Soil Maps and Soil Information of Thailand

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Overview of Thailand

• Total area  513,000 km² (app.)
• Population  64 million (app.)
• Administration
  77 provinces of 4 Adm.regions
  (North, Northeast, Central, South)
• Climate
  - Tropical Savanna
  - Tropical Monsoon
  - Tropical Rain Forest
  - Rainfall 1,000-4,700 mm/yr
  - Temp. 26-29 °C
• Highest
  - Doi Inthanon in Chiangmai
  at 2,565 meters (8,415 ft)
Land Development Department
Ministry of Agriculture and Cooperatives
Established in 1963
Duties and Responsibilities

- Soil survey and mapping in agricultural land (≤35% slope)
- Soil analysis
- Present land uses mapping
- Land use plans for appropriated land uses.
- Researches and experiments
  - soil and land improvement,
  - soil and water conservation,
  - watershed management
- Disseminate technologies on land development to farmers and other users
Central Offices 16 Division/Group/Office
Regional Offices 12 Offices

Office of the Secretary
Office of Technology and Communication
Office of Research and Development for Land Management
Office of Science for Land Development
Office of Soil Resources Survey and Research
Land Development Regional Office 1-12
Land Development Regional Office (12 offices)

- Land Development Station (77 stations)
- Khao Hin-Sorn Royal Development Study Center
# Manpower of LDD in the year 2011

<table>
<thead>
<tr>
<th>Details</th>
<th>Central</th>
<th>Regional</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Officials</td>
<td>531</td>
<td>928</td>
<td>1,459</td>
</tr>
<tr>
<td>2. Permanent Employees</td>
<td>238</td>
<td>926</td>
<td>1,164</td>
</tr>
<tr>
<td>3. Government Employees</td>
<td>274</td>
<td>734</td>
<td>1,008</td>
</tr>
</tbody>
</table>
To enhance soil fertility and agricultural productivity while promoting long-term sustainability based on participatory principle.
Mission

1. To conduct research, implement activities, provide services and transfer technologies on land development, including the establishment of land use zoning to enhance agricultural productivity, and the provision of accurate and updated spatial data.

2. To develop basic infrastructure on land development, soil improvement and soil rehabilitation to increase agricultural productivity and sustainable land uses.

3. To strengthen volunteer farmers or ‘soil doctors’ and farmers’ groups by providing knowledge on land development as a basis for sustaining livelihoods according to the principles of the ‘sufficient economy.'
Land Use Plan
SOIL & WATER CONSERVATION SYSTEM MAP

LEGEND OF SOIL & WATER CONSERVATION SYSTEM

- Sediment Pond บ่อตกตะกอน
- Check Dam ทางชะลอความเร็วของน้ำ
- Reservoir ลำน้ำที่ 102.63 Rai (ไร่)
- Flood Control Canal ฝายน้ำย่อย
- Farm Road ทางล่ำเลียงในไร่
- Hillside ditch (Brood type) ซูเปอร์ม้ารักษา (แบบ 5 ฐานกว้าง 2 เมตร)
- Contour Planting การปลูกพืชตามแนวตั้งạchวงกิ่งกลางพื้นที่ 443.94 Rai (ไร่)
Land Development Department, Ministry of Agriculture and Cooperatives

http://www.ddd.go.th
Farm Pond Development
Bio-technologies

Land Development Department, Ministry of Agriculture and Cooperatives
http://www.ddd.go.th
Soil doctor volunteers were trained on land development technologies

Land Development Department, Ministry of Agriculture and Cooperatives
http://www.ffd.go.th
พิพิธภัณฑ์ดิน
Soil Museum

สร้างปี พ.ศ. 2545
ปรับปรุงครั้งที่ 1 ปี พ.ศ. 2549
Students and soil doctor volunteers visited soil museum
Soil Survey in Thailand

- Soil survey activity was initiated in 1935
- Techniques on soil survey and classification system currently follow Soil Survey Manual & Soil Taxonomy of USDA
Dr. R.L. Pendleton American soil scientist, Dr. Sarot Montrakun (Filipino) and Dr. Rerm Buranalerk Thai scientist started conducting reconnaissance soil survey and mapping in Thailand.

