

# No buildings on lands over 80 meters above sea level? - a case study of Kamala, Phuket

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## Abstract

A current issue on *Phuket-stay-green* above 80 meters from sea level is controversial among property investors and environmentalists. This study addressed this problem posed by mapping land uses at the elevated zones determined by the provincial policy and regulation. A case study was carried out for Kamala sub-district, Phuket, the South of Thailand. The GeosEye satellite image accessed in January 2011 was used to classify land use and land cover types. Field survey was conducted for the accuracy assessment of land use and land cover mapping. Four zones were 0-40 meters, 40-80 meters, 80-125 meters and above 125 meters from sea level. Our findings emphasize that the lands at the elevated zones 0-40 meters and 40-80 meters were mainly categorized as bare lands. These lands have not yet been filled up as the investors have overstated. There would be no need to revise the policy and regulation for allowing the buildings and constructions on the lands above 80 meters. Future land use policy and management should consider a balance between the development and environmental protection.

**Keywords:** Remote Sensing, Land Use, Land Cover, Forest, Agricultural, Government policy

## 1. Introduction

"Phuket Natural Resources and Environment Department have announced more measures to protect Phuket's natural environment from over development. Phuket department head Khun Ong-art said the 80-meter limit, which forbids construction above 80 meters from sea level, would remain in place..." has been reported by the Phuket Word (<http://www.phuketword.com/phuket-to-stay-green/>) on June 2010. This topic has been the controversial issue among property investors and environmentalists. The investors have put pressures on local authorities to have the height limit removed with a reason that available space in Phuket's major construction lands along the west coast have been filled up. Thus, they *think* a new regulation would have allowed the height limit to be lifted to not above 125 meters from sea level. If this regulation was approved, they would earn priceless benefit from property investment in this region. How about natural resources? What and how much such regulation would affect environment, ecosystem, and biodiversity? The environmentalists would decline and refuse such regulation and urge locals and authorities involved to protect natural resources in the west coast of Phuket Island. With the issue stated above, we aimed to investigate whether or not the lands below 80 meters from sea level have *already* been filled up. Our study area is located at Kamala sub district, Kathu district, Phuket. Our finding would be useful for the authorities to impose the land management regulation in the future.

## 2. Methods

### 2.1 Study Area

Kamala town is located in Kathu district, Phuket, the south of Thailand, with a population of about 6,500 people. A bunch of 20,000 potential tourists travels to Kamala town each year because of stunning tourist attraction i.e. beautiful sandy beaches, forest hills and wildlife. The terrain is surrounded by mountains in the north and the terrain slopes down to the kamala beach in the south and the

east. A total area is approximately 20.2 square kilometers.

### 2.2 Remote sensed image and digitization

The GeoEye imagery in year 2011 with 0.5 meter resolution was obtained from the GISTDA, Thailand. It was geometrically corrected before digitizing the five land use types; urban, forest, agriculture, water, and other lands. The contour line was obtained from the Provincial Administration Organization for a creation of elevated zones; 0 – 40 meters, 40 – 80 meters, 80 – 125 meters and above 125 meters from sea level. The zonings were mapped onto the digitized land use map to examine how much land was used for a specified category. Field survey has been carried out for accuracy assessment. Observations and verifications for the ground checks were collected for most part of the study area where the location could be reached.

