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Auditing

SESSION 6.0
Identifying Audit Evidence and Methodology

LEARNING OBJECTIVES

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At the end of this session participants will be able to:

1. Identify types and sources of evidence, and
2. Utilize the GIS for collecting and analyzing audit evidence in auditing forest in reference to audit objective and audit criteria

THE IMPORTANCE AND CHARACTERISTICS

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- **Competent** → actually represents what it purports to represent
- **Relevant** → clear and logical relationship to the audit objectives and to the criteria
- **Sufficient** → enough, relevant and reliable evidence to persuade a reasonable person that the performance audit findings, conclusions and recommendations are warranted and supported

TYPES OF AUDIT EVIDENCE

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Physical	photos	charts	maps	graphs
Oral	statements	interviews		
Documentary	Internal	External		
Analytical	Computa-tions	ratios	trends	patterns

EVIDENCE GATHERING TECHNIQUES

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"Auditors should have a sound understanding of techniques and procedures such as inspection, observation, enquiry and confirmation, to collect audit evidence. The SAI should ensure that the techniques employed are sufficient to reasonably detect all quantitatively material errors and irregularities."

The INTOSAI Auditing Standards

EVIDENCE GATHERING TECHNIQUES

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1. Document review
2. Interviews
3. Questionnaires
4. Analysis of data
5. Physical Observation
6. Confirmation
7. Benchmarking
8. Focus Group Discussion
9. Expert Opinion

EVIDENCE ANALYSIS TECHNIQUES

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Program Logic Models (PLM)

- analytic tool best used in the audit overview and survey

Making comparisons using rates and ratios

- Their purpose is to compare one quantity with another
- proportions, percentages, and decimals.

Interpreting Data Distribution

- generally expressed by a graph (bar-chart or curve) that shows all the values of a variable
- The statistics that describe data distributions can be powerful tools for audit analysis and reporting

EVIDENCE ANALYSIS TECHNIQUES

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Regression Analysis

- a technique for assessing the degree to which variables are associated (correlated)

Benefit-Cost Analysis

- to determine whether the benefits of an entity, program or project exceed its costs

Simulation and Modeling

- a mathematical model, together with input data, to "mimic" a "real life" system and to predict the response of that system to changes

EVIDENCE ANALYSIS TECHNIQUES

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Content Analysis of Qualitative Data

- a systematic approach to collecting and organizing information in a standardized format

Work Flow and Communications Flow Analysis

- One way to analyze the activities of an organization is to chart where, when or how decisions are made or information or materials are sent from one unit or person to another

AUDIT EVIDENCE

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Characteristic of Evidence	Type of Evidence	Collecting Methodology	Analyzing Methodology
□ Competent □ Relevant □ Sufficient	□ Physical □ Oral □ Documentary □ Analytical	□ Document Review □ Interviews □ Questionnaires □ Analysis Data □ Physical Observation □ Confirmation	□ Program Logic Model □ Interpreting Data Distribution □ Regression Analysis □ Benefit-Cost Analysis □ Simulation and Model □ Content Analysis of Qualitative Data □ Work Flow & Communication Flow Analysis

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The Importance of geospatial technology in forestry

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1. Forestry has long been and will likely always be a worldwide societal concern with issues that require appropriate attention by government policy makers, such as meeting the demand for forest resources while ensuring conservation and preservation.
2. Geospatial technology aids foresters in the acquisition of the data that is necessary to further research, manage, and recover present and future conditions of the global forests.
3. Many state foresters have indicated that geospatial technology is an invaluable resource whenever they need to understand, communicate, and make effective decisions about conditions on the ground.
4. Forestry organizations are among the most extensive geospatial technology users of any agency.

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Real world information as source of spatial data base

