

GVSIG EDUCATION FOR DISASTER RISK MANAGEMENT WITHIN AN INTERNATIONAL COOPERATION PROJECT

Pau Aragó¹, Tesfahun Kasie², Antonio Grandío¹, Sergio Clark¹, Joaquin Huerta¹

1 University Jaume I

2 University of Bahir Dar

3 Corresponding author: parago@uji.es

ABSTRACT

University Jaume I (UJI) and University of Bahir Dar (BDU) are involved in a cooperation project sponsored by “Agencia Española de Cooperación al Desarrollo” (AECID). The project called “Strengthening the research center and community service on disaster risk management to improve food security and agricultural productivity in the Amhara Regional State (Ethiopia)”. One of the activities of this project was GIS capacity building for the Disaster Risk Management Department at BDU. The BDU Disaster Risk Management Department is working on identifying vulnerabilities that have an influence in food insecurity. In order to achieve the goals of this research a GIS capacity building is a key factor. GvSIG was chosen as the tool for GIS capacity building within the scope of Disaster Risk Management. This article explains our experiences in International Cooperation for GIS capacity building.

Keywords. GvSIG, Education, Cooperation, Disaster Risk Management.

1. Introduction

The Cooperation project called “Strengthening the research center and community service on disaster risk management to improve food security and agricultural productivity in the Amhara Regional State (Ethiopia)” is carried on by Bahir Dar University (BDU) and Universitat Jaume I (UJI) and sponsored by AECID. One of the activities of this project is GIS capacity building for the Disaster Risk Management (DRM) Department in BDU. The BDU DRM Department works on identify vulnerabilities that have an influence on food security. In order to achieve the goals of this research a GIS capacity building was a key factor.

Within the cooperation project BDU demanded a GIS lab. This GIS lab should cover the needs of the department for:

- GIS data analysis
- GIS capacity building for students and educators
- Plotter for map outputs
- Mobil GIS lab for field data collection and education
- GPS for field data collection
- Tablet for field data collection and to be use as eBook reader

Before the project started, needs on GIS capacity building for the department staff were identified. The first year of the project an introductory seminar on GvSIG was carried on by Sergio Clark.

Sergio Clark in his Master Thesis (Clark López 2012) evaluated the requirement of the department regarding to GIS. A conclusion from the first year was that a GIS capacity building should be developed in a close cooperation among both Universities. BDU will contribute it's know how in DRM and UJI it's know how in GIS. This is how the course of GIS for Disaster Risk Management was created

2. Gis lab and capacity building background

Starting a GIS lab and GIS capacity building almost from zero requires to evaluate the current situation within the department were the project will be developed. First year of the project an evaluation was carried on (Clark López 2012) and reviewed during the second year of the project.

While Risk Reduction and DRM is a discipline well known at BDU and they count on wide expertise, regarding GIS there is a lack of training and their knowledge on this field is limited to the GIS basics. Here, GIS capacity building, is where UJI know-how is helpful. Cooperation project brings GIS facilities under the advice of UJI.

The new GIS lab was already built on February 2012 and improved during the second year of the project. Nowadays is ready to use. In terms of hardware and software the work is done, data collection has start using tablets and GPS, GIS capacity building will be improved with the GIS course ans successive courses. Indeed, one of the biggest gaps of the project is the lack of spatial data available but the course improve students capacity on data discovering and sharing it

A GIS training seminar was already carried out at BDU in June 2011 by the University of Dacca (Bangladesh). UJI done a first GIS training at BDU during October 2011. A second GIS training was carried on at BDU during February 2012. Also On February 2012 tablets were already available. Indeed Having available the tablets, a training on spatial data collection was carried on. This tablet's training was done using Oruxmaps software. Oruxmaps software is an Android application which can collect point and lines export information as gpx or kml. The main advantage is its capacity to download maps and doing them off-line available, which is important for field data collection.

The GIS capacity building was appreciated and demanded by BDU staff. Nevertheless, the first GIS trainings where carry on too soon. The BDU staff take the lesson where it necessities were not required at that time. BDU DRM department were at that moment designing the project and doing the preliminary researches. GIS training couldn't be implemented and most of the new knowledge acquired remained unused and consequently forgotten. Tablet's training came in the right moment so they could implement its new knowledge immediately to collect spatial data.

