

Land Use / Land Cover Change by Tsunami 2004 in Thailand: a Case Study at Phi Phi Island, Krabi Province and Ban Num Kem Village, Pang Nga Province

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ABSTRACT

Aerial photo interpretation were utilized for monitoring land cover changes with emphasis on tsunami ravaged coastal regions in Phi Phi Island, Krabi Province and Ban Num Kem, Bang Muang, Pang Nga Province areas in the southern peninsula Thailand. All of the images acquired after the Dec 26/2004 tsunami hit, were analyzed and results were compared to image taken before to address the tsunami-affected communities' details. Results of interpretation show different land cover changes in different areas due to the former land cover/land use. It was also showed that aerial photo interpretation data are capable of identification on devastated areas with a high level of accuracy at scale of 1:25,000. Special attention is given to a few examples of Ban Num Kem village in Takuepa District, Pang Nga Province and Phi Phi Island, Krabi Province.

Keywords

Land use, land cover change, Tsunami 2004, Thailand.

INTRODUCTION

On 26 Dec 2004, a magnitude 9.0 earthquake occurred off the west coast of northern Sumatra, Indonesia. The epi-centre was located under sea water at 3.32 N 95.85 E. This is the fourth largest earthquake in the world since 1900. The earthquake generated tsunamis which swept across the Indian Ocean within hours. Over 200,000 people lost their lives in this disaster. Areas near to the epicentre in Indonesia, especially Aceh, were devastated by the earthquake and tsunamis. The tsunamis also affected Phuket and surrounding areas in Thailand, Penang in Malaysia, Sri Lanka, India, and places as far as Somalia in Africa (<http://www.crisp.nus.edu.sg/tsunami/tsunami.html>).

In Thailand, the popular Puket Island i.e. Patong, Kamala, Kata, and Karon on the western part of the island were exposed to the tsunami. After some minutes giant wave hit and devastated the whole Ban Num Kem village near Khao Lak while in Krabi Province, the Phi Phi Island was also affected. There was extensive damage to beachfront hotels, villages, and sadly many casualties. It was believed at first sight not less than 80% of the exposed regions would be totally demolished and thousands of people, tourists and villagers reported dead. This tragedy calls for urgent set up "regional early warning system" in Thailand as well as for the Indian Ocean nations.

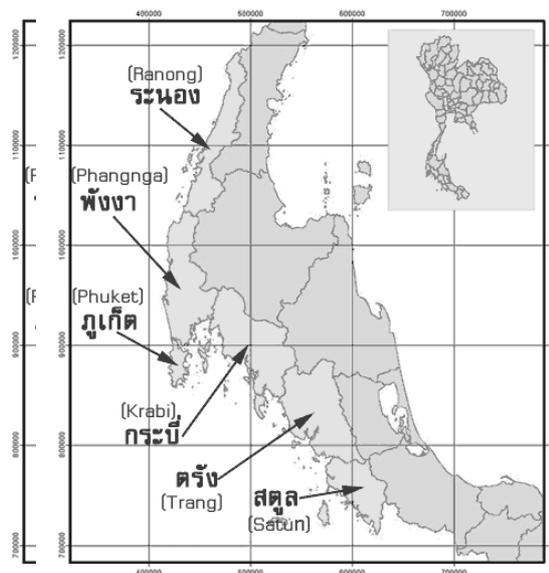


Figure 1. Andaman Sea Coast of Thailand that was attacked by Tsunami (26/12/04)

OBJECTIVE OF THIS PAPER

To study land use /land cover change by Tsunami disaster at the Andaman sea coast of Thailand by application of aerial photo interpretation and GIS.

STUDY AREAS

Phi Phi Island, Krabi Province

One of the most attractive tourist destinations in southern Thailand, KRABI is located some 800 kilometers from Bangkok with an area of 4,708 square kilometres. To the West it borders on the Andaman Sea where countless natural attractions abound, including white, sandy beaches, fascinating coral reefs, numerous large and small islands, verdant forest and highly interesting archaeological remains. Mu Ko Phi Phi or Phi-Phi Islands are located at an equal distance from both Krabi and Phuket, about 40 kilometres. Made up of six small and large isles, the main features are sheer limestone cliff and rock. Some offer beautiful beach and coral reefs.

