The Application of Geospatial Information for Natural Resources Management in Indonesia

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Presented at the United Nations World Geospatial Information Congress (UNWGIC)
Deqing, Zhejiang Province, China
19-21 November 2018
Maritime Continent of Indonesia

Indonesia has abundant LAND and MARINE natural resources

Geospatial Information is compulsory for managing these natural resources

Maritime area is about 63%

about 5000 km

### SOVEREIGNTY ZONE (in km²)

1. Internal Waters and Island
   - 3,092,085
2. Territorial Waters
   - 282,583

### SOVEREIGN RIGHT ZONE (in km²)

1. Economic Exclusive Zone
   - 2,936,345
2. Continental Zone
   - 2,749,001
3. Continental Zone > 200 nm
   - 4,209

**Maritime Area (km²)**
- 3,223,137

**Land Area (km²)**
- 1,890,739

Geospatial Information is compulsory for managing these natural resources.
Natural Resources of Indonesia

✓ Fertile Soils
✓ Vast Marine Areas
✓ Oil and Natural Gas
✓ Mining, Metals and Minerals
✓ Forest Resources
✓ Marine Resources
✓ Plantation
✓ Biodiversity
✓ Etc.
Ranking of Indonesian Natural Resources Products in the World

1st Palm Oil
40.5 Million Mt (54% World Production)

2nd Nat Rubber
3.1 Million Mt (30% World Production)

3rd Paddy Rice
75 Million Mt (54% World Production)

4th Coal
460 Mt (6.3% World Production)

3rd Cocoa
3.1 Million MT (30% World Production)

2nd Fisheries
22 Million Mt (3% World Production)

Indonesian Area
• 63% Water
• 37% Land, consists of:
  • 64% Forest Area
  • 36% Non Forest Area
  • 17504 Islands
  • 263 Million of population
Geospatial Information Agency of Indonesia: Business Process

**Base Maps**
- Topographic Map (RBI)
- Coastal Area Map (LPI)
- Marine Area Map (LLN)

**Geodetic Control Network**
- Horizontal
- Vertical
- Gravity & Tide

**Thematic Geospatial Information**
- 1. Coastline
- 2. Hypsographic
- 3. Hydrographic
- 4. Geographic Name
- 5. Administrative Boundary
- 6. Transportation & Utility
- 7. Building & Social Facility
- 8. Land Cover

**85 themes (OMP)**
- Executor
- Regulator
- Coordinator
- Integrator

**Geospatial Information Infrastructure**
- Data infrastructure
- Standard and Regulation
- Institutional Arrangement
- Human Resources
- Science & Technology

**One Map Policy (OMP)**
- Executor
- Coordinator
- Regulator
The Roles of Geospatial Information and Statistical Data for National Sustainable Development Planning

**Development Directives**
- RPJPN 2005-2025
- 1. Reduced Interregional Gaps
- 2. Development of Growth Centers based on Regional Potential Advantage
- 3. Equity of Basic Social Services

**Data Base**
- Geospatial Information
- Statistical Data

**Planning Foundation**
- Spatial Planning
- Land Management
- Spatial Dynamics Model

**Regional Approach**
- National Urban System
- Rapidly Growing Areas
- Special Areas
- Border Areas
- Underdeveloped Areas
- Disaster-prone Areas
- Local Economic Development
- Rural Areas

**National Goals**
- Reduction in Interregional Gaps
- Increased Economic Growth based on Regional Potential Excellence
- Increased Basic Social Services throughout Indonesia
- Increased Strength of Defense and State Security

**Indicators**
- Gini Ratio
- Williamson Index
- Theil Index
- Number of Growth Centers
- Connectivity
- Human Development Index

**Government Vision “Nawacita”**

**SDGs**

(Ref: Bappenas, 2017)

National Development Paradigm → THIS (Thematic, Holistic, Integrative, Spatial)
Geospatial Information for Natural Resources Management (Indonesian Case)

Geospatial Information

Geospatial Reference Frames
- CORS, Tide Gauges, Geodetic Network, Geoid

Base Maps
- Topographic Map (RBI), Coastal Area Map (LPI), and Marine Area Map (LLN)

Integrated and Synchronized Thematic Maps
- One Map Policy (OMP)

InaGeoportal

National Geospatial Information Network

Natural Resources Management

National Development Paradigm → THIS
(Thematic, Holistic, Integrative, Spatial)

• Planning
• Execution
• Monitoring
• Evaluation
Spatial Planning Systems

Tool for Natural Resource Management in Indonesia

Strategic Development Framework

Hierarchy
System of Spatial Planning

Land and Water Spatial Planning (RTRWN – RTLN)

