Positional Framework to support Land Information Systems

Neil Ashcroft, Leica Geosystems,

Dan Roman, Chair Commission 5, Rob Sarib, Chair AP CDN

Hosted by: MOLIT Ministry of Land, Infrastructure and Transport FIG

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- when it has to be right

Leica Geosystems

HEXAGON

Land Governance ?

Governance - framework of legislation, policies, processes and institutions by which land / marine , property and natural resources are managed

Administration - a system that provides infrastructure for

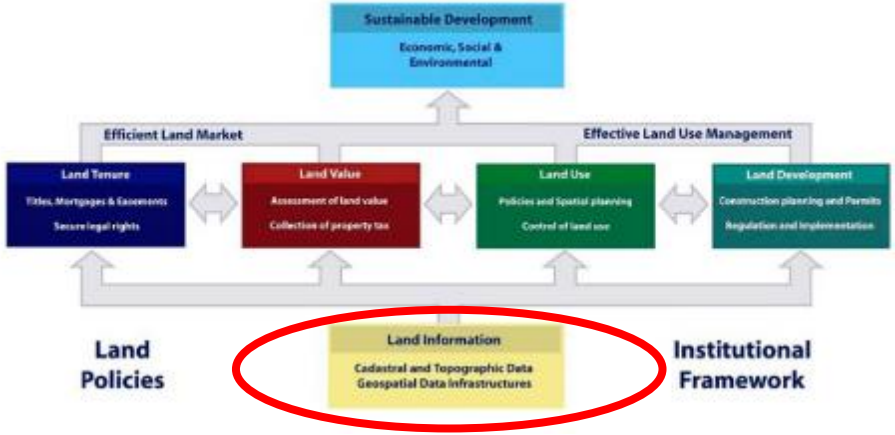
- securing land / marine tenure (rights, restrictions, responsibilities),
- determining valuation and taxation of land / water,
- land / marine use planning and
- development of built environment - utilities, construction

Management - processes for the use and development of land / marine resources

Source – Enemark, Williamson

Elements of “good’ Land Governance

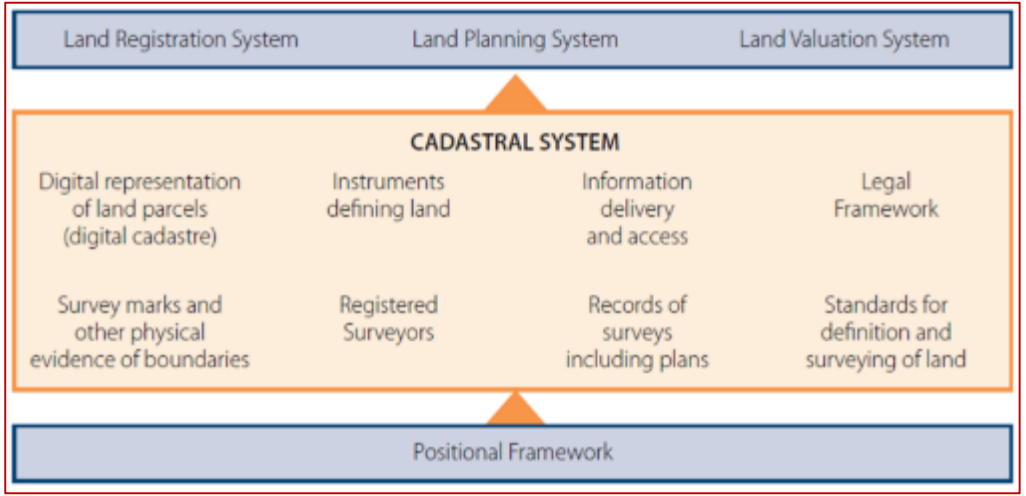
- Security of tenure
- Integrated land and marine information system
- Modernised geospatial reference system (incl. infrastructure)
- Foundation or fundamental datasets
- Policy, standards, practices, guidelines
- Agile flexible high performing people
- Collaboration



Source – Enemark, Williamson

Land Information Systems (LIS)

