



The Association of Surveyors  
of  
Papua New Guinea Inc.



XXIV FIG International Congress 2010  
SIDS Workshop,  
Small Island Developing States and The Millennium  
Development Goals  
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Case Study of the Papua New Guinea Experience  
with natural disasters from a land practitioners  
perspective

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## OUTLINE OF PRESENTATION

- OVERVIEW OF:
  - Natural Disasters in PNG
  - Current Assessment
  - Map hot spots in PNG
  - Surveying & Mapping Profession in PNG
  - Fields of Surveying & Current Practices
  - Laws of Land use in PNG
  - Spatial Technologies
  - PNG Datum for Survey Control Monument Network
  - Data Collection / Monitoring
  - Reforms & Capacity Building
  - Presentation
  - Recommendations



## ***Natural Disasters in PNG ?***



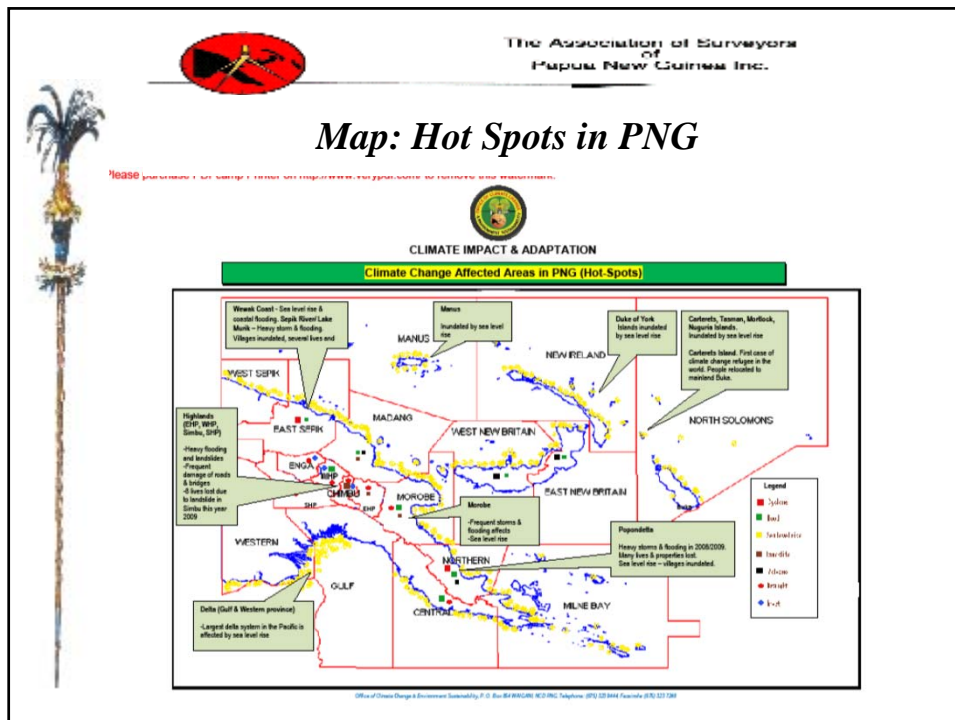
- Nearly all categories of natural disasters have occurred;
  - Flood, Earthquake, Tsunami, Storm surge, Landslide, Drought, Volcano eruption, Cyclone, etc...
  
- Large disasters occurring frequently with increasing intensity and potency
  - 1983 Lae Flood, 1994 Rabaul Volc. Eruption, 1997 Aitape Tsunami, 2008 Popondetta Flood, etc.



## **Current Assessment**



- **Highlands region**
  - i. Gumanch Flood – WHP
  - ii. Landslides/Landslips – Simbu (Gere) / EHP (Daulo area)
  
- **Momase region**
  - i. Flooding – Morobe/Madang/East Sepik/West Sepik
  - ii. High tides/ sea level rise
  
- **Islands region**
  - i. Food security- Agriculture
  - ii. High tides/ sea level rise – Duke of York (NIP)/ Carterets Islands (NSP)/ number of small islands in Manus
  
- **Southern region**
  - i. Flooding – Oro/ Central (Rigo)/ Milne Bay, Gulf and Western
  - ii. High tides/ Sea level rise – All