Spatial Planning based on: Island, Special Area, Border Area, Remote Area

Regional Spatial Planning

Operationalization/accuracy

General Spatial Planning

Detail Spatial Planning

Engineering Spatial Planning

Scenarios on Spatial Allocation

Data Analysis

Survey and Data Analysis

National Coordination in Planning

Information Database

Decision Making

Decision Maker

Researchers

Surveyor, Data Managers, Analysis

Require Base and Thematic Maps

Good Data → Good Map → Good Plan → Good Investment → Good Development
Geospatial Reference Frames of Indonesia

**GEODETIC CONTROL NETWORK: 7153 Stations (2018)**

**TIDE GAUGES STATIONS: 138 Stations (2018)**


**GEOID MODEL (2018)**
Accuracy: 23 cm
Basemaps of Indonesia

- Topographic Map
- Coastal Area Map
- Marine Area Map

Scales of 1:1000 to 1:1,000,000

Topographic layers:
1. Coastline
2. Hipsography
3. Hydrography
4. Topographic names
5. Administrative boundary
6. Transportation and utility
7. Building and public facility
8. Land cover
## Typical Requirement of Base Map in Indonesia

<table>
<thead>
<tr>
<th>Program</th>
<th>Required Base Maps</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Map Policy</td>
<td>1: 50.000</td>
</tr>
<tr>
<td>New Harbour Development (Maritime Toll Road)</td>
<td>1: 10.000</td>
</tr>
<tr>
<td>Village Mapping</td>
<td>1: 5.000</td>
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<tr>
<td>Detail Spatial Planning (RDTR)</td>
<td>1: 5.000</td>
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<tr>
<td>Peatland Management</td>
<td>1: 2.500</td>
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<tr>
<td>Development of Special Economic Zone and Industrial Zone</td>
<td>1: 1.000</td>
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<tr>
<td>Smart City Development</td>
<td>1: 1.000</td>
</tr>
<tr>
<td>Acceleration of Land Registration</td>
<td>1: 500 - 1: 5.000</td>
</tr>
<tr>
<td>Hazard Mitigation and Adaptation</td>
<td>1: 1000 – 1: 5000</td>
</tr>
</tbody>
</table>
Geospatial Information issues in Indonesia: Many Layers and Many Actors

- More than one institutions produced and published the same map without coordination;
- Several maps were not created by authorized institutions;
- Different geospatial information was published such as the number of islands and the size of forest areas;
- Overlaps of land uses permits (licenses);
- Basic Geospatial Information was rarely used as the basis for creating maps;
- Satellite imageries for the same area were purchased by more than one institutions.

THE PROBLEMS OF GEOSPATIAL DATA:
- Non-Uniform Georeference.
- Limited Data Availability.
- Out of date and Inaccurate.
- Difficult Accessibility.
- No Optimum Utilization, etc.

Low quality decision making process and consequently degrade the achievement of the national development goals.
Example of Overlapping Permits due to Non Unified Maps

- Topographic Map (RBI)
- Permits of Mining Sector
- Permits of Forestry Sector
- Permits of Cadastral Sector

CREATING LEGAL, SOCIAL & ECONOMIC CONFLICTS:

✓ Lead to unattractive investment condition
✓ Hampering the development process
✓ Delaying the project completion
✓ Wasting the energy of development
Regarding the acceleration of implementation of **One Map Policy** on 1:50,000 scale map accuracy

Issued on 4 February 2016

**ONE MAP POLICY GOALS**

1. Georeference standard data base geoportal

**ONE MAP POLICY UTILITY**

As Reference for Improving the quality of:

- Spatial Planning
- National Resources Management
- Sustainable Development
- Disaster Risk Reduction Management
- Policy and Decision Making

**ONE MAP POLICY MAIN PROGRAM**

- Compilation
- Integration
- Synchronization
- Data Sharing

**ONE MAP POLICY**

- 85 thematic maps
- 19 ministry/agency
- 34 provinces

**PRESIDENTIAL REGULATION**

NO. 9 YEAR 2016
ONE MAP POLICY

19 Ministries and 85 Thematic Maps

Involving

85 Thematic Maps

18 ESDM
10 ATR/BPN
11 PUPR
9 LHK
6 KKP
5 Kemenhub
4 DAGRI
3 BIG
2 BMKG
2 Kemhan
2 PPN/Bappenas
1 Kementan
1 Kemenko Perekonomian
1 BPS
1 Kemenlu
1 BNPP