- **Defines and records** the location and extent of property rights, restrictions and responsibilities - 3 dimensions plus a temporal (time) component
- **Geometric representation** of land and real property boundaries (digital visualisation)
- Must be easily, uniquely and accurately **underpinned by a positional framework**



Source - https://www.icsm.gov.au/sites/default/files/Cadastre2034.pdf

Foundation Datasets of an LIS

Are the fundamental geospatial datasets of a land information system

- common asset of location information to make decisions that affect people's safety, prosperity, and environment
- comprising of the best available, most current, authoritative source of foundation geospatial data which is standardised and quality controlled

Source - http://www.anzlic.gov.au/fsdf-themes-datasets

Positioning / Geodetic Framework

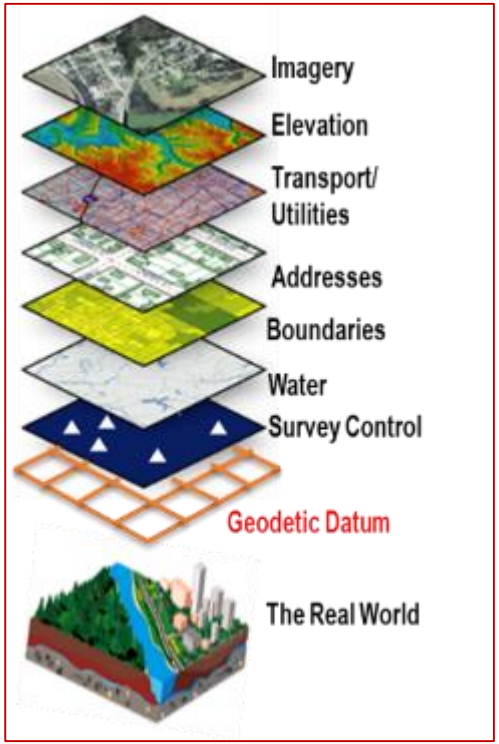
Data is **underpinned** by the **common reference system** or **geodetic datum** or **geospatial reference system**

To facilitate

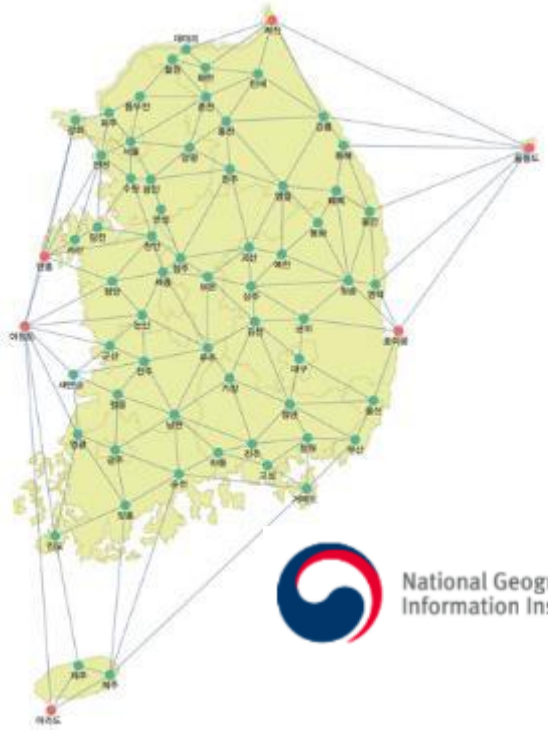
- IT, computers, systems, software and applications to communicate - **interoperability**
- extraction and amalgamation of spatial data - **unification**

The “where is it” component for the **measuring and monitoring of SDGs**

At all levels – **local**, **national**, **regional**, and **global**.