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- ### THE SURVEYING & MAPPING PROFESSION IN PNG
- **ADMINISTERED BY THE PNG SURVEYORS BOARD**
    - SURVEY CO-ORDINATION ACT
    - SURVEY DIRECTIONS 1990
    - WORKS & SUPPLY STANDARD SURVEY INSTRUCTIONS
    - CODE OF ETHICS AND CONDUCT
  - **COMPLIANT TO THE SURVEY ACT 1969 (CHAPTER 95)**
    - Provides for the Regulation of surveyors & the regulation of the practice of land surveying and for related purpose.
  - **SURVEY REGULATION (CHAPTER 95) Registration of Surveyors**
    - Protect the public by ensuring a surveyor is competent and a person of integrity
    - To facilitate the work of the Surveyor General & Registrar of Titles by ensuring surveys are submitted in standard manner
  - **ASSOCIATION OF SURVEYORS OF PNG Inc.**



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## FIELDS OF SURVEYING & CURRENT PRACTICES



- CADSTRAL SURVEYING
  - BOUNDARY
- ENGINEERING SURVEYING
  - DETAIL & TOPOGRAPHICAL / CONSTRUCTION SET OUT
- HYDROGRAPHIC SURVEYING
  - SHIPPING CHANNELS, MARINE CHARTS, WHARFS & JETTIES.
- MINING SURVEYING / OIL and GAS
  - MINE OPERATION AND PRODUCTION
- GEODETIC SURVEYING / DGPS
  - COORDINATION OF FIRST ORDER SURVEY MONUMENT



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## LAWS OF LAND USE IN PNG



- LAND ACT
- LAND TENURE CONVERSION ACT.
- LAND TITLE COMISSION ACT
- PHYSICAL PLANNING ACT & REGULATION
- SURVEY ACT
- SURVEY CORDINATION ACT
- (VOLUNTARY) CUSTOMARY LAND REGISTRATION ACT
- LAND GROUPS INCORPORATION ACT (CHAPTER 147)
- FAUNA (Protection and control) ACT & WATER RESOURCES ACT
- FORESTRY ACT, NATIONAL CULTURAL PROPERTY ACT.
- CONSERVATION AREA ACT. & NATIONAL PARKS ACT.
- ENVIRONMENTAL PLANNING ACT.



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## SPATIAL TECHNOLOGIES

- Surveying
  - Legal boundaries (customary land)
- Remote Sensing:
  - Capture & process imagery
  - Quantify from a period of time
- GPS (Global Positioning System):
  - Precision location, tracking, navigation
- GIS (Geographic Information System):
  - Data processing (analysis & modelling)
  - Handles Vector and raster data
  - Combines / integrates data from multiple sources
  - Layers



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## PNG DATUM FOR SURVEY CONTROL MONUMENT NETWORK

- NEED FOR MAJOR UPGRADING OF SURVEY MOMUMENT NETWORK IN PNG TO PNG 94 DATUM (Gazetted datum)WGS84
  - UTM Coordinates in E, N, RL (MSL) & GEOGRAPHICAL, Lat, Long
- OLD DATA IN AGD 1966 / LOCAL DATUM
- SURVEYORS CAN HELP TRANSFORM COORDS OF OTHER DATA FROM VARIOUS DEPTS TO A STANDARD DATUM (PNG 94)
- ESTABLISH ELECTRONIC TIDE GAUDES AT PNG PORTS SITES AND CONNECT BY GPS,
- REVISIT / REOCCUPY FIRST ORDER SURVEY MONUMENTS
- DEFINE PNG GEOID MODEL



### DATA COLLECTION / MONITORING

- Current practice(s)
- Institutionalize data sharing arrangements (partnerships)
- Key data custodians:
  - Dept of Lands & Physical Planning
  - Dept of Works & Transport
  - Dept of Environment & Conservation
  - National Weather Service
  - Dept of National Planning & Monitoring
  - Mineral Resources Authority
  - Dept of Petroleum & Energy
  - National Statistics Office
  - PNG Ports / National Maritime Authority
  - Dept of Agriculture
  - Civil Aviation Authority
  - National Forest Authority



### DATA COLLECTION / MONITORING

- Base data will start with the legal boundaries, cadastral, regional, provincial, LLG and project sites.
- ALL SURVEYS FOR LEGAL BOUNDARIES ARE AS PER LAND ACT  
Normal conventional ground surveying by surveyor, electronic Total Station Theodolites with data recorder.
- By LiDAR & GPS Technology over large area on land.
- By Echo sounding, side scanning & GPS Technology on off shore survey.
- SOFTWARE AND HARDWARE
- DATA FORMATS



