

**COMMUNITY BASED GPS BOUNDARY MAPPING & CURRENT STATUS OF  
FOREST AND FORESTRY LAND MONITORING & DIGITAL IN ZANG VILLAGE,  
KUANG SI WATERFALL, LUANG PRABANG CITY,  
LUANG PRABANG PROVINCE, LAO PDR**

“Carbon storages in the rain-forest biomass is a across cutting foundation of all living being, therefore, commodification of Carbon is impossible”!.

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**Independent Monitoring & Supervision**

**Subject. SMART3 M3 01/ECO-ANTH/2024-2050/SPERI**

[www.co2justice.org](http://www.co2justice.org)

**LUANG PRABANG August to December, 2024**

## LEGAL BASIS

<b>Legal document</b>	<b>Document's No</b>
LAW	Forest Law (amended & supplemented) No. 64/QH dated 13 June 2019 of Lao People's Democratic Republic (LPDR)

# OBJECTIVES

1. Have a map and database system that complies with current legal requirements for forest owners.
2. Inventory and calculate timber volume, carbon stock, and convert into CO2 equivalent as required.
3. Identify positive changes?!
4. Identify any negative changes?!

# METHODOLOGY

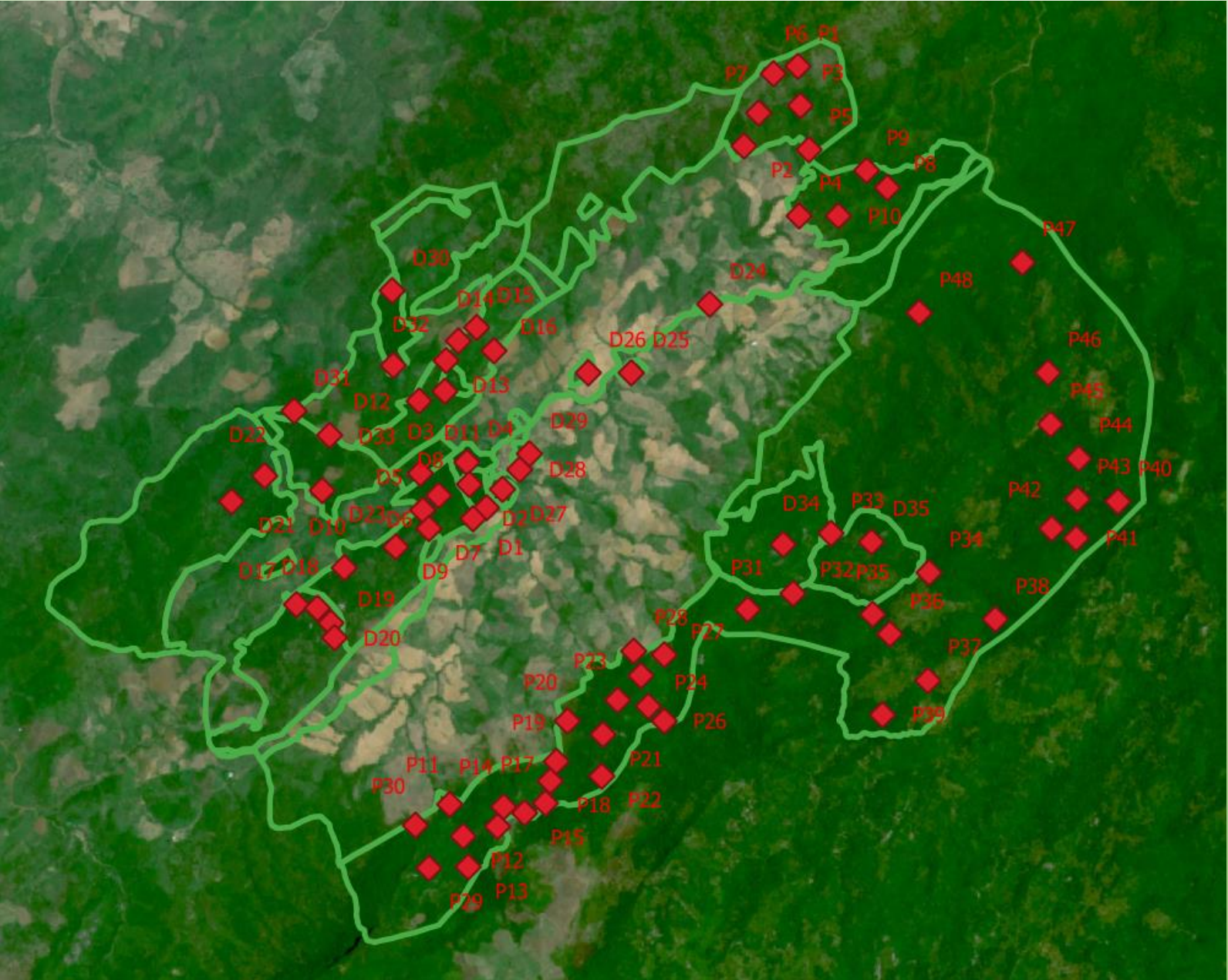
- Forest field survey and inspection, current status verification.
- Inventory by standard plots and boundary markers identified by forest owners.
- Application of GPS technology
- Interpretation of satellite image (Landsat9 and Sentinel2)
- Apps: Qgis, Arcgis, Mapinfo, Microstation and Cad