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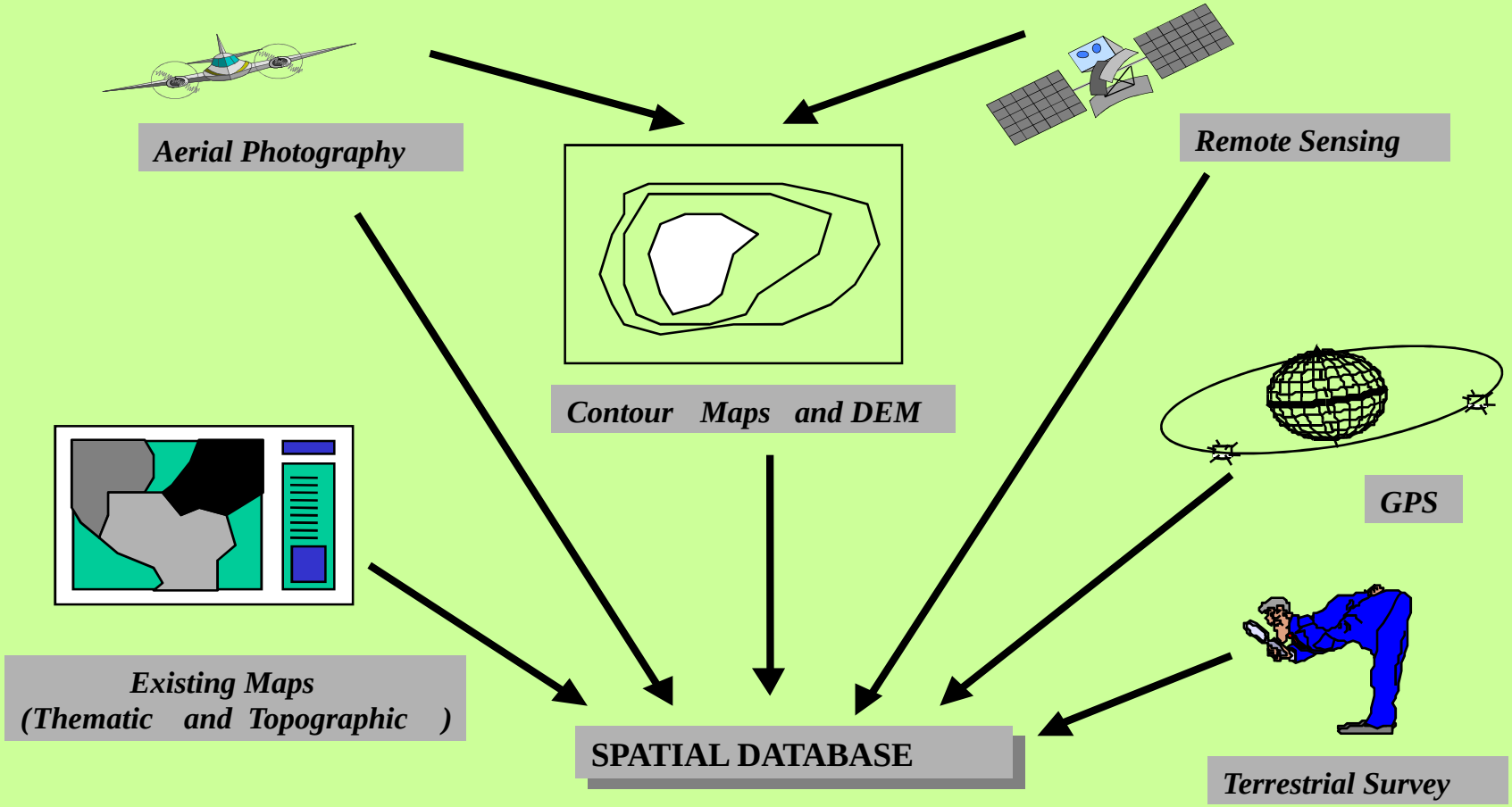

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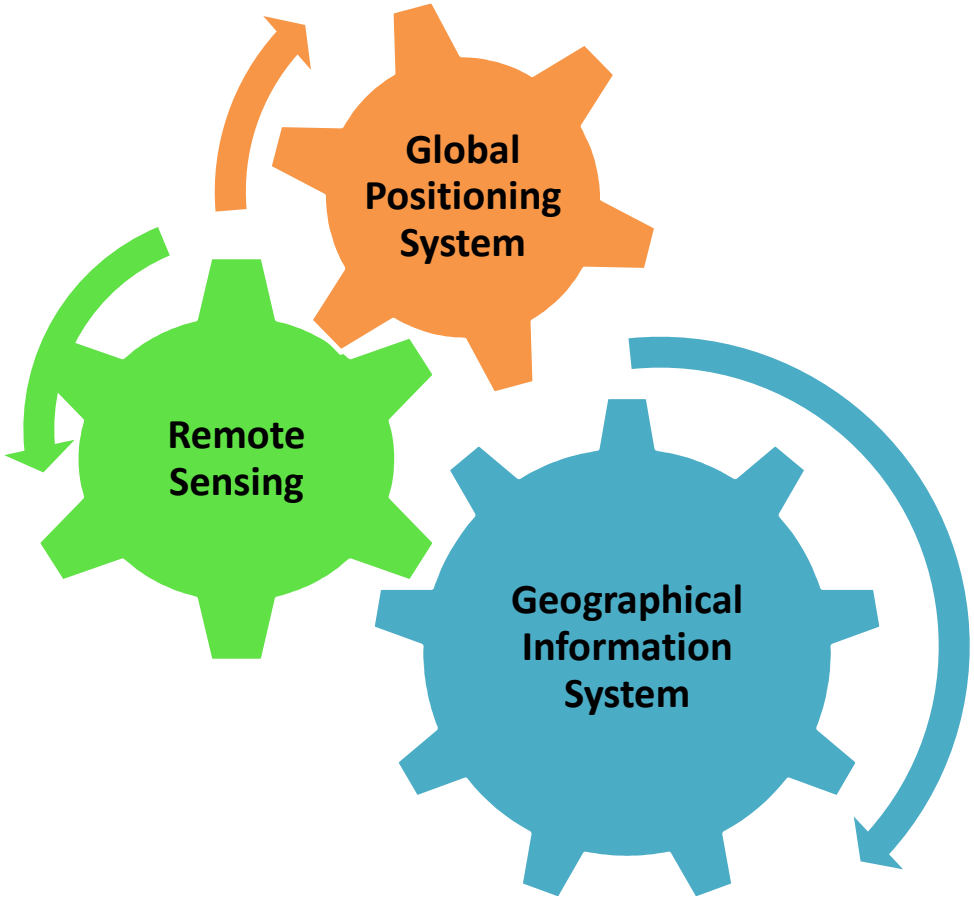
Component of Geospatial Technology



Geographical data is the data or information that identifies the geographic location of features and boundaries on earth, usually stored as coordinate and topology

Geographic Information System (GIS)