## DATA MANAGEMENT & PRESENTATION , SPATIAL & TEMPORAL DATA (Geographical location), (over a period of time)

- Two components (location / attribute info)

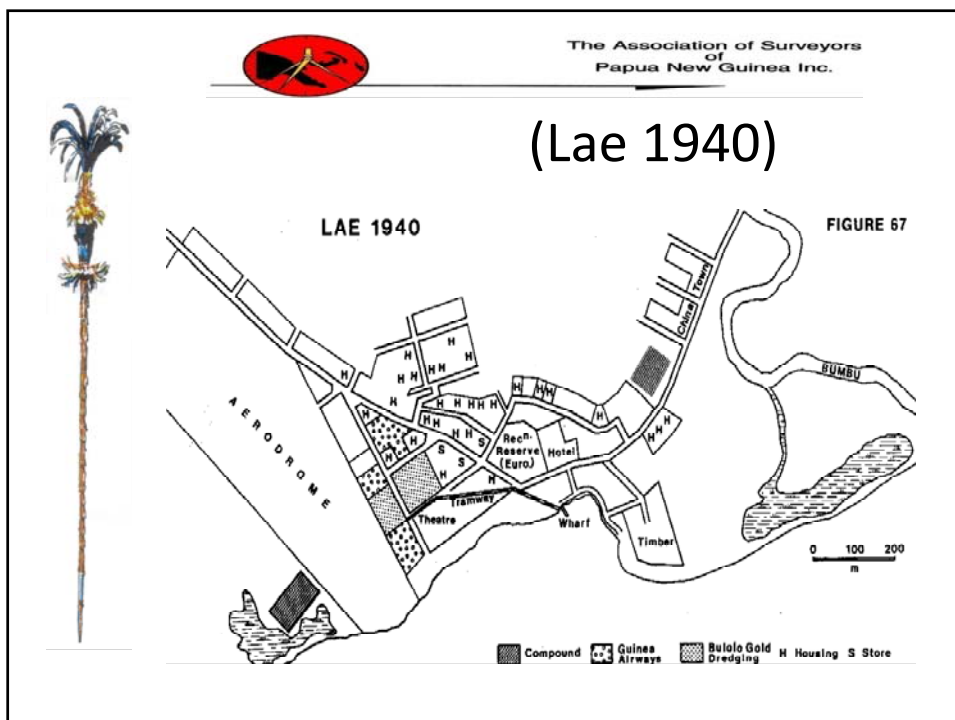
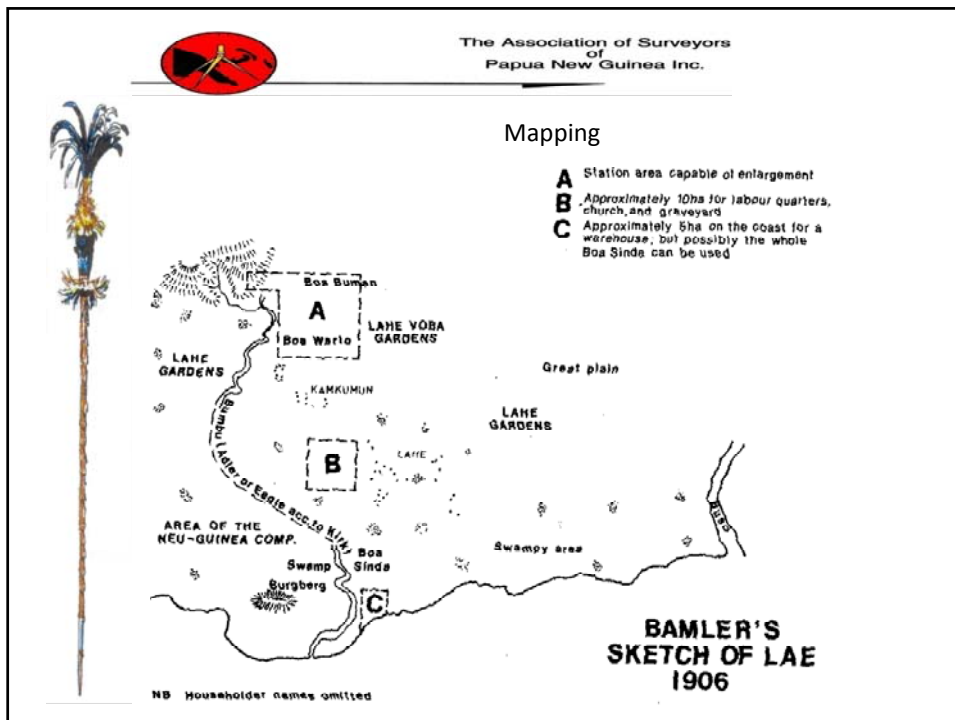
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<input type="checkbox"/>	60 Qv	4	Victory Volcanics	lavas and pyroclastics
<input type="checkbox"/>	60 Qv	4	Waiowa Volcanics	lavas and pyroclastics