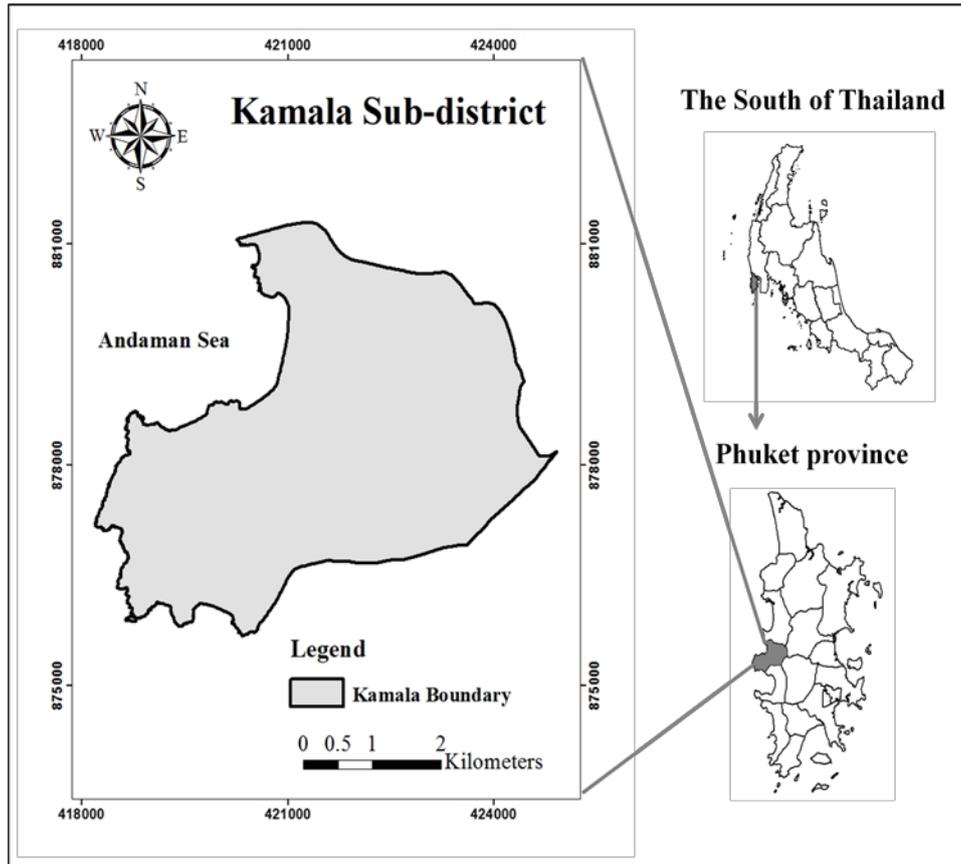
## 3. Results

Figure 2 shows land use classification for Kamla town in 2011 and contour lines were used to divide lands into four elevated zones; 0-40 meters, 40-80 meters, 80-125 meters and above 125 meters, respective, and details of land use changes, expressed as square kilometers and percentage of the total area of 20.21 square kilometers, are shown in Table 1.

At the zone 0-40 meters, other lands was accounted for by 63.6% of the total area. These lands include bare lands and beaches on the coastal lines. Agricultures were the second largest lands with mixed crops of para rubber plantation, asam gelugur plantation, local beans, and other local fruits.

At the zone 40-80 meters, a majority lands was occupied by mixed crops whereas bare lands were clearly observed.

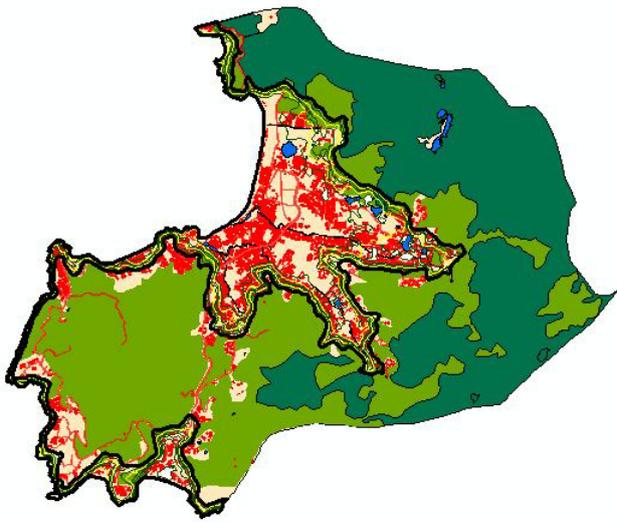
At the zone 80-125 meters, para rubber plantation was the major land use whereas forests were relatively less observed. The lands above 125 meters were covered by dense evergreen forests with a minor para rubber agricultures.



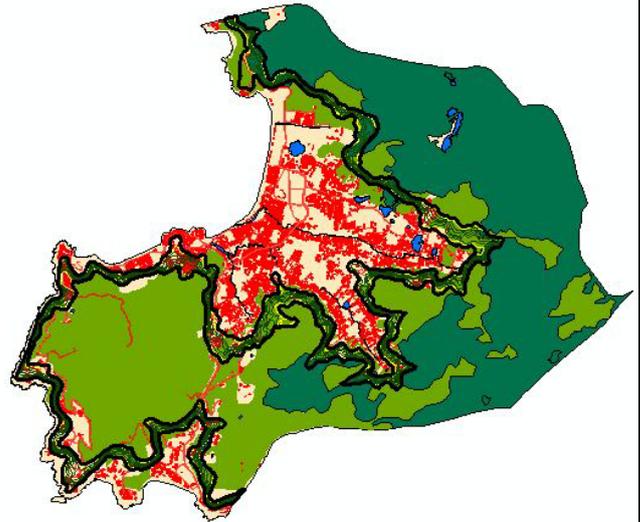
**Figure 1:** The study area of Kamala sub district, Kathu district, Phuket Thailand.

