SDGs Local Monitoring - China's Pilot Practice

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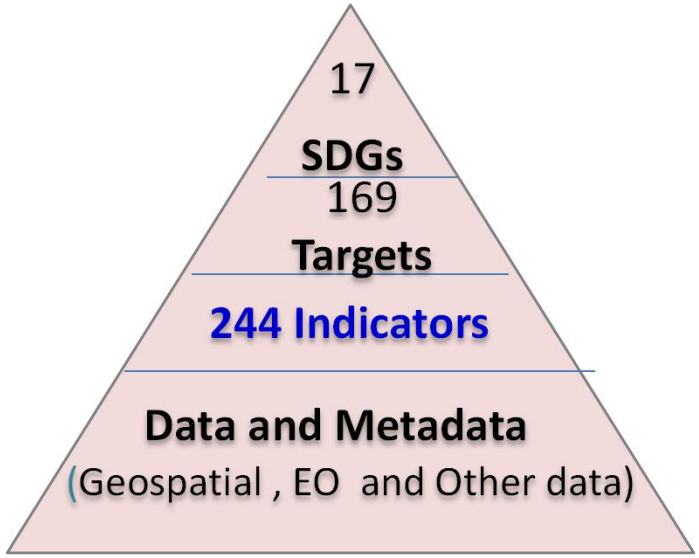
Contents

Monitoring Progress towards 2030 SDGs

UN is calling for indicator-based and data-driven monitoring



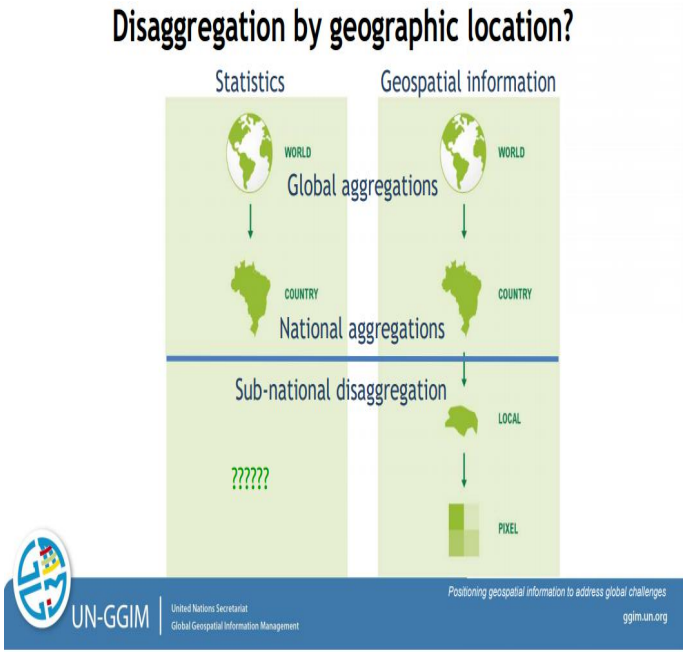
- **with globally agreed indicator framework**
- **through integrating geospatial and statistical data**

Becoming a crucial task for national/ local governments

Major Challenges

- **State-of-the -art**
  - More in theoretical/concept than in practical
  - Some individual indicators studied
  - Lack of comprehensive monitoring

- **Challenges Facing**
  - **Indicators**– more or less? (definition , localization)
  - **Data** –available/ reliable? (geospatial/ EO data)
  - **Computing**– geographical angle?
  - **Assessment**- translating into actions?



UN Calling for Good Practises

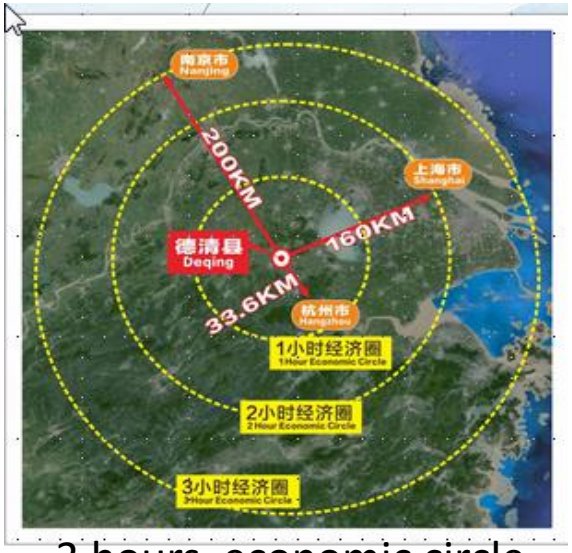
Good practices needed for galvaning the momentum for implementing 2030 Agenda

China’s Pilot Practice

Deqing county, Zhenjiang Province, was taken a pilot study area

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

- 937.92 Km^2
- 430,000 permanent habitants
- GDP 6.91 billion US Dollars in 2017

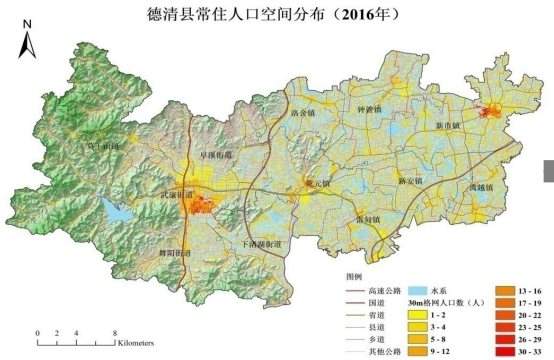


3 hours economic circle

- Sustainable development concepts well accepted and implemented
- Geospatial and statistical information resources well established

My Presentation

China's Pilot Practice on Local SDGs monitoring

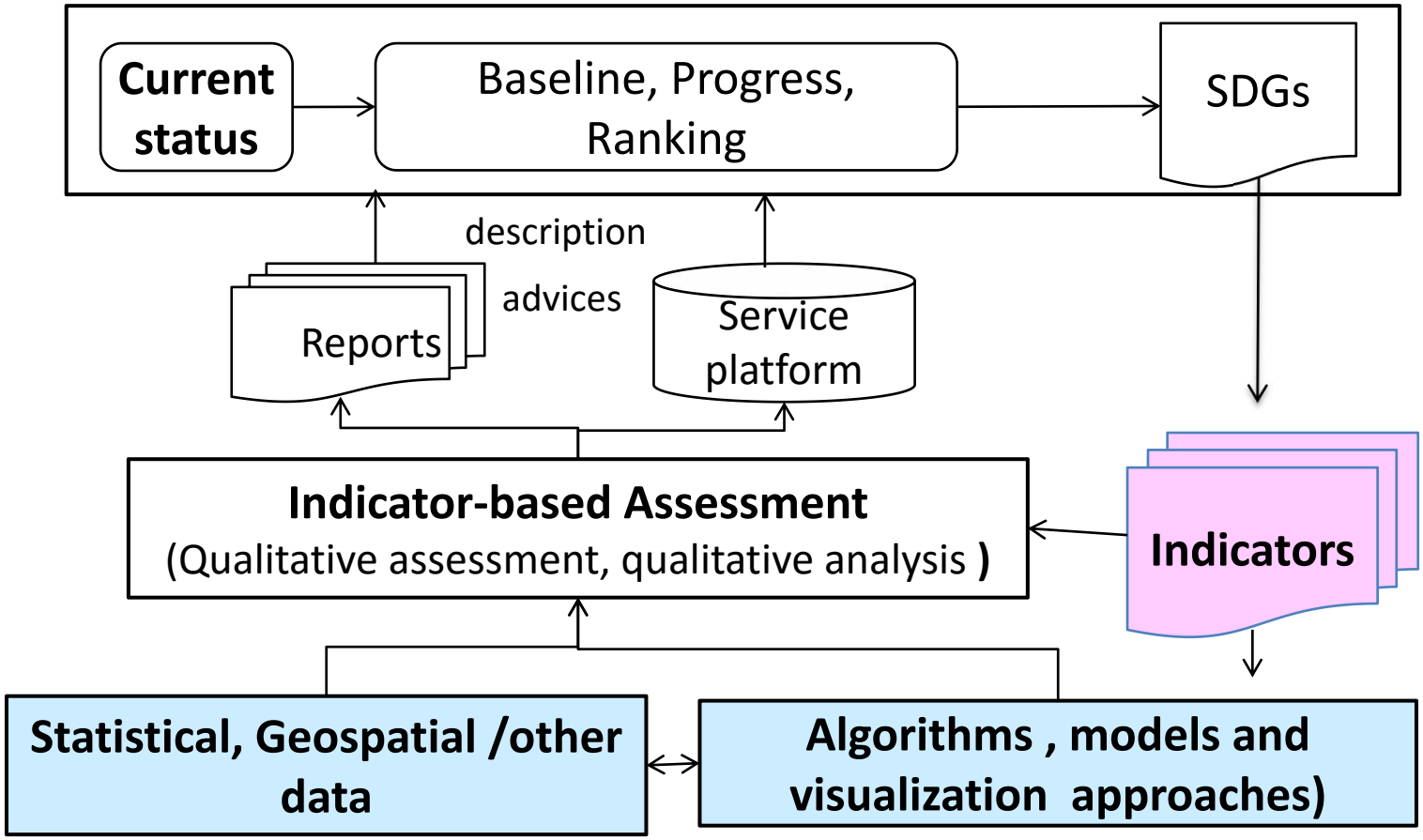


- 2018: Monitoring progress towards SDGs with geo-statistical data
- 2019 : Translate monitoring results into actions with the help of a SDGs knowledge Portal and