BNPP
Kemenlu
Kemenko Perekonomian
Kemenhub
Kememperin
Kemendes
Kemendikbud
Kemhan
Kemhan
Kemhub
LHK
BMKG
ATR/BPN
PPN/Bappenas
Dikbud
BPS
Kemenlu
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<th>No</th>
<th>Peta</th>
<th>Deskripsi</th>
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<tr>
<td>1</td>
<td>Peta Penetapan Kawasan Hutan (hasil Tata Batas), minimal pada skala 1:50,000</td>
<td>KLHK</td>
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<tr>
<td>2</td>
<td>Peta Izin Pemanfaatan Kawasan Hutan (IUPHHK-HA, IUPHHK-HT &amp; IUPHHK-KLHK)</td>
<td>ESDM</td>
</tr>
<tr>
<td>3</td>
<td>Peta Hutan Tanaman Rakyt (HTR), minimal pada skala 1:50,000</td>
<td>KKLHK</td>
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<tr>
<td>4</td>
<td>Peta Kawasan Hutan dengan Tujuan Khusus, minimal pada skala 1:50,000</td>
<td>KKLHK</td>
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<tr>
<td>5</td>
<td>Peta Izin Usaha Pertambangan skala 1:50,000</td>
<td>ESDM</td>
</tr>
<tr>
<td>6</td>
<td>Peta Wilayah Kerja Migas skala 1:50,000</td>
<td>ESDM</td>
</tr>
<tr>
<td>7</td>
<td>Peta Huk Gunung Usaha, minimal pada skala 1:50,000</td>
<td>ATR/BNP</td>
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<tr>
<td>8</td>
<td>Peta Hak Pengelolaan, minimal pada skala 1:50,000</td>
<td>ATR/BNP</td>
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<tr>
<td>9</td>
<td>Peta Hak Gunung Bangunan, minimal pada skala 1:50,000</td>
<td>ATR/BNP</td>
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<tr>
<td>10</td>
<td>Peta Perda Tanah Ulayat, minimal pada skala 1:50,000</td>
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<tr>
<td>11</td>
<td>Peta Izin Lokasi, minimal pada skala 1:50,000</td>
<td>ATR/BNP</td>
</tr>
</tbody>
</table>
| 12 | Peta penetapan Kawasan Ekonomi Khusus (KEK), minimal pada skala 1:50,000 | Kemenperin & Kemenko Per }

85 Thematic Maps of OMP Program

85 Peta Jaringan Sarat Optik, skala 1:50,000 | Kemenkominfo
82 Peta Jalan Nasional, Jalan Tol, Jalan Provinsi, dan Jalan Kabupaten skala 1:50,000 | PUPR
41 Peta Sebaran Lokasi Tempat Pembuangan Akhir (TPA) skala 1:50,000 | PUPR
44 Peta Sebaran Lokasi Instalasi Pengolahan Air Limbah (IPAL) dan Instalasi Peng | PUPR
45 Peta Sebaran Lokasi SPAM skala 1:50,000 | PUPR
46 Peta sebaran lokasi Bendungan skala 1:50,000 | PUPR
47 Peta Daerah Irigasi Permukiman skala 1:50,000 | PUPR
48 Peta Sebaran Lokasi Sabo DAM skala 1:50,000 | PUPR
49 Peta Sebaran Lokasi Pengaman Pantai skala 1:50,000 | PUPR
50 Peta Sebaran Lokasi Rusunawa skala 1:50,000 | PUPR
51 Peta Air Tanah skala 1:50,000 | PUPR
52 Peta Ketersediaan Air skala 1:250,000 | PUPR
53 Peta Penggunaan Tanah skala 1:50,000 | ATR/BNP
54 Peta Lahan Gambut skala 1:50,000 | Kemendagri
55 Peta Neraca SD Hutan skala 1:250,000 | KLHK
56 Peta Desa Aliran Sungai (DAS) skala 1:50,000 | KLHK
57 Peta Geologi skala 1:100,000 | ESDM
58 Peta Kawasan rawan Bencana Gunung Api skala 1:50,000 | ESDM
59 Peta Kawasan Rawan Bencana Gempa Bumi skala 1:50,000 | ESDM
60 Peta Kawasan Rawan Bencana zona Kerentanan Gempa Tanah skala 1:50,000 | ESDM
61 Peta Kawasan Rawan Bencana Tsunami skala 1:50,000 | ESDM
62 Peta Hidrogeologi skala 1:100,000 | ESDM
63 Peta Tanah Semi-detai skala 1:50,000 | Kemendagri
64 Peta Curah Hujan dan Hari Hujan skala 1:50,000 | BMKG
65 Peta Potensi Energi Matahari dan Angin skala 1:250,000 | BMKG
66 Peta Lahan Sawah skala 1:50,000 | ATR/BNP
67 Peta Lahan Sawah skala 1:50,000 | Kemendagri
68 Peta Wilayah Pengelolaan Perikanan Negeri Republik Indonesia (WPPNR) | KKP
69 Peta Jenis dan Kekayaan Perikanan tangkap di WPPNR skala 1:250,000 | KKP
70 Peta Kawasan Bentang Alam Karst skala 1:50,000 | ESDM
71 Peta Sumberdaya Mineral skala 1:50,000 | ESDM
72 Peta Sumberdaya Batubara skala 1:50,000 | ESDM
73 Peta Sumberdaya Panas Bumi skala 1:50,000 | ESDM
74 Peta Sistem Lahan (Morfologi) skala 1:50,000 | BIG
75 Peta Morfometri Bentang Lahan skala 1:50,000 | BIG
76 Peta Batas Administrasi Provinsi skala 1:50,000 | Kemendagri
77 Peta Batas Administrasi Kabupaten/Kota skala 1:50,000 | Kemendagri
78 Peta Batas Administrasi Desa/Kelurahan skala 1:10,000 | Kemendagri
79 Peta Batas Darat Negara skala 1:25,000 | Kemenlu & BNPP
80 Peta Batas Laut Negara skala 1:1,000,000 | Kemenlu
81 Peta Potensi Desa (sosial-ekonomi), minimal pada skala 1:50,000 | BPS
82 Peta Kawasan Cagar Budaya skala 1:50,000 | Kemendikbud
83 Peta Sebaran Lokasi Cagar Budaya skala 1:50,000 | Kemendikbud
84 Peta Penunjukkan Kawasan Hutan skala 1:250,000 | KLHK
85 Peta Zonasi Kawasan Konservasi skala 1:50,000 | KLHK
86 Peta Zonasi Kawasan Konservasi Perguruan skala 1:50,000 | KLHK dan KKP
Steps of One Map Policy Activity