“Soil Classification System of USDA 1938” was adopted.
1960 - The first general soil map at a scale of 1:2,500,000 was published.

Map units were soil type of soil series:
- Khorat fine sandy loam
- Bangkok clay
- Chiangmai loam
AGRICULTURE AND SOILS OF THAILAND

COMPILATION OF SOIL REPORTS AND LABORATORY ANALYSIS OF THE SOILS IN THAILAND

By

Sarat Montrakun

Technical Division,
Department of Rice,
Ministry of Agriculture,
1964

Dr. Sarot Montrakun (Filipino)

1964
Dr. F.R. Moormann (Dutch) FAO expert studied and revised soil classification system in Thailand using general soil map of Dr. Pendleton.

In 1963 Land Development Department was established under Ministry of National Development and has been responsible for soil survey and classification of the country.
Dr. F.R. Moormann and Dr. Santhad Rojanasoonthorn prepared and published the 2nd general soil map and printed at a scale of 1:1,250,000 and 1:2,500,000

- Modified USDA 1938 classification system by Dr. R. Dudal and Dr. F.R. Moormann was introduced.

- Map units: - great soil groups
  - association
Provincial Soil Maps were published at scale 1:100,000

Map units: -soil series
-association of soil series

Transition from USDA 1938 to Soil Taxonomy 1975
1983
Reorganization of Land Development Department

- 1-12 Land Development Regional Offices are responsible on sub-district, village, farm and small projects. (including soil survey and land use planning)

- Office of Soil Survey and Land Use Planning is responsible for soil survey and mapping of the country, province, district and large projects (>1,600 ha.)
62 Groups of soil series have been proposed as map units for non soil scientists, farmers and other users.

Provincial soil maps at 1:100,000 were revised and published in 1:50,000.

Distinct soil characteristics and properties for economic crops, table of soil suitability rating, limitation, and recommendation for soil management were also included in the reports.
1991-1997

• Semi-detailed survey in some districts were conducted and soil maps at 1:25,000 were published for district development planning.

• Soil boundaries were delineated on the A3 aerial photo mosaic.

• Map units: phases of soil series, complexes.

• Distinct soil characteristics and properties for economic crops, table of soil suitability rating, limitation, and recommendation for soil management were also included.
2006-2011

• Provincial semi-detailed soil survey at 1:25,000

• Soil boundaries were delineated on the ortho-photographs.

• Map units: 62 groups of soil series
Soil maps at different scales

- **Country level**  scale 1:1,000,000 +
- **Regional level** scale 1:500,000
- **Provincial level** scale 1:100,000, 1:50,000 and **1:25,000**
- **District level** scale 1:25,000
- **Sub-district level** scale 1:4,000 -1:10,000
  - Land development zones,
  - Royal project
  - Development project in highland, etc.
<table>
<thead>
<tr>
<th>Order</th>
<th>Area (km²)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>718</td>
<td>0.14</td>
</tr>
<tr>
<td>Spodosols</td>
<td>615</td>
<td>0.12</td>
</tr>
<tr>
<td>Oxisols</td>
<td>153</td>
<td>0.03</td>
</tr>
<tr>
<td>Vertisols</td>
<td>4,156</td>
<td>0.81</td>
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<tr>
<td>Ultisols</td>
<td>216,192</td>
<td>42.13</td>
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<tr>
<td>Mollisols</td>
<td>6,003</td>
<td>3.80</td>
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<tr>
<td>Alfisols</td>
<td>46,991</td>
<td>9.16</td>
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<tr>
<td>Inceptisols</td>
<td>48,253</td>
<td>9.40</td>
</tr>
<tr>
<td>Entisols</td>
<td>16,860</td>
<td>3.29</td>
</tr>
<tr>
<td>Others</td>
<td>173,174</td>
<td>33.75</td>
</tr>
<tr>
<td>Total</td>
<td>513,115</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Country level

