BUILDING SUSTAINED CAPACITY TO USE GEOSPATIAL DATA EFFECTIVELY FOR CONSERVATION IN LAO PDR AND VIETNAM

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ABSTRACT

This paper introduces a training center which aims to strengthen and ensure the long-term capacity to provide geospatial training and data access support for biodiversity conservation in Vietnam and Lao PDR using expertise available in the region. This is being accomplished by establishing two training and data centers; one in Vietnam and one in Lao P.D.R., to provide services to support the geospatial needs for biodiversity conservation such as managing protected areas.

Two components required for effective conservation monitoring and management are a well-trained workforce and access to data. In recent years there has been a growth of well-trained geospatial experts in Vietnam and Lao PDR capable of training conservation practitioners in geospatial techniques required for effective conservation monitoring and management. Unfortunately, these trainers, from many different organizations, do not have access to appropriate materials such as data, and training modules necessary for effective training.

The center will: 1) create opportunities so local geospatial experts can contribute their skills for training and provide data services to conservation projects throughout the region; 2) provide services to assist projects to access data in a format that is appropriate for the intended use; 3) provide instruction manuals and/or software so projects can access and process data on their own.

The regional conservation community will benefit from a facility that supports the collection and distribution of data and maintains an archive of the most accurate set of base data. The production of and access to metadata and appropriate licensing of data will be encouraged to improve data access as well..

1. INTRODUCTION

Earth observing sensor packages on aircraft and spacecraft and advanced image processing technologies provide researchers, resource management with powerful tools for producing and analyzing spatial, spectral and temporal information. Geographic Information Systems (GIS) provide forest rangers and biologists with a tool for effective storage and analysis of remotely sensed and other spatial and non-spatial data and biodiversity information, for scientific, management, and policy oriented problem solving. As such, these technologies may be used to facilitate measurement, mapping, monitoring, modeling, and management for a wide range of users, especially for biodiversity conservation.

GIS not only facilitates the use of many types of data, GIS also permits data to be updated readily. Indeed, the synergism between remotely sensed data for updating spatial data/information, and the use of GIS for improving the information extraction potential of remotely sensed data and ground data, is a major advantage of the merging of these powerful data sources.

There is an increasing awareness of the importance of the integration of remote sensing and GIS for conservation as shown by the themes of a number of recent workshops and conferences in Lao P.D.R. and Vietnam. The trend toward more emphasis on the application of integrated geographic information systems to support biodiversity conservation. These important trends are definitely indications of broader changes that are developing . They make it imperative for us as researchers to not only improve remote sensing and GIS technology but to widen our focus in order to examine a greater range of biodiversity conservation questions.

GIS and remote sensing have moved well beyond the novelty stage. Researchers and biologists have realized that the synergism created by this merger has the potential for a significant increase in information extraction and analysis for biodiversity conservation. Nevertheless, if this potential is to be realized - if we are to use these tools to move to wider, deeper levels of understanding - there are a great many steps to be taken.

This paper briefly reviews the activities of the Geospatial Training and Data Center and the integration of Remote Sensing, GIS and ground data for conservation. In particular, it presents a prioritized research data provide, focusing on trainees which are both important to the problems of GIS-RS integration for biodiversity conservation.

This paper also presents key results from a series of meetings and continuing research and educational activities have been done by the Training and Data Center supported by the , American Museum of Nature and History's, Biodiversity Informatics Facility (BIF) and the John D. and Catherine T. MacArthur Foundation. Center activities focus on: training; data services; services to assist projects to access data; instruction manuals and/or software.

2. GIS AND REMOTE SENSING FOR BIODIVERSITY CONSERVATION

From 2006 to 2009 BIF and IEBR have held 6 workshops Vietnam and Lao, training over 20 participants per workshop. Participants have mainly come from the Provincial protection department and protected areas of 3 Provinces in Vietnam, IEBR, Hue University of Agriculture and Forestry (HUAF), and four protected areas in Lao and with the National University of Laos (NUoL) in Vientiane. 10 projects have been funded for research in Lao and in Central Vietnam and the results were presented at a conference in 2009. The training has helped to improve the analytical skills and knowledge of local staff, which is very helpful for the Lao and Vietnam government in their efforts to conserve the remarkable flora and fauna of these two countries.