1. **COMPILATION**
   Thematic data collection from Ministries/Agencies as Data Producer (Custodian).

2. **INTEGRATION**
   Thematic data integration processes which refer to the National Standard Base Map produced by BIG.

3. **SYNCHRONIZATION**
   Synchronizing thematic maps among ministries/agencies which include solving land use conflicts.

4. **DATA SHARING**
   Product of OMP will be shared through InaGeoportal to ministries/agencies involved.
Priority Areas of One Map Policy (2016-2019)

Kalimantan: 05 Provinces
Sumatera: 10 Provinces
Sulawesi: 06 Provinces
Papua: 02 Provinces
Maluku: 02 Provinces
Jawa, Bali, Nusa Tenggara: 09 Provinces
Status of One Map Policy (OMP) Data Integration (July 2018)

SUMATERA 76 from 84 IGT
KALIMANTAN 71 from 80 IGT
JAWA 68 from 83 IGT
SULAWESI 75 from 82 IGT
MALUKU 64 from 82 IGT
PAPUA 62 from 83 IGT
BALI & NT 68 from 80 IGT

Legend:
- Data Integration in 2016
- Data Integration in 2017
- Data Integration in 2018

The Geoportal of One Map Policy will be officially launched by the Indonesian President on Nov. 2018
OMP Results is housed in **InaGeoportal BIG**

Data sharing is based on the regulation and done through **InaGeoportal**
Indonesian National Geospatial Information Network (NGIN)

Status of NGIN Nodes

<table>
<thead>
<tr>
<th></th>
<th>TARGET</th>
<th>CONNECTED</th>
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<tbody>
<tr>
<td>Ministries/Agencies</td>
<td>57</td>
<td>23</td>
</tr>
<tr>
<td>Provinces</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>Regencies/Cities</td>
<td>514</td>
<td>22</td>
</tr>
<tr>
<td>Universities</td>
<td>34</td>
<td>19</td>
</tr>
</tbody>
</table>

Link to OMP Geoportal
OMP-Geoportal is only available for OMP stakeholders, and governed by data sharing protocol.
InaGeoportal is connected to the network nodes of Ministries, Agencies, Provinces, Districts.
**8** ALREADY OPERATIONAL

- Kementerian LHK
- Kementerian ESDM
- Kementerian PUPR
- Kementerian Pertanian
- Kemenko Perekonomian
- Kementerian ATR/BPN
- BIG
- BMKG

