LANDUSE AND LANDCOVER CHANGE EFFECT ON FLOOD

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INTRODUCTION

Flood is an overflow of water, an expense of water submerging land, a deluge. It is influenced by a combination of natural factors such as high rainfall, snowmelt, relief and coastal flooding and human causes such as deforestation, poor farming, over cultivation and population pressure. Severe flood occurred in each country which caused severe damages and loss of lives.

It is well documented that urbanization can have significant effects on local weather and climate(Landsberg 1981). One of the most familiar is the hydrologic impacts on streams caused by impervious area (eg roads, driveways, parking lots, and rooftops). Land use and land cover change in these study areas was analyzed using remote sensing and geographic information system techniques. Results show that rapid urbanization has resulted in loses of forest, non-agriculture and bareland. Inevitably, both agricultural lands and urban increased the pressure on the drainage system.

STUDY AREA

Myanmar (Ayeyarwaddy delta) is situated between Lat 15° 40′ and 18 30′ approximately and between long 94° 15′ and 96° 15′. It is an area of 13566sq miles. Thailand (chaophraya) is situated between lat 14° 27′ 07° 78′N and between Long 100° 05′ E. Vietnam(Mekong) is situated between lat 9° 42 43° 92′ N and 10 19′ 27° 87′ N and long 106° 10′ 12° 35′E and 106° 51′ 12° 71′E. Most of the parts of these

study areas are plain and all these three regions are delta regions and the annual rainfall is not quite different. Most of the land in each area is arable and the biggest rice growing area of each country. All these three study areas face with flood hazard in monsoon season during May –September.

METHODOLOGY

Remotely sensed images from(Earth Science data interface) during the period 2000 to 2005 were used as reference data. The study area of Mekong delta in Vietnam is contained within the Landsat path 133, row053, the area of ayeyarwaddy delta Myanmar is contained within the Landsat path 133, row 49 and the area of chao phraya is contained within the Landsat path 129, row 50. All images are available free for download through the internet from the link http://glcfapp.glcf.umd.edu:8080/esdi/index.jsp. In this study, landsat Enhanced Thematic Mapper plus data (ETM+) images were used, three thermal bands (band5, band4, band2) were used for LULC classification. The supervised classification method with the maximum likelihood was employed to perform the classification of the satellite images. By analyzing landsat imagery time series of LULC can be generated and then be used for the verification of changes pattern as well as for the future development.

RESULTS AND DISCUSSIONS

According to a predetermined classification scheme of six categories of land covers present within the study areas and their images were combined to produce visually images. These covers include urban, forest, agriculture, non-agriculture bareland and water. Results show that rapid urbanization in different regions increases. Inevitably, urban increased the pressure of the drainage systems.

Key words: deforestation, urbanization, drainage system
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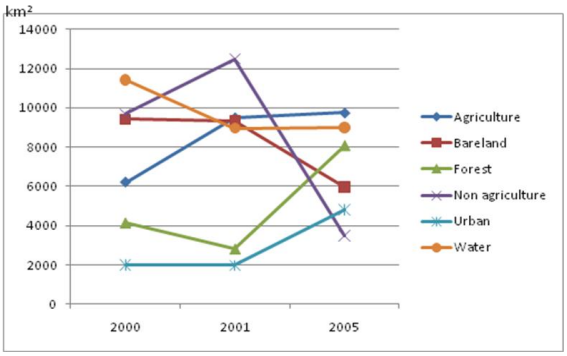


Fig(1) Land use Land cover change in Vietnam

Land cover change in vietnam Using Landsat ETM (Unit %) from 2000 to 2005							
Categories	2000(%)	2001(%)	Change(%)	2001(%)	2005(%)	Change(%)	Total
Agriculture	14.46	21.11	6.65	21.11	23.74	2.63	9.28
Bareland	21.98	20.71	-1.27	20.71	14.53	-6.18	-7.45
Forest	9.62	6.2	-3.42	6.2	19.63	13.43	10.01
Non agriculture	22.64	27.73	5.09	27.73	8.50	-19.23	-14.14
Urban	4.65	4.38	-0.27	4.38	11.69	7.31	7.04
Water	26.65	19.87	-6.78	19.87	21.91	2.04	-4.74

Table(1) Land use land cover change in Vietnam from 2000 to 2001

In Vietnam Mekong delta region during 2000 to 2005, agriculture, forest and urban has resulted in losses of bareland, non-agriculture. The agricultural land increased about 9.3% during 2000-2005 as cropping systems have been changing rapidly in the Mekong delta region.

