Measuring Deqing’s Progress towards 2030 SDGs with Statistical and Geospatial Information

Jun Chen\textsuperscript{1,2}
\textsuperscript{1} National Geomatics Center of China
\textsuperscript{2} ISPRS
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How to Measure Progress towards SDGs

A crucial task for national / local governments in implementing 2030 Agenda

- UN called upon an indicator-based monitoring by combining geo-statistical data

- Current status
  - More in theoretical/concept than in practical
  - Some individual indicators studied
  - Lack of comprehensive efforts

- Pilot studies needed
A Pilot Project by China at a County Level

Deqing county, the venue of the first UN World Geospatial Information Congress (Nov.19-21,2018)

- 937.92 Km²
- 430,000 permanent habitants
- GDP 6.91 billion US Dollars in 2017

- Sustainable development concepts well accepted and implemented
- Geospatial and statistical information resources well established
In line with UN Global SDG Indicator framework and by combining geo-statistical data

A Comprehensive Measurement

1. Localization of Indicators (指标本地化)
2. Spatio-temporal data processing (时空数据处理)
3. Computing indicators with geographical angle (指标计算)
4. Indicator and evidence-based analysis (基于指标和事实的分析)
5. Knowledge Service (知识服务)

UN Global SDG Indicator Framework (联合国SDGs全球指标框架)
Regional SDGs practices (区域发展实践与需求)
102 SDGs Indicators Selected for Deqing

- Examined all 232 indicators of UN SDG Global indicator framework

<table>
<thead>
<tr>
<th>SDG</th>
<th>UN</th>
<th>Deqing</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>6</td>
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<td>16</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>总计</td>
<td>234</td>
<td>102</td>
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</tbody>
</table>

Three Principles
- Suits local circumstance
- Enables international and national comparison
- Data availability

Adopted 47
Extended 6
Revised 42
Substituted 7

All the 16 SDGs are covered that is essential for a comprehensive measurement
200 types of data were collected and processed, including topographic/LC maps, EO images, disaggregated socio-economic statistics, as well as some from social media.

<table>
<thead>
<tr>
<th>镇名</th>
<th>人口</th>
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<tbody>
<tr>
<td>武康街道</td>
<td>89944</td>
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<td>26008</td>
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<tr>
<td>下渚湖街道</td>
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<td>舞阳街道</td>
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<td>72395</td>
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<tr>
<td>禹越镇</td>
<td>33297</td>
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</tbody>
</table>

30-m Population density with topographic information.
③ Data-driven Measurement of the Indicators

Three different ways to measure the 102 indicators

A Direct calculation with statistical data  85
- using ratio (or proportion), rate of change, index or other calculations

B Direct derivation from geospatial data  10
- using spatial density calculation, coverage classification and others

C Integrated utilization of statistical and geospatial information  7
- based on quantitative measurement of spatial accessibility, coverage, spatial relations
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4.1</td>
<td>Population Proportion living in households with access to basic services</td>
</tr>
<tr>
<td>2.4.1</td>
<td>Proportion of agricult. area under productive/ sustainable agriculture</td>
</tr>
<tr>
<td>3.8.1</td>
<td>Coverage of essential health services</td>
</tr>
<tr>
<td>6.3.2</td>
<td>Proportion of bodies of water with good ambient water quality</td>
</tr>
<tr>
<td>6.6.1</td>
<td>Change in the extent of water-related ecosystems over time</td>
</tr>
<tr>
<td>9.1.1</td>
<td>Proportion of rural population living within 2 km of an all-season road</td>
</tr>
<tr>
<td>11.2.1</td>
<td>Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities</td>
</tr>
<tr>
<td>11.3.1</td>
<td>Ratio of land consumption rate to population growth rate</td>
</tr>
<tr>
<td>11.7.1</td>
<td>Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities</td>
</tr>
<tr>
<td>15.1.1</td>
<td>Forest area as a proportion of total land area</td>
</tr>
<tr>
<td>15.1.2</td>
<td>Proportion of important sites for terrestrial and freshwater biodiversity covered by protected areas, by ecosystem type</td>
</tr>
<tr>
<td>15.2.1</td>
<td>Proportion of forest change</td>
</tr>
<tr>
<td>15.3.1</td>
<td>Proportion of land that is degraded over total land area</td>
</tr>
<tr>
<td>15.4.1</td>
<td>Protected area coverage of import. sites for mountain biodiversity</td>
</tr>
</tbody>
</table>
④ Hierarchical Assessment with three levels

- **Level I** (Indicators): 79/102 were Contracted and ranked
  - with SDGs Index and Dashboard, National Plan mandate requirements etc.