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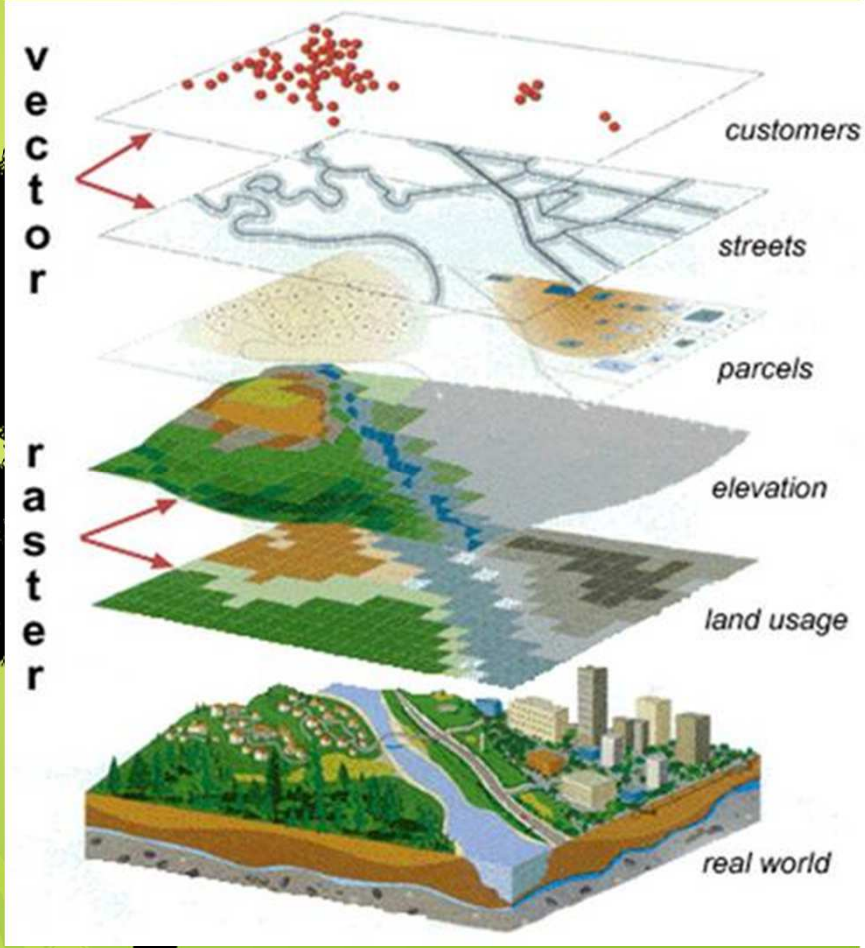
The Power of GIS

- GIS enables users to produced high quality maps at any scale, to stored and maintained a large quantity of geographically related information, to visualized and simplify complex data, and to created new data from existing data.
- The most powerful aspect of GIS is it's allow users to perform complex analyses by linking data layers and overlaying different data sets to get a spatial perspective.



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Remote Sensing

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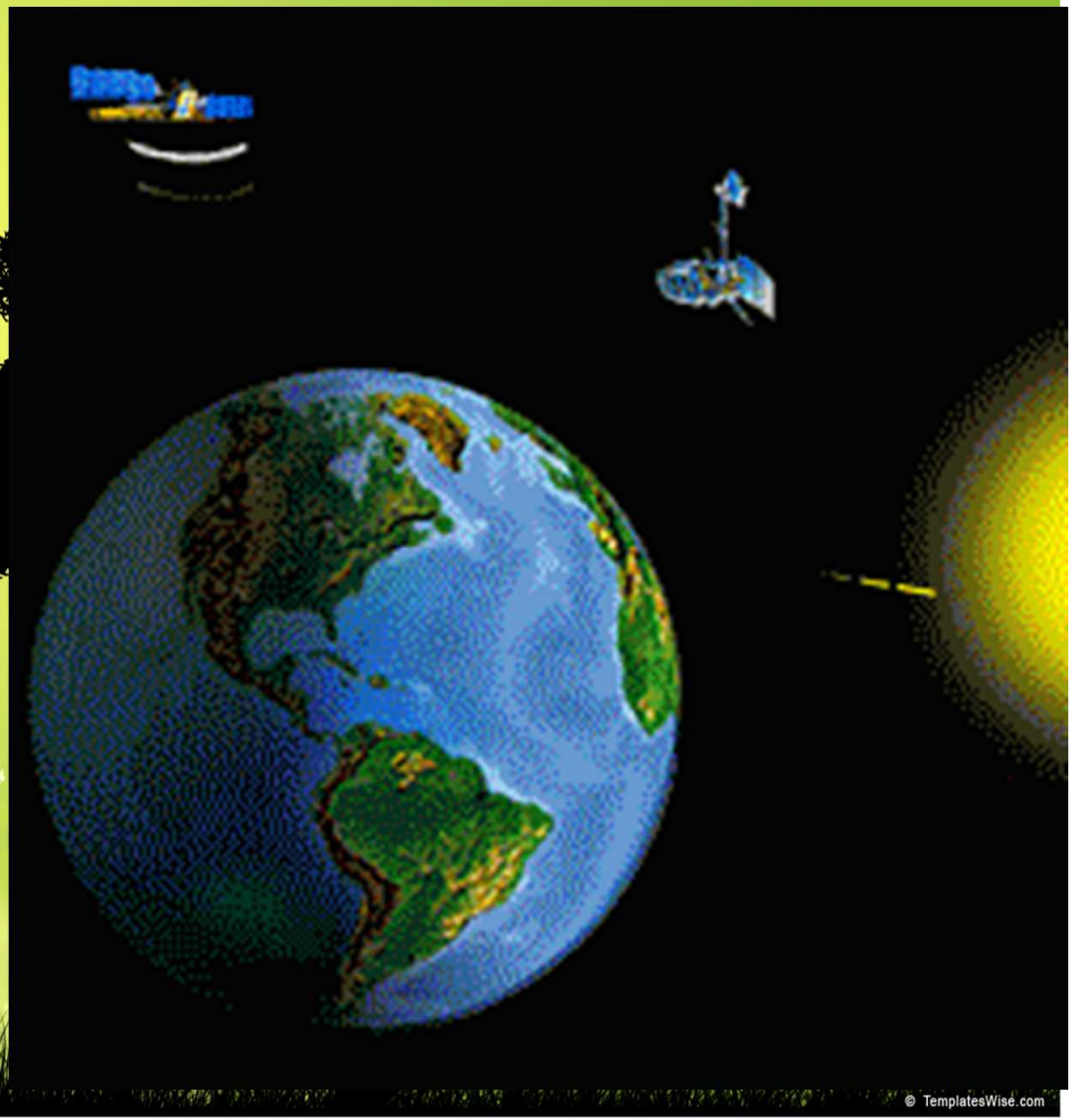
Remote sensing is a small or a large-scale acquisition of information of an object or phenomenon, by the use of either recording or real-time sensing devices that is not in physical or intimate contact with the object (such as by way of aircraft, spacecraft, satellite, buoy, or ship).