# PROCESS

- COMBINED INTERPRETATION OF SATELLITE IMAGE AND FIELD SURVEY.
- FIELD SURVEY OF BOUNDARIES AND OBSERVATION OF CURRENT STATUS.
- INDEPENDENT VERIFICATION AND VALIDATION OF INFORMATION OF STANDARD PLOTS AND BOUNDARIES PROVIDED BY FOREST OWNERS.
- CALCULATIONS AND ANALYSIS
- FEEDBACK AND GATHER INPUTS FROM FOREST OWNERS



# INTERPRETATION OF SATELLITE IMAGE



— Current status of boundaries

*P1*  
■ Location of standard plots






# MEASUREMENT TECHNIQUE AND STANDARD PLOT DATA RECORDING; BOUNDARY DEMARCATION









# FIELD MEASUREMENT EQUIPMENT

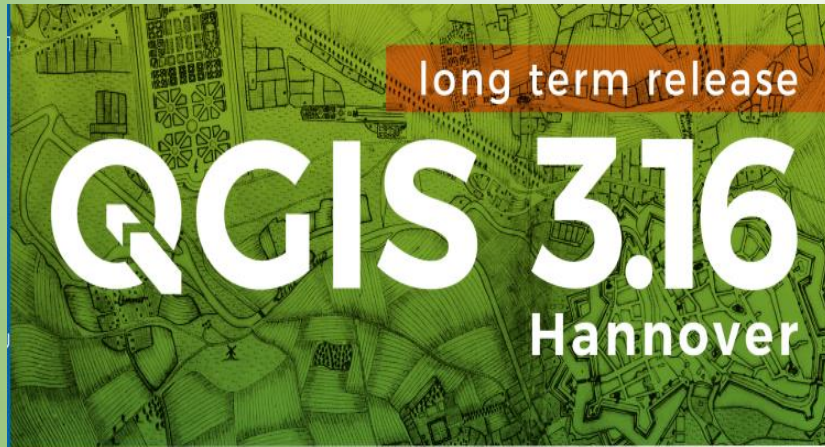
Equipment	Specification	Photo
Handheld GPS unit	<ul style="list-style-type: none"><li>- Positional accuracy of <math>\pm 2</math> m</li><li>- Handheld GPS is preferred for forestry surveys due to its mobility and negligible positional error within the acceptable tolerance.</li></ul>	 A close-up photograph showing two hands holding handheld GPS units. The unit on the left is yellow and black, displaying a menu with options like 'Waypoint Manager', 'Route Planner', and 'Track Manager'. The unit on the right is black and displays a similar menu. Both units have 'GARMIN' branding at the bottom.
Electronic theodolite	<ul style="list-style-type: none"><li>- Positioning accuracy of <math>\pm 0.2</math> mm.</li><li>- High accuracy but low mobility by the requirement for establishing a network of survey markers along the transmission line which is labor-intensive.</li></ul>	 A photograph of an electronic theodolite mounted on a silver tripod in a grassy field. The theodolite is yellow and black, with a lens and various adjustment knobs. The background shows green grass and trees.
Dual-frequency GPS unit	<ul style="list-style-type: none"><li>- Positional accuracy of <math>\pm 2</math> cm, utilizing a Radio Base Station, a CORS station of the Department of Surveying and Mapping, or a private Base Station</li><li>- High accuracy, good mobility, and low manpower requirements, but higher cost</li></ul>	 A photograph showing two dual-frequency GPS units mounted on tripods in a field. The units are silver and black. There are yellow equipment cases on the ground nearby. The background shows green grass and trees.



