Status of Soil Information in Asia

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GlobalSoilMap.net East Asia Vs. Asia Soil Partnership Vs. ESAFS

It's important to know where we are.
A highly diversified continent

• Physiography
  – From the roof of the world to the lowest altitude
  – From the extreme hot to the extreme cold
  – From the extreme moisture to extreme
  – All types of soils in the world

• Socio-economy
  – From highly developed to the least developed

• Soil information
The new mechanisms to bring Asian partners together

- **GlobalSoilMap.net: East Asia Node**, including Mongolia, Korea, Japan, the Philippines, Malaysia, Vietnam, Thailand, Laos, Cambodia, Myanmar and China

- **Global Soil Partnership - Asian Soil Partnership**, including all of the above + Bhutan, Nepal, Bangladesh, Sri Lanka, India and Pakistan
“Advancing the Science and Technology of Soil Information in Asia: the Launch of GlobalSoilMap.net East Asia Node and Asia Soil Partnership”

Feb. 8-12, 2012
Nanjing, China
The launch of GSM EA Node and ASP in Nanjing
Nanjing Communique on Asia Soil Partnership

• Recognized the achievements of the past
• Recognized the need of soil information integration and sharing
• Recognized the need of capacity building to meet the challenges
• Agreed to establish ASP and to work with GSM.net
Soil Survey and Soil Survey Institutions in Asia

- Some countries have national soil survey institutions (Korea, the Philippines, Thailand), but quite a few no, even including China.

- Many countries have finished reconnaissance surveys (1:1,000,000 map scale and lower), but many not yet.
<table>
<thead>
<tr>
<th>Country / region</th>
<th>Organization</th>
</tr>
</thead>
</table>
| Bangladesh      | Department of Soil, Water and Environment, University of Dhaka  
                  Soil Science Society of Bangladesh  
                  Soil Resources Development Institute, University of Darka |
| Bhutan          | Department of Agriculture, Ministry of Agriculture and Forests |
| Cambodia        | Department of Agricultural Land Resources Management, General  
                  Directorate of Agriculture |
| China           | Institute of Soil Science, CAS;  
                  Institute of Agricultural Resources and Regional Planning, CAAS  
                  Institute of Geographical Sciences and Natural Resources Research, CAS |
<table>
<thead>
<tr>
<th>Country &amp; region</th>
<th>Organization</th>
</tr>
</thead>
</table>
| Japan            | Natural Resources Inventory Center, National Institute for Agro-Environmental Sciences  
Department of Forest Site Environment, Forestry and Forest Products Research Institute |
<p>| Lao PDR          | Agriculture Land Use Research Center (ALURC), National Agriculture and Forestry Research Institute, Ministry of Agriculture and Forestry |
| Malaysia         | Bahagian Pengurusan Dan Pemuliharaan Sumber Tanah (BPPST) |
| Mongolia         | Soil Science Department, Institute Geography, Mongolian Academy of Sciences |
| Nepal            | Soil Science Division, Khumaltar, Lalitpur, Nepal |
| Pakistan         | Soil Survey of Punjab |
| Philippines      | Bureau of Soils and Water Management |
| RO Korea         | National Academy of Agricultural Science, Rural Development Administration (RDA) |</p>
<table>
<thead>
<tr>
<th>Country &amp; region</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Lanka</td>
<td>Department of Soil Science, Faculty of Agriculture, University of Peradeniya; Soil Science Society of Sri Lanka</td>
</tr>
<tr>
<td>Thailand</td>
<td>Land Development Department, Ministry of Agriculture and Cooperatives</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Soils and Fertilizers Research Institute (SFRI)</td>
</tr>
</tbody>
</table>
Formats of existing soil data

- Paper maps and books
  - Many lost due to various reasons
- Being converted to electronic ones
- National or regional soil information systems
Digitalized and updated cultivated soil maps (1:50,000)

- Cultivated soil maps (1:50,000)
- Benchmarked soil dataset (about 20,000 sites)

- Soil Survey for Improving Fertilizer application
- Fundamental Soil Survey for Soil Fertility Conservation

- Digitalized soil inventory
- Benchmark pedon database
- Digital soil map

Updating soil-land map

Urban sprawl impacts on fertile soils
Map scales or resolutions

- 1:1,000,000 and lower for country level
- Varied across different countries
## Soil maps: scales and coverage

