of GIS application within the country.

At present condition, various applications in the field of space technology are running in the country. In the new millennium era, highly developed Internet mapping and the wireless based geospatial data dissemination to the vast array of users accelerate the space technology
as seamless disciplines. Digital geospatial data handling have gained momentum on different disciplines. A large numbers of governmental and non-governmental agencies are using geospatial data for their own purpose and requirement. There are various universities and training centers that have included GIS, remote sensing, GPS etc in their curricula as a complementary courses of their respective degree program in their own fashion. But the necessity and usefulness of the Geomatics application and development of this field as an academic discipline has not been realized yet.

Meanwhile, land management training center, an only governmental institution has been giving her full efforts for supporting human resources in this field. Since its establishment, the center has been conducting only training programs based on traditional methods for technician and supervisor level. The need of higher-level manpower and specialists is greatly felt. There is a high demand to develop this center not merely as a training center but also as an academic one to fulfill this need. So, the center is going to conduct B.E.Geomatics, affiliating with Kathmandu University (KU), produces academic cadre in this field, which could be a milestone for the fulfillment of the quality geo-professional human resources.

3. RATIONALE OF THE PAPER

Geomatics is an ever-evolving technology and it has gained a certain height in the recent years. It offers the great functionality for using and disseminating geo-spatial information. The application of Geomatics science is spreading rapidly with the development of IT. It is a science of visualization or expression of all kind of information in the desired way. The prime factors affecting the whole Geomatics are geospatial data, geoprofessionals, GI technology, and education system. GI technology promises cost benefits, efficiency gains, efficient management and resources allocation and services. It is only possible with the availability of skilled human resources for efficient performance. Quality Geomatics education is based on the various factors like GI-policy, commitment, and role of qualified geoprofessionals in ever-evolving, complex multicultural & interlinked societies. In Nepal, the application of Geomatics is not in real practices for the service oriented and people centered activities but the unstructured fashion on romancing sophisticated softwares and colorful products is diminishing the ethics of geoinformation science. The paper highlights on Geomatics education, its development and current situation and finally concludes with its necessity and potential intervention areas to reinforce quality geoinformation for elevating this sector, which are valueless without quality Geomatics education.

In the mean time, writers are focusing their view for encompassing the quality Geomatics education from school to university degree courses as a academic platform and in order to establish such a platform, paper aims to draw an attention for international agencies, donor communities, academic institution and especially the organizations like FIG, FAO, EU, WB, UN- habitats and other UN agencies to move with hand in hand for promoting the GI community in Nepal which in turn may incorporate the whole South Asian region as a potential geo-market.
4. NECESSITY OF THE GEOMATICS EDUCATION

As the importance and necessity of the IT commodities- electronic products and home appliances are increasing among the user communities, better management and reliable services of such products and also the planning and implementation of any social and economical development activities rely on the appropriate and adequate information. Better development program and projects can only be planned when realistic and accurate information is available to the planners. The field of geoinformation i.e. production, analysis, dissemination of spatially referenced data broadly termed as Geomatics has become so far a platform for the all kind of disciplines. It also provides and maintains the triangular relation between geospatial data to its producer and end users. So, it is very crucial to use Geomatics education as a means of serving society and as an influence behavior for the policy-making environment.

In many engineering works, importance of spatial information and maps has not realized yet. There are various hanging or unsuccessful projects. Most of them were made feasible but technically failed, resulted from the lack of spatial knowledge e.g. there is a canal but no irrigation, there is a pipeline but no water, there is a land in a map but not in a ground, there is a bridge but not across the flow of water. Likewise, pollution increasing, traffic jam and housing and settlements problem are increasing because of not giving priority on spatial information. In many cases it is a bitter truth that maps and spatial data are used merely as a documentation material. Similarly, in the huge projects, on one hand, the country has to depend upon foreign geo-expertise and on the other hand the resources couldn’t be used properly due to the lack of geo information knowledge within the country.

Geography and earth sciences rely more and more on spatial data which are acquired from remotely sensed images, analyzed through Geographic Information System (GIS) and visualized on different formats and styles. The technologies supporting the process of acquisition, analysis and the visualization of spatial data are the core elements of geoinformatics. Operational skills alone are not sufficient for organizations involved in the production and the management of geo-information. The additional capabilities such as understanding of collecting, structuring and framing and also the visualization technique of spatial data are essential to optimize the use of technology. For the fulfillment of these requirements, only Geomatics education can provide the knowledge and skill to the professionals in a standard manner. Thus, the marketing of Geomatics education and also professional exchanges for making Geomatics leaders are the fundamental inputs to the sustainable development.

According to the Rio Conference in 1992, sustainability has been the central principle of international development. Also, the World Summit on Sustainable Development (WSSD) 2002, in Johannesburg had unconditionally recognized "Geomatics" as a significant part of the world sustainability. It focuses on place, people and information as the key elements of the development.