# FIELD SURVEY MEASUREMENT TOOLS

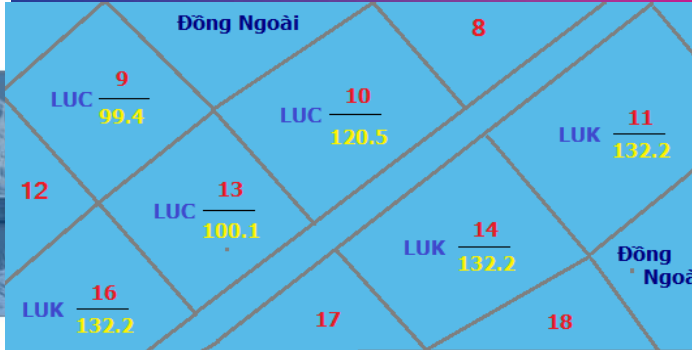
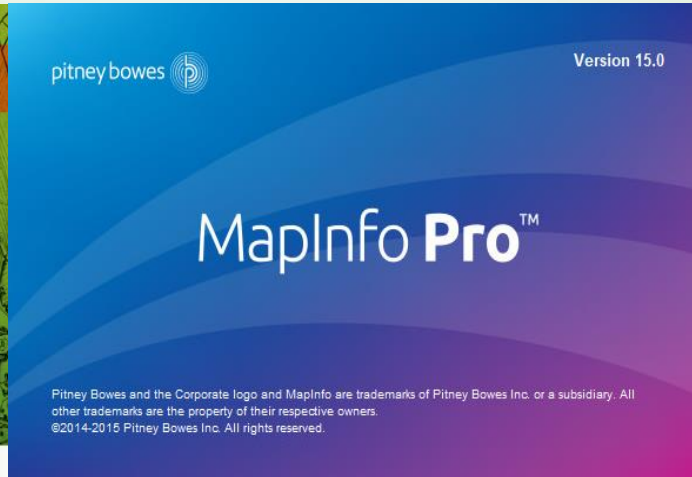
Type	Uses	Photo
Cloth tape measure (German technology)	Measuring tree circumference/diameter	
Diameter caliper	Measuring tree diameter	
Blume tape measure	Measuring tree height	
Tape measure	Measuring standard plot dimensions	

# APPLIED TECHNOLOGY SOFTWARES



**MicroStation V8i**  
SELECTseries 3

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**PHẦN MỀM THÀNH LẬP BẢN ĐỒ ĐỊA CHÍNH**

**VIETMAP XM**

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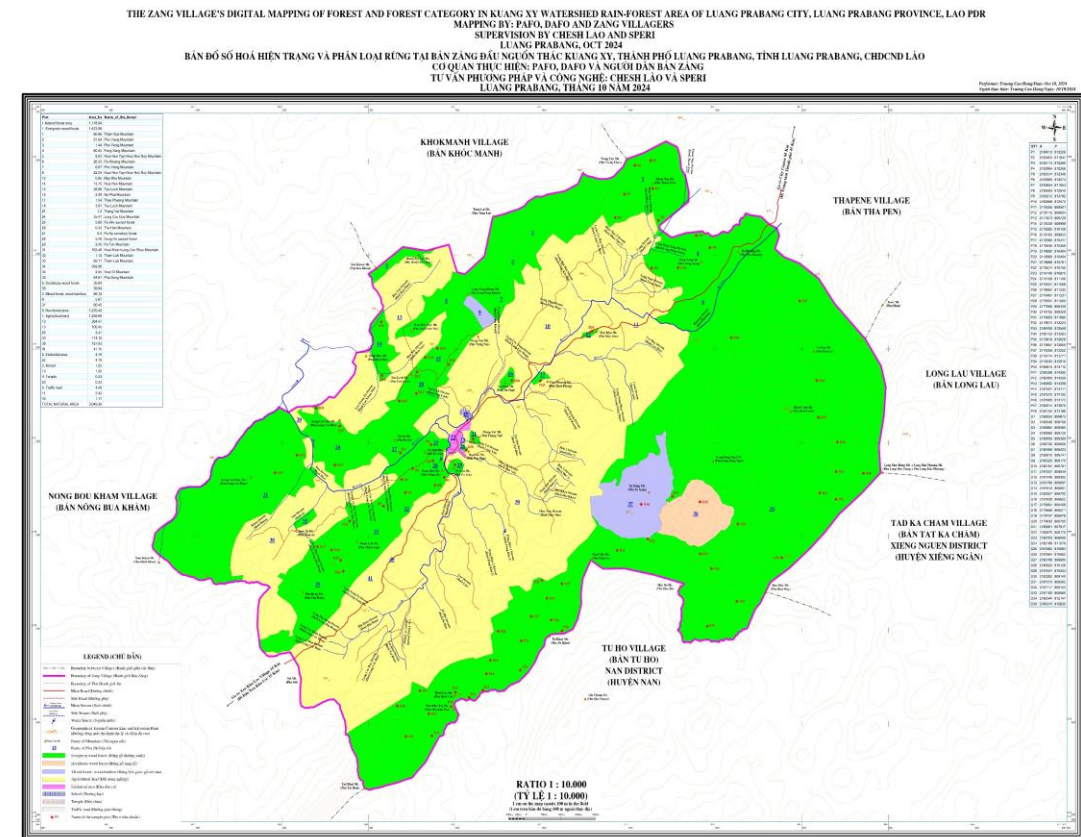
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# SURVEY RESULTS