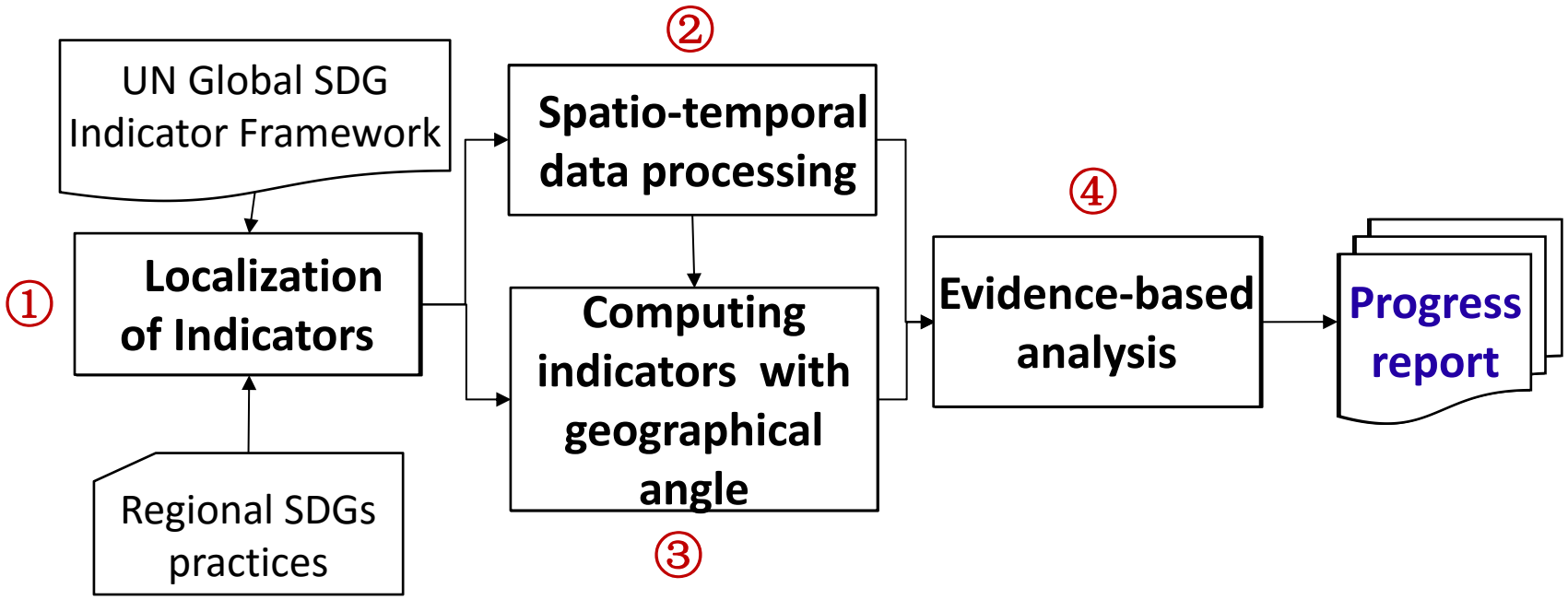
Contents

Methodology

An indicator-based, data-driven measurement and evidence-based analysis with statistical / geospatial information



Four Major Steps



Step 1 Selected 102 SDGs Indictors for Deqing

SDG	UN	Deqing	
1	14	**5**	1.1.1；1.3.1；1.4.1；1.a.1；1.b.1
2	13	**7**	2.1.2；2.1.2；2.2.1；2.3.2；2.4.1；2.a.1；2.c.1
3	27	**15**	3.1.1；3.1.2；3.2.1；3.2.2；3.3.1；3.3.2；3.3.3；3.3.4；3.4.1；3.6.1；3.7.1；3.8.1；3.b.1；3.b.2；3.c.1
4	11	**8**	4.1.1；4.2.2；4.3.1；4.4.1；4.5.1；4.6.1；4.a.1；4.c.1
5	14	**4**	5.1.1；5.5.1；5.5.2；5.c.1
6	11	**7**	6.1.1；6.2.1；6.3.1；6.3.2；6.4.1；6.4.2；6.6.1
7	6	**3**	7.1.1；7.1.2；7.3.1
8	17	**6**	8.1.1；8.2.1；8.5.2；8.6.1；8.9.1；8.9.2
9	12	**10**	9.1.1；9.1.2；9.2.1；9.2.2；9.3.1；9.4.1；9.5.1；9.5.2；9.b.1；9.c.1
10	11	**2**	10.1.1；10.2.1
11	15	**9**	11.1.1；11.2.1；11.3.1；11.4.1；11.5.1；11.5.2；11.6.1；11.6.2；11.7.1；
12	13	**5**	12.2.2；12.4.2；12.5.1；12.6.1；12.7.1
13	8	**4**	13.1.1；13.1.3；13.3.1；13.3.2
15	14	**7**	15.1.1；15.1.2；15.2.1；15.3.1；15.4.1；15.4.2；15.a.1
16	23	**6**	16.1.1；16.1.3；16.3.2；16.5.1；16.6.1；16.1.a
17	25	**5**	17.1.1；17.2.1；17.3.1；17.8.1；17.11.1
总计	234	102	

Criteria for Localization

- adaptability
- comprehensiveness
- measurability

A Adopted **47**

E Extended **6**

R Revised **42**

S Substituted **7**

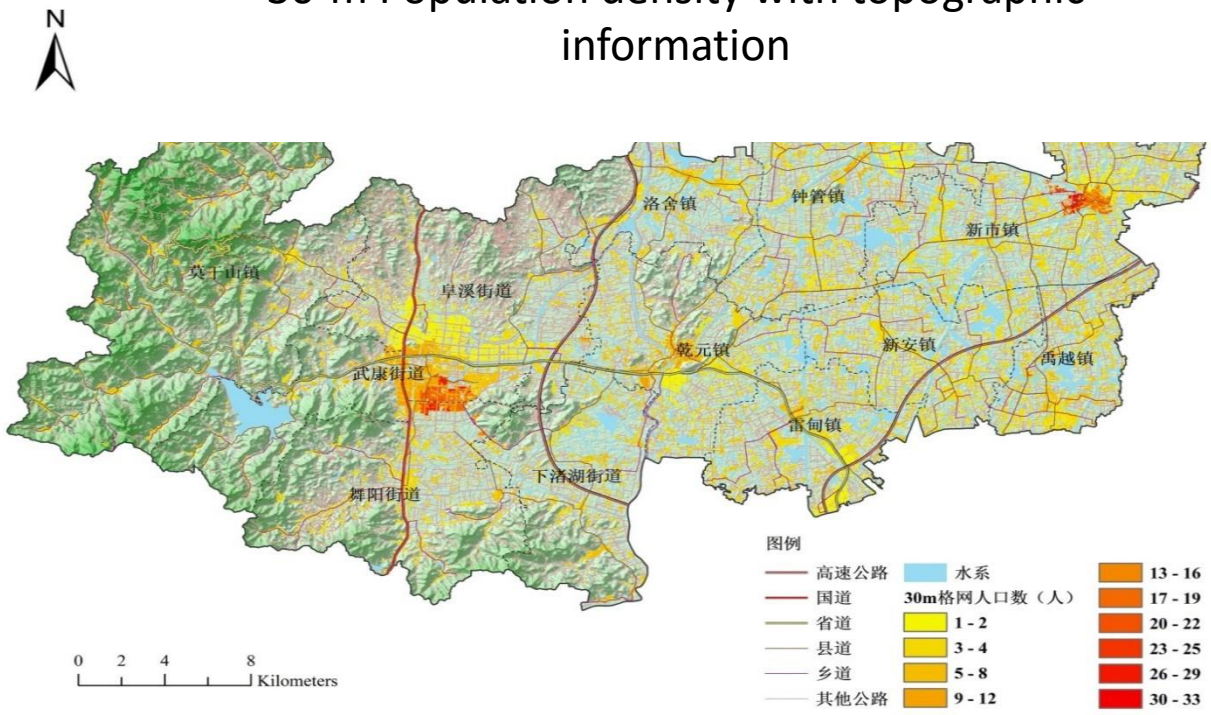
All the 16 SDGs are covered- allowing a comprehensive measurement

Step 2 Spatio-temporal Data Handling

200 types of data were collected/ processed, including topographic/ LC maps, EO images, disaggregated socio-economic statistics

镇名 Town names	人口 population
武康街道	89944
阜溪街道	26008
下渚湖街道	23999
舞阳街道	52180
洛舍镇	20553
钟管镇	43856
莫干山镇	31643
乾元镇	49644
雷甸镇	37592
新安镇	31730
新市镇	72395
禹越镇	33297

30-m Population density with topographic information



Enabling integrated geospatial and statistical analysis

Step 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

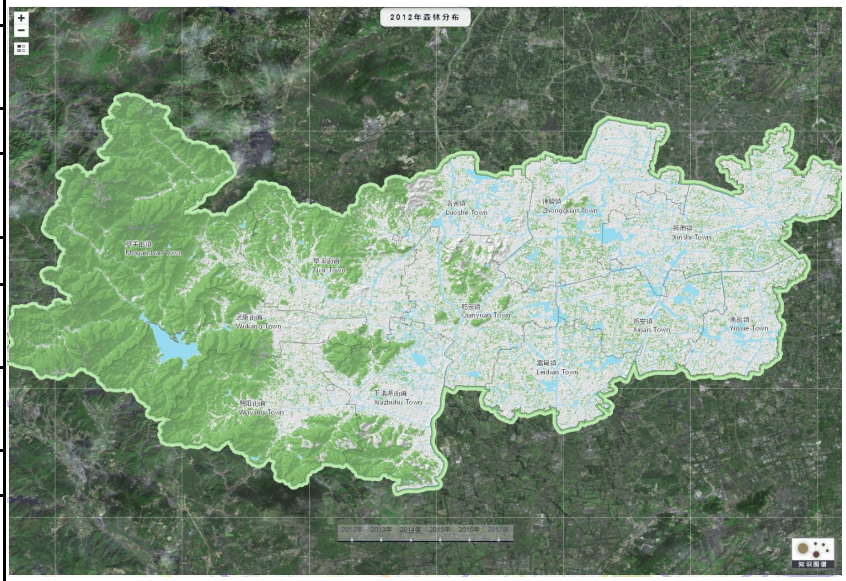
C **Integrated utilization of statistical and geospatial information** **7**

- quantitative measurement of spatial accessibility, coverage, spatial relations

Step 3 Data-driven Measurement of the Indicators

17 Indicators measured with geospatial data

Indicator	Contents
1.4.1	population Proportion living in households with access to basic services
2.4.1	Proportion of agricult. area under productive/ sustainable agriculture
3.8.1	Coverage of essential health services
6.3.2	Proportion of bodies of water with good ambient water quality
6.6.1	Change in the extent of water-related ecosystems over time
9.1.1	Proportion of rural population living within 2 km of an all-season road
11.2.1	Proportion of population having convenient access to public transport (sex, age, persons with disabilities)
11.3.1	Ratio of land consumption rate to population growth rate
11.7.1	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
15.1.1	Forest area as a proportion of total land area
15.1.2	Proportion of important sites for terrestrial and freshwater biodiversity covered by protected areas, by ecosystem type
15.2.1	Proportion of forest change
15.3.1	Proportion of land that is degraded over total land area
15.4.1	protected area coverage of import. sites for mountain biodiversity



