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Geographic Information System (GIS) Infrastructure Development in Timor-Leste 2006-2009[*]

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Geographic Information System (GIS) Infrastructure Development in Timor-Leste 2006-2009
-Technical Report to 18th UNRCC-AP-

In response to the Resolution 6 of 17th United Nations Regional Cartographic Conference for Asia and the Pacific (UNRCC-AP) and efforts made for cooperation activities in the GIS sector for the development of Timor-Leste, National Directorate of Land and Property and Cadastral Services (DNTPSC), the Ministry of Justice, the Government of Timor-Leste hereby submits this technical report which summarizes GIS infrastructure development in Timor-Leste from 2006 -2009 to the 18th UNRCC-AP, to be held in Bangkok, Thailand, on 26 -29, October 2009.

1. Country profile

The Democratic Republic of Timor-Leste, a Southeast Asian country located in the Lesser Sunda Islands, includes the eastern half of Timor Island, the Oecussi region on the northwest portion of Timor Island and the Atauru and Jaco Islands. Timor-Leste covers approximately 15,000 square kilometers. It is mainly a mountainous land enclosed by small fluvial and coastal plains. It has a tropical monsoon climate with a distinct rainy and dry season. During the last census in 2004, the population was estimated to be approximately one million. Agriculture is the main economic activity of the country. Coffee, sandalwood, marble and oil are major products for exporting. Dili is the capital of Timor-Leste.

It is believed that smaller indigenous kingdoms existed on the island prior to colonization by Portugal during the early sixteen hundreds. In 1859, Portugal ceded the western part of the Island to the Dutch, however, Portuguese colonization on the eastern part of the Island continued until 1975, with an interruption of Japanese occupation from 1942 to 1945. The ensuing conflicts around the declaration of independence in 1975 allowed Indonesian forces to occupy the country, resulting in its annexation by Indonesia. In 1999, following the United Nations sponsored act of self-determination, Indonesia relinquished its control of the territory and Timor-Leste became the first new sovereign state of the 21st century on 20th May 2002. Since then, the people and the Government of Timor-Leste have made efforts to develop the country, overcoming hardship including conflicts in 1999 and 2006.

2. Outline of GIS Infrastructure in Timor-Leste

The application of GIS in Timor-Leste started with the Second Land Resource Evaluation and Planning Project (LREP-II) funded by Asian Development Bank (ADB) during the Indonesian period. Substantial development of GIS infrastructure has continued since United Nations Transitional Administration in East Timor (UNTAET) period beginning in 2000. Various bilateral and international donor agencies have sponsored GIS capacity building and infrastructure development in Timor-Leste to support a range of Timor-Leste Ministries in their endeavors to set up GIS capabilities. Thanks to the continuing supports of donor agencies, GIS infrastructure and capabilities in Timor-Leste have gradually developed.

Currently there is no legal framework which solely focuses on the development of GIS infrastructure in Timor-Leste. Rather, GIS infrastructure is regarded as a tool that facilitates the achievement of respective administrative goals within the legal system. Recent remarkable progress includes preparation of a bill concerning a special regime for attribution of property rights, which requires land registration procedures and establishment of a national cadastral system. This bill is considered as a step to mitigate land dispute, which is one of underlying issues that led to the 2006 crisis. National Directorate of Land and Property and Cadastral Service (DNTPSC), Ministry of Justice will have functions for creating and establishing a national cadastral and geographic information system according to the ordinance for organization structure of DNTPSC.

The Geographic Information Group (GIG) has provided a forum for exchanging views and ideas about policy and technology issues in GIS field, with the participation of experts from government and international organizations. Although it is not an official body, the GIG virtually functions as the national coordination body in the GIS infrastructure sector within Timor-Leste. This forum is currently being co-chaired by DNTPSC and the UN.

Producers and users of geographic information are still limited to the government, donors and international organizations. Use of Geographic Information (GI) by the private sector is in its infancy. With the presence of the United Nations Integrated Mission in East Timor (UNMIT) and other UN organizations since 2006, international organizations' accumulation of geographic information technology and human capacity in Timor-Leste has been important for the capacity development of the GIS sector in Timor-Leste.

3. Major institutions and their achievements 2006-2009

- <u>Ministry of Agriculture and Fisheries</u>: The Agriculture and Land Use Geographic Information System (ALGIS), established in 2001 with the support of the Australian Government, has contributed to making basic spatial datasets and has a capability of developing and analyzing agricultural geographic data. ALGIS has conducted survey, mapping and designing for agricultural projects and programs such as rubber plantation, sugar cane plantation, irrigation and water management system, a research center and national park protections areas.

- Ministry of Finance: Supported by United Nations Population Fund (UNFPA), census mapping unit at Directorate National Statistics (DNE) conducted the 2004 census, capturing the location of all households using GPS and publishing the census atlas for Timor-Leste. Through the financial support of UNFPA, the unit has also created the census spatial database, conducted thematic mapping, developed in-house capacity continuously and supported various organizations through information sharing. Since August 2009, the unit has been preparing for the next census, to be held in 2010.