<b>Location</b>	Zang village, Luang Prabang City, Luang Prabang province, LPDR
<b>Total area</b>	3,049.39 ha
<b>Current status-Classification</b>	<ul style="list-style-type: none"> <li>- Area with natural forests: 1,778.94 ha (including evergreen forest: 1,672.98 ha; Deciduous forest: 39.84 ha; Mixed wood-bamboo forest: 66.12 ha)</li> <li>- Area without forest: 1,270.45 ha (including agricultural land: 1,259.69 ha; Residential area: 4.79 ha; School: 1.25 ha; Temple/Pagoda: 0.23 ha; Road land: 4.49 ha)</li> </ul>
<b>Functional planning by management entities</b>	<ul style="list-style-type: none"> <li>- Land area managed by Luang Prabang province: 1,100.30 ha (protection forest land)</li> <li>- Land area managed by Luang Prabang City / Zang village: 1,928.71 ha (protection forest land: 552.30 ha; Use forest land: 66.12 ha; Grazing land: 39.84 ha; Agricultural land: 1,259.69 ha; Residential land: 4.79 ha; Education land: 1.25 ha; Religious land: 0.23 ha; Road land: 4.49 ha)</li> <li>- Land area managed by Zang village: 20.38 ha (Cultural land (sacred land))</li> </ul>
<b>Timber volume</b>	<ul style="list-style-type: none"> <li>- Evergreen forest: The average timber volume is 275.09 m<sup>3</sup>/ha; the timber volume of the total area is 460,220.06 m<sup>3</sup></li> <li>- Deciduous forest: The average timber volume is 759.09 m<sup>3</sup>/ha; timber volume of the total area is 30,242,15 m<sup>3</sup></li> <li>- Mixed wood-bamboo forest: The average timber volume is 161.34 m<sup>3</sup>/ha; timber volume of the total area is 10,667.80 m<sup>3</sup></li> </ul>