Step 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

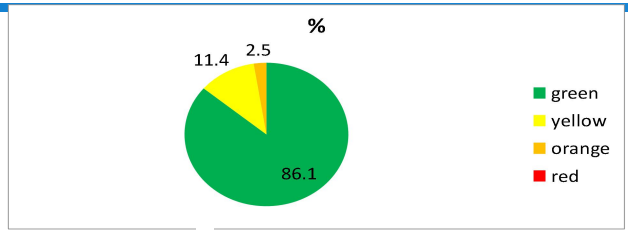
- **Level III** （SDGs clusters): **3** , economy, society and environment

  - coherency analysis with degree of coordination, coefficient of variation

Step 4 Hierarchical Assessment with three levels

Level I ---- Indicator Ranking

68	9	2	0	23



INDICATOR	RANK
SDG1	
1.1.1 Basic standard of living	
1.a.2 Proportion of total government spending on basic services (education, health, and social security)	
1.b.1 Proportion of government recurrent used for the benefit of women, poor and disadvantaged groups	
1.3.1 Proportion of population covered by the social security system	
1.4.1 Population and proportions of access to basic services	
SDG2	
2.1.1 Engel's Coefficient	
2.1.2 Food security	
2.2.1 Prevalence of stunting among children(<5 years old)	
2.2.2Prevalence of malnutrition among children(<5 years old)	
2.3.1 Crop Yield	
2.3.2 Per capita disposable income of rural residents	
2.4.1Ratio of agricultural area under sustainable agriculture	
2.a.1Agriculture orientation index for government expenditures	
2.c.1 Indicator of food price anomalies	

INDICATOR	RANK
SDG3	
3.1.1 M mal mortality ratio	
3.2.1 U r-five mortality rate	
3.2.2 N atal mortality rate	
3.4.1 tality probability attributed to cardiovascular, cancer, etes or chronic respiratory disease	
3.6.1 D rate due to road traffic injuries	
3.3.1 N ber of new HIV infections per 1,000 population	
3.3.2 T rculosis incidence per 100,000 population	
3.3.3 M ria incidence per 1,000 population	
3.3.4 H titis B incidence per 100,000 population	
3.b.1C rage of vaccination including in national immunization progra	
3.1.2 P ital delivery rate	
3.7.1 C ceptive rate of married women	
3.8.1 C rage of essential health services	
3.b.2 (ernment health expenditure as a proportion of GDP and rnment expenditure	
3.c.1 T umber of health workers per 1,000 population	

INDICATOR	RANK
SDG4	
4.1.1 Consolidation rate of primary /junior high school	
4.2.2 Gross enrollment ratio of preschool education	
4.3.1 Junior high school graduation rate/The scale ratio of common education and vocational education	
4.6.1 Net enrollment rate of primary school / junior high school and gross enrollment rate of high school	
4.5.1 Gender Parity Index of Indicator 4.1.1	
4.a.1 Proportion of schools with access to basic facilities and services	
4.c.1 Percentage of teachers who have received the organized teacher training pre-service or in-service required for teaching at the relevant level	
SDG5	
5.1.1 Whether or not legal frameworks are followed to promote, enforce and monitor equality and non□discrimination on the basis of sex	
5.5.1 Proportion of women in the county People's congress and members in the county committee of CPPCC	
n of women in managerial positions	
ion of maternal and child health care funds to government health expenditure	

INDICATOR	RANK
SDG6	
6.1.1 Ratio population using safe drinking water services	
6.2.1 Prop ion of population using safely managed sanitation serv	
6.3.1 Prop n of wastewater safely treated	
6.3.2 Prop n of water with good ambient water quality	
6.4.1 Chan n water-use efficiency over time	
6.4.2 Level water stress	
6.6.1Chan extent of water-related ecosystems over time	
SDG7	
7.1.1 Prop n of population with access to electricity	
7.1.2 Prop on of population with primary reliance on clean fuels and techno	
7.3.1 Ener intensity and rate of change measured in terms of prim energy and GDP	

Step 4 Hierarchical Assessment with three levels

Level I ---- Indicator Ranking

With geo-disaggregated population data, geographical coverage of essential services be well described

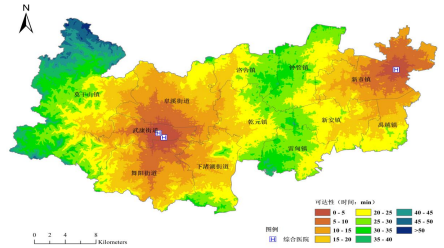
Population Census

（人口数量,镇为单位）

计算提取

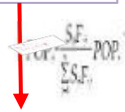
时间(分钟)	百分比(医院)	累计百分比(医院)
0 - 5	3.52	3.52
5 - 10	9.84	13.37
10 - 15	15.39	28.76
15 - 20	20.37	49.12
20 - 25	23.34	72.46
25 - 30	18.14	90.61
30 - 35	6.23	96.84
35 - 40	1.67	98.51
40 - 45	0.91	99.42
45 - 50	0.50	99.92
50 - 55	0.08	100

无法反映人口分布细节，计算结果不准确



分区密度法

建筑物分布

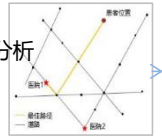


道路

医疗设施分布

可达性分析

选择最佳路径



4	4	4	11	11
4	4	4	11	11
4	4	8	11	11
4	8	8	8	8
8	8	8	8	8

t1	t1	t1	t3	t3
t1	t1	t1	t3	t3
t1	t1	t2	t3	t3
t1	t2	t2	t2	t2
t2	t2	t2	t2	t2

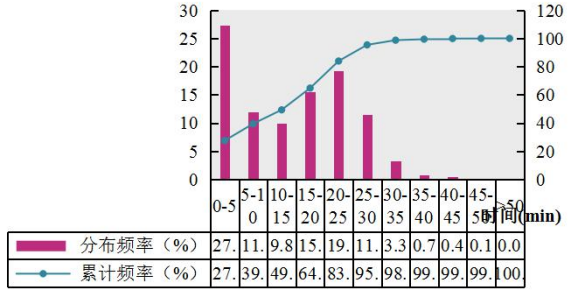
以5分钟为间隔，进行时间分级

t1: 0-5min　t2:5-10min　t3: 10-15min

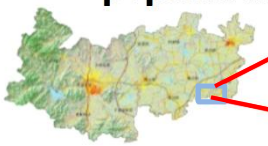
$Z(S_0) = \sum_{i=1}^{n} \tau_i Z(S_i)$

$S(t_0) = V(t_0)T$

计算任意点到最近医院的时间成本



Geospatially disaggregated population data



0	0	76	62	51
0	0	50	73	66
0	0	59	39	24
0	0	0	0	0
0	0	0	0	0

时间(分钟)	百分比(医院)	累计百分比(医院)
0 - 5	14.21	14.21
5 - 10	12.45	26.66
10 - 15	12.25	38.91
15 - 20	17.36	56.27
20 - 25	19.84	76.10
25 - 30	17.06	93.16
30 - 35	5.14	98.30
35 - 40	1.04	99.34
40 - 45	0.53	99.87
45 - 50	0.13	100

人口分布细节明显

结果更加准确

超过20min到达最近医院区域

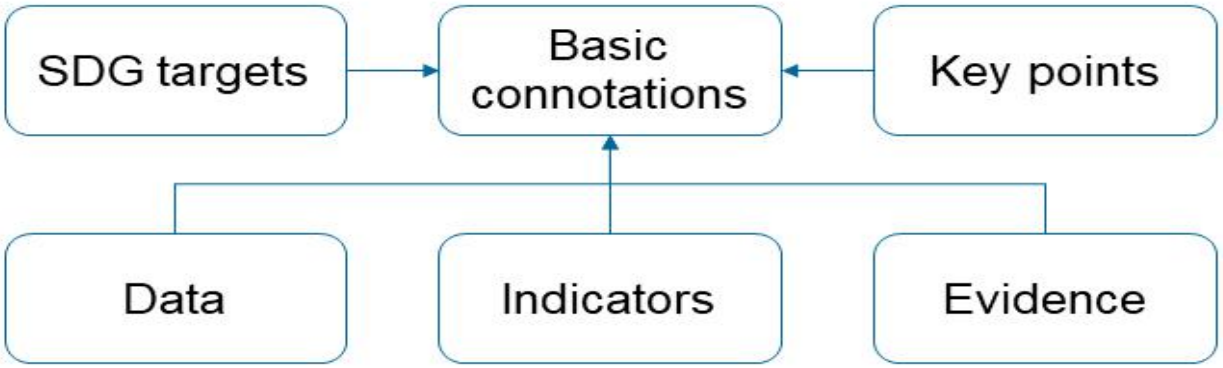
Step 4 Hierarchical Assessment with three levels

Level II---- individual SDG

Metrics Used for ranking

- I -- SDGs Dashboard
- II -- National plan
- III-- Multiple evaluation
- IV-- others

Grouping targets into sub-groups for focused analysis



Step 4 Hierarchical Assessment with three levels

Level II---- individual SDG **SDG 6**

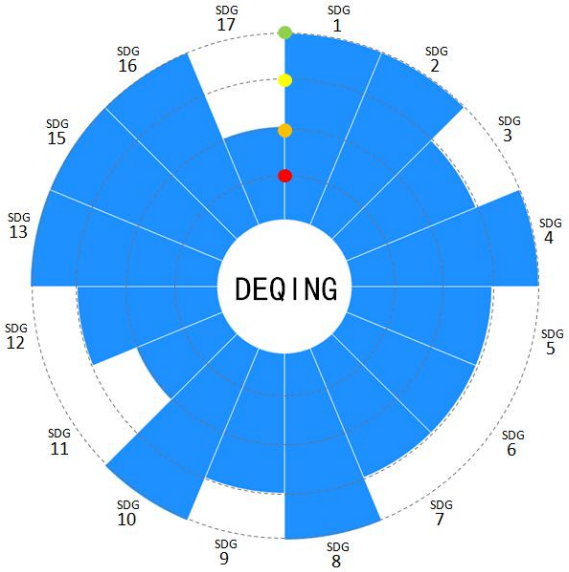
- Safe drinking water and sanitation ***6.1, 6.2***
- Water resource utilization ***6.3 6.4 6.5 6.a 6.b***
- Protection of water-related ecosystems ***6.6***

