Mitigation of Landslides in Hong Kong

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5th September 2012

NAGOYA UNIVERSITY

Japan

Hong Kong Fact Sheet

- Formerly a British colony
- Returned to China on 1 July 1997
- Population ~7 million
- Area ~1,100 km^2
- Annual rainfall ~2,200 mm
  - 80% between May and September
  - Highest hourly rainfall of 145.5 mm recorded on 7 June 2008

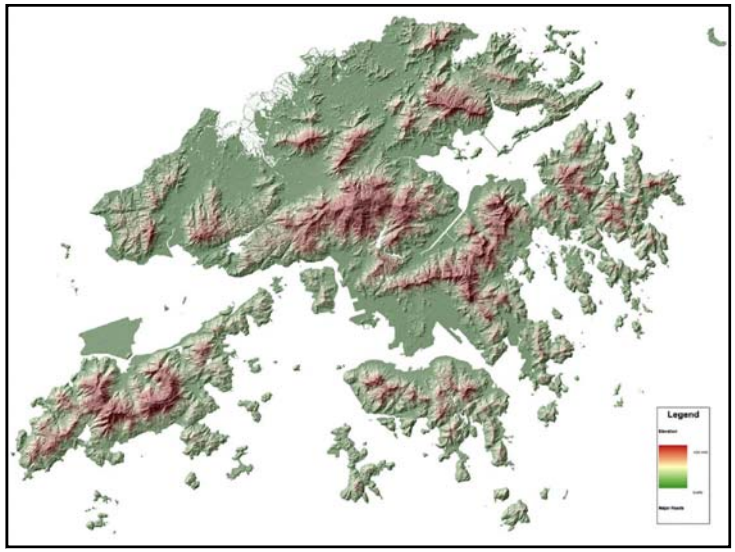
Where is Hong Kong?

Natural Disasters in Hong Kong

- Typhoons
- Flooding
- Landslides







Cut Slopes Formed for Building & Infrastructure Developments

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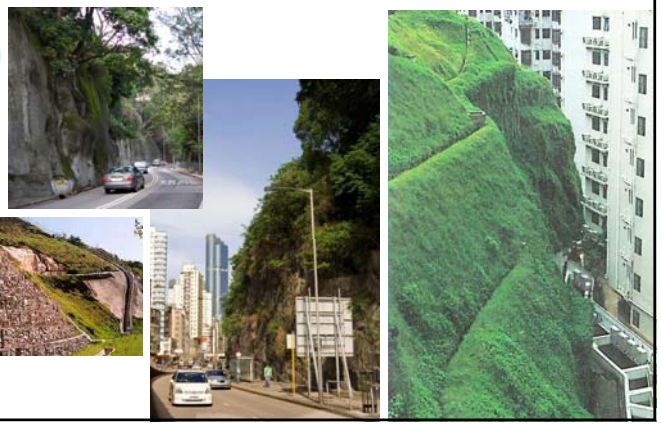
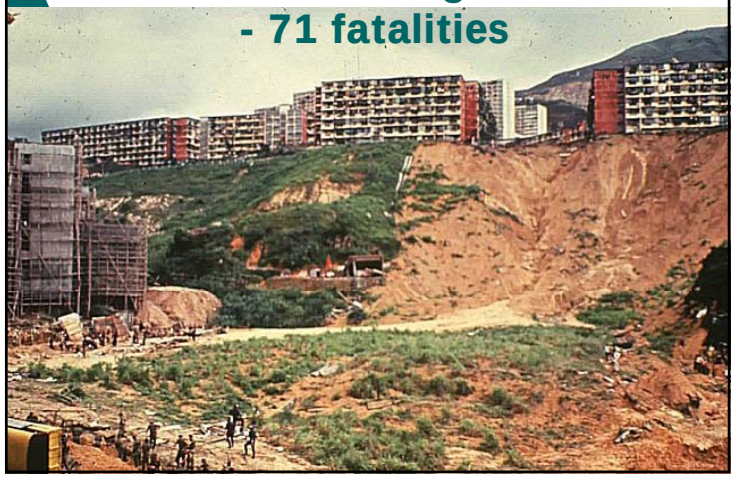
Slopes near Roads and Buildings



1972 Sau Mau Ping Landslide - 71 fatalities



Hong Kong is Highly Susceptible to Landslide Risk

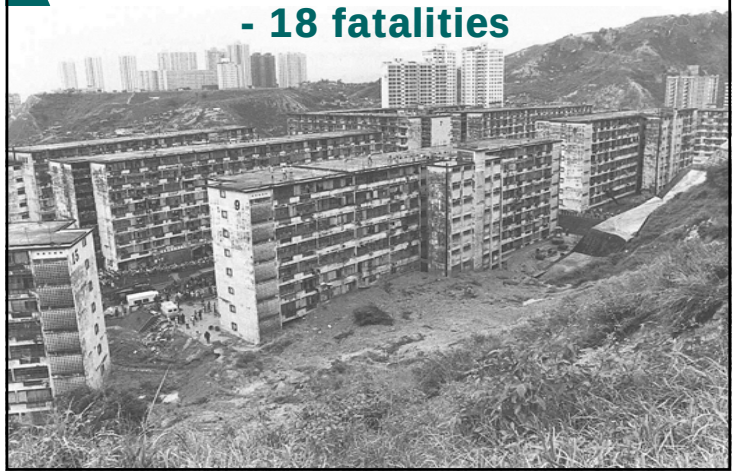
- Steep hilly terrain
- Heavy rainfall
- Dense development