Positioning Infrastructure



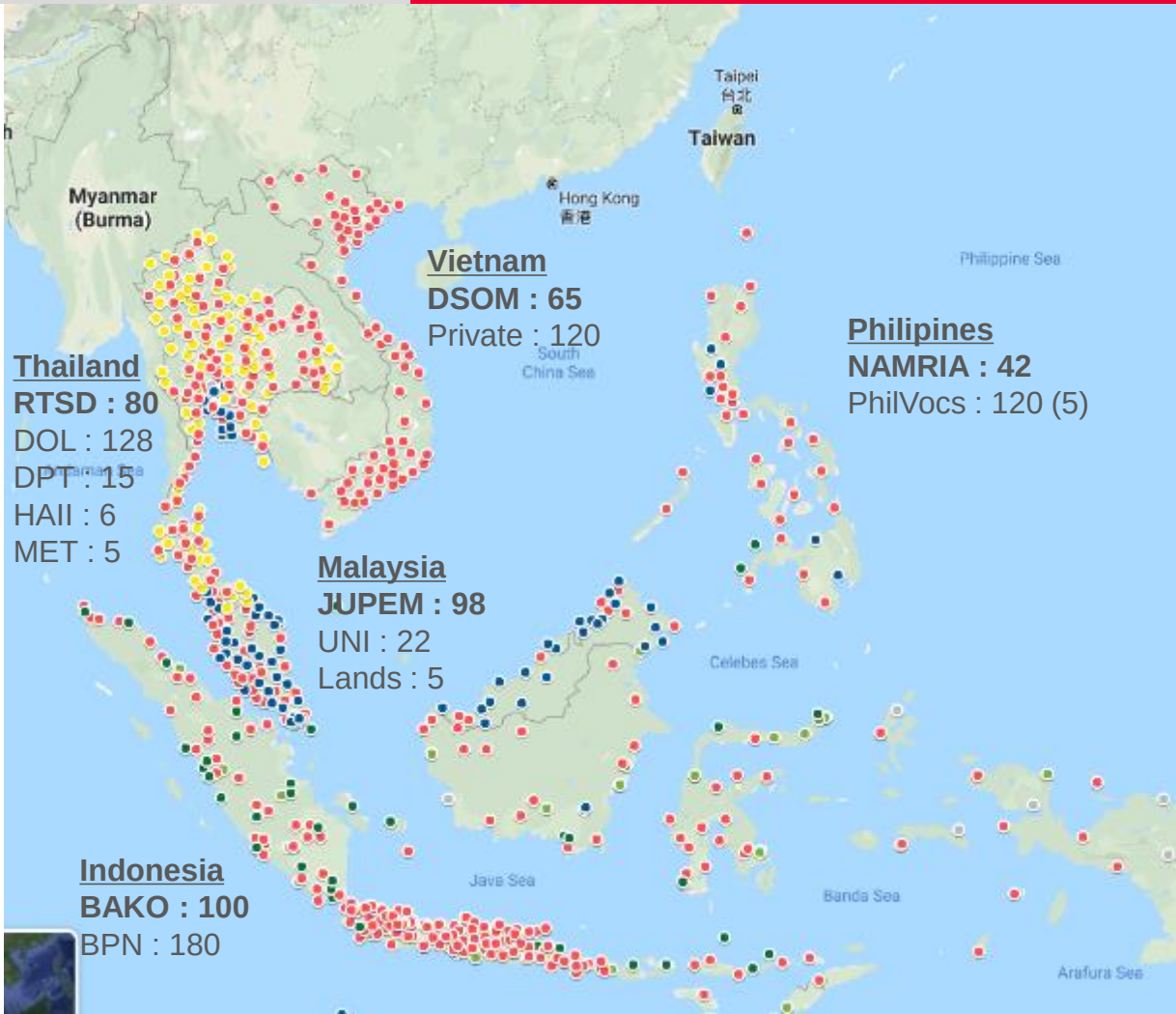
National Geographic Information Institute