TS 8E – The Future of Surveyors
Babu Ram Acharya and Mr. Keshay Sharma (Nepal):
Initiation for Geomatics Education in Nepal

Strategic Integration of Surveying Services
FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007
Moreover, Geomatics and its application helps to manage and interpret data of certain geographical pockets by providing digital maps of resources and infrastructures, images of an area, watershed, etc. They are very useful for researchers, planners, and scientists and also for planning activities to run development projects at the local level. Besides these, the blending of ICT applications with Geomatics is providing new insights into global issues such as the patterns and degradation of forests, homeland security and prevention of cultural heritages, monitoring of crops, war strategies and conflict management activities. Geomatics finds itself in a multi-disciplinary market along with the other disciplines that is why, it must be aware of the potential cross-disciplinary usefulness of a Geomatics element in many programs and projects. So for the integration and holistic orientation of such applications, a separate academic discipline should be needed, that is not anything else except geo-education.

Therefore, for the professional development of any discipline, higher education is a prime requirement. In the case of geo professional, only training and little opportunity for abroad study can’t cope up the space with the development. Thus, it is urgent for academic community to focus on Geomatics education for the fulfillment of human resources in this field. (If there is one aspect of Geomatics which needs attention in 2007 it is education; or more specifically funding for education. - Prof. Ian Dowman, President, ISPRS)

5. POTENTIAL INTERVENTION AREAS

– Introducing Geomatics education in school and side-by-side, including Geomatics science as an extensive academic degree program in university level.

– Foster the importance and usefulness of the spatial information to the end users in their daily activities through the citizen oriented publicity programs.

– Conducting awareness program to geo-information stakeholders such as for engineers, real estate brokers, geo-consultants, notary public, IT institutions and others.

– Restructuring traditional training institutions by introducing Geomatics as a collective discipline applied to independent fields of study such as cartography, photogrammetry, remote sensing, geodesy, GIS and other mapping sciences.

– Making efforts to establish sister relation with the foreign institutions for the expansion of education and collaboration between organizations through education exchange programs and moving hand in hand with the international donor communities to promote education and research activities in Geomatics and establishing Nepal as a potential geo-market in south Asia.

– Merging geo-information with IT education to develop geo-IT professionals, this contributes in the economic development of the nation.

– Encouraging the government, especially the decision makers about the enormous value of geospatial data from planning to implementation stage of the development programs such as...
in road construction, pollution reduction, housing and settlements, traffic management, disaster management, land use planning and consolidation and others so that these programs become more realistic and sustainable.

5. CONCLUSION

Every development activity depends upon sound policy, appropriate technology and reliable & accurate information system. The spatial information provides the essential and adequate grounds for overall development activities and the base of the spatial information is Geomatics science. So, the applications of the Geomatics science plays a pivotal role and offers the great functionality as a science of visualization for the geo-spatial information related to almost all of the disciplines. It has numerous applications even in government activities from regulatory functions such as law and order maintaining, crime control and conflict management to various development functions. So it is a time to develop Geomatics and using it to help as a key element for the sustainable development.

Overall, this paper focuses on the need to introduce and promote Geomatics education from the school level to university degree courses. As the country has a great diversity in geography, friendly people, heavenly climate, plenty of natural resources, and cheap manpower, there should be potentiality of the geo-market. So, this presentation also intends to draw attention to all international GI-community, donor agencies, universities and especially the organizations like FIG, EU, WB and UN agencies for investing their efforts, funds, and any other contributions in order to promote Geomatics education in Nepal, to develop quality of geo-professionals and to accelerate its professional marketing in national and global mode as well.

Thus, it is a high time to focus on creating awareness to lawmakers, government & non-government organizations, public & private sectors and especially those who are development seekers and we professionals engaged in this field from the long time to make a voice for Geomatics education.

REFERENCES

CONTACT

Mr. Baburam Acharya  
Executive Director  
Land Management Training Centre  
Dhulikhel, Nepal  
GPO BOX: 12695  
E-mail: lamachourbabu@yahoo.com  
Mobile: +977-9851003374

Mr. Keshav Sharma  
Instructor  
Land Management Training Centre  
Dhulikhel, Nepal  
GPO BOX: 12695  
E-mail: keshav_palpali@yahoo.com  
Mobile: +977-9841208701
Resume 1

Name                                          Babu Ram Acharya
Education                                    MSc in GIS (Netherlands), FRICS (UK), BL (Nepal)
Date of birth                               28/04/1952

Career- to- date

Key Skills and Experiences

Policy/Management
− Contributed to formulation of policies and strategies pertaining to land reform, land management and land distribution and tenancy rights in Nepal. Was a member of several national commissions such as public land investigation, urban and rural squatters and settlement of landless people
− As Director General of Land Survey Department, was responsible to provide leadership and manage land survey offices in 75 districts with a total of around 3,000 staff.
− Was responsible for liaison and coordination of land sector policies, programs and activities with other ministries and high level officials in other related agencies of the government prior, during and post formulation of policies, strategies, programs and budgeting.
− Experienced in designing and implementing participatory and citizen centered policies and programs.
− Experienced in negotiation on land related conflicts and mobilizing resources of external partners, donors, stakeholders and non-state authorities.
− Experienced in planning for response to emergency situations. Familiar with rural dynamics and context of land management and administration.

