LAND USE MONITORING IN SRI SONGKHRAM WETLAND AREA

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KEY WORDS : Wetland, Remote Sensing. Visual interpretation, Intersection

ABSTRACT : Sri Songkhram wetland is one of the most productive area in the lower part of Mekhong basin, northeastern of Thailand, covers the area about 738.8 km^2. According to the two major problems annually occur in this area, flooding for 2-3 months in the rainy season and lack of water in the dry season, farmers have to capture water during flooding for utilizing in dry season. Due to development activities disturbed environment and ecological function could lead to adverse effect, the present status and trend of changes are essential for proper assessment of resources development. To monitor land use changes in the Sri Songkhram wetland, multidate of Landsat TM acquired in March 1989 and March 1998 were visually interpreted. Land use classes recognized from the images were urban area, rainfed paddy, field crop, forest and disturbed forest, bamboo and disturbed bamboo, idle land, swamp and water resource. The result of intersection of land use polygons by Arcview software showed that water resources increased up to 110 percent due to dam construction by government sector, 35 percent of forest area and 47 percent of bamboo were changed to agricultural land, human communities expanded up to 57.3 percent due to the increasing of population.

1. INTRODUCTION

The "Wetland" definition provided by the Ramza convention is "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flooding, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 meters." (Siripong and Wanchai, 1999). Wetlands abound biological diversity and are treasure houses of lives. They are the most productive places for every activities such as agriculture, fisheries transportation and also have very important natural function, flood control water purification and supported almost all lives including human beings. According to the directory of Thailand wetland in 1998, there are approximately 42,653 wetland areas in Thailand (not included paddy field) Sri Songkram Wetland is one of 61 international well known wetland site in Thailand. There are 183 local fish species and unfortunately some specie is going into the extinction state. At present serious problems in this area are flooding in rainy season and water shortage in dry season, encroachment of forested area into cultivated land and human settlement expansion. To solve the above problems, monitoring of the wetland natural resources has been studied and the result was dedicated as guide-lines for land use planners to manage and conserve those resources for sustainable use in the future.

2. STUDY AREA

Sri Songkhram wetland is located in the lower part of Mekhong basin nearby the Mekhong river, Nakhon Phanom Province, Northeastern of Thailand, between latitude 17° 30′ N and 17° 45′ N, longitude 104° 00′ E and 104° 15′ E, covers 738.8 km^2. Mainly of this study area is Wetland where paddy field, idle land, swamp forest and bamboo forest and deciduous forest and field crop in undulating area. The two serious problems annually in this area are flooding for 2-3 months in rainy season and lack of water in dry season. The annual rainfall is about 2,266.5 mm.

3. OBJECTIVE

To monitor land use / land cover change in Sri Songkhram wetland using Remote Sensing technology and GIS.

4. DATA USE MATERIALS AND METHODOLOGY

4.1 Data used and materials:

- Administrative boundary and Transportation digital Maps.
- Landsat - TM image of Path/Row 127/48 (7 bands) in digital formats, acquired in March 1989 and 1998.
- Topographic maps (scale 1:50,000 and 1:250,000) covering the study area.
- PC computer with EASI/PACE, Arc-info, Arcview and Excel Programs
- GPS. (Global Positioning System)
- Camera and field equipments.
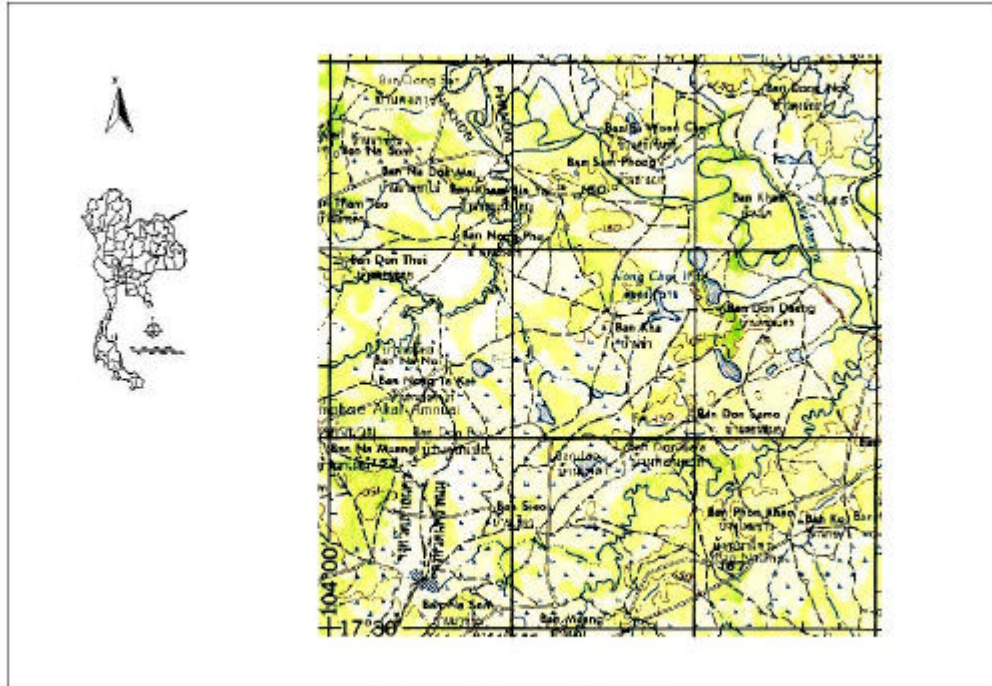
Figure 1 Study area