- when it has to be right

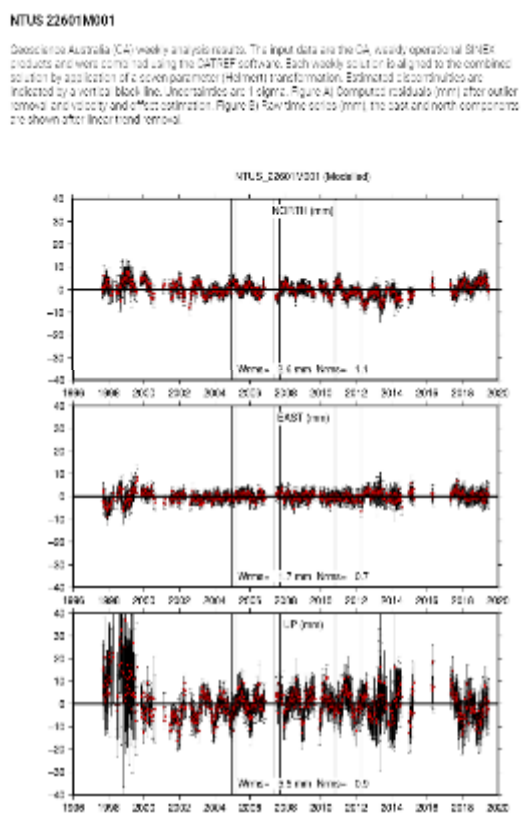
Leica Geosystems

CORS Sites in SE Asia

There are coming close to 1,000+ **C**ontinuously **O**perating GNSS **R**eference **S**tations operated by various Government organisations that determine a National / Regional / International Reference Frame

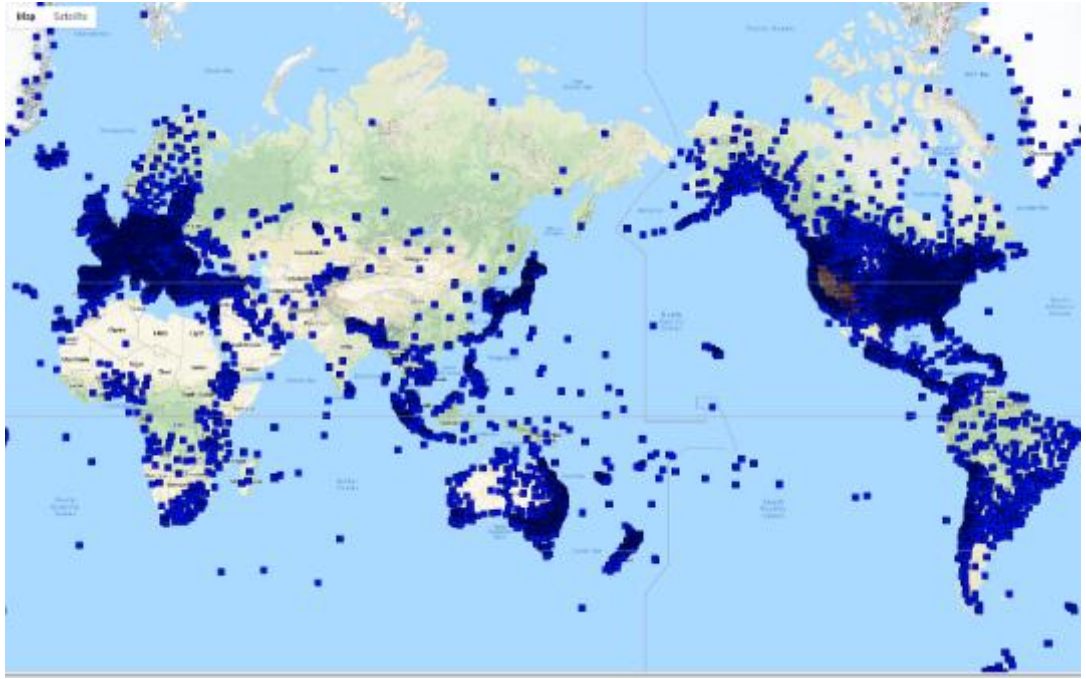


Geoscience Australia – Daily Time Series



What is a GNSS CORS system used for ?