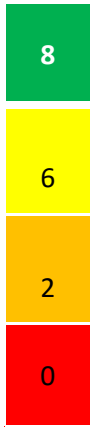
Content	Indicators	Quantitative result	Evaluation reference	
Clean Water	**6.1.1** Proportion of population using safely managed drinking water services	Urban：100% Rural：99.6%	Green≥98%	I
	6.2.1.a Penetration rate of sanitary toilets in rural areas **6.2.1.b** Service conven-of urban public toilets	98% --- From all parts of town, the nearest public toilet can be reached within 16 minutes	Green≥95%	I
Volume, quality and efficiency of water resources	**6.3.1** Proportion of wastewater safely treated	Urban domestic sewage: 91.06%	Municipal domestic sewage:92.4%	IV
		Rural domestic sewage: 80.68%;	Coverage rate of the treatment of domestic wastewater (upper- middle -income countries) :59%	III
		trade effluent: N/A;		
	6.3.2 Proportion of bodies of water with good ambient water quality	68.75%,100%**	76.9%	IV
	6.4.1 Change in water-use efficiency over time	The water consumption per 10,000 CNY of GDP in 2017 was 67.5m³, dropped 23.52% from 2015	By 2020, the efficiency of water use will be 23% lower than at of 2015	II
	6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	25.08%	Green≤25% Yellow:25%<x≤75%	I
Sustainability of water-related ecosystems	**6.6.1** Change in the extent of water-related ecosystems over time	6.47%; High sustainable	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.	III
	6.6.1.a Rate of change in the spatial extent of water-related ecosystems	11.14%		
	6.6.1.b Rate of change in the water quantity characteristic of water-relate ecosystems	8.26%		
	6.6.1.c Rate of change in the water quality of water-relate ecosystems	0%		
	6.6.1.d Health state of typical wetland ecosyst	Xiazhuhu wetland: well		

Metrics Used for ranking I -- SDGs Dashboard, II -- National plan. III-- Multiple evaluation, IV--- others

Step 4 Hierarchical Assessment with three levels

Level II---- individual SDG

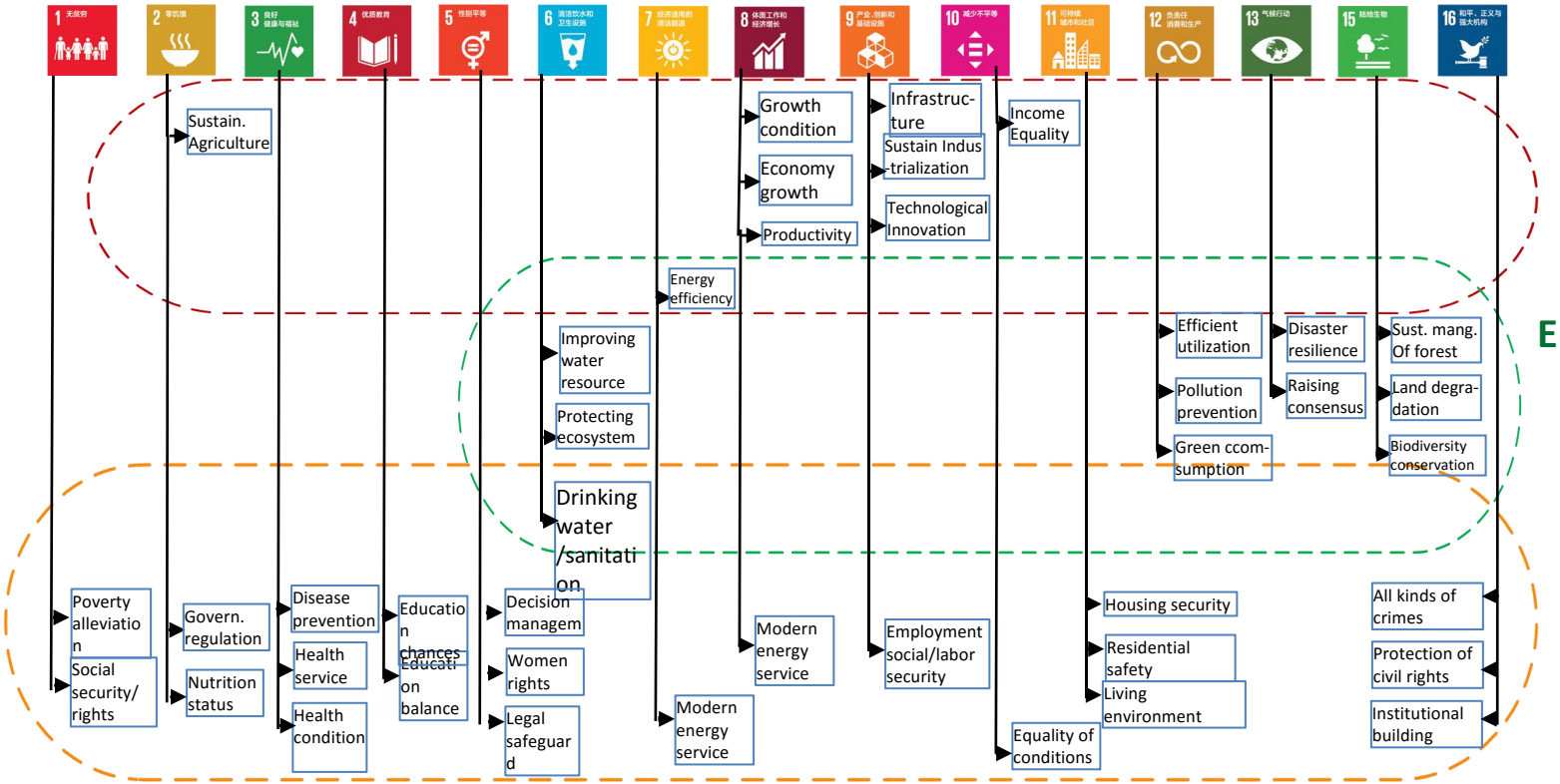




- SDGs basically fulfilled
- SDGs need to be improved
- SDGs are facing challenges
- SDG is far behind

Step 4 Hierarchical Assessment with three levels

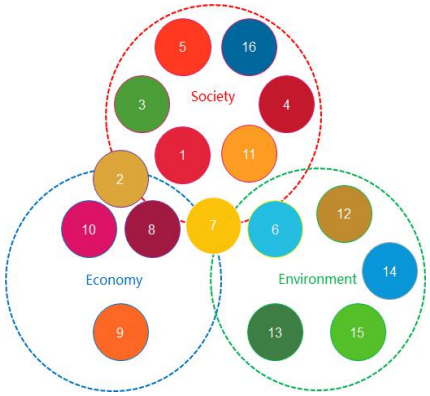
Level III -- SDGs Clusters Analysis



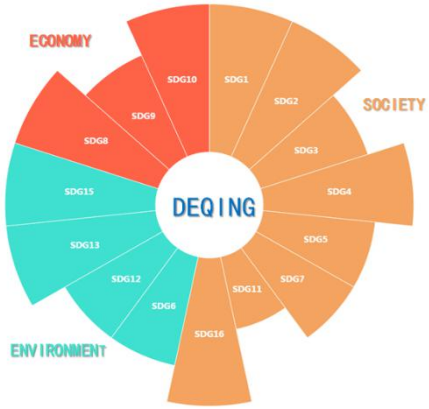
- 15 SDGs are grouped into three different SDG clusters: economy, environment & society according to the contribution or relevance of their indicators
- some single SDG has been allocated to 2 or 3 SDGs clusters

Step 4 Hierarchical Assessment with three levels

Level III -- SDGs Clusters Analysis



(SDG14 & SDG17 are excluded)



Statistical Analysis of SDGs Clusters

	μ	σ	C.V.
Economic cluster	3.867	0.352	0.091
Environmental cluster	3.810	0.402	0.106
Social cluster	3.872	0.397	0.102

Lower Coefficient of Variation means a better coordination

Progress Report of Deqing County towards SDGs

Chinese version- around 70 pages

中文版-约70页

English version- around 80 pages

英文版-约80页

Progress Report of Deqing County towards SDGs

Approach briefing

Assessment of each Single SDG

Directory

SDGs Cluster analysis

Answer three questions

1) How to measure progress towards 2030 SDGs ?

2) How far is Deqing from 2030 SDGs ?

3) What are next steps ?

How far is Deqing from SDGs?

Crested Ibis growing largely in past few years

- Refuse Collection/ Harmless treatment

100%

- Good Rate of AQI

97.5%

- Drink Water Quality

II

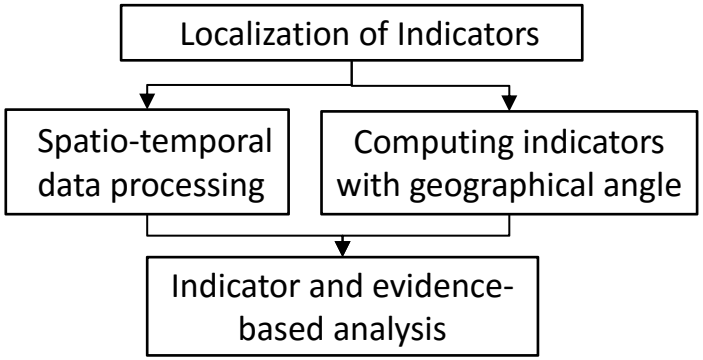
- Forest Cover Rate

46.1%

Several challenges or gaps were identified (such as shortage of public transportation) and clear messages were sent to local decision makers for devising actions or pathways

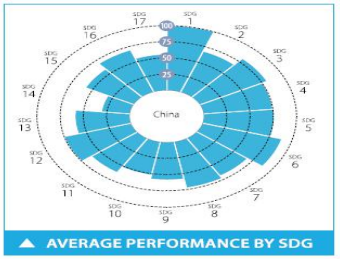
China (Deqing) SDGs Profile（中国德清样本）

(1) A data-driven and evidence-based approach



- **How to measure the progress towards 2030 SDGs（如何去量测）?**

(2) Local SDGs progress report



- **How far is Deqing from 2030 SDGs（德清离2030SDGs有多远)?**

Released at UN World GI Congress

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**

MENU nature

CORRESPONDENCE · 07 NOVEMBER 2018

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 measurement and evidence-based progress analysis. These data included topographic and land-cover maps, aerial and satellite images, disaggregated socio-economic information and environment statistics, as well as some from social media.

Reported by the world top scientific magazine

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all news / observations blog

China completes first comprehensive SDG assessment using Earth observations

GEO's three priority engagement areas overlap with China's Belt and Road Initiative objectives, facilitating effective collaboration on the UN 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction and the Paris Climate Agreement.

In support of the Paris Agreement, China has worked to account for climate change in medium and long term national economic and social development planning, and has used its first dedicated carbon monitoring mission, TanSat, to promote the use of meteorological and oceanic satellites for monitoring climate change. In support of the Sendai Framework, the country is distributing satellite data for disaster response through the China GEOSS Data Sharing Network (DSNET).