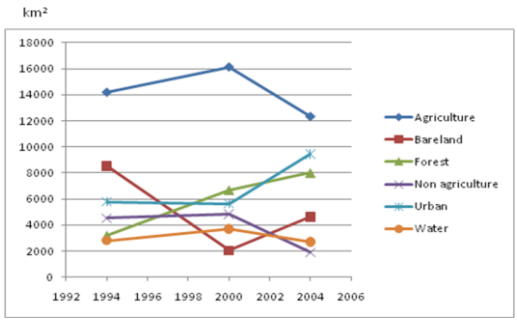
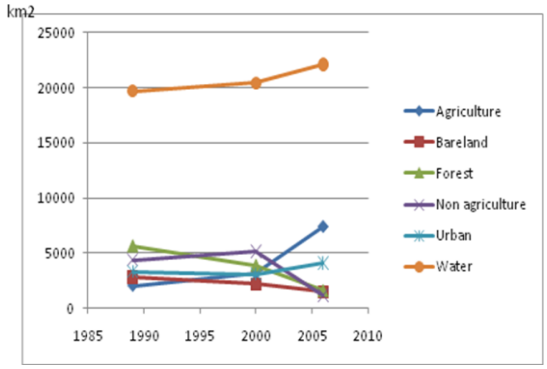


Fig (3)Land Use Land Cover change in Thailand

Land cover change in Thai Using Landsat ETM (Unit %) from 1994 to 2005							
Categories	1994(%)	2000(%)	Change(%)	2000(%)	2004(%)	Change(%)	Total
Agriculture	36.35	41.28	4.93	41.28	31.63	-9.65	-4.72
Bareland	21.87	5.24	-16.63	5.24	11.83	6.59	-10.04
Forest	8.19	17.15	8.96	17.15	20.52	3.37	12.33
Non agriculture	11.61	12.37	0.76	12.37	4.88	-7.49	-6.73
Urban	14.79	14.46	-0.33	14.46	24.22	9.76	9.43
Water	7.18	9.49	2.31	9.49	6.92	-2.57	-0.26

Table(2) Land use land cover change in Thailand from 1994 to 2004

In Thailand chaophraya, the Agricultural land, Bareland and Non agricultural land are covered by forest and urban. The agriculture decreases in lower chaophraya due to intense of urbanization and industrialization.



Fig(2) Land use Land cover change in Myanmar

Land cover change in Myanmar Using Landsat ETM (Unit %) from 1990 to 2006							
Categories	1990(%)	2000(%)	Change	2000(%)	2006(%)	Change	Total
Agriculture	5.41	8.39	2.98	8.39	19.57	11.18	14.16
Bareland	7.46	5.79	-1.67	5.79	3.97	-1.82	-3.49
Forest	14.96	10.32	-4.64	10.32	4.24	-6.08	-10.72
Non agriculture	11.55	13.56	2.01	13.56	3.18	-10.38	-8.37
Urban	8.82	8.12	-0.7	8.12	10.84	2.72	2.02
Water	51.8	53.82	2.02	53.82	58.2	4.38	6.4

Table(3) Land use land cover change in Myanmar from 1990 to 2006

In Myanmar Ayeyarwaddy delta, the area decreases are found in Bareland, forest and non agriculture 3%,10% and 8% respectively. During this period, the agricultural lands are replaced in the forest area.

CONCLUSIONS

Remotely sensed imagery data were employed to examine the linkage between land use and cover change in flood risk. Results show that rapid urbanization increased 7.04% in the time period 2000-2005 in Vietnam, 9.43% from 1994 to 2004 in Thailand and 2.02% during the period 1990-2006 in Myanmar. The agricultural land in Vietnam and Myanmar also increased. But in Thailand urban and industrialization are more intense. Inevitably, both the urban and agricultural lands increased the pressure of the drainage systems.

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