During the evaluation of the previous GIS capacity buildings steps, was concluded a need on improve it with an e-learning course. This course should provide to students a GIS basic knowledge easy to understand and to implement in their daily work on DRM

3. GIS course for disaster risk management

The course in a first approach was designed to fit DRM department needs for GIS capacity building. Also UJI had an interest in DRM because Master of international cooperation for development was held in UJI. DRM, somehow could be and interesting knowledge for UJI' master's students. Joining the BDU and UJI students needs was born the GIS for Disaster Risk Managemnt Course.

The course is addressed to professionals and students with an interest in development cooperation projects disaster risk management and sustainable development, that works with spatial information and needs GIS tools to mange this kind of information, collect process and analyze data. GIS



provide the tools to perform all these tasks. Nowadays, it is necessary to have a basic knowledge of these tools to manage the spatial information in an efficient way.

The course being born to fit DRM and Cooperation for development was enhanced with a small introduction to web 2.0. This introduction is important to show how Internet could help to keep in contact, share information and use social web to get and share information in a collaborative way. Web 2.0 has become an important tool to monitor, manage and analyze DRM (White et al. 2009; Okolloh 2009; Vieweg et al. 2010).

The student will finish the course with a basic knowledge in GIS to be applied on Disaster Risk Management, Sustainable Development and cooperation development. The student will be capable of introducing new geospatial information in a GIS, process, perform an analysis and create a graphical output of the results. Also the students will have an overview of the Internet capabilities to get and share spatial information.

3.1. Course modules

The course is divided in three modules, Disaster Risk Management (DRM), GIS practices and Web 2.0, 3.0.

The first module is introduction to DRM, aimed to provide students with a basic understanding of DRM. Various aspects which constitute disaster risk will be discussed. Emphasis is placed on the characteristics of hazards and the various domains of vulnerability which helps to determine and understand disaster risk as well as its management. Understanding the characteristics of hazards and the various domains of vulnerability is also critical in mapping disaster risk using GIS where it can be useful to facilitate and support decision making processes related to the management of disaster risk. The last part of this section is focused on disaster risk reduction and management as a multi-disciplinary and multi-sectoral approach aimed at enabling societies to be resilient to hazards while ensuring that development efforts do not increase vulnerability to these hazards.

Internet has become an important tool for communication. Internet is not only a place to get data or publish your results. It is also a social tool from which you can get information from other people, and share your experiences. On module Web 2.0, student learn about Internet resources to download and share spatial information. Students learn how to take advantage of the social networks to spread their work and take advantage of social networks for DRM

The GIS module has the goal of introduce students to the basic concepts to work properly with geographical data. Students learn how to visualize spatial data and manage it to get derived information and show the results using report map tools.

Finally students is able to demonstrate their new knowledge in a final work. The topic of the final assignment is free, nevertheless should be within the scope of the course using what they have learned from the three topics

3.2. Course tools

The course was a virtual one. As a virtual course was required to have a virtual platform for e-learning. The course requirements pro the e-learning platform were:

- Registration of the students directly by course managers

- Forum open to students to discuss course topics
- A place to share links
- Capacity to deliver messages to students
- Capacity to upload students deliverables

EVAI¹ (Entorno Virtual de Aprendizaje Interactivo) (Grandío Botella 2001) was the e-learning tool choose to do the course. Main reason was that the course was held by The “Instituto Interuniversitario de Desarrollo Local” (IIDL) which use this e-learning platform². EVAI covers all the requirements of the course, Moreover, there was direct contact with the developers to improve or modify the platform depending on our requests.

From the beginning of the cooperation project, GIS was a fundamental part of it. The project member were arguing about opensource or privative software (Clark López 2012). Finally opensource was the alternative chosen mainly by its technology independence. We are not teaching how to use a software we are teaching GIS. Indeed, there are several reasons to use opensource software by a university (Steiniger and Bocher 2009), the algorithms are open documented and available, its possible to adapt the software without restrictions, you can take along the software whatever place it conduct a research or work, new developed data models will be available as soon as are developed. Moreover, Opensource GIS is mature enough to support complex projects and researches (Moreno-Sanchez 2012). Finally opensource software is recommended to work with it education in developing countries (Rajani, Rekola, and Mielonen 2003) .The GIS software choose to deliver the course was gvSIG, because the explained reasons, is known by BDU and have Sextante³ library fully integrated.

The course was online. Therefore, the course documentation was developed to be follow by the students at home. Some parts of GvSIG practices were supported by live demo videos uploaded to You Tube platform⁴. The documentation was created and shared under Creative Commons license

4. Disaster risk management at BDU

The National Policy on Disaster Prevention and Management in Ethiopia led to a shift in thinking to the link between relief and development and provides an opportunity for the integration of disaster risk management and sustainable development initiatives in higher education and research institutions. As a response for the identified gap, Bahir Dar University has established “The Department of Disaster Risk Management and Sustainable Development (DRMS)” in 2005, and the Disaster Risk Science MSc program in 2007.