As a major global contribution to the 2030 Agenda Sustainable Development Goals (SDGs) process, China recently completed the world's first comprehensive measurement of progress towards the SDGS at the county level using geospatial and statistical data. The pilot was carried out in Deqing, a county in Zhejiang province of 923km2 that is home to 430,000 people.

Mr. Chen Jun, professor at the National Geomatics Centre of China and leading scientist on the project presented the results and significance at the GEO-XV Plenary in Kyoto, Japan (view presentation and video from 1:16).

"Countries still rely heavily on statistical data for SDG monitoring, rather than using remotely sensed data. We combined Earth observations with statistical data for comprehensive assessment of all indicators," he said, "The overall progress towards the SDGs of an entire region can be measured by combining geospatial and statistical information. [Earth observations] play a number of important roles in this process."

Shared with the Global Earth Observation community

Official Release at the first UN World Geospatial Congress, officiated by Mr. Liu Zhenmin, USG of UN for Economic and Social Affairs

Winner of the Geospatial World Excellence Awards 2019

Winner Notification: Geospatial World Excellence Awards 2019

Dear Chen Jun,

I am happy to inform you that the project id: **10873**, titled **China (Deqing) SDGs 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.

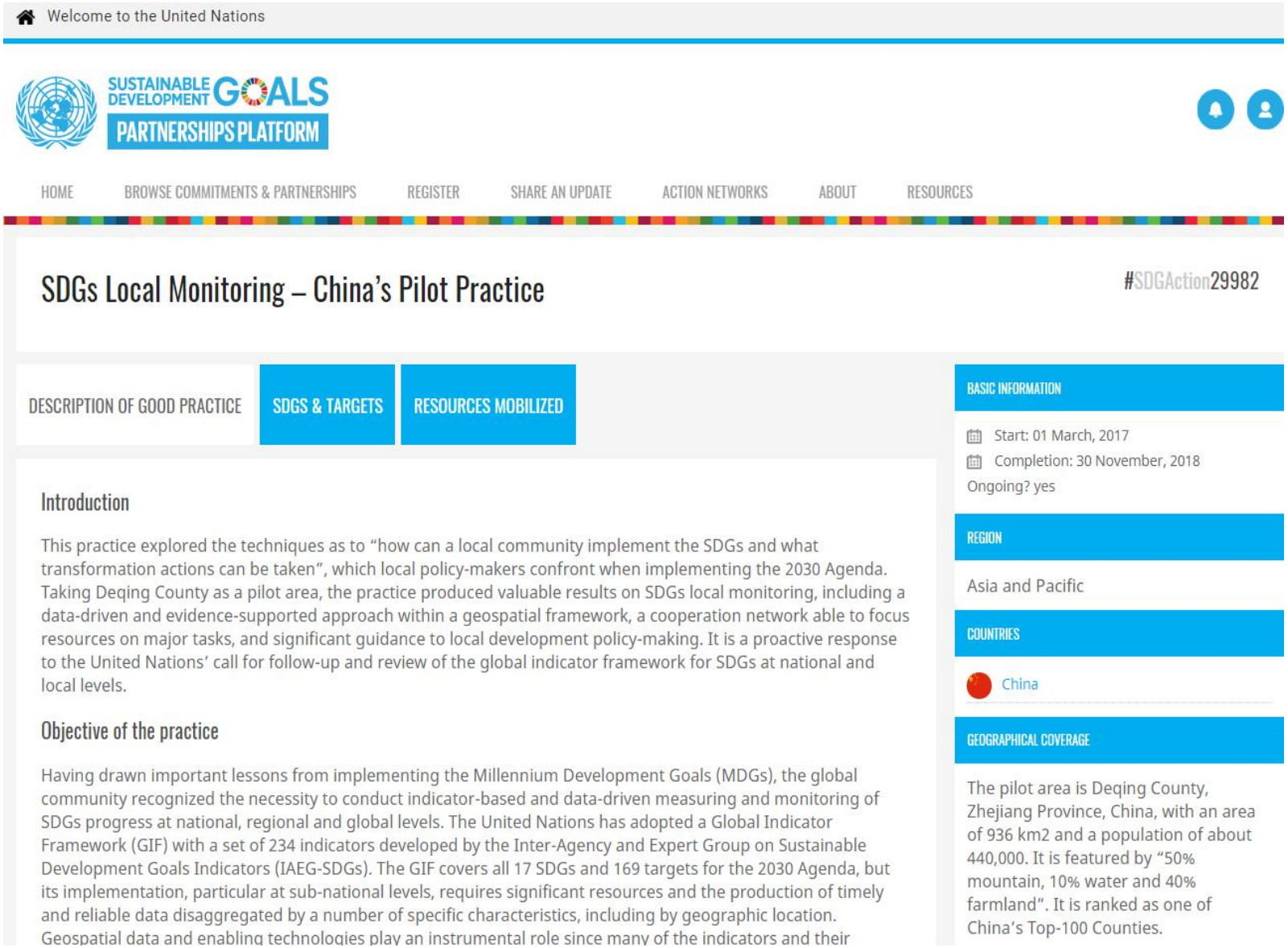
Dr. Wang Keran, Chief of Space Applications Section (SAS), IDD of UN ESCAP

"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."

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."

Recognized as One of UN SDGs Best Practices



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SDGs Local Monitoring – China's Pilot Practice

#SDGAction29982

DESCRIPTION OF GOOD PRACTICE | SDGS & TARGETS | RESOURCES MOBILIZED

Introduction

This practice explored the techniques as to "how can a local community implement the SDGs and what transformation actions can be taken", which local policy-makers confront when implementing the 2030 Agenda. Taking Deqing County as a pilot area, the practice produced valuable results on SDGs local monitoring, including a data-driven and evidence-supported approach within a geospatial framework, a cooperation network able to focus resources on major tasks, and significant guidance to local development policy-making. It is a proactive response to the United Nations' call for follow-up and review of the global indicator framework for SDGs at national and local levels.

Objective of the practice

Having drawn important lessons from implementing the Millennium Development Goals (MDGs), the global community recognized the necessity to conduct indicator-based and data-driven measuring and monitoring of SDGs progress at national, regional and global levels. The United Nations has adopted a Global Indicator Framework (GIF) with a set of 234 indicators developed by the Inter-Agency and Expert Group on Sustainable Development Goals Indicators (IAEG-SDGs). The GIF covers all 17 SDGs and 169 targets for the 2030 Agenda, but its implementation, particular at sub-national levels, requires significant resources and the production of timely and reliable data disaggregated by a number of specific characteristics, including by geographic location. Geospatial data and enabling technologies play an instrumental role since many of the indicators and their

BASIC INFORMATION

Start: 01 March, 2017
Completion: 30 November, 2018
Ongoing? yes

REGION

Asia and Pacific

COUNTRIES

China

GEOGRAPHICAL COVERAGE

The pilot area is Deqing County, Zhejiang Province, China, with an area of 936 km2 and a population of about 440,000. It is featured by "50% mountain, 10% water and 40% farmland". It is ranked as one of China's Top-100 Counties.

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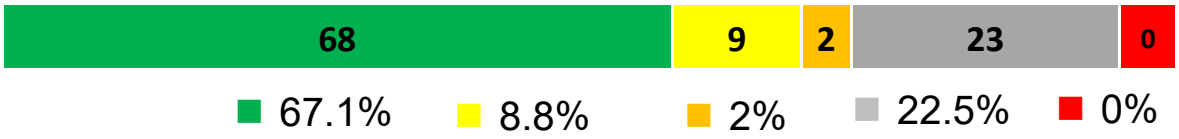
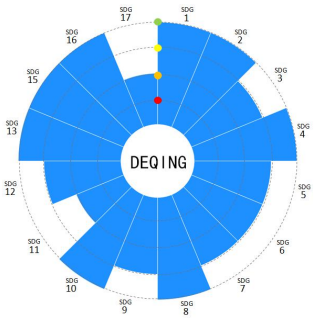
From Monitoring to Actions