**10** ALREADY OPERATIONAL BUT NOT YET OPTIMAL*

- Kementerian Kelautan dan Perikanan
- Kementerian Kominfo
- Kementerian Perhubungan
- Kementerian Dalam Negeri
- Kementerian Luar Negeri
- Kementerian Dikbud
- Kementerian Desa, PDT, dan Transmigrasi
- Kementerian Perindustrian
- BPS
- Kementerian PPN/Bappenas

**1** NOT YET OPERATIONAL **

- Kementerian Pertahanan

---

*Already connected to NIGN and has supporting regulation*

*Already connected to NIGN but no supporting regulation yet*

**Not yet connected to NIGN but has supporting regulation**

Ref. Kemenko Perekonomian (Agt. 2018)
Status of Network Nodes of Provinces

August 2018 Status

15 ALREADY OPERATIONAL

19 ALREADY OPERATIONAL BUT NOT YET OPTIMAL*

* Already connected to NIGN but no supporting regulation yet

Ref. Kemenko Perekonomian (Agt. 2018)
Geoportal Address of Provinces (August 2018)

- Sumatera Utara: http://sumutprov.ina-sdi.or.id
- Aceh: http://gisportal.acehprov.go.id
- Sumatera Barat: http://sumbarprov.ina-sdi.or.id
- Jambi: http://jambiprov.ina-sdi.or.id
- Bengkulu: http://bengkuluprov.ina-sdi.or.id
- Lampung: http://sumutprov.ina-sdi.or.id
- DKI Jakarta: http://jakartasatu.jakarta.go.id/portal/
- Banten: http://geoportal.bantenprov.go.id
- Jawa Barat: http://geodatabase.pusdalisbang.jabarprov.go.id
- Jawa Tengah: http://geoportal.jatengprov.go.id
- Jawa Timur: http://geoportal.jatimprov.go.id
- Bali: http://baliprov.ina-sdi.or.id
- Kalimantan Barat: http://geoportal.bAPPEDA.kalbarprov.go.id
- Kalimantan Tengah: http://kaltengprov.ina-sdi.or.id
- Kalimantan Timur: http://onedatasonemap.kaltimprov.go.id
- Kalimantan Selatan: http://geoportal.kalselprov.go.id
- Kalimantan Utara: http://geoportal.kaltraprov.go.id
- Sulawesi Barat: http://sulbarprov.ina-sdi.or.id
- Sulawesi Tengah: http://geoportal.sultengprov.go.id
- Sulawesi Selatan: http://geoportal.sulselprov.go.id
- Sulawesi Barat: http://sulbarprov.ina-sdi.or.id
- Nusa Tenggara Barat: http://nttprov.ina-sdi.or.id
- Nusa Tenggara Timur: http://nttprov.ina-sdi.or.id
- Maluku: http://maluku.ina-sdi.or.id
- Maluku Utara: http://malukuutara.ina-sdi.or.id
- Gorontalo: http://gorontaloprov.ina-sdi.or.id

- 19 provinces are already connected to NIGN and have supporting regulation.
- 15 provinces are already connected to NIGN but have no supporting regulation yet.
Closing Remark (1): Geospatial Information and National Resources Management

NSDI: NATIONAL SPATIAL DATA INFRASTRUCTURE
• Presidential Decree No. 27/2014 (NSDI)

Geospatial Information Law No. 4/2011

GOVERNANCE
ONE MAP POLICY
Coordination & Supervision
Presidential Regulation No. 9/2016
Acceleration of OMP Implementation

DATA & STANDARD
National Planning Law

HUMAN RESOURCES
National Sustainable Development Program

TECHNOLOGY
Sustainable Natural Resources Management

POLICY
DATA SHARING

STATISTIC DATA (Social and Economy)

By integrating multi sectors, product of one map will be used for developing or for updating district spatial planning which contributes to sustainable development

SD Planning

INTEGRATION

SYNCHRONIZATION

COMPILATION

GEOSPATIAL INFORMATION

GEOSPATIAL DATA PRODUCTION

GEOSPATIAL INFORMATION UTILIZATION & MODELING

National Geospatial Information Network
✓ **Geoportal** housing OMP data will be launched on November 2018. The **synchronization** stage is continuing.

✓ **Data Sharing** of OMP data is based on regulation.

✓ **The National Geospatial Information Network** is being completed to support data sharing of OMP data.

✓ **Several issues for OMP continuation:**

| • Utilization of OMP Data in Decision Making Process of Central and Local Governments |
| • Toward Larger Scale of 1:5.000 | • Human Resource Development |
| • Inclusion of other Thematic Maps | • Institutional and Policy Enhancement |
| • Adding more Stakeholders, e.g. NGO and Private Sector |  |

**Closing Remark (2): Future of One Map Policy**
THANK YOU
6.490°S 106.849°E