4.2 Methodology :

- Data Preparation and Pre-processing
- Image rectification, geometric correction of the two images by using 1:50,000 scale topomaps and ground control points (GCP.) selection by image to map registration.
- Visual interpretation.
- Ground checking and collecting the local references data.
- Create landuse/land cover maps (2 different seasonal Landsat - TM data, 1989 and 1998)
- Data input and Data updating
- Data analysis. (intersection analysis).
- Data Display.
- Discussion and report.

5. RESULTS

Visual image interpretation of the two different dates between March 1989 and 1998, covering the study area were urban area, rainfed paddy, fieldcrop forest and disturbed forest, bamboo and disturbed bamboo, idle land swamp and water resources. To monitor land use change by intersection showed that water resources increased upto 110

percent due to dam construction, 35 percent of forest area and 47 percent of bamboo were changed to agricultural land and human communities expanded upto 57.3 percent because of the population increasing.

Table : Land use changes between 1989 and 1998

Land use types	1989		1998		Land use changes
	Area (km^2)	%	Area (km^2)	%	
1. Urban land	10.27	1.39	16.11	2.18	+57.38
2. Paddy	348.12	47.12	353.81	47.89	+2.26
3. Fieldcrop	59.03	7.99	67.38	9.12	+14.02
4. Forest	113.70	15.39	73.58	9.96	-35.33
5. Disturbed forest	33.62	4.55	9.60	1.30	-71.30
6. Bamboo forest	22.98	3.11	12.12	1.64	-47.13
7. Disturbed bamboo forest	-	-	4.51	0.61	-
8. Idle land	105.94	14.34	138.89	18.80	+21.16
9. Marsh and swamp	21.65	2.93	13.30	1.80	-38.69
10. Water resources	23.49	3.18	49.50	6.70	+110.73
Total	**738.80**	**100.00**	**738.80**	**100.00**	