High Resolution Satellite

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Table 1: Currently Available High Resolution Sensors

Platform	Sensor	Launch Year	Spectral Range	No. of Channels	Resolution (m)	Image Frame/Swath Width (Km)
Landsat-7	ETM+	1999	PAN	1	15	185
			VIS, NIR	4	30	
			SWIR	2	30	
			TIR	1	60	
IRC-1C/1D	PAN & LISS-III	1995/98	PAN (Stereo)	1	5.8	70.5
			VIS, NIR,	4	23.5	141
			MIR		70.5	
	WiFS		VIS, NIR,	2	188	728 - 812
Resourcesat-1	PAN	2003	PAN	1	5.8	70
	LISS-III		VIS, NIR,MIR	4	23.5	140
	LISS-IV		VIS, NIR,MIR	4	5.8	23.9
	AWiFS		VIS, NIR,MIR	4	56-70	740
Cartosat-1	PAN	2005	PAN (Stereo)	1	2.5	27-30
SPOT-4	PLA	1998	PAN (Stereo)	1	10	60
	MLA		VIS, NIR, MIR	4	20	
SPOT-5	PLA	2002	PAN (Stereo)	1	2.5 to 5	60
	MLA		VIS, NIR	3	10	
			MIR	1	20	
IKONOS	PAN	1999	PAN	1	1	11
	MULTISPECTRAL		VIS, NIR	4	4	
Quick Bird	PAN	2001	PAN	1	.61 (Nadir)	16.5
	MULTISPECTRAL		VIS, NIR	4	2.44 (Nadir)	
Orbview-3	PAN	2003	PAN	1		8
	MULTISPECTRAL		VIS, NIR	4		
EROS-B1	PAN	2004	PAN	1	0.82	13
	MULTISPECTRAL		VIS, NIR	4	3.48	
Geo Eye -1	PAN	2008	PAN	1	41 cm (16 in)	15.2
	MULTISPECTRAL		VIS, NIR	4	1.65	

Remote Sensing Device

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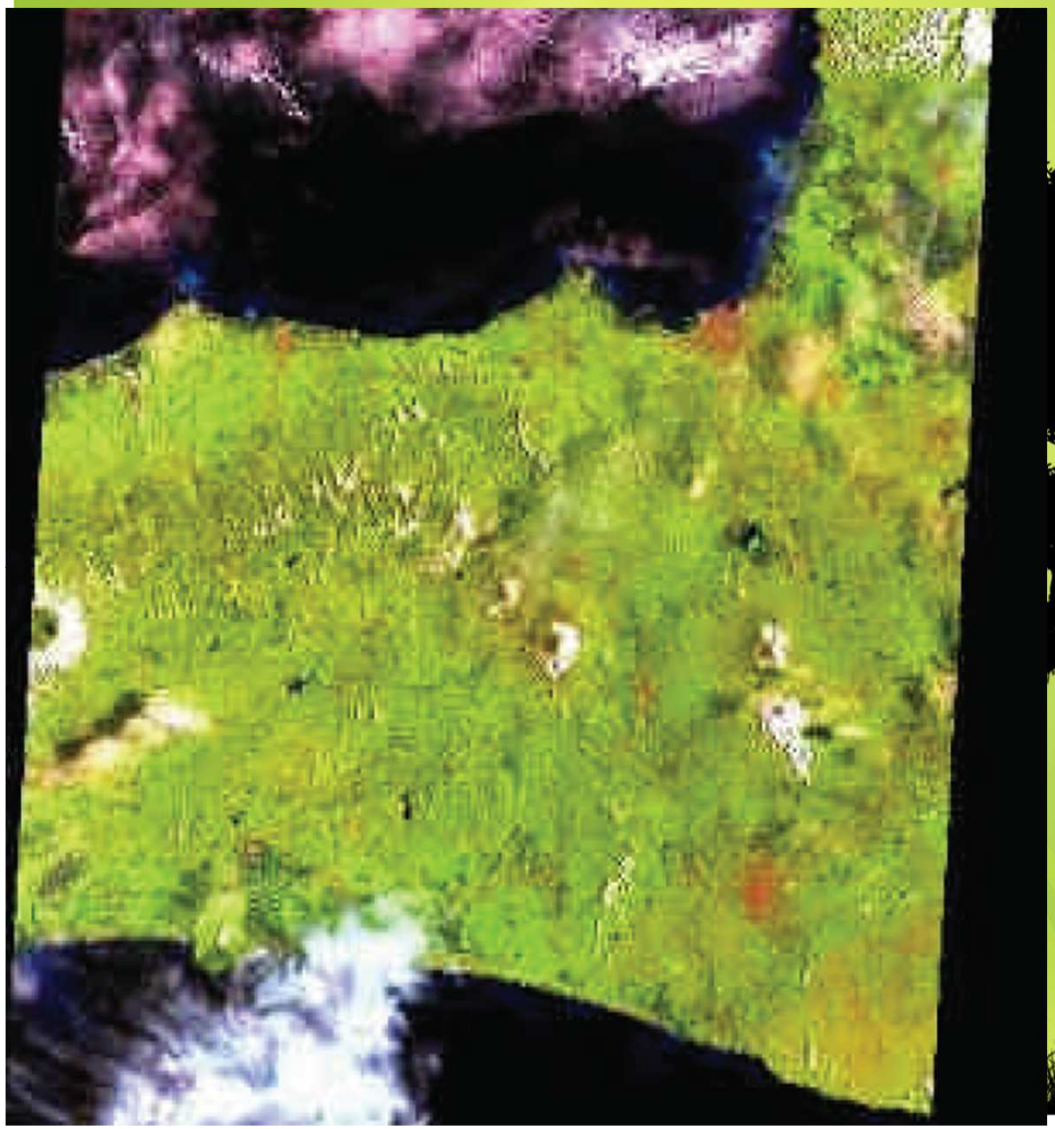