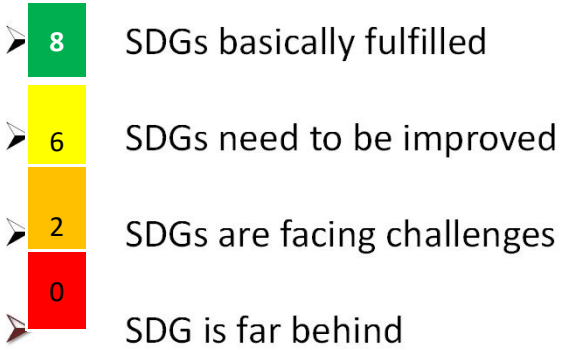
The Result of SDGs Monitoring in Deqing

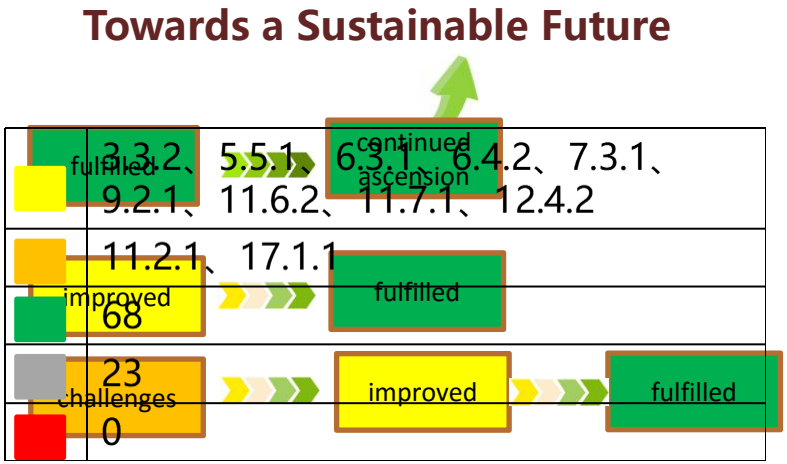
Indicator Ranking （指标评价）



Single SDG Assessment Ranking （单目标评价）

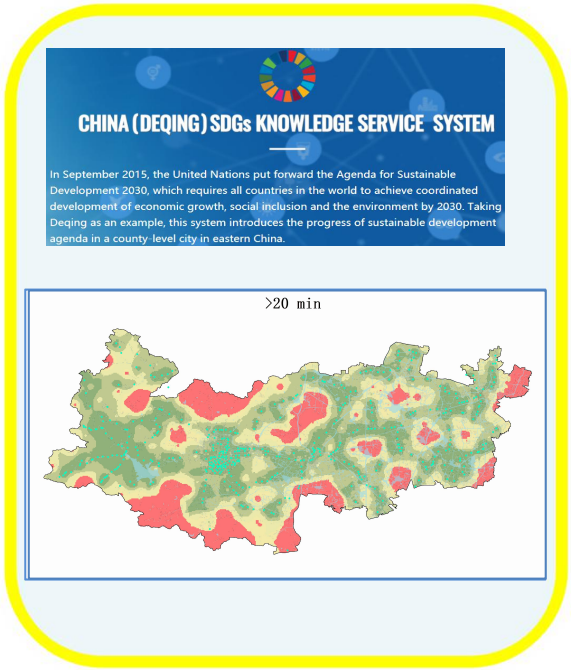




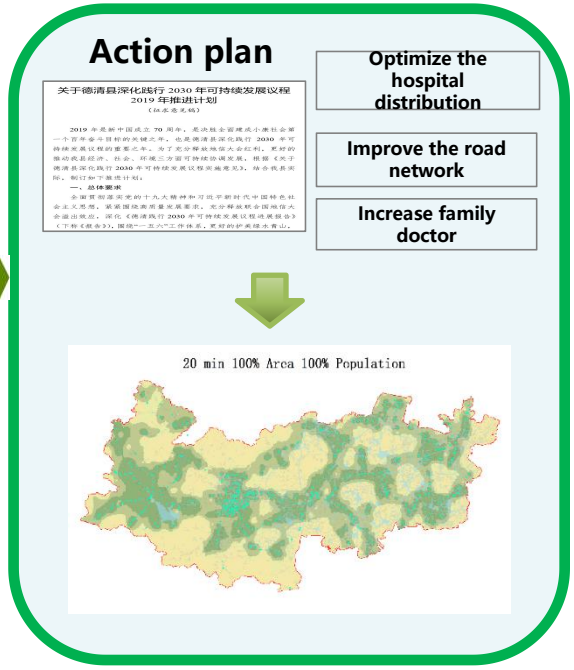


From Monitoring to Actions

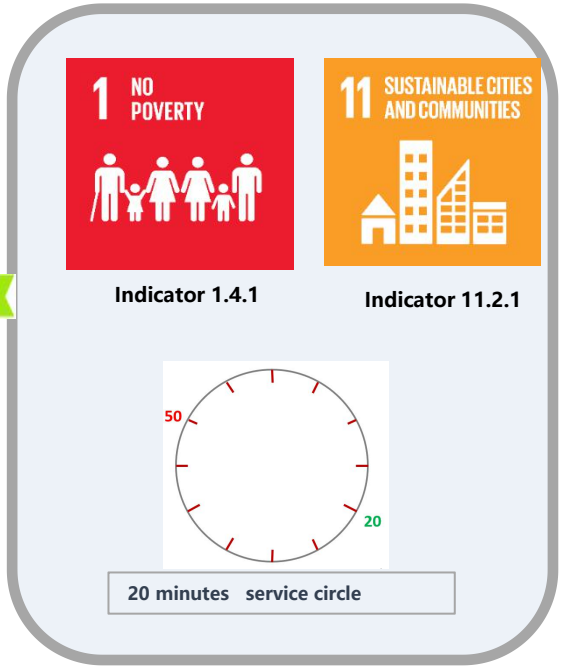
Local policy-makers used to formulate a transformation programme and Three-Year Action Plan (2019-2021) with the monitoring results



Current situation
(system knowledge)



Transformative knowledge

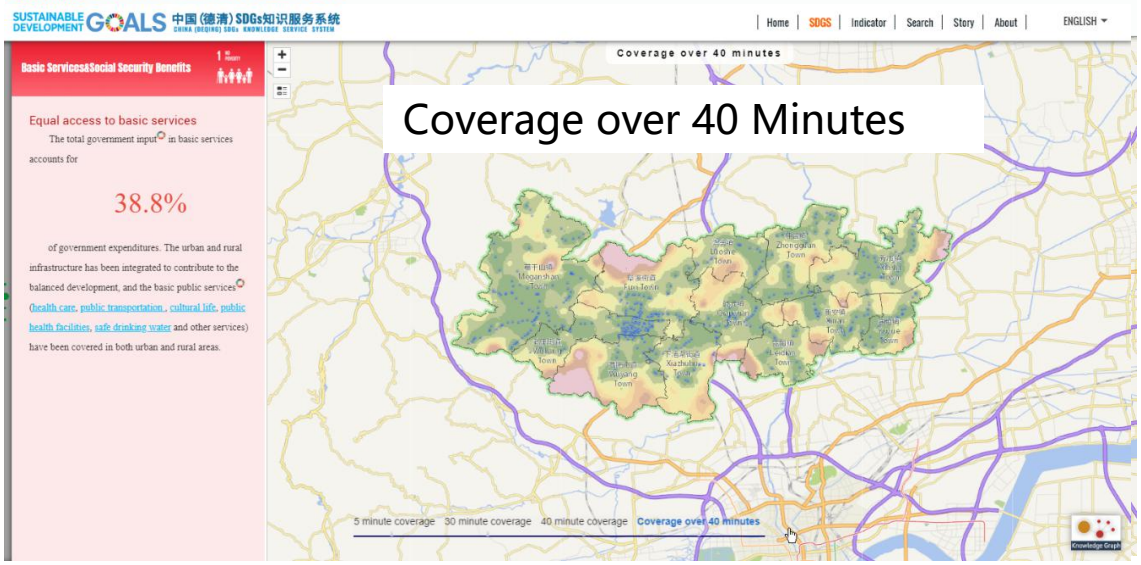


Goal knowledge

From Monitoring to Actions

Example 2

Goal 1: public Transportation



Qualitative Analysis

Public travel services need to be further improved.

3 years Develop. Goals

Increase proportion of the population that can easily use public transportation

- urban areas- 90%
- rural areas- 60%-80%

Action Plan

- Build new roads and improve the quality of rural roads
- Improve public transportation system
- …

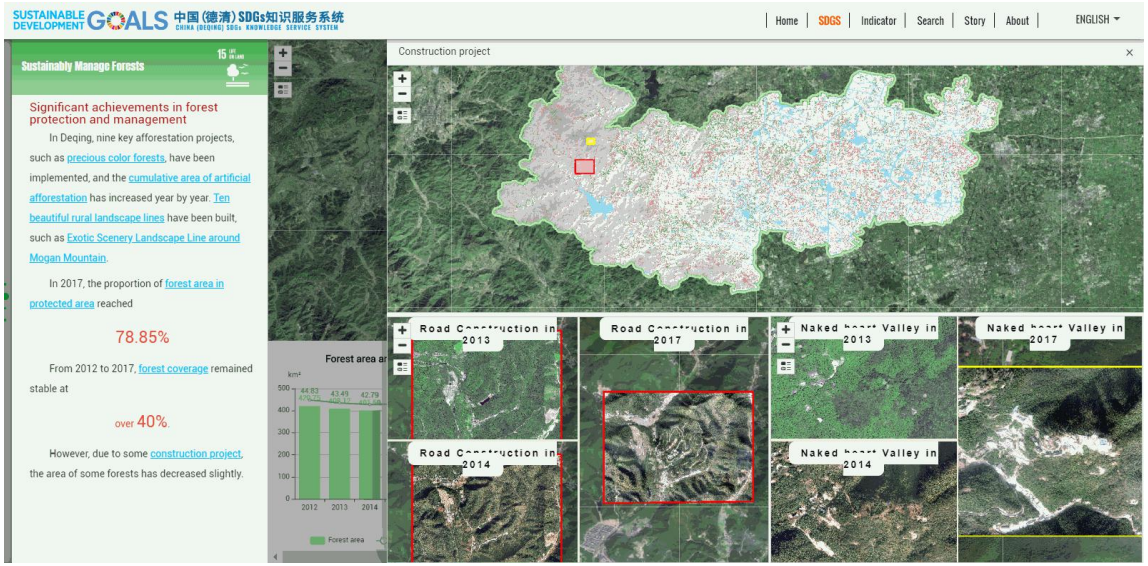
From Monitoring to Actions

Example 2
Goal 6: Water Utilization

Qualitative Analysis	3 Ys- Develop. Goals	Actions
▪ Water use efficiency not high and needs to be improved. ▪ There is a potential shortage of water.	build saving society, improve water use efficiency, and optimize the total amount and intensity of water resources consumption.	▪ implement more strict water resources management system ▪ Implement control on total water consumption and intensity ▪ Encourage water conservation for all.

From Monitoring to Actions

Example 3
Goal 15: Terrestrial Creatures



Qualitative Analysis

Forest protection and resto-ration in ecologically sensitive areas such as Moganshan Scenic Area needs to be strengthened

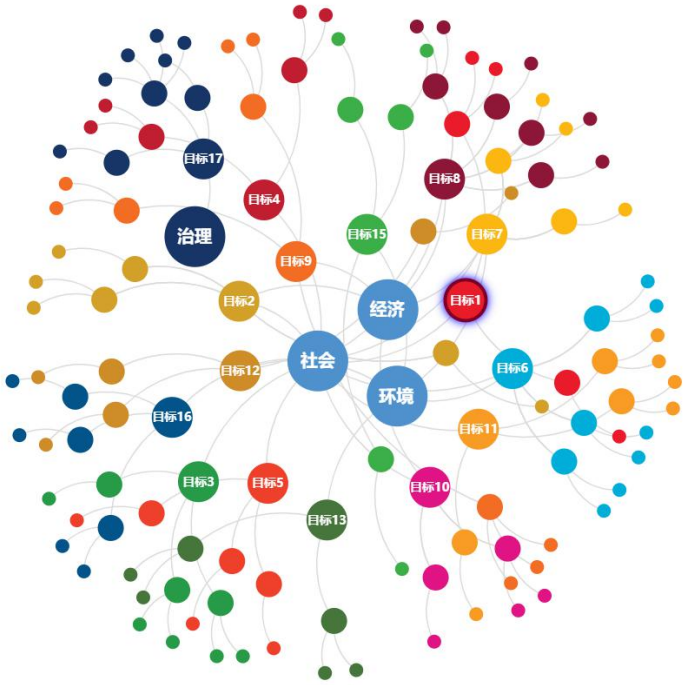
3 Ys Develop. Goals

Rehabilitate forests and strengthen the construction and protection of ecologically sensitive areas