Program/Technical
− Fellow of Royal Institute of Chartered Surveyors (FRICS), UK
− Land Management (Surveying and Mapping, Land Administration and Land Tenure System)
− Land/Geographic Information System (LIS/GIS)

Work Experience
07/2006 – Current    Executive Director, Land Management Training Centre
07/2005 – 07/2006    Joint Secretary, Planning and Monitoring, Ministry of Land Reform and Management
12/2004 – 06/2005    Regional Administrator (Government's Secretary level)
05/1998 – 11/2004    Deputy and then Director General of Survey Department, Nepal
− Convener of the 23rd Asian Conference on Remote Sensing held on November 2002 in Kathmandu, Nepal
Babu Ram Acharya and Mr. Keshay Sharma (Nepal):
Initiation for Geomatics Education in Nepal
Strategic Integration of Surveying Services
FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007

Chairman of SNAC (SAARC (South Asian Association for Regional Cooperation)
Networking Arrangement on Cartography)
06/2002 Secretary of the Electoral Constituency Boundary Delineation Commission
06/2000 Member Secretary of the Commission for the Landless- 6 months
11/1977 – 06/1997 Progressively from Officer Surveyor, Instructor, Planner, Regional Survey Officer
to Chief Survey Officer;

Key Workshops / Seminars /Conferences / Meetings/Study Visits

– Led Nepalese delegation for the International Conference on Agrarian Reform and Rural Development (ICARRD) held in Porto Alegre, Brazil during 6-10 March 2006, organized by FAO
– Participated in the high-level study mission to Geoinformation Infrastructure related agencies in Australia during 27 March to 03 April 2004.
– Participated in the 10th session on Asia and Pacific Regional Space agency Forum (APRSAF-10), in Chiang Mai, Thailand.
– Led delegation for ACRS 2003 during 3-7 November 2003 in Busan, South Korea.
– Participated in the XIXth ISPRS conference (16-23 July 2000) in Amsterdam, The Netherlands

Selected Papers and Publications
1. Land Bank Program for Landless Poor in Nepal, a paper presented to The 26th ACRS, November 7-11, 2005, Hanoi, Vietnam.
6. A Perspective View on Space Applications in Nepal. APRSAF-10 in Chiang Mai, Thailand.
7. Spatial Information Management for Sustainable Real Estate Market – best practice guidelines on nation-wide Land Administration (Workshop organized by the UN/ECE-WPLA and FIG commission 3 & 7, the Technical chamber of Greece (TCG) and the Hellenic Association of Rural and Surveying Engineers (HARSE) – Athens, Greece, 28-31 May 2003

Membership
Professional Societies
− RICS member, Fellow of The Royal Institute of Chartered Surveyors (FRICS), UK
− Nepal Surveyor Society.
− Advisor, Nepal GIS Society.
Social Institutions
− Rotary Club of Pokhara - Fishtail, Nepal.
− Kaskeli Prajatantric Samaj, Kathmandu.
− Founder Member of Institute of Governance (IOG), Nepal.
− REUKAI, Pokhara, Nepal
− Founder Member of Center for Rural Development and Environment Conservation (CRUDEC), Nepal
− Member of UCEP (Underprivileged Children’s Education Programs)

Decorations and Awards

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Prabal Gorkha Dakshin Bahu Tesra” by His Majesty’s the King of Nepal (Ashad 23, 2059 BS)</td>
</tr>
<tr>
<td>1991</td>
<td>“NFP Scholarship” by The Netherlands government to study M. Sc. in ITC, The Netherlands.</td>
</tr>
</tbody>
</table>

Resume 2

Name Sharma, Keshav
Education MPA, BSc
Date of birth                                October 30, 1973

Career- to- date
Instructor, Land Management Training Center, 2002 – to- date
- Designing and conducting different types of training packages; GIS, Land Administration & Management etc.
- Take part in planning and coordinating training activities.
- Teaching different subjects e.g. land management, public relation, GIS, cartography, etc.
- Conducting practical field works for senior, junior and basic survey course.

Visiting Instructor, Land Management Training Center, 2000 – 2002
- Involved in teaching different subjects especially land administration and management, cartography, GIS cadastral survey etc. in the invitation of the training center.
- Conduction field training for the different survey courses.
- Worked for assisting the center in planning and implementation of various training programs

Survey Officer, Cadastral Survey Branch, 1999 – 2000
- Worked as a survey officer in the cadastral survey activities.
- Involved in planning and monitoring activities.
- Worked as a field officer in the field study of “Possibility of land consolidation in Nepal.”
- Worked as a survey officer in geodetic survey branch.

Trainings
- Senior Surveyor Training (16 months)
- Basic Administration Training (3 months)
- GIS Training (5 weeks)
- Basic Computer Training