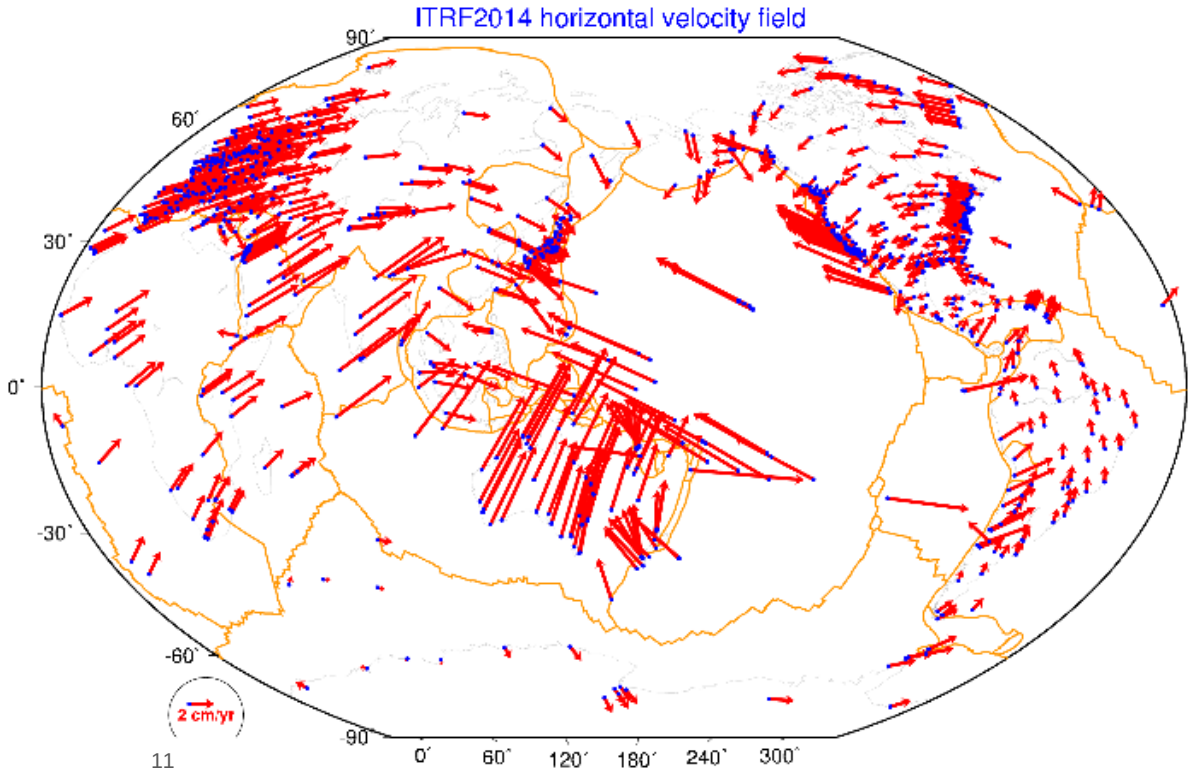
Worldwide CORS Sites



http://geodesy.unr.edu/NGLStationPages/gpsnetmap/GPSNetMap.html

Geodynamics

Computing Plate Velocities from GNSS CORS



"Other" Space geodesy Techniques

VLBI

SLR

DORIS

⇩

GNSS ⇨ **ITRF Definition**

Latest = ITRF2014 (published Jan 2016)

Geodynamics

Plate Velocities

HAZARD MAPPING

FIG Commission 5 - Positioning and Measurement
Mission Statement

Focus on modern technologies, and technical developments and **assist** individual surveyors, engineers and GIS/**LIS** professionals through guidelines and recommendations, to choose and utilise those methods, technologies and instruments that are most appropriate to different applications

Follow **technical developments** through **collaboration** with other FIG Commissions and other international organisations; participation in appropriate meetings; and the preparation of appropriate publications.

Support research and development and **stimulate** new ideas in the fields of expertise represented within the commission

Collaborate with manufacturers on the **improvement** of instrumentation and associated software.

Present and **promote** the work of the Commission and its working groups on an on- going basis at FIG Congresses, FIG Working Weeks, FIG Regional Conferences and other relevant technical meetings and in appropriate FIG and other media.