Action Plan

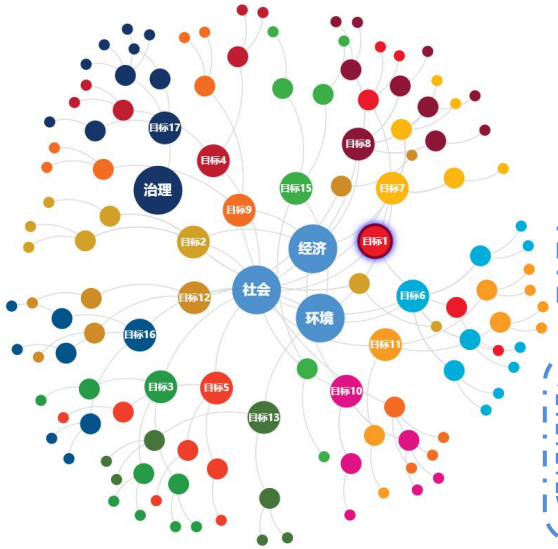
Strengthen the construction and protection of ecologically sensitive areas such as nature reserves, and standardize the orderly development of hotels

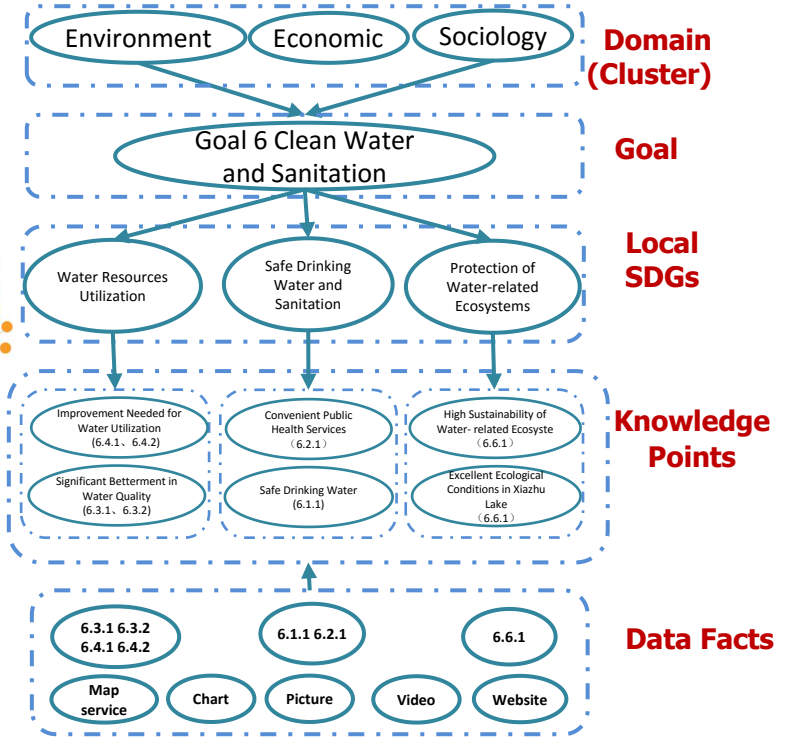
Developed a SDGs Knowledge Service System



Developed a SDGs Knowledge Service System

Provide SDGs knowledge to facilitate and utilize the results





a knowledge-graph with five level nodes

Developed a SDGs Knowledge Service System

a knowledge-graph with five level nodes

Demos

China (Deqing） SDGs Knowledge Service System

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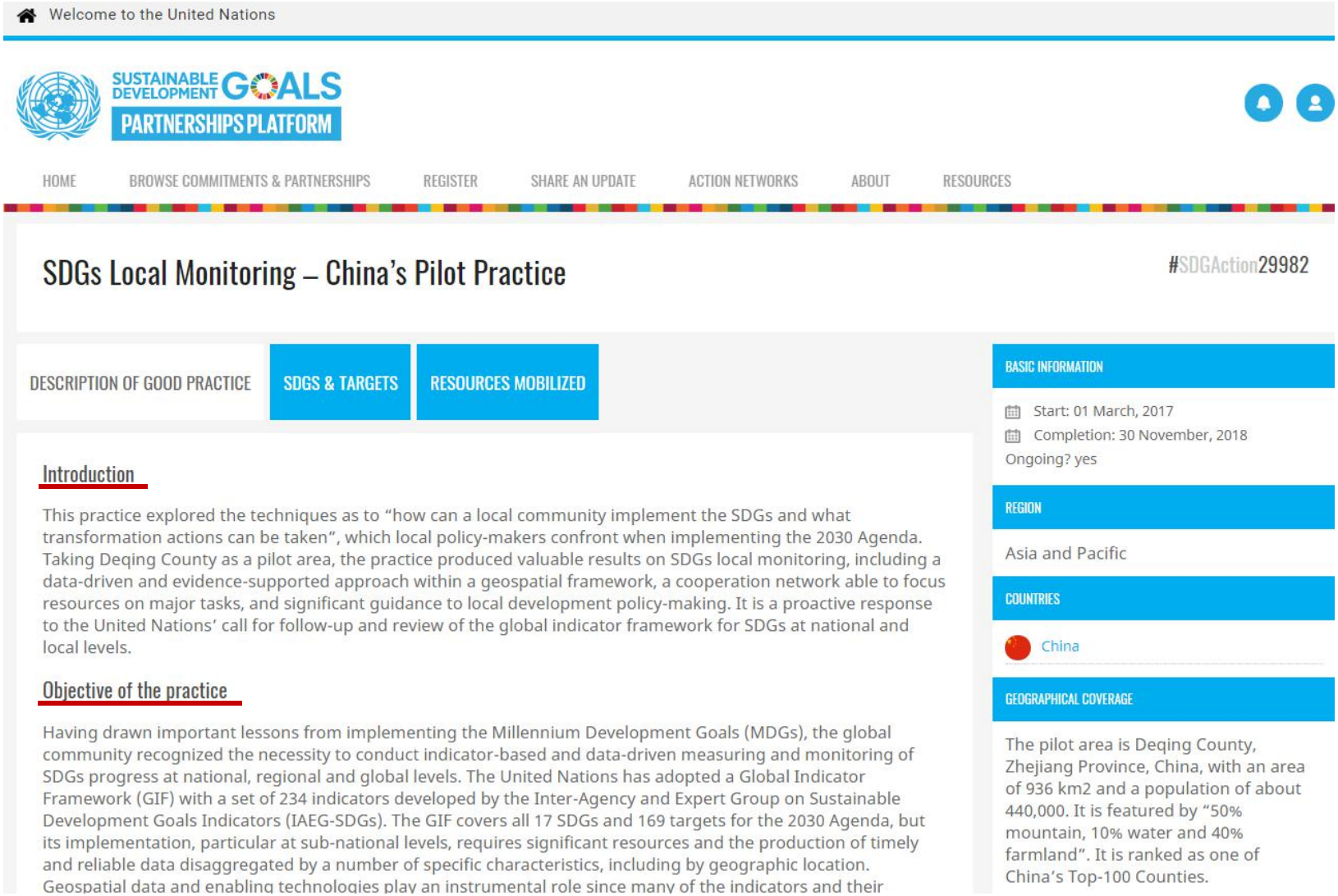
SDGs local Monitoring- China's Pilot Practice



https://sustainabledevelopment.un.org/partnerships/goodpractices

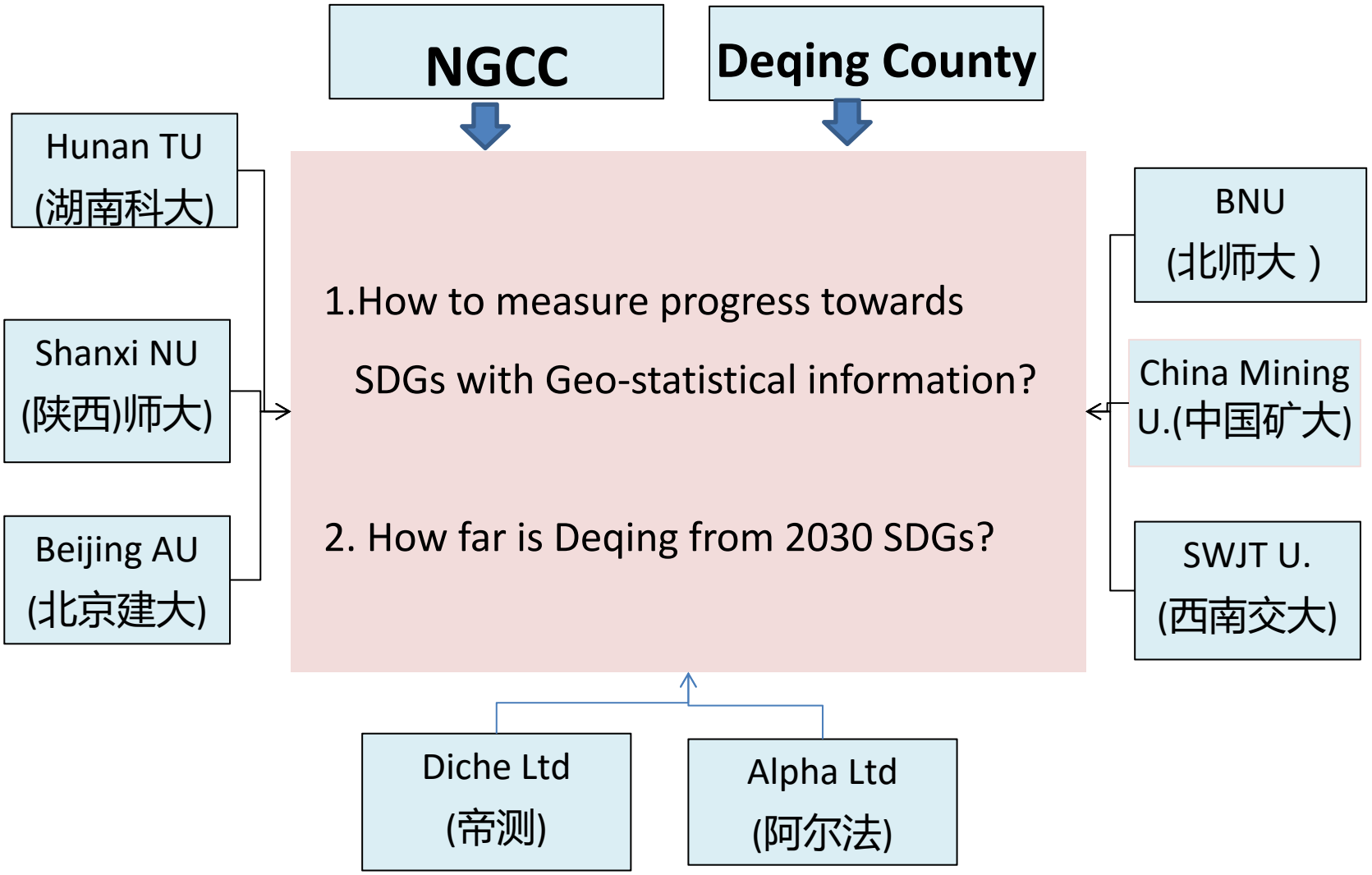
Key stakeholders and partnerships

This practice was initiated by the Ministry of Natural Resources of China and Zhejiang Provincial Government, and supported by the National Bureau of Statistics. The major beneficiary is the Deqing County Government with about 20 subordinate departments, who developed the user requirements, provided significant data, aided indicator selection, and devised transformation actions. NGCC is the principal implementer, who led a research team with approximately 20 researchers from six universities and three companies to establish the overall approach, solve the technical obstacles, and complete the project. A group of multi-disciplinary experts, national and international, provided constructive advice through over twenty meetings.