- **Level II** (individual SDG): 16 were assessed
  - through grouped focused analysis with quantified indicators and evidences

- **Level III** (SDGs clusters): 3, economy, society and environment
  - coherency analysis with degree of coordination, coefficient of variation
## Level II: SDG 6 as an Example

<table>
<thead>
<tr>
<th>Content</th>
<th>Indicators</th>
<th>Quantitative result</th>
<th>Evaluation reference</th>
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</thead>
<tbody>
<tr>
<td>Clean Water</td>
<td>6.1.1 Proportion of population using safely managed drinking water services</td>
<td>Urban: 100% Rural: 99.6%</td>
<td>Green≥98%</td>
</tr>
<tr>
<td></td>
<td>6.2.1.a Penetration rate of sanitary toilets in rural areas</td>
<td>98%</td>
<td>Green≥95%</td>
</tr>
<tr>
<td></td>
<td>6.2.1.b Service convenience of urban public toilets</td>
<td>From all parts of town, the nearest public toilet can be reached within 16 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.3.1 Proportion of wastewater safely treated</td>
<td>Urban domestic sewage: 91.06% Rural domestic sewage: 80.68%; trade effluent: N/A;</td>
<td>Coverage rate of the treatment of domestic wastewater (upper-middle-income countries): 59%</td>
</tr>
<tr>
<td></td>
<td>6.3.2 Proportion of bodies of water with good ambient water quality</td>
<td>68.75%, 100%**</td>
<td>76.9%</td>
</tr>
<tr>
<td></td>
<td>6.4.1 Change in water-use efficiency over time</td>
<td>The water consumption per 10,000 CNY of GDP in 2017 was 67.5 m³, dropped 23.52% from 2015</td>
<td>By 2020, the efficiency of water use will be 23% lower than at the end of 2015</td>
</tr>
<tr>
<td></td>
<td>6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources</td>
<td>25.08%</td>
<td>Greens&gt;25% Yellow: 25%&lt;x≤75%</td>
</tr>
<tr>
<td></td>
<td>6.6.1 Change in the extent of water-related ecosystems over time</td>
<td>6.47%; High sustainable</td>
<td>0-20%; High sustainable; 21-40%; Local sustainable but threatens global stability; 41-60%; Border-line sustainability; Corrective actions are strongly recommended; 61-100%; Unsustainable. Urgent renewal is required.</td>
</tr>
<tr>
<td></td>
<td>6.6.1.a Rate of change in the spatial extent of water-related ecosystems</td>
<td>11.14%</td>
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<tr>
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<td>6.6.1.b Rate of change in the water quantity characteristic of water-related ecosystems</td>
<td>8.26%</td>
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<tr>
<td></td>
<td>6.6.1.c Rate of change in the water quality of water-related ecosystems</td>
<td>0%</td>
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</tr>
<tr>
<td></td>
<td>6.6.1.d Health state of the typical wetland ecosystems</td>
<td>Xiazhuhu wetland: well</td>
<td></td>
</tr>
</tbody>
</table>

### Metrics Used for Comparing/ranking
- I -- SDGs Dashboard
- II -- National plan
- III -- Multiple evaluation
- IV -- Others

### Grouping targets into sub-groups for focused analysis
- Safe drinking water and sanitation 6.1, 6.2
- Water resource utilization 6.3 6.4 6.5 6.6
- Protection of water-related ecosystems 6.6

<table>
<thead>
<tr>
<th>Quarter</th>
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<tr>
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<td>2nd Quarter</td>
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<td>4th Quarter</td>
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<td>No ranking</td>
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</table>
Level III: Three SDGs Clusters Analysis

- **Economy growth** (5)
  - Sustain. Agriculture
  - Growth condition
  - Infrastructure
  - Income Equality
  - Efficient utilization
  - Disaster resilience
  - Green consumption
  - Land degradation
  - Biodiversity conservation

- **Environment** (5)
  - Energy efficiency
  - Improving water resource
  - Protecting ecosystem
  - Pollution prevention
  - Raising consensus
  - Sust. mang. Of forest
  - Biodiversity conservation

- **Social harmony** (12)
  - Social security/rights
  - Poverty alleviation
  - Government regulation
  - Disease prevention
  - Health service
  - Education balance
  - Education chances
  - Women rights
  - Legal safeguard
  - Modern energy service
  - Employment social/labor security
  - Women rights
  - Modern energy service
  - Housing security
  - Residential safety
  - Living environment
  - Equality of conditions
  - All kinds of crimes
  - Protection of civil rights
  - Institutional building
Progress Report Resulted

Chinese version - around 70 pages
中文版-约70页

English version - around 80 pages
英文版-约80页
Report Contents

1. Introduction
   1.1 Geographical location
   1.2 Comprehensive measurement of progress towards SDGs

2. Goal Assessment
   1) End poverty in all its forms everywhere
   2) End hunger, achieve food security and improve nutrition and promote sustainable agriculture
   3) Ensure healthy lives and promote well-being for all at all ages
   4) Ensure an inclusive and equitable quality education and promote lifelong learning opportunities for all
   5) Achieve gender equality and empower all women and girls
   6) Ensure availability and sustainable management of water and sanitation for all
   7) Ensure access to affordable, reliable, sustainable and modern energy for all
   8) Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
   9) Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
   10) Reduce inequality within and among countries
   11) Make cities and human settlements inclusive, safe, resilient and sustainable
   12) Ensure sustainable consumption and production patterns
   13) Take urgent action to combat climate change and its impacts
   14) Protect oceans, combat desertification, halt and reverse land degradation, halt biodiversity loss
   15) Promote peace and justice for all and build effective, accountable and inclusive institutions at all levels