Chair: *Daniel Roman*, USA

Vice-Chair of Administration: *Kevin Ahlgren*, USA

Working Group	Chair	Co-Chair
WG 5.1: Standards, Quality Assurance and Calibration	David Martin, France	
WG 5.2: 3D Reference Frames	Nic Donnely, New Zealand	
WG 5.3: Vertical Reference Frames	David Avalos, Mexico	
WG 5.4: GNSS	Suelynn Choy, Australia	Ryan Keenan, Australia
WG 5.5: Multi-Sensor Systems (Joint w/ IAG / Com. 6)	Allison Kealy, Australia	Günther Retscher, Austria
WG 5.6: Cost Effective Positioning	Leonid A. Lipatnikov, Russia	Li Zhang, Germany

FIG Commission 5
Working Group 5.2 – Reference Frames

Projects:

- Review of Reference Frames in Practice Manual
- Connection to ISO-TC211: Geodetic Registry Network

Workshops:

- Continuing Seminars on Reference Frames in Practice, 3D and vertical frames
- An RFIP Workshop will be held with FIG 2019, SIRGAS 2020, FIG 2021, and FIG WW 2022

Publication:

- FIG Publication on ITRF
- Publication regarding national datums (different types)

Nic Donnely, NZ

FIG Commission 5

Working Group 5.3 – Vertical Reference Frames

Projects:

- Inventory/catalogue of height systems per country
- Capture planned changes for height systems in countries
- Provide guidelines to re-define the national vertical control,

Sessions and workshops:

- Special Sessions regarding vertical reference systems at various conferences including Reference Frame in Practice Seminars
- Splinter meetings at FIG, UN-GGIM, IAG and UNOOSA
- RFIP Workshops to be held with FIG 2019, SIRGAS 2020, FIG 2021, and FIG 2022

David Avalos, Mexico

FIG Regional Capacity Development Network

In 2015 the FIG Council established this Network. The purpose of the Regional Capacity Development Network is to "**Ensuring the Rapid Response to Change Ensuring the Surveyors of Tomorrow**" by a global network operationalised on a Regional basis.

Chair :
Dr. ***Diane Dumashie***,
RICS, United Kingdom

Asia Pacific Chair :
Mr. **Rob Sarib**,
Australia

FIG-Asia Pacific Capacity Development Network

Our Purpose…

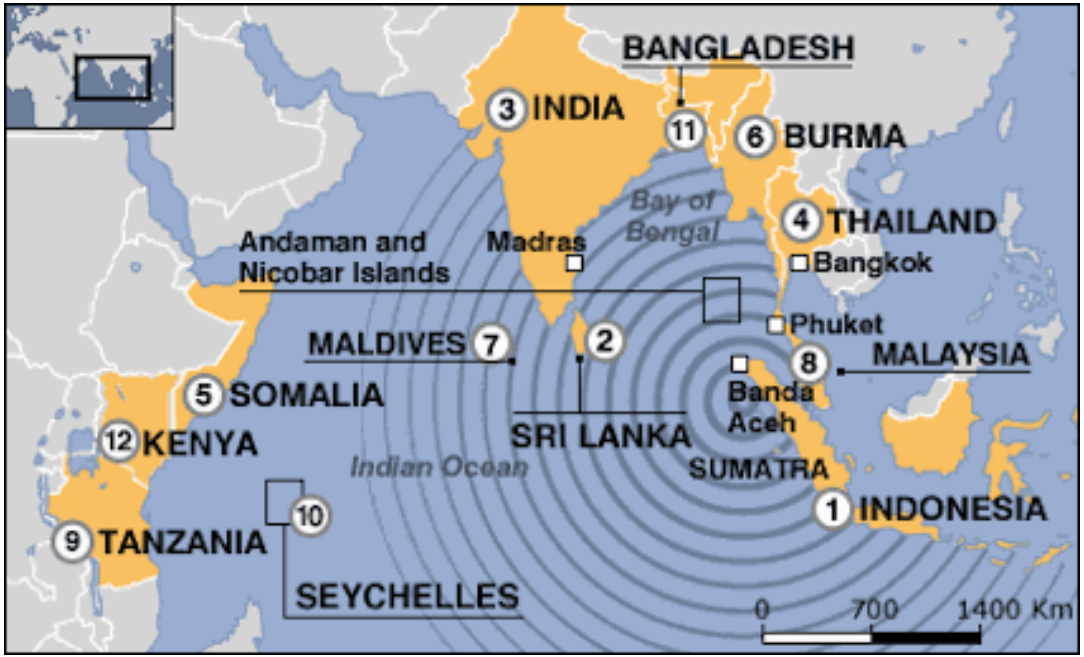
"Responsible governance frameworks and integrated administrative systems of tenure (rights and interests) for land and marine, are underpinned by sustainable fit for purpose geospatial survey infrastructure and information management"