The workshops targeted groups with responsibility for biodiversity conservation at the local and national levels. These include Forest protection Department, Universities, from each of the tree (3) province (Quang Tri, Thua Thien Hue and Quang Nam), and in NUoL, Lao P.D.R.. A total of 200 participants attended these workshops.

The training program emphasized the utility of GIS in several biodiversity conservation applications with a strong emphasis on: 1) Biodiversity monitoring, Landcover change; 2) GIS basics, technical aspects of GIS including geo-targer; 3) Training in the use of open source software in the basic use of QGIS, OpenEV, EasyGeoTarger, Multispec, OSGeo4W; 4) Symbology; Geoprocessing Tools; Layout; Assigning a Projection; Onscreen Digitizing; Editing Shapefiles; map Topology; image classification.

As part of the training program copies of the open source software were provided to the all participants. Topics were selected based on a needs survey of the trainees via email. Discussion was centered how to implement processes using the open source software. It was an exercise in 'mapping' the processes that are used daily for map production from the office using software like MapInfo and ArcView.

Participants expressed satisfaction with the training program, delivery of the hands-on training and material as well as the presentations. In retrospect, the expectation that the training modules could be delivered to entry level users was a little over ambitious.

There were different levels of comfort using open source software among the participants, but by the end of the session all were capable of producing basic maps with their own data. The utility of having a joint training with the entire team was evident towards the end of the session. The participants were able to work together to answer some of the questions about biodiversity hotspots, landscape change and the habitat loss in their own area.

3. DATA AND TRAINING CENTER FOR BIODIVERSITY CONSERVATION

With funding from the John D. and Catherine T. MacArthur Foundation we will establish a geospatial training and data center in Hanoi to support biodiversity conservation. The project is being coordinated by the American Museum of Natural History's Center for Biodiversity and Conservation (CBC) and the IEBR. The training and data centers will use local experts to provide training and data services to conservation projects throughout Vietnam. A similar center is being established in Lao P.D.R. The main function of the Center includes:

3. 1. Create opportunities so local geospatial experts can contribute their skills for training and provide data services to conservation projects throughout the region;

Researchers benefit greatly from properly managing their research data. Data management should be planned from the start of research. If it becomes part of standard research practice, then it need not necessarily incur much additional time or costs.

When it comes to sharing geospatial data, good management is essential to ensure that data can be preserved and remain accessible in the long-term, so they can be re-used and understood by other researchers. When managed and preserved properly, research data can be successfully used for future scientific and conservation purposes, thus maximizing the investment made in generating the data and increasing the visibility of the research.

Geospatial data management primarily occurs within the life-cycle of a research project and is ideally carried out by all members of the conservation communities. Digital preservation, which enables long-term data sharing, is often managed by a specialized data archive or center. The value of data to be preserved depends on the quality and efficiency of the data management during research.

It is recognized that different types of geospatial data created and managed across the research discipline spectrum may require certain discipline-specific approaches to data managing and sharing; and that data centers may differ in their approach to specific data management and preservation issues. Geospatial data are a valuable resource, usually requiring much time and money to be produced. Many datasets have a significant value

beyond the original research.

Sharing geospatial data: 1) encourages scientific inquiry and debate; 2) enables scrutiny of research outcomes; 3) facilitates research beyond the scope of the original research; 4) leads to new collaborations between data users and data creators; 5) increases the impact and visibility of research; 6) reduces the cost of duplicating data collection; 7) provides important resources for education and training; 8) encourages the improvement and validation of research methods; 9) promotes the research that created the data and its outcomes; 10) can provide a direct credit to the researcher as a research output in its own right

The ease, with which digital data can be stored, disseminated and made accessible to secondary users via the Internet means that many institutions embrace the sharing of research data to increase the impact and visibility of their research. The Data and Training Center will be a forum to require researchers to offer Geospatial data resulting from their grants to designated data centers for conservation, through the web site address http://www.geoconser.com, the research data can be shared by: 1) depositing data with a Training and Data Centre; 2) submitting data to a journal; 3) depositing data in an institutional repository; 4) online via a project or institutional web site; 5) informally between researchers on a peer-to-peer basis.