LANDSAT :

COVERAGE AREA :

- 185 km square

SPATIAL RESOLUTION :

- Band 8 (15 m)
- Band 6 (60 m)
- Other Band (30 m)

REVISIT TIME : 16 days

http://landsat.org

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Remote Sensing Device

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ALOS :

COVERAGE AREA :

- 60 km X 60 km

SPATIAL RESOLUTION :

- 2,5 to 10 m

REVISIT TIME :

- 46 days

September 3, 2006

March 11, 2005

Remote Sensing Device

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QUICKBIRD :

COVERAGE AREA :

- 16,5 – 19 km

SPATIAL RESOLUTION :

- XS (2,44 m)
- Pan (0,61m)

Frequency : 3 days

RS Vs Ground Survey

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	Ground Survey	Satellite Remote Sensing
Resolution limit	< 1 m	0,5 m - 1 km
Potential aerial extent	Constrained by resources	Global
Features mapped	Land cover, land use	Land Cover
Discrimination	Individual species and finer	Broad Land Cover Classes
Revisit frequency	Constrained by resources	Daily also weather dependent
Recording medium	Analog	Digital
Investment	Low	high
Interpretation methods	Human Observation	Automated image processing and photo interpretation
Cost per unit area	High	Low

Advantage & disadvantage of different survey techniques (Wyatt, 200)

Global Positioning System (GPS)

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The Global Positioning System (GPS) is a Global Navigation Satellite System (GNSS) developed by the United States Department of Defense. It is the only fully functional GNSS in the world, can be used freely, and is often used by civilians for navigation purposes. It transmit precise microwave signals, which allow GPS receivers to determine their current location, the time, and their velocity.

GPS

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GPS Navigasi (hand-held) + +

The Function of Geospatial Technology

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Remote Sensing

A wide array of sensors is available having different :

- Spatial resolution
- Spectral resolution
- Temporal resolution
- Radiometric resolution

Geographic Information System

By :

- Collecting
- Storing
- Manipulating
- Retriving
- Modelling

Large database, digital maps can be generated

Global Positioning System

Help in :

- Locating the exact position
- Laying sample plots for data collection

Example of the use of RS and GIS in Forestry

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Forest Cover	Forest Fire	Forest Change	Forest Fragmentation
• Assessing the structure of the forest • Discriminating various vegetation types • Mapping forest from local to continental scale	• Damage assessment using multi temporal satellite data in pre and post fire situations • Mapping of forest fire prone area and availability fire fighter equipment	• Using multi-temporal satellite data, the changes for forest cover for a periode of time can be monitored	• Forest fragments can be identified. Their area, shape and size can be studied and analyzed in GIS domain

How GIS apply in Forestry Audit?

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GIS COMPONENT

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EXAMPLE OF THE USE OF GEOSPATIAL TECHNOLOGY IN AUDIT

Land cover analysis - detect breach in forest management

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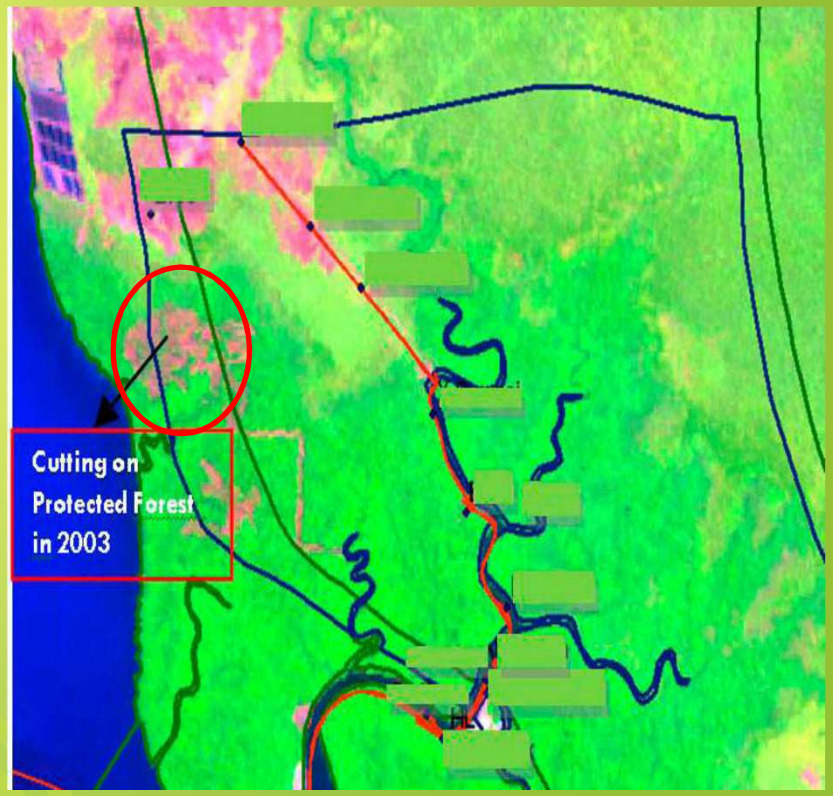