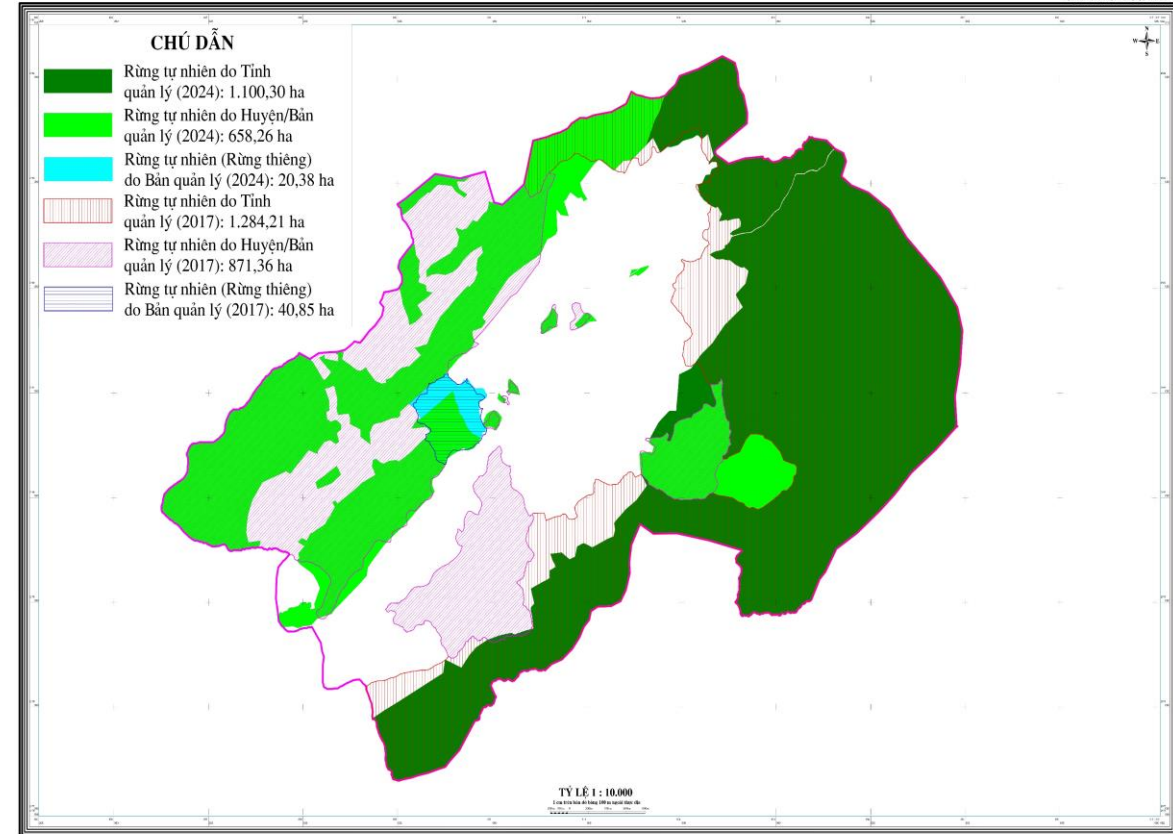
<b>Carbon stock, CO2 equivalent</b>	<ul style="list-style-type: none"> <li>- The total carbon stock in biomass of the entire area of 1,778.94 ha of natural forests is 296,362.57 tons of C</li> <li>-The total CO2 equivalent absorbed by the above-mentioned forest area is 1,087.650.13 tons of CO2-e</li> </ul>
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# DATA CHANGES

Timeline	Current status	Area (ha)
2017	Natural forest managed by the provincial authority	<b>1,284.21</b>
	Natural forest managed by the district/village authority	<b>871.36</b>
	Natural forest (sacred forest) managed by the village	<b>40.85</b>
Present	Natural forest managed by the provincial authority	<b>1,100.30</b>
	Natural forest managed by the district/village authority	<b>658.26</b>
	Natural forest (sacred forest) managed by the village	<b>20.38</b>

# BOUNDARY CHANGES AND CURRENT STATUS MAP

BẢN ĐỒ PHÂN TÍCH DIỄN BIẾN RANH GIỚI, HIỆN TRẠNG THỜI KỲ 2017-2024 TRONG QUÁ TRÌNH SỬ DỤNG, QUẢN LÝ RỪNG VÀ ĐẤT LÂM NGHIỆP TẠI BẢN ZÃNG ĐẦU NGUỒN THÁC KUANG XY, THÀNH PHỐ LUANG PRABANG, TỈNH LUANG PRABANG, CHDCND LÀO  
LUANG PRABANG, THÁNG 10 NĂM 2024





## **SUBJECTIVE CHANGES**

- Synchronous collaboration between inspection teams and management agencies?!
- Field verification of boundaries and current status?!
- Periodical monitoring of boundary changes, and current status?!
- Regulation for coordination and collaboration among neighboring forest owners?!
- Forest and forestry land co-governance from 2017- 2024?!

# OBJECTIVE CHANGES

- Applied projection in 2017?!
- Map technology in 2017?!
- Mapping skills in 2017?!
- Map system governance from 2017-2024?!
- Control of changes:
  - BOUNDARIES?!
  - AREA?!
  - PROCESS ?!
  - **DEFORESTATION FOR INDUSTRIAL CASSAVA PLANTATION AND BOUNDARY ENCROACHMENT?!**



# RECOMMENDATIONS

- A meeting for sharing among forest owners.
- Co-working on a co-governance regulation.
- Presentation on findings of boundary changes and current status.
- Propose and discuss management and protection methods.
- Raise awareness about the negative impacts of forest land encroachment for cultivation
- Investment in technology and equipment for management and monitoring of changes.