Ban Num Kem village Phang Nga Province

Phang Nga, a land of tin mines and beautiful scenery, is located about 788 km. from Bangkok and covers an area of 4,170 square kilometers. Most of province is evergreen forest and mangrove. The province is bordered to the west by the Andaman Sea and to the south neighboring province-Phuket island. The most populated area occupied by native people that was totally destroyed by Tsunami was Ban Num Kem village in Bang Muang, Takuapa District, Pang Nga Province.

METHODOLOGY

1. Interpretation of auto aerial photographs (color) in the year 2002 to study land use/land cover of the areas.
2. Interpretation of black and white and colour aerial photographs (color) in December 2004 to study changes in land cover/use by Tsunami to the areas.
3. Analyze land use/land cover change of the areas.

RESULTS

| Areas | Area (Ha) | | Damaged Areas | | | | | | | | | |
|------------------------|--------------|-------|---------------|------|-------------|------|------------|-----|---------|------|-------|-----|
| | | | Urban areas | | Agriculture | | Water body | | Others* | | Total | |
| | Total | D | Ha | % | Ha | % | Ha | % | Ha | % | Ha | % |
| Krabi Province | | | | | | | | | | | | |
| Phi Phi Island | 5192.6 | 30.4 | 24.16 | 79.5 | 4.64 | 15.3 | - | - | 1.6 | 5.2 | 30.4 | 100 |
| Panga Province | | | | | | | | | | | | |
| Ban Nam Kem Village | 7225.9 | 649.6 | 52.0 | 8.1 | 198.6 | 30.6 | 44.0 | 6.8 | 355.0 | 54.6 | 649.6 | 100 |

- Other = beaches, sand dune, mangrove forest, pine forest, trees, shrubs, old tin mine, and fallow.
- D= Damaged areas %

After Dec 26, 2004 tsunami hit, there was dramatic physical destruction on several coastline provinces in southern Thailand. Some of these severely affected places were heavy environmental damage on beachfront of Bang Muang, Takuapa District, Pang Nga Province. Numbers of hotels, resorts, villages were almost destroyed. Seawater intruded inland, flooded beachfront and agricultural area, and killed many of tourists and local people there. Especially in Ban Num Kem Village. Figure 2 is image before and after that reveals land cover changes of Ban Num Kem, Bang Muang, Panga Province: beach, resorts, villages and agricultural areas as a result of aerial photo interpretation. Almost of the ravaged area is identified as follow: 8 % urban (villages and resorts), 30.6 % are accounted for coconut and rubber plantation, 6.7% water body and the rest were beaches, sand dune, mangrove forest, pine forest, trees, shrubs, old tin mine, and fallow. In Phi Phi Island, Krabi Province (Figure 3), within the damaged areas 79.5 % were urban , 15.3 % were coconut plantation and 5.2 % were water body and the rest were beaches, sand dune, mangrove forest, pine forest, trees, shrubs, old tin mine, and fallow. It was observed that most of the urban areas were resorts, hotels and houses.

CONCLUSION

An aerial photo interpretation results , acquired on December 29,2004 after the Dec 26 tsunamis hit were studied for detection on land cover types and monitor land use/land cover changes, the tsunami ravaged coastal regions in Phi Phi Island, Krabi Province and Ban Num Kem, Bang Muang, Phang Nga Province in the southern peninsula Thailand . It was concluded that the damages areas in the study sites are different. In Phi Phi Island almost 80 % of the whole damaged were resorts, hotels and houses and 15% are coconut plantation the rest are identified as others. While in Ban Num Kem, Bang Muang, Pang Nga Province where agricultural land were more destroyed but with 8% of urban area destroyed all are houses, schools and public places . Last but not the least, aerial photo interpretation is still be a best way to identify on devastated areas with a high level of accuracy at scale of 1:25,000.

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