- Data (baseline) available in digital and analogue form:
  - Survey mark infrastructure
  - Legal boundaries (cadastral, administrative, political, project)
  - Landuse (residential, commercial, industrial, agriculture)
  - Land cover (vegetation, forests, soils)
  - Topography (contours, rivers, landform)
  - Infrastructure (roads, bridges)
  - Geology and tectonics
  - Meteorology (rainfall, temperature)
  - Population (density, distribution)

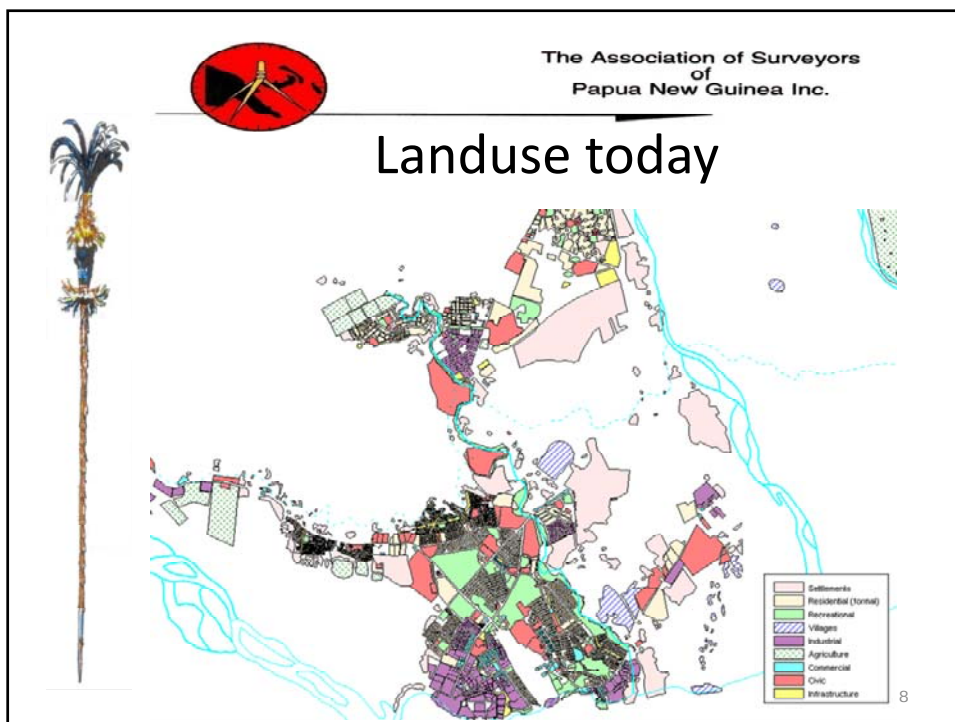
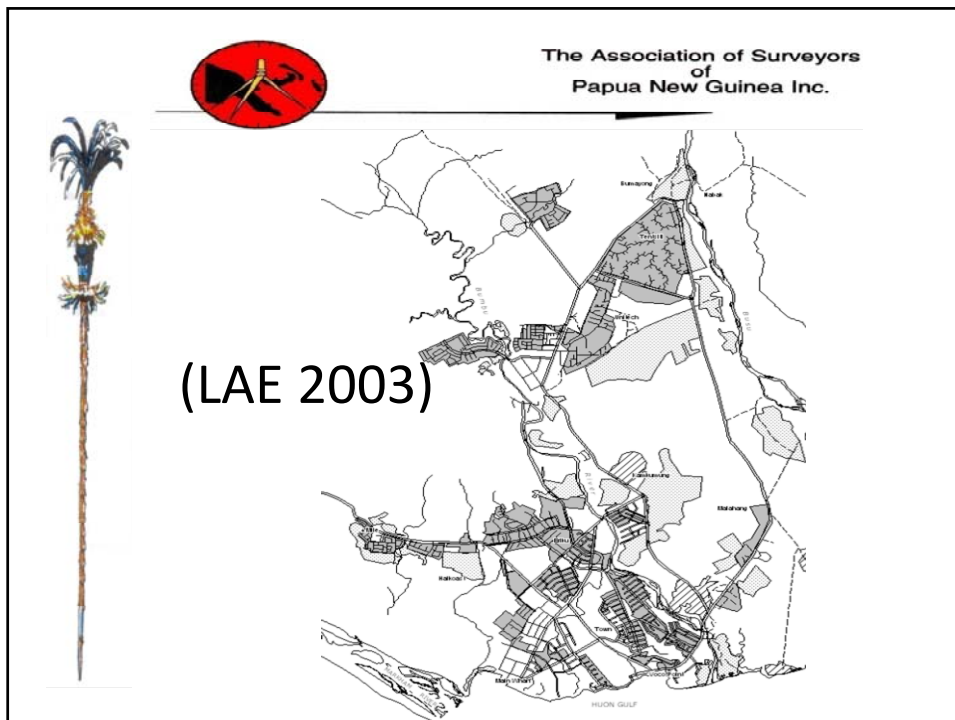