Modernisation – establish, maintain, upgrade

Short Example…

Utilising **Positioning Infrastructure** to rapidly recover **land boundaries** after a disaster…

December 26, 2004: Tsunami Devastates Indonesia and Many Other Countries



Magnitude of Mw 9.1–9.3

Disaster Management

Before…

Disaster Management

…After

…After

…After

GNSS Reference Stations in Indonesia

Disaster Management

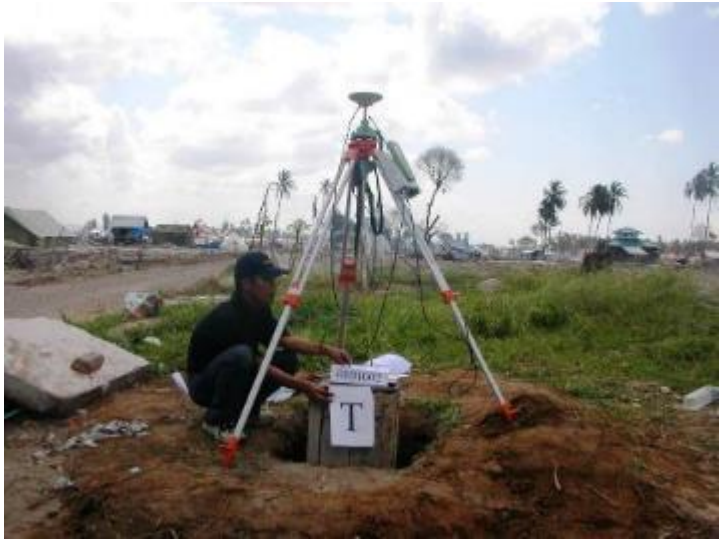
Reinstatement begins

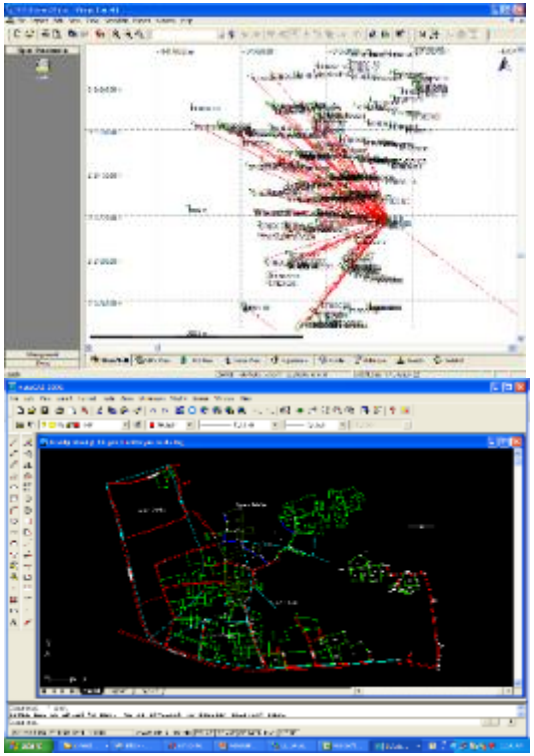
…After…

…After…

Re-instating Ground Control Points

…to recover boundaries





Re-instating Boundaries

Thank You

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