1972 Po Shan Rd. Landslide - 67 fatalities

Independent Review Panel on Fill Slopes (1976)

- Professor J.L. Knill
- Professor P. Lumb
- Professor S. Mackey
- Professor V.F.B. de Mello
- Professor N.R. Morgenstern
- Dr. B.G. Richards

1976 Sau Mau Ping Landslide - 18 fatalities



Geotechnical Engineering Office
Civil Engineering & Development Department

- As a result of several disastrous landslides in the 70's, the GEO was set up in 1977 to regulate the whole process of
  - Investigation
  - Design
  - Construction
  - Monitoring, and
  - Maintenance of slopes

Hong Kong Slope Safety System

- Set up, developed and maintained by the GEO since 1977
- Objective

Meet Hong Kong's Needs for the Highest Standards of Slope Safety

Ensure new slopes meet safety standards

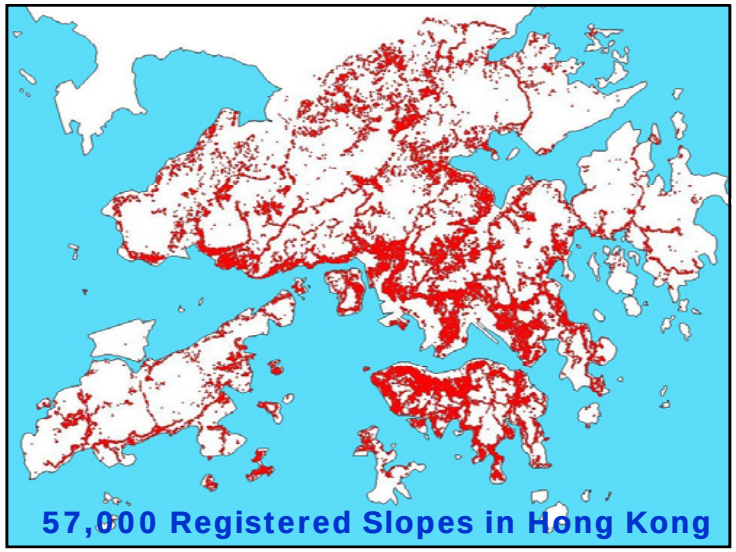
- Improvement of slope safety standards, administrative and regulatory frameworks, and technology
- Checking of new slopes
- Enhancement of land use planning

Hong Kong Slope Safety System

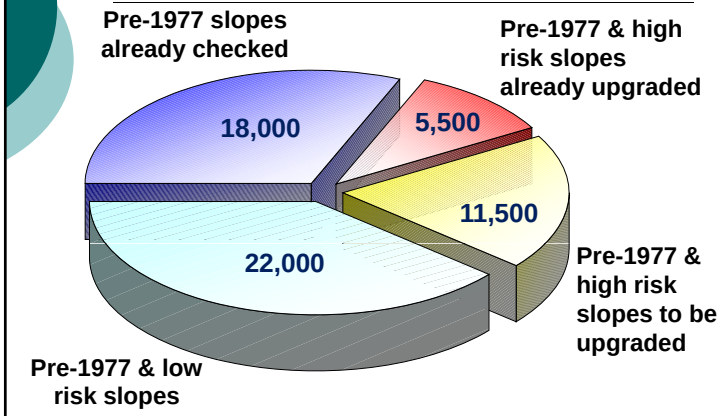
- Ensure new slopes meet safety standards
- Rectify stability of old man-made slopes
- Mitigation of natural terrain landslide risk
- Minimize damage caused by landslides
- Enhance the appearance of aesthetics of engineered slopes

Rectify the Stability of Old Man-made Slopes

- Rectify substandard Government slopes
  - Upgrading slopes though the LPM program
  - Clear squatters on slopes
- Promotion of slope maintenance
  - Routine Engineer Inspection and maintenance of government slopes
  - Ensure that owners take responsibility for slope safety
- Provision of information



Distribution of Registered Slopes



Registered Slopes

Mitigation of Natural Terrain Landslide Risk

- Detailed study of natural terrain landslides
  - Types
  - Mechanism
  - Mobility
- Inventory of landslides on natural terrain

Minimize Damage Caused by Landslides

- Public education and publicity on slope stability
- Thunderstorm, rainstorm, flood and landslide warning services
- Landslide Potential (rainstorm) Index (LPI)
- Landslide emergency service

Enhance the Appearance and Aesthetics of Engineered Slopes

Enhance the Appearance and Aesthetics of Engineered Slopes

Before

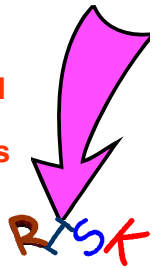
After

Best Landscaped Slope Award 2003-2004

（赤柱 龍德苑）

Outcome of 35 Years' Efforts

- Success rate in preventing major landslides in slopes checked as conforming to the current safety standard exceeds 99.8%
- Large reduction in fatalities
- Overall landslide risk from substandard man-made slopes reduced



Strive to further reduce risk

Conclusions

- Past experience, on-going programs, and future directions of slope disaster prevention in Hong Kong have been presented
- Research is being carried out to develop a better understanding of landslides and slope stabilization measures

Looking Forward

- Improvement in design methodology for slope stabilization measures
  - Better geologic information
  - Better understanding of the stabilizing mechanisms of soil nails
  - Better material for soil nails
  - Non-destructive evaluation of soil nail performance

Thank you!