6. CONCLUSION

The results of the analysis using remote sensing data integrated GIS revealed that the mainfactors of land use changes in Sri Songkhram wetland between 1989 and 1998 were the population increasing, expansion of human community and encroachment of bamboo forest along the river to cultivated land in dry season. The results can establish trend in land use changes and utilized as a guideline for natural resources sustainable management in this study area and others wetland area in Thailand.
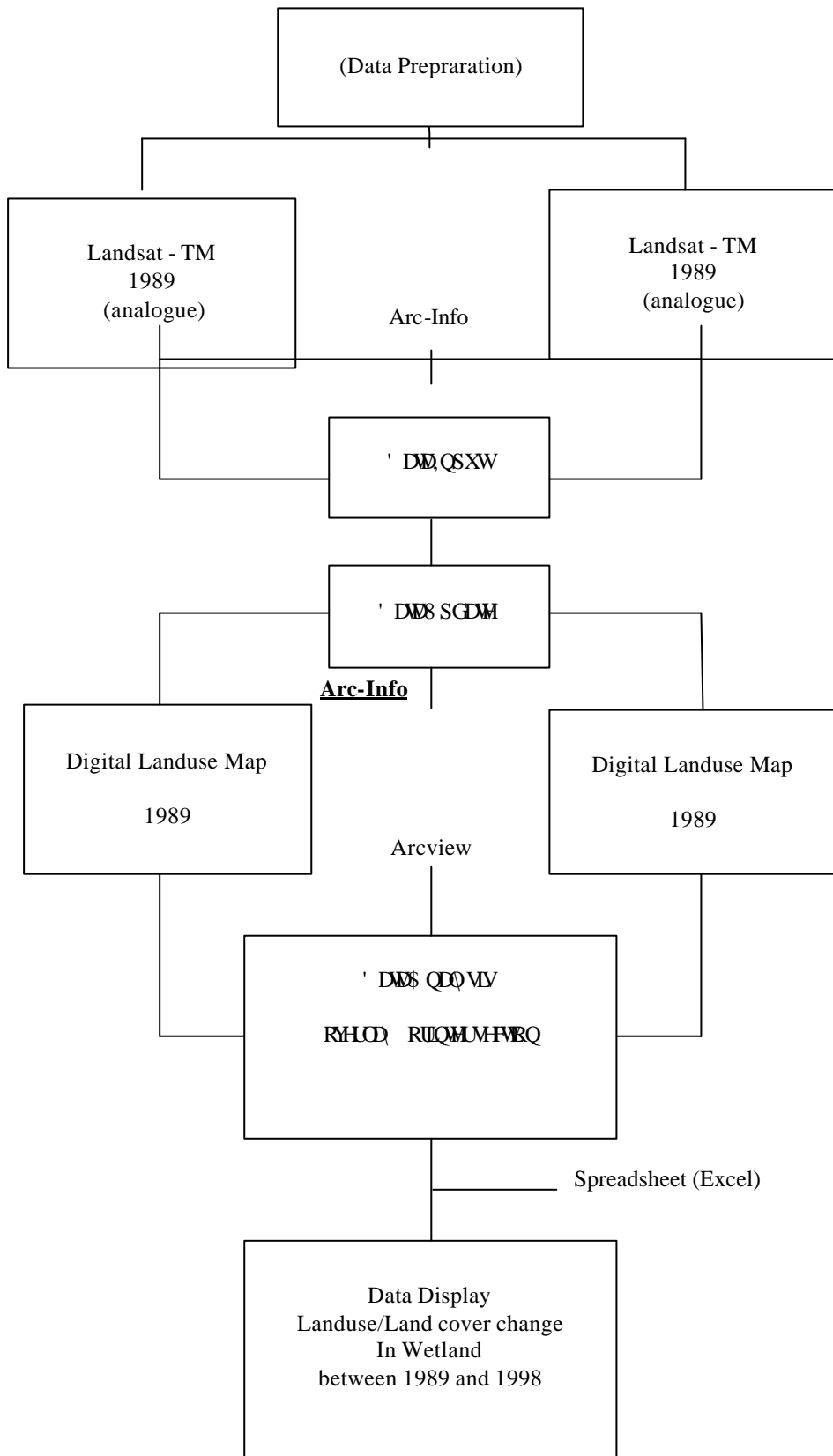
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Figure 2   Process of the Land use change analysis between 1989 and 1998
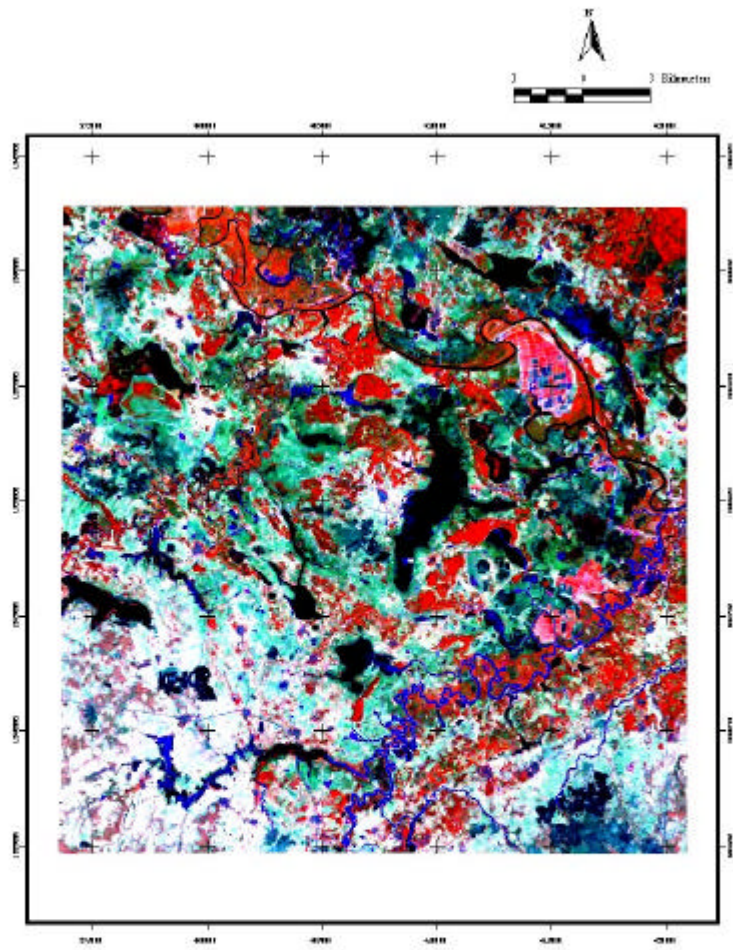
Figure 3 Landsat – TM image of the study area acquired in March 1998

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