**Tables 1:** Land use in km<sup>2</sup> (%) in the elevation zones. A total area of Kamala town is 20.2 km<sup>2</sup>.

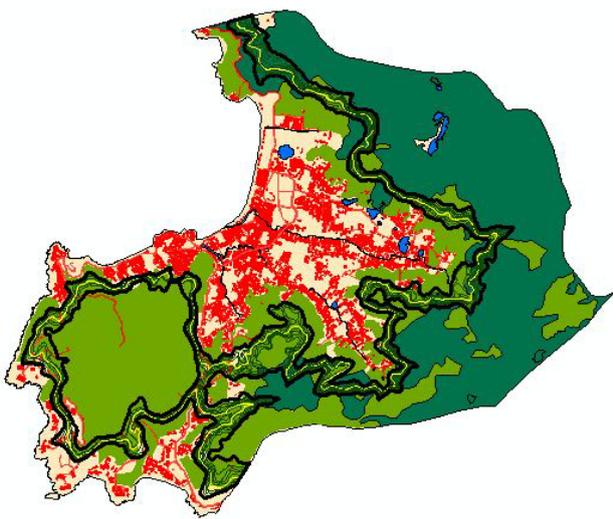
zone	urban	forest	agriculture	water	other
0-40 m.	0.930 km <sup>2</sup> (18.3 %)	0.039 (0.8)	0.784 (15.4)	0.097 (1.9)	3.233 (63.6)
40-80 m.	0.207 (8.2)	0.328 (12.9)	1.368 (54.0)	0.001 (0.04)	0.628 (24.8)
80-125 m.	0.074 (2.2)	0.795 (24.1)	2.094 (63.4)	0.002 (0.07)	0.338 (10.2)
>125 m.	0.023 (0.3)	5.669 (60.7)	3.502 (37.5)	0.032 (0.3)	0.121 (1.3)
Total	1.234 (1.6)	6.831 (35.4)	7.748 (40.1)	0.132 (0.6)	4.320 (22.3)



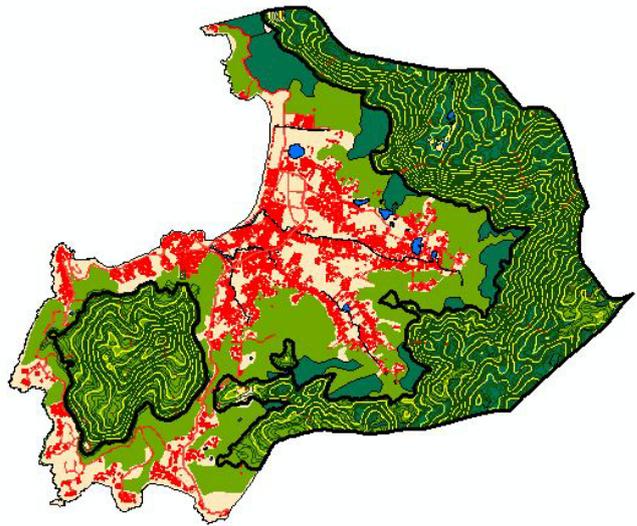
(a) Zone elevation 0-40 m.



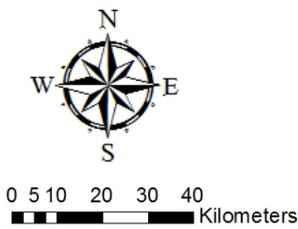
(b) Zone elevation 40-80 m.



(c) Zone elevation 80-125 m.



(d) Zone elevation > 125 m.



**Legend**

- |   |  |  |
|---|--|--|
|  Urban |  Other  |  Zone elevation |
|  Water |  Forest |  Agriculture    |

Figure 2: Land use classification within a given zone. A contour line indicates a zone elevation

#### 4. Discussion

Balancing between environmental conservation and the development of the area is essential and vital for all locations worldwide (Prasetyoputri et al.2003,). Phuket is the famous tourist destination. Beautiful sandy beaches, forests, hills, wildlife are attractive to travelers around the world to visit the Island. Phuket contributes about 30% of Thailand's income from the tourism industries. This comes with many drawbacks; deforestation for constructing hotels, resorts, villas and buildings (Narayan P.K.2000,) biodiversity degradation and unplanned urbanization.

A current issue on *Phuket-stay-green* above 80 meters from sea level is controversial among real estate business sectors and conservational groups. The revision of notification of Ministry Natural Resources and Environment RE: Territory and Environment Protection Measure for Phuket province may have both positive and negative impacts. A positive consequence is that residential development areas will increase to support the tourism activities. A negative side is environmental problems that may incur. The problems involve landslides, flooding, and deforestation.

Our findings emphasize that the lands at the elevated zones 0-40 meters and 40-80 meters are mainly categorized as bare lands. These lands have not yet been filled up as the investors have overstated. There would be no need to revise the policy and regulation for allowing the buildings and constructions on the lands above 80 meters.

#### 5. Conclusions

The lands below 80 meters from sea level have not yet filled up. This is inconsistent to the problem statement posed by the property investors. A large number of bare lands is still available. Such that, at this time, buildings should not be allowed to be constructed on the lands over 80 meters.

Despite the extensive field work, it was not possible to check all the areas due to difficulties in access to the terrain conditions in the area. Limited time for the study also affected the field work. An intense field survey effort is needed for monitoring whether the agricultural lands above 80 meters from sea level are either healthy agricultural plantations or damaged/broken agricultural lands. If there were damaged agricultural lands, there would be two choices; restoration of lands by planting forests campaigns or giving it up to investors for their property construction business. Similar studies should be applied to other locations on the west coast of Phuket Island. Local policy makers should strictly enforce the current regulation and impose a balance between land use sustainability and natural resource protection.

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