Hot spot monitoring – assess the forest fire controll system

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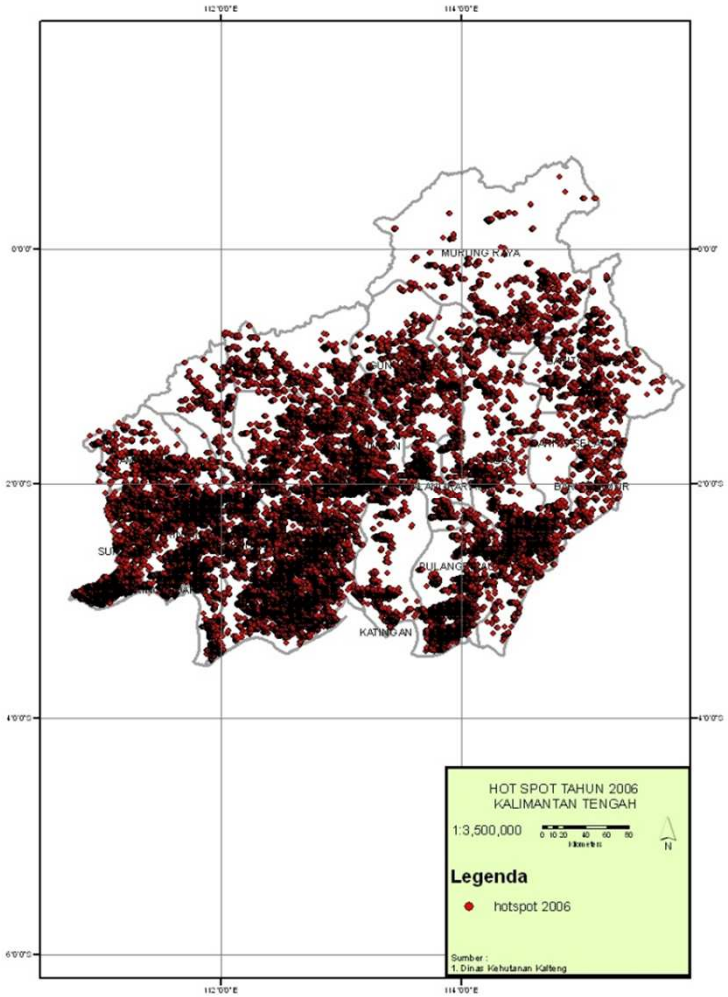
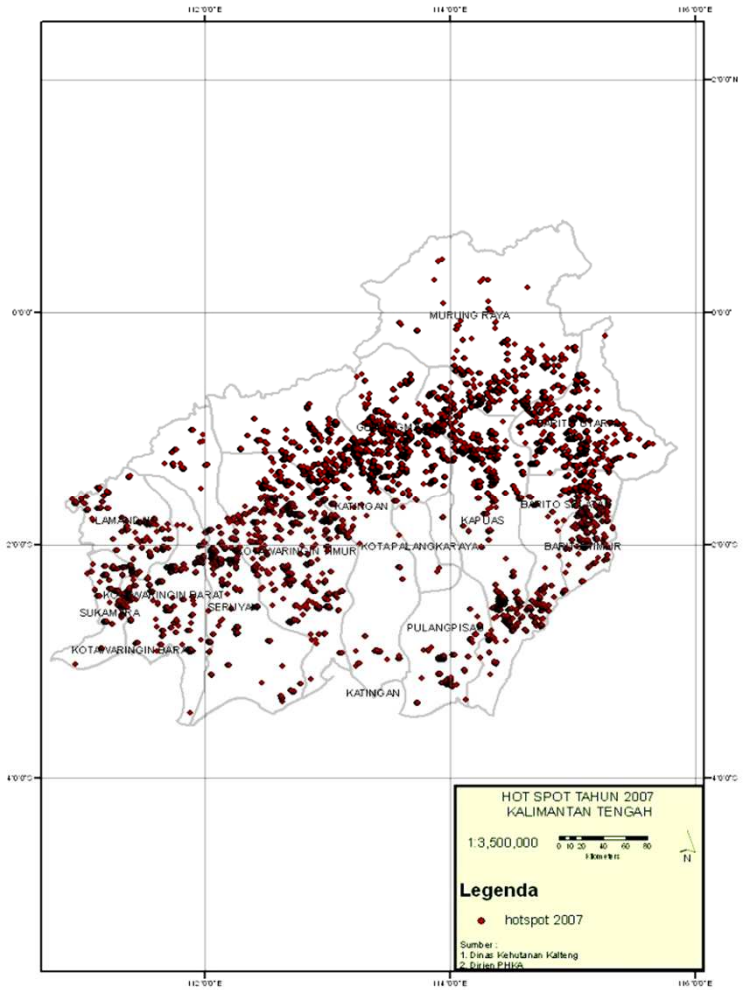