There has been several efforts to establish the center of excellence and source of information for disaster risk management endeavors in Ethiopia. The joint UJI-BDU cooperation project sponsored by AECID is one of the major initiatives in strengthening the center at BDU. With the aim of contributing towards improved food security and agricultural productivity in the Amhara Region, the project has contributed to strengthening BDU’s Centre for Research and Community Service in Disaster Risk Management.

The GIS capacity building component is one component of the project. The project was particularly successful in establishing the GIS lab at BDU through equipment acquisition and training on open software gvSIG. Training on the use of current technologies, particularly the role of Android tablets for GPS data collection and eBook reading. One interesting use of the tablets was collecting real

1 <http://www.evai.net/login.php>

2 <http://iidl.evai.net/>

3 <http://www.sextantegis.com/>

4 <http://www.youtube.com/user/paragoUJI/videos?flow=grid&view=0>

time information during flood disaster that occurred in August this year in Bahir Dar where the university is located. Using Oruxmap⁵ software the team downloaded the map of flood area and use it to collect spatial data of the most affected areas and as well as the location of schools used as a shelter for flood affected people. The number of affected people were also collected to identify the most affected kebeles. Pictures were captured using the tablets during collecting GPS points.

Finally, the flood disaster map was produced and shared among BDU communities to sensitise further help for the affected people. More than two GIS trainings have been provided to BDU-DRMSD staff over the last two years focusing on its application in DRM and food security research. Both DRMSD academic staff and DRM Msc students attended the training. Since the project has focused on establishing the GIS lab and building the capacity of BDU staff over the last two years, we don't have research outputs with practical application of GIS. However we have currently two professional researches underway using GIS for mapping levels of vulnerability to food insecurity induced by climate change as well as representing kebeles in Amhara region with varied levels of PSNP impact. Owing to sustaining the use of GIS application in DRM, we have developed a curricula of online short course on GIS for DRM. We have currently more than 10 Msc students and staff members attending the course. Students have incorporated gvSIG software as a tool for different purposes in their dissertation that will be submitted in the coming year as part of fulfilling their Msc degree in DRM. BDU Technical coordinator of the project and a professional in DRM, is very interested in the use of gvSIG software in DRM and is planning to use it in his own PhD study on mapping climate change vulnerability of livelihood zones using existing geodata at livelihood zone level. In addition to offering the course to DRM practitioners and experts in Ethiopia, we are planning to incorporate the course into existing BDU DRM Msc curricula.

5. Discussion and conclusion

The cooperation project between UJI and BDU started two years ago. GIS has become an important activity of this project. During this two years of cooperation different actions has been taken to achieve the goal of GIS capacity building. First action was to provide the DRM department with a GIS lab ready to be use as research lab and for educational purpose, also has been provided with tablets and hand GPS to collect field data.

Second step was GIS training. First year was done a GIS seminar (Clark López 2012), showing the basics of GIS using gvSIG. This first seminar was valuable for BDU staff as an overview of GIS and gvSIG potential. Unfortunately, the lessons learned were not put in practice because the department didn't have already data to work with it. A conclusion from first year was the importance of scheduling the GIS training close to its need for data collection and analysis.

Second year a training on tablet to be use for spatial data collection was done. This small seminar was appreciated by DRM staff and other BDU members involved in the project. Indeed, the tablets are actually very useful for DRM department to collect spatial data and pictures.

GIS course for Disaster Risk management was design and developed between both universities. Being an on-line course was possible to teach it from Ethiopia and Spain and have students from both countries. The course was design to fill GIS gaps of the students and put in context GIS utility for DRM.

GvSIG is the tool selected for the course. Using gvSIG as a training tool to teach GIS concepts is a

5 <http://www.oruxmaps.com/>

guarantee of technology Independence. Indeed, the course is focused in GIS concepts and not teaching gvSIG as a tool. This point of view is very important for the students, because they can demonstrate its new acquired knowledge whatever tool they will use to work with.

DRM department, actually, is involved in a research activity and GIS capacity building with gvSIG has become an elementary part to collect spatial information and analyze it. BDU has seen the great potential of GIS for spatial data analysis and their next step is work with spatial data collected using gvSIG software and apply its new knowledge acquired during the course.

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