- Great Group
- association of GG

Sub watershed level

- phases of soil series
- complexes
SOIL MAP & SUITABILITY FOR ECONOMIC CROPS

Provincial level
1:50,000
-62 groups of soil series

District level
1:25,000
-phases of soil series
-complexes
On farm level (Detailed Survey)
Soil Map of Lower Mekong Basin (MRC)

- Scale: 1:250,000
- Classification system: FAO/UNESCO 1988 (textural phases of soil units)
- Map units: consociation and association
- 4 countries: Cambodia, Lao P.D.R., Thailand, Vietnam

Land Evaluation by using ALES
Suitable soils  16.03%
Problem soils  51.23%
Slope complex  29.61%
Miscellaneous areas  1.98%
Water  1.15%
Suitable areas for organic farming

- Paddy
- Upland crops
- Fruit trees
Survey and Mapping of Soil Moisture in Eastern Thailand
Effect of climate changes on saline soils in Northeastern Thailand
Soil data & Information

• Soil Map and Report
• Properties & Characteristics
• Environments
• General Information
• Soil Survey Interpretation (soil suitability for crops and engineering purposes etc.)
Established Soil Series (English version)

- More than 360 Established and Tentative soil series were identified and classified under Soil Taxonomy (USDA, 2003)
- Characterization of established soil series were published as the benchmark soils of the country.
Established Soil Series (Thai version)
Soil Properties & Characteristics

- Depth, horizon thickness & arrangement, texture, structure, rock fragments, drainage, roots, biological activities etc.

- Particle size distribution, bulk density, water holding capacity, permeability, shrink-swell potential etc.

- OM, pH, ion exchange capacity, base saturation, salinity, sodicity, available nutrients (P,K)

- Primary & secondary minerals etc.
Soil Environments

- Parent materials
- Climate (rainfall, temperature)
- Physiography (Landform)
- Slope
- Elevation
- Vegetation & land uses
- Surface runoff
- Flooding (depth, duration, frequency)
Application of soil survey data and information

- Land use planning
- Agricultural zoning
- Irrigation planning
- Research and development
- Warning, preparedness, rehabilitation on natural disaster i.e. drought, flood, landslide
- Land Taxation
- Technology transfer etc.
Some Application Programs for Agriculture (softwares)
SoilView is the ready made GIS application program in Microsoft Windows. It was developed in Avenue language from soil data and their suitability for economic crops.
Typical Soil Profiles
(ThaiPedon version 2.0)

ThaiPedon was developed by Visual Basic 6.0 with Map Object 30. The program includes provincial soil maps, typical soil profile description, soil properties, and soil suitability.
Application program on soil suitability for economic crops. It is a tool to support the decision on crop production.
**Economic crops Zoning**  
*(AgZone version 1.0)*

**AgZone** is the application program for agro-ecological zoning follow FAO land evaluation (FAO, 1976). Parameters used in the program are soils, land use/land cover, land units, forest areas, irrigation areas, moisture availability, LUT and distance from factory, for specific crops (15 economic crops).
**Physical Land Evaluation for Farm Pond**
(FarmPond version 1.0)

**FarmPond** is an application program in Thai under ArcView. It indicates the suitable areas for constructing farm pond.
Development of simulation models on soil & plant nutrients and fertilization

Land Development Department, Ministry of Agriculture and Cooperatives
http://www.ddd.go.th
- What is soil?
- Soil formation and factors
- Soil components
- Properties of soil
- Soil survey and classification
- Soils of Thailand
- Problem soils
- Soil conservation
Website
Soils Clinic

Problem soils
Of Thailand

Knowledge &
Management
Some Current Projects and Activities

1. Land degradation assessment
   - FAO
   - UNDP
2. Soil sampling (0-25 cm) and analysis for fertilizer recommendation (OM, P, K, LR)
3. Researches relate to climate changes, C sequestration, soil OM, soil pollution etc.
4. Soil data base in the Royal Highland Project
5. Soil survey and training in Lao P.D.R. (ACMECS project)
6. Cooperation on soil museum establishment: Environmental Agency of Abu Dhabi, Guangdong Institute of Eco-Environmental and Soil Science etc.
Thank You for Attention