- Ministry of Justice: DNTPSC conducts cadastral surveys, maintains framework geographical datasets including topographic maps, aerial photographs and geodetic data and distributes them to the stakeholders by request. Since March 2009, it has also provided topographic maps and several thematic maps for the formulation of a national strategic plan, managed by the Office of the Prime Minister. At DNTPSC, the United States Agency for International Development (USAID) supported "Ita Nia Rai (Our land)" project is under way to establish an administrative and technical platform for a cadastral and land registration system. Recently draft cadastral maps for several district capitals were put up on notice boards for the public.

- World Health Organization (WHO) / Ministry of Health: WHO set up a spatial database containing the location and relevant information (staff, equipment etc) of health related facilities such as hospitals and health posts for the Ministry in 2006. Updated regularly, many donors and NGOs use the database for their activities.

- Other Ministries and UN organizations:
  - Ministry of Education has developed and maintained spatial dataset of the schools in Timor-Leste.
  - Ministry of Infrastructure re-evaluates national and secondary roads database for the country based on an initial assessment by Japan International Cooperation Agency (JICA) in 2006.
  - World Food Programme (WFP) produces thematic maps for food security and logistics.
  - United Nations Development Programme (UNDP) conducts the Sustainable Land Management Project with Ministry of Agriculture and Fisheries by applying remote sensing and GIS.
  - UNMIT has the GIS section which is the custodian of geographic datasets in UN organizations with an expertise in GIS, remote sensing and GPS.

4. GIS Issues and challenges in Timor-Leste

- Capacity building: Despite the fact that Timor-Leste is one of the youngest independent states in the world, considerable amount of datasets has been developed in the country thanks to supports from donors and the international community. However, human and institutional capacity is needed for the improvement of storing, revising, distributing, using and organizing

geographic data effectively and efficiently for the development of the country, given the limited resources. There is a need of training, building of skills and the establishment of GIS infrastructure (hardware and software) in all institutions. Emphasize should be on using what is available currently to address the need. GIG could organize training and mentorship programs implemented by members' organizations, fully using the technology and knowledge in UN and other international organizations.

- <u>Towards a NSDI</u>: While achievements have been made in the designation of common national coordinate (WGS84 geographic coordinate) and projection system (UTM 51 south), establishment of a GIS portal site for Timor-Leste "http://websig.civil.ist.utl.pt/timorgis/Home@1.aspx" and provision of various kinds of framework datasets through the efforts of GIG members and supporters, the following points are still recognized as major challenges for effective and efficient development and maintenance of GIS infrastructure.
  - ➢ Developing the standards of GIS infrastructure in Timor-Leste;
  - ➢ Coordinating GIS activities through regular communication amongst stakeholders;
  - ➢ Centralizing metadata and feature catalogues of GIS data from all Government institutions;
  - ➢ Facilitating the exchange of spatial data among Government bodies and stakeholders, including the revision of GIS portal functions.

Solving these challenges in the future would lead to the establishment of a framework for the National Spatial Data Infrastructure (NSDI) in Timor-Leste.

- <u>Administrative boundary</u>: Timor-Leste has 13 Districts, 65 Sub-districts and 442 Sucos (villages) as administrative units. However, there is no legitimate administrative boundary dataset that is up to date and topologically and geographically correct, regardless various versions without any proper metadata description. This always leads to the problems such as land disputes, identifying census enumeration units and electorates, and misconduct of various administration works. GIG is now advocating this issue and proposing to seek the understanding of legislatures and decision-makers and securing funding to solve the issue. Timor-Leste needs this dataset as the reference dataset for all other geographic information within the country.

- <u>Demarcation of border lines between Timor-Leste and Indonesia</u>: Bilateral negotiation on border demarcation between Timor-Leste and Indonesia started in 2001. The two countries reached an agreement on most sections of the border, but a few sections remain contested. Further joint works including marker maintenance, 1:25,000 mapping in the border area and production of gazetteers are being discussed. DNTPSC is planned to conduct the work for Timor-Leste side. Demarcation of the border and clear geographic reference to border areas are considered important for maintaining security, facilitating the movement of people and goods across the border and effective natural resources management.

5. Conclusions

- Efforts have been made to strengthen administrative and technical capacity for GIS infrastructure development of Timor-Leste, however, the capacities of national institutions remains still low.
- Of high priority is acquiring sufficient technical capability in organizing, producing and updating important geographic datasets, including administrative boundaries. Another priority is the overall coordination of GIS infrastructures, including developing standards and systematization, leading to the establishment of NSDI in future. These activities should be put into action in parallel.
- Timor-Leste appreciates the helpful supports of UNRCC-AP member countries, donors and UN and international organizations for strengthening the capability of GIS and would like to further cooperate with them.

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