3. SDGs Cluster Analysis
   3.1 Economic Growth
   3.2 Natural Beauty
   3.3 Social Harmony
   3.4 Summary

4. Conclusion
   4.1 A data-driven and evidence-based approach for comprehensive assessment
   4.2 Deqing’s progress towards 2030 SDGs
   4.3 Outlook

Acknowledgements

Answer three questions

1) How to measure progress towards 2030 SDGs?
2) How far is Deqing from 2030 SDGs?
3) What are next steps?
Deqing Story

In order to improve the ecological environment, Deqing County has actively carried out the construction of beautiful pastoral.

1. As of 2017, sewage treatment terminals have covered 99.25% of administrative villages.

2. Deqing upgraded the aquaculture industry, implemented the "beautiful pasture" project, and adjusted the industrial structure of the polluted farms to achieve 100% zero emission and 100% resource utilization.

3. In 2017, all of the major monitored river water quality reached the standard.

4. Xiazhu Lake is the largest wetland in the south of the Yangtze River. The improvement of its ecological environment is the key project of Deqing.

http://Deqing-SDGs.net
Released Officially at UN-WGIC

Nov. 20, 2018, Deqing, China
Received numerous positive comments from the international community

“A good practice for implementing and measuring SDGs at local level”
“A pioneering project whose experiences is helpful and available for people both from within and outside China”

— Mr. Liu Zhenmin, USG for Economic and Social Affairs of UN

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Dr. Wang Keran, Chief of Space Applications Section (SAS), IDD of UN ESCAP

“The experience of this practice has been shared with relevant agencies in Asia-Pacific countries and received positive feedback and requests on capacity building towards using geo-statistical data to support monitoring progress of the SDGs.”

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Mr. Jack Dangermond, ESRI president

“We must show tangible impact and results beyond convening technical meetings and conferences and go further to ‘implement’ and achieve development results required to address the challenges ahead. Your work provides a very valuable contribution to this process and we would like to support the amplification of your effort.”

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Chinese pilot project tracks progress towards SDGs

China’s progress in meeting the United Nations Sustainable Development Goals (SDGs) is being successfully monitored using geospatial and statistical information in a pilot scheme running in Deqing county, Zhejiang province.

A team of 20 researchers, led by the National Geomatics Center of China, measured 100 SDG indicators over the 938-square-kilometre county, in line with the UN Global SDG Indicator Framework, multi-scale and multi-type geospatial and statistical data were integrated for comprehensive monitoring and evidence-based progress analysis. These data included topographic and land-cover maps, aerial and satellite images, disaggregated socio-economic information and environmental statistics, as well as some from social media.

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"Winner of the Geospatial World Excellence Awards 2019"

Dear Chen Jun,

I am happy to inform you that the project at 108F3, titled China (Deqing) SDG’s Profile: A Comprehensive Measurement of Progress Towards 2030 SDGs with Geospatial and Statistical Information, which was nominated by you, has been selected for the Geospatial World Excellence Awards 2019.

The award will be presented at Geospatial World Forum 2019, to take place in Taets Art & Event Park, Amsterdam from 2-4 April 2019. I request the officially designated person from Deqing County Government to be present to accept the same.

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Shared with the Global Earth Observation community
Current Works (1)

- Document the methodology and prepare training seminars
- Organize a special issue in ISPRS Int. J GIS
- Prepare seminar(s) with UN-GGIM and UN-ESCAP
Current Works (2)

- Convey Deqing SDGs Profile website into UN Open SDGs Data Hub
- Knowledge-graph based

With four level nodes
Current Works (3) Transforming the assessment into Actions

- Transforming the assessment results into actions of local decision makers by formulating an action plan for the period 2019-2023

**System Knowledge**
- Current state and trends

**Transformation Knowledge**
- Facilitating pathways

**Goal Knowledge**
- Desirable future

**Comprehensive assessment Results**

**List of actions**

**Local SDGs for the next five years**
Summary

- **SDGs progress can be well monitored in a local context**, through establishing a cooperative partnership among all stakeholders to mobilize resources, developing a set of data driven and evidence-supported approach with a geographic perspective.

- **An overall picture was derived about local SDGs status, gaps and challenges.** The local government is therefore able to develop concrete implementation strategies and allocate resources accordingly, to address the issues identified in the monitoring.

- **A practical and replicable approach was provided.** UNSD (UN-GGIM Secretariat) has decided at the end of 2018 to “showcase the work as a flagship example on how countries can practically measure their progress using statistical and geospatial information, especially at the sub-national level”.
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