Implementation of the Project/Activity

Measuring and monitoring SDGs progress is indicator-based, data-driven and evidence-supported. Therefore, the pilot practice was carried out in the following six consecutive steps:
(1) Localized GIF according to the local context: The GIF was tailored according to the local circumstances with three criteria, i.e., adaptability, comprehensiveness and measurability. A set of 102 indicators was selected for Deqing County, which covers 16 SDGs (Goal 14 “Ocean” is not applicable to the inland County), assuring the comprehensiveness. Among them, 47 indicators were adopted directly from the GIF, 6 indicators resulted from extension of the GIF, 42 indicators were revised, and 7 indicators were substituted. Meta-data were developed for each of the 102 indicators, including their definition, calculation method, and data requirements.
(2) Acquired and processed multi-type data: 45 geospatial datasets, 385 statistical datasets, 66 thematic datasets, and 27 other datasets were collected and processed. The statistical data were mainly from authoritative information sources, such as the County Annual Statistical Bulletin and Water Resources Bulletin. Geospatial data were mainly provided by the County Geographic Information Centre. Also collected were the time series remote-sensing data in the recent 30 years. Population was disaggregated at 30m spatial resolution usingland cover/use data to facilitate integrated analysis of statistical and geographic data.
(3) Measured 102 indicators within a geographic framework: With the ready-to-use data, the selected 102 indicators were derived or measured in three different ways. 85 indicators were quantified by statistical data; 10 indicators were derived from geospatial data, such as 6.6.1, 15.1.1; and the remaining 7 indicators were measured by combined calculation of statistical and geospatial data, such as 11.3.1 and 3.8.1.
(4) Assessed all SDGs: Based on the quantified indicators and multi-type facts (data and local practices), the SDGs progress were analyzed at three hierarchical levels. First, each indicator was contrasted and ranked against the international (such as "SDGs Index and Dashboard") or national criteria/references. Second, each primary SDG was analyzed with related indicators and evidence. Third, a cluster analysis was proceeded to obtain an overall picture about the economic growth, social inclusion, and natural beauty.

Partnership with Local Government and Universities



Implementation and Coordination

- Good plan on important events
- More than20 key mtgs with local peoples
- More than 10 expert consultant or reviewing mtgs at the key points
- More than 50 discussion mtgs between the task team
- …..

Coordination

- Discuss with local people

Coordination

- Experts reviewed the indicator set

Coordination

- Discuss the results of assessment with local decision makers

Results/Outputs/Impacts

1. Major outputs: (1) A data-driven and evidence-supported approach: The approach includes four components: (a) localizing the GIF with three criteria (adaptability, comprehensiveness and measurability) to select appropriate indicators based on the local circumstances; (b) disaggregating statistical data (e.g., population) over geographic space and time, and performing other pre-processing techniques to generate ready-to-use data; (c) computing indicators within a geographic framework in three different ways, i.e., calculation with statistical data, derivation from geospatial data, and integration of statistical and geospatial data; (d) assessing SDGs at hierarchical levels, i.e., indicator ranking and analysis, individual SDG analysis based on quantified indicators and evidence, and cluster SDGs analysis for economic growth, social inclusion, and natural beauty. (2) A progress report towards the 2030 SDGs (80 pages, in both English and Chinese languages): The report presents the major findings and results of the project, and provides answers about "how far Deqing is from achieving the SDGs". The major conclusion is that the County has made significant economic and social advances while maintaining a good ecological environment in the past 5 years. For the 79 SDGs indicators that have comparable reference criteria, 68 have reached or are very close to the 2030 Agenda, or ranked top in China and even the world, 9 indicators need to be improved, and 2 indicators are facing challenges. For the 16 SDGs analyzed, 8 SDGs have reached the standard, 6 SDGs remain to be improved, and the other 2 SDGs are facing challenges. (3) A SDGs information portal: The major results of this project were published on this internet-based portal, which allows online access of the information and knowledge about Deqing's 102 indicators, 16 SDGs, and development stories. 2. Impacts: (1) Set up a good exemplar: This project is one of the first comprehensive measurements in a local context over an entire administrative progress towards achieving the SDGs in both China and the world. Mr. Liu Zhenmin, Under-Secretary General for Economic and Social Affairs of the United Nations appreciated it as "a good practice for implementing and measuring SDGs at local level", and "a pioneering project whose experiences is helpful and available for people both from within and outside China". Mr. Jack Dangermond, ESRI president, commented that "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". (2) Provided a practical and replicable approach: This project shows how the overall progress towards the SDGs at a sub-national level can be well measured in alignment with the GIF through integration of statistical and geospatial data. It provides a practical approach to other parts in China and the world. The Chinese Society for Sustainable Development is planning to promote its application in some cities in China. The UNSD (UN-GGIM Secretariat) and UN-ESCAP are designing related training workshops for developing countries this year.

Enabling factors and constraints

1. Enabling conditions: The pilot County has a long tradition in practicing the concepts of sustainable development. It fully recognized that lucid waters and lush mountains are invaluable assets, and paid significant attention to the harmonized development of economic growth, social inclusion and natural beauty. The County is moving towards "an open and inclusive city of entrepreneurship and innovation", "a land of harmonious livelihood with deep-rooted traditional culture", and "a large ecological garden with water and mountains in sight". This laid a sound basis for the design and implementation of this pilot practice. On the other hand, the County has been proactive to develop its geospatial infrastructure and related industries. It has established multi-scale and multi-type geospatial databases and developed a variety of value-added geospatial applications. A geographic information town that has now gathered about 230 geospatial companies was built up several years ago. Last November, the first United Nations World Geospatial Information Congress (UNWGIC) was successfully held in Deqing, attracting more than 1,000 participants from 80 countries. This made Deqing a good pilot place for geospatial-enabled SDGs measurement and monitoring. Moreover, this pilot project has received strong support from the Ministry of Natural Resources, the National Bureau of Statistics, and Zhejiang Provincial Government, who provided necessary policy guidance and technical advice, as well as expert resources. The Ministry of Foreign Affairs, Ministry of Science and Technology, National Development and Reform Commission, and Chinese Academy of Sciences contributed to the project with constructive suggestions. The UNSD (UN-GGIM Secretariat) guided the implementation of the project. 2. Specific constraints and innovations: The geo-statistical data-driven and evidence-supported SDGs measurement and assessment is a complex process that faced a number of technical and coordination challenges. Innovative ideas and techniques were implemented to tackle and overcome them, such as:
(1) Three criteria were proposed to localize the GIF based on the local circumstances: (a) adaptability, the indicators shall have practical significance and adapt to the local development priorities; (b) comprehensiveness, cover major SDGs and targets; and (c) measurability, have available and reliable data. The tailoring/localizing process was conducted in the following four ways: direct adoption from the GIF, revision, extension and substitution. (2) Four different methods were utilized to measure and analyze SDGs with geospatial information: (a) geospatial disaggregation of statistical data; (b) derivation of indicators with geospatial parameters (such as spatial density, accessibility, coverage and relations); (c) provision of spatial-temporal evidences; and (d) location-based visualization. (3) Hierarchical analysis at three levels was made to derive an overall picture about a given region's SDGs progress and status. Firstly, each indicator was contrasted and ranked against the international or national recognized criteria or references. Secondly, each SDG was assessed by grouping its targets into 2-3 meaningful subsets, which were analyzed with quantified indicators and facts. Thirdly, a cluster analysis was

Sustainability and replicability

1. Sustainability: (1) Transforming information into action plan: The information and results acquired from this project were used by the local decision-makers to formulate an action plan for the next five years. They are currently developing concrete implementation strategies and allocating resources accordingly, to address the gaps and challenges towards achieving the SDGs, such as reducing industrial emissions, lessening energy consumption and material consumption, improving public transport convenience, etc. (2) Planning to establish a regular monitoring mechanism: Having identified the role of measurable indicators as a management tool, the County resolved to carry out regular monitoring and reporting of SDGs implementation performance. There are a number of items to be explored, including the design of key variables for regular monitoring, use of social media and other big data, problem diagnosis, and policy simulation. 2. Replicability: (1) Showcase at the UN Open SDG Data Hub: The 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". It is underway to transfer Deqing SDGs information portal into the UN Open SDG Data Hub to serve as "an example to assist countries to develop their own sustainable service-based, interoperable and standards driven system-of-systems approach to measure, monitor and report, in an integrated and consistent manner, on the SDG indicators". (2) Replicate the practice in more cities in China: The Administrative Centre for China's Agenda 21 and Chinese Society for Sustainable Development are researching and selecting candidate cities in China to perform similar practices in the near future. The Ministry of Natural Resources and National Bureau of Statistics are planning to use the results for nation-wide SDGs monitoring. (3) Capacity building for developing countries: The UNSD (UN-GGIM Secretariat) and UN-ESCAP have resolved to organize training workshops/seminars for developing countries, and develop relevant technical guidelines.

Conclusions

This pilot practice has successfully performed SDGs local monitoring through establishing a cooperative partnership among all stakeholders to mobilize resources, developing a set of data-driven and evidence-supported approach, and transforming monitoring results into action plans. It has demonstrated that SDGs progress can be well monitored in a local context, and strengthened the local implementation of the 2030 Agenda. The SDGs monitoring in this pilot County was realized with the application of a data-driven and evidence-supported approach developed in the practice that takes a geographic perspective into consideration. The monitoring results presented an overall picture of the local development status, informed the local community of its gaps and challenges for implementing the SDGs, and raised local awareness of the importance of SDGs monitoring for implementing the 2030 Agenda. The local government is therefore able to develop concrete implementation

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 established**. UNSD (UN-GGIM Secretariat) has decided 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”.

SDGs Local Monitoring

- China's Pilot Practice

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