HOTSPOT 2006

HOTSPOT 2007



Forest licensed distribution – assess management of forest zone

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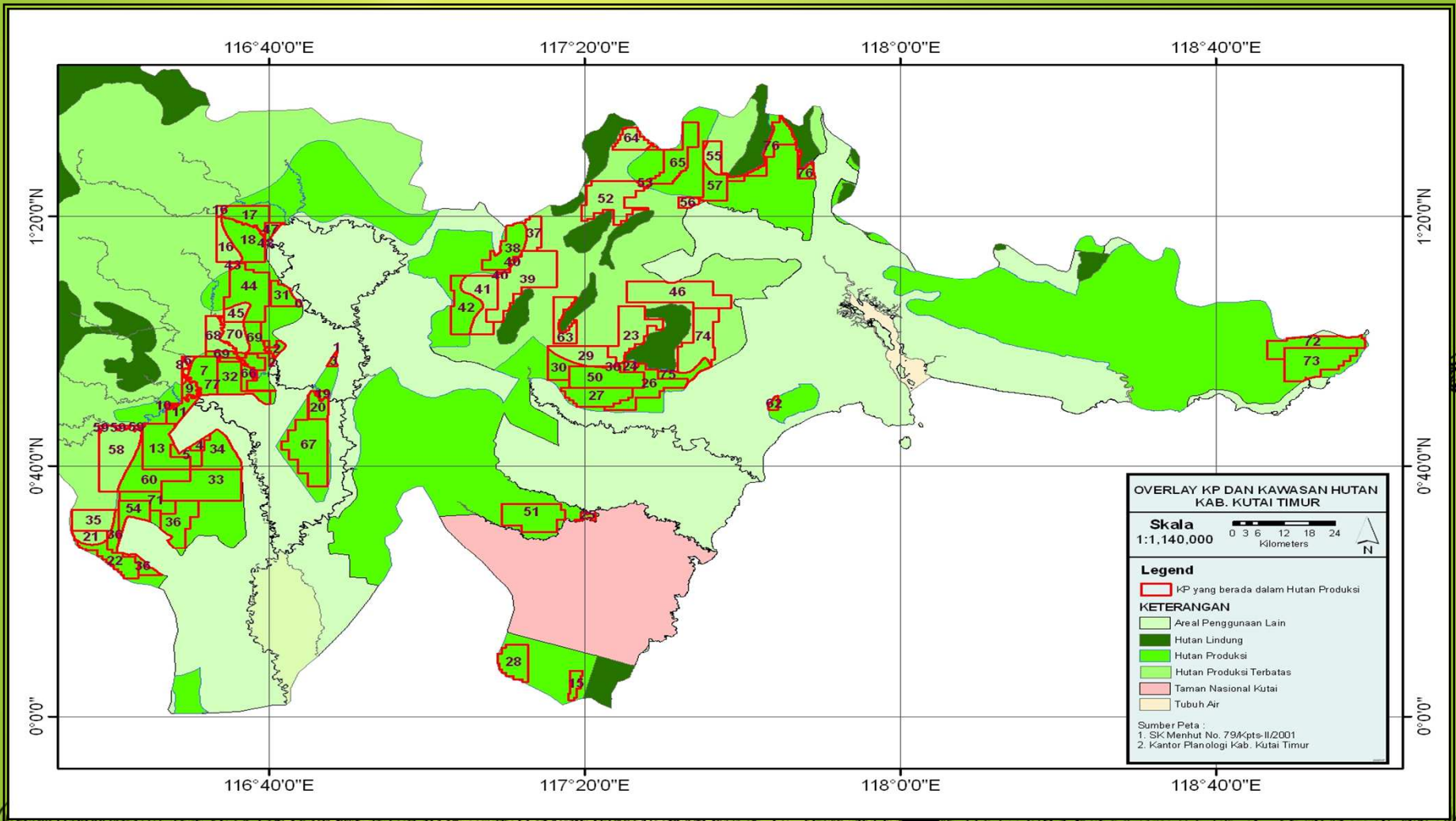

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Detecting violation in the forest zone

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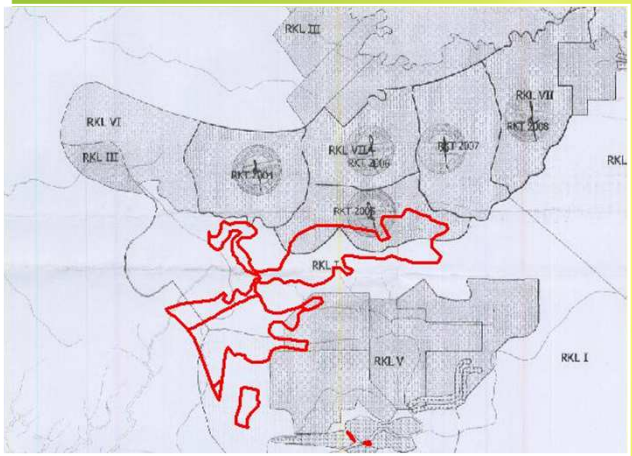

