Identifying Audit, Evidence Methodology and Audit Design Matrix (ADM)
LEARNING OBJECTIVES

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

- **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

Physical: photos, charts, maps, graphs

Oral: statements, interviews

Documentary: Internal, External

Analytical: Computations, ratios, trends, patterns
“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.”
EVIDENCE GATHERING TECHNIQUES

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
## AUDIT EVIDENCE

<table>
<thead>
<tr>
<th>Characteristic of Evidence</th>
<th>Type of Evidence</th>
<th>Collecting Methodology</th>
<th>Analyzing Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competent</td>
<td>Physical</td>
<td>Document Review</td>
<td>Program Logic Model</td>
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<tr>
<td>Relevant</td>
<td>Oral</td>
<td>Interviews</td>
<td>Interpreting Data Distribution</td>
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<tr>
<td>Sufficient</td>
<td>Documentary</td>
<td>Questionnaires</td>
<td>Regression Analysis</td>
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<td></td>
<td>Analytical</td>
<td>Analysis Data</td>
<td>Benefit-Cost Analysis</td>
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<td></td>
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<td>Physical Observation</td>
<td>Simulation and Model</td>
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<td>Confirmation</td>
<td>Content Analysis of Qualitative Data</td>
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<td>Work Flow &amp; Communication Flow Analysis</td>
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</tbody>
</table>
THE IMPORTANCE OF GEOSPATIAL TECHNOLOGY IN FORESTRY

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.
REAL WORLD INFORMATION AS SOURCE OF SPATIAL DATA BASE

Aerial Photography

Remote Sensing

Contour Maps and DEM

Existing Maps (Thematic and Topographic)

GPS

Terrestrial Survey

SPATIAL DATABASE
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)

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.
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).
PIXEL RESOLUTION SATELLITE
REMOTE SENSING DEVICE

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
REMOTE SENSING DEVICE

ALOS:
COVERAGE AREA:
- 60 km X 60 km
SPATIAL RESOLUTION:
- 2.5 to 10 m
REVISIT TIME:
- 46 days
REMOTE SENSING DEVICE

QUICKBIRD:

COVERAGE AREA:
- 16.5 – 19 km

SPATIAL RESOLUTION:
- XS (2.44 m)
- Pan (0.61 m)

Frequency: 3 days
## RS VS GROUND SURVEY

<table>
<thead>
<tr>
<th>Ground Survey</th>
<th>Satellite Remote Sensing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resolution limit</strong></td>
<td>&lt; 1 m</td>
</tr>
<tr>
<td><strong>Potential aerial extent</strong></td>
<td>Constrained by resources</td>
</tr>
<tr>
<td><strong>Features mapped</strong></td>
<td>Land cover, land use</td>
</tr>
<tr>
<td><strong>Discrimination</strong></td>
<td>Individual species and finer</td>
</tr>
<tr>
<td><strong>Revisit frequency</strong></td>
<td>Constrained by resources</td>
</tr>
<tr>
<td><strong>Recording medium</strong></td>
<td>Analog</td>
</tr>
<tr>
<td><strong>Investment</strong></td>
<td>Low</td>
</tr>
<tr>
<td><strong>Interpretation methods</strong></td>
<td>Human Observation</td>
</tr>
<tr>
<td><strong>Cost per unit area</strong></td>
<td>High</td>
</tr>
</tbody>
</table>

Advantage & disadvantage of different survey techniques (Wyatt, 2000)
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 transmits precise microwave signals, which allow GPS receivers to determine their current location, the time, and their velocity.
GLOBAL POSITIONING SYSTEM (GPS)

GPS Navigasi (hand-held) ++

PDA (Personal Data Assistant) + Perangkat Lunak GPS + Bluetooth

GPS + Bluetooth

GPS Navigasi (hand-held)
A wide array of sensors is available having different:
- Spatial resolution
- Spectral resolution
- Temporal resolution
- Radiometric resolution

By:
- Collecting
- Storing
- Manipulating
- Retrieving
- Modelling

Large database, digital maps can be generated

Help in:
- Locating the exact position
- Laying sample plots for data collection
## EXAMPLE OF THE USE OF RS AND GIS IN FORESTRY

<table>
<thead>
<tr>
<th>Forest Cover</th>
<th>Forest Fire</th>
<th>Forest Change</th>
<th>Forest Fragmentation</th>
</tr>
</thead>
</table>
| • 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 period 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 APPLIED IN FORESTRY AUDIT?

- PLANNING
- EXECUTION
- REPORTING

GIS
GIS COMPONENT

Hardware
Methods
Software
Data
People

OPERATING GIS
# Audit Evidence Through Geospatial Technology

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<th>Type of Evidence</th>
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<th>Characteristic of Evidence</th>
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<td>√ Review</td>
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<td>√ Confirmation</td>
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- **Physical**: Physical evidence includes direct observation and confirmation.
- **Oral**: Oral evidence involves interviews and questionnaires.
- **Documentary**: Documentary evidence is through reviewing and analyzing documents.
- **Analytical**: Analytical evidence is through physical observation and confirmation, analysis data, and program logic models.
AUDIT DESIGN MATRIX (ADM)

ADM gives a clear linkage and consistency between audit objectives, audit criteria, audit evidence, methodology, limitation and the result
## AUDIT DESIGN MATRIX (ADM)

<table>
<thead>
<tr>
<th>Audit Objective</th>
<th>Researchable Question (s) (RQ)</th>
<th>Sub Researchable Question (s) (SRQ)</th>
<th>Audit Criteria</th>
<th>Audit Evidence</th>
<th>Audit Methodology</th>
<th>Limitation</th>
<th>What This Analysis Will Likely Allow Auditors to Say</th>
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<tr>
<td>A.O.1.RQ.2.</td>
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<td>A.O.1.RQ2. SRQ1.AC</td>
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<td>Information required Source Of Evidence</td>
<td>Data Gathering Technique Data Analisis</td>
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