<table>
<thead>
<tr>
<th>Scale</th>
<th>Coverage</th>
<th>Countries and regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small scale (&lt;1:1,000,000)</td>
<td>complete</td>
<td>China, Japan, South Korea, North Korea, Thailand, Vietnam, Philippines, Mongolia, Malaysia, Bangladesh, Sari Lanka</td>
</tr>
<tr>
<td></td>
<td>Partially</td>
<td>Cambodia, Pakistan, Myanmar, Bhutan</td>
</tr>
<tr>
<td></td>
<td>Very limited</td>
<td></td>
</tr>
<tr>
<td>Exploratory (&lt;1:250,000 &amp;</td>
<td>complete</td>
<td>China, Japan, South Korea, North Korea, Thailand, Vietnam, Philippines, Cambodia, Malaysia, Myanmar</td>
</tr>
<tr>
<td>&gt;1:1,000,000)</td>
<td>Partially</td>
<td>The rest</td>
</tr>
<tr>
<td></td>
<td>Very limited</td>
<td></td>
</tr>
<tr>
<td>Reconnaissance (&lt;1:100,000 &amp;</td>
<td>complete</td>
<td>Japan, South Korea, North Korea, Philippines, Taiwan China, Hong Kong China</td>
</tr>
<tr>
<td>&gt;1:250,000)</td>
<td>Partially</td>
<td>China</td>
</tr>
<tr>
<td></td>
<td>Very limited</td>
<td>The rest</td>
</tr>
<tr>
<td>Semi-detailed (&lt;1:25,000 &amp;</td>
<td>complete</td>
<td>Thailand, South Korea</td>
</tr>
<tr>
<td>&gt;1:100,000)</td>
<td>Partially</td>
<td>China, Japan, Vietnam, Philippines</td>
</tr>
<tr>
<td></td>
<td>Very limited</td>
<td>The rest</td>
</tr>
<tr>
<td>Detailed (&lt;1:10,000 &amp;</td>
<td>complete</td>
<td>South Korea</td>
</tr>
<tr>
<td>&gt;1:25,000)</td>
<td>Partially</td>
<td>China, Japan and some others</td>
</tr>
<tr>
<td></td>
<td>Very limited</td>
<td>The rest</td>
</tr>
<tr>
<td>Very detailed (≤1:10,000)</td>
<td>complete</td>
<td>South Korea</td>
</tr>
<tr>
<td></td>
<td>Partially</td>
<td>Japan and a few others</td>
</tr>
<tr>
<td></td>
<td>Very limited</td>
<td>The rest</td>
</tr>
</tbody>
</table>
Standardization problems – soil classification

- National systems (China, Japan, Mongolia, etc.)
- Land use – soil types (when no soil classification available)
- USDA (southeast Asian countries)
- FAO Legend and WRB
Soil Maps at Series level

Wet Zone 1:250,000

Intermediate Zone 1:400,000

Dry Zone 1:500,000
Soil Survey in Korea

Reconnaissance Soil Survey (’64~’67)
1:50,000 (MMU, 6.25 ha)

Detailed Soil Survey (’68~’90)
1:25,000 (MMU, 1.56 ha)

Detailed Soil Survey (’95~’99)
1:5,000 (MMU, 10 a)

Digitization of Soil Maps (’98~’05)

Korean Soil Information System (’02~’06)
(1:5,000 Soils Maps Service)

Soil Thematic Maps

Web-GIS System for Agro–Environmental Maps (’07~’11)

Soil Map DB

Soil Fertility DB

Soil Testing DB (’98~present)

※MMU: Minimum Mapping Unit
Applications

- Agriculture
- Land use planning
- Hazard assessment
- Climate mitigation assessment
Land evaluation

Crop Requirements

Thematic maps  
Land unit map  
Land suitability map

Basic Soil - Environment Monitoring

About **20,000 monitoring sites.**

5-year-interval (Since 1979)
GIS-based Soil Information of Korea

Main page: http://soil.rda.go.kr

<Soil and Environment Information System of Korea>

<Major functions>

Soil and Environment

Web-based GIS Map Service

Fertilizer Recommendation

Statistics

Love Soil
To link soil knowledge with sustainable soil management

Development phase for iPhone applications

Cloud Computing

- Soil DB
- Climate DB
- Models

Key demands of soil information

- Agronomic consulting
- Environmental assessment
- Educational materials
- Food safety

Soil is

Effective outputs

- Location data
- Activity data
- Soil test ID

C sequestration potential
Irrigation timing
Improving fertilization
Etc.
Needs for Integrated Soil Data

• Agriculture – biomass production
  – Optimize fertilizer applications

• Regional Eco-Environment protection
  – Water protection

• Global change adaptation and mitigation
  – Carbon sequestration potential
Challenges and opportunities

- Outdated and fragmented data
- Shift of expertise
- From data to “forces”
- Demanding update
Summary and Conclusions

- Lack of institutions and loss of experts
- Moving from maps to geo-referenced systems
- Varied by map scales and standards
- Soil data are being used in different ways for various applications
- Future development is demanded for digital and use-friendly services
- Digital soil mapping activities are at research or project level, but it seems to be the only way
Recent activities

• Asia Soil Information System in collaboration with FAO
• Soil atlas of Asia in collaboration with EU-JRC
• Training for and pilot studies with GlobalSoilMap.net specifications
Thank you!
National institutions from 20 countries were contacted for this meeting. 16 are present and due to logistics issues representatives from Myanmar, Laos and India couldn’t come. However, they are interested on being part of the network.

After the national presentations, it is rewarding to see that National Soil Survey institutions are solidly present in most of the countries. Something that is very different in other regions, especially LAC.

In general, soil information is available in all the countries and some are using modern technologies while others are in a transformation phase. It’s very valuable to see the impact of their activities into the decision making process, specially in agriculture.
FAO together with ISCAS signed a LoA in order to implement two main activities:

- Establish the basement of the Asian Soil Partnership/network (contacting and bringing the national institutions is the first step). Empowering and strengthening the network is the second step.
- Start together a joint activity: with some small support prepare a regional report on the status of soil institutions and soil data/information using the valuable inputs from this meeting and further work. Harmonizing a regional soil map making use of available national soil maps (this could improve the current version of the HWSD, and then be used as legacy data for other projects). Ganling to provide further details.

- FAO will provide with the soil legacy data available in their databases.
- If interested, recent soil publications could be sent to each institution.