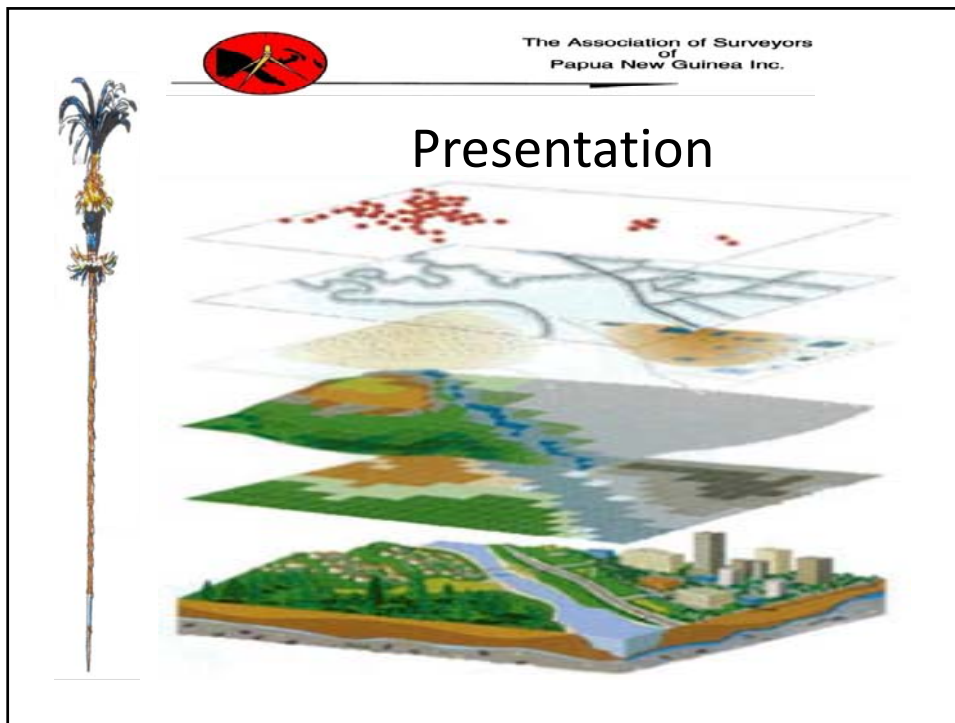
## REFORMS & CAPACITY BUILDING

- ASPNG Proposed Post Graduate Diploma in Surveying Practice Course at PNG University of Technology.
- ASPNG Proposal to privatize the PNG Surveyors Board and the Office of the Surveyor General.
- Review of the Survey Act, Survey Regulations and Survey Coordination Act. Survey Directions Manual and the Department of Works & Supply Standard Survey Instructions Manual.











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### RECOMMENDATIONS

- Conform with the WGS84 datum and PNG 94/ coordinate system (global system) for all data based on:
  - Continuously operating reference systems & ancillary data
  - Legal boundaries
- Placement/installation of modern measuring station network:
  - Tide gauge (PNG Ports sites), Gauging stations –wharf & bridge
  - Temperature & wind velocity (schools, District offices)
  - Rainfall, etc. (schools, District office)
- Adopt / implement spatial data standards
- Institutionalize data sharing arrangements
- Reforms and Capacity Building
- Use selected disaster sites as case studies.
- AWARENESS AND EDUCATION.
- TRAINING

End of ASPNG Presentation

**THANK YOU**