3.2. Provide services to assist projects to access data in a format that is appropriate for the intended use;

When considering the long-term usability of data, attention needs to be given to the most appropriate software and data format to use. The Training and Data Center will provide services to assist with data formating issues by processing data to be compatible with specific conservation applications and software.

All digital information is designed to be interpreted by GIS and Remote sensing programs to make it understandable and is, by nature, software dependent. All digital data may thus be endangered by the obsolescence of the hardware and software environment on which access to data depends.

Despite the backward compatibility of GIS and remote sensing software packages to import data created in other formats and the interoperability between competing popular software programs, the safest option to guarantee long-term data access is to convert data to standard formats that most software are capable of interpreting, and that are suitable for data interchange and transformation. This typically means using open or standard formats – such as ASCII, tab-delimited format or comma-separated Shape file, IMG, GeoTIFF, and others. Some proprietary formats, such as DBF, are widely used and likely to be accessible for a reasonable, but not unlimited, time.

Thus, whilst conservationists tend to use the most suitable data formats for specific GIS software for map analyses, once map analysis is completed and data are prepared to be stored, researchers should consider converting their research data to standard, interchangeable formats, in order to avoid being unable to use the data in the future. Similarly for back-up of data, standard formats should be considered.

At the same time, data are offered to users by conversion to current common and user-friendly data formats and may be migrated forward when needed. When conservationists offer data to data archives for preservation, researchers themselves should convert data to a

preferred data preservation format, as the person who knows the data is in the best position to ensure data integrity during conversions.

3. 3. Provide instruction manuals and software so projects can access and process data on their own.

The aim of the Center is to provide a manuals and/or software for the production of maps for conservation. The aim of providing all the manual and software is to be able to answer the needs the local staffs.

Mastering new software takes time as one practice the processes they will need to conduct regularly. The participant will undoubtedly find time-saving shortcuts as they work with the software and local language manual. As the team begins to work with Data and Training Center regularly, more questions will surely arise and the home office participants will be available to answer any questions in a timely manner. It is important to remember that the concepts presented here are part of a process and that we learn each time this material is presented to a new audience. Prioritization of the services provided by the Data and Training Centers will be guided by feedback from stakeholders who will benefit from the Centers' products and services.

We believe there is more than one path that can be taken to establish priority manual and software requiring research and many arguments can be made concerning the adequacy of research and resources currently being directed toward any given field. This prioritization can be seen as being primarily focused around the need for monitoring and conserving biodiversity. Where we believe more resources are needed. The prioritized manual and software which follows is our considered opinion, our best judgment at the present time, of where emphasis needs to be placed to move the combined application of remote sensing and GIS technology forward. Please

4. CONCLUSIONS

The material presented here deserves careful attention. It is a fact that remote sensing and GIS technologies are helpful for biodiversity conservation. To be effective, key GIS data layers must be as accurate and up-to-date as practical. It is important then that we get on with research of the type discussed here, to begin the integration of remotely sensed, GIS and ground data for biodiversity conservation.

What is required is the realization of the need for biodiversity conservation information about current status and trends in Indochina region. This Center is urgently needed to support scales from local to global. Yet, to be effective we must transfer the knowledge, the skill, the data and the experience to policy makers, planners, ecologist and forest ranger.

At a time when global climate change, loss of biodiversity, and sustainable economic development are in the forefront of public policy, we must address the needs of the policy making establishment for these technologies.

Hopefully this realization will equate to new resources being directed towards these research areas. We hope this Center can provide significant benefits that can improve the biodiversity conservation in Vietnam and Lao P.D.R.

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