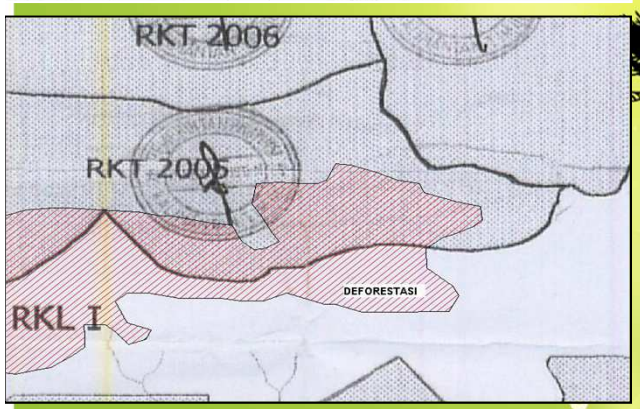

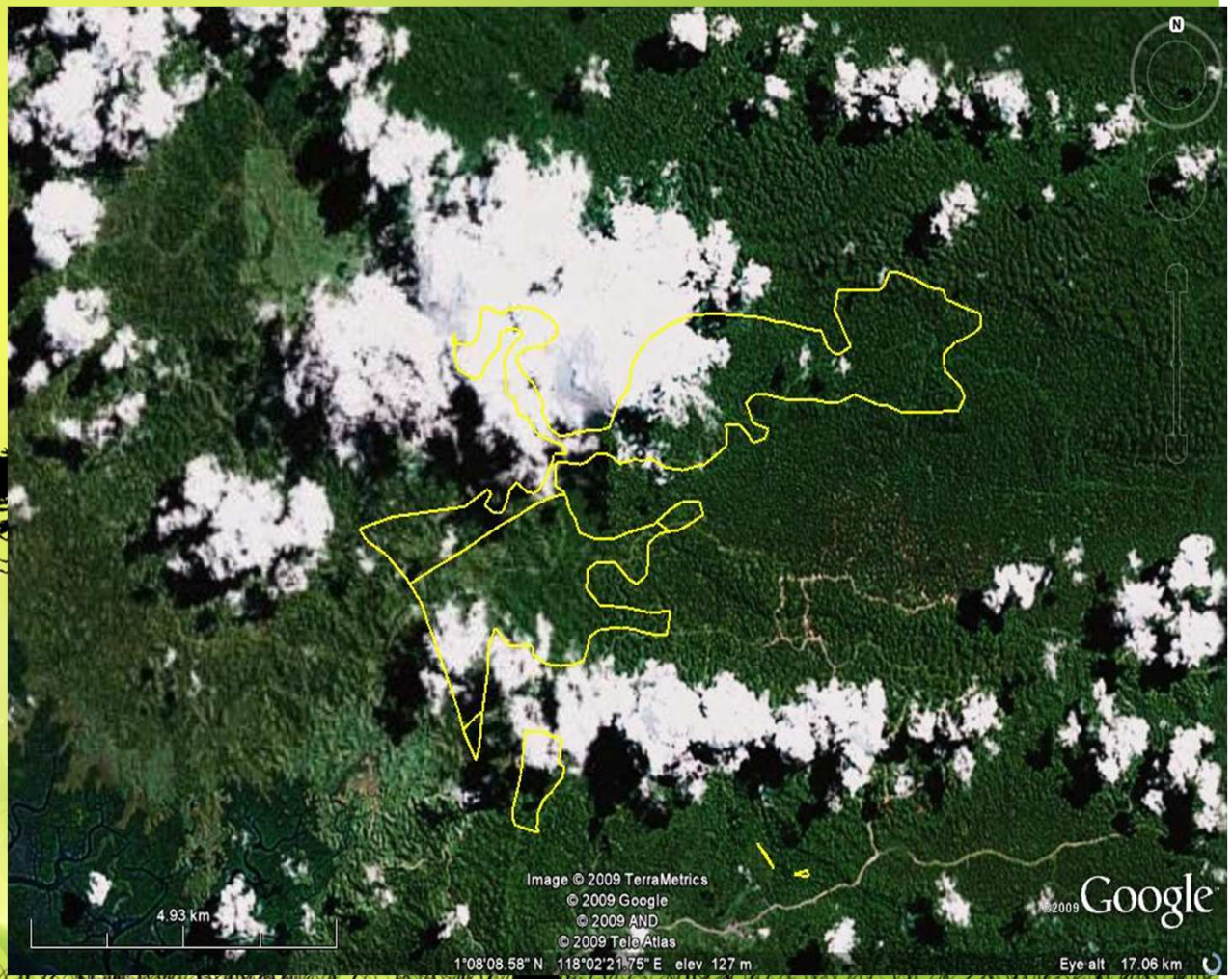

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Audit Evidence through Geospatial Technology

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Type of Evidence	Collecting Methodology	Analyzing Methodology	Characteristic of Evidence
Physical Oral Documentary Analytical	Document Review Interviews Questionnaires Analysis Data Physical Observation Confirmation	Program Logic Model Interpreting Data Distribution Regression Analysis Benefit-Cost Analysis Simulation and Model Content Analysis of Qualitative Data Work Flow & Communication Flow Analysis	Competent Relevant Sufficient

Class Exercise (60 Min)

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1. Find the Training Center location using Google Earth?
2. What information can you get from the image in Google Earth?
3. What satellite has possibly being use to take the images you see now?
4. How to operate GIS function in Google Earth? (marking a spot, create a polygon and path, measuring surface and distance, and also operating the overlay function)
5. How to import and to get data from a GPS?

Field Trip Exercise

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- Find the Training Center location on Google Earth. Observe the image, all building you see in the complex are your sample population.
- Choose the darkest building on the image and create a polygon base on the shape of the building you choose (this will be your your target location to be observed)
- Use the GPS to direct you to the target location
- Observe the location and record your observation result on the Observation Sheet
- Analyze your observation result from the GPS using Google Earth
- Present your result with the class

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THANK YOU

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