From Local SDGs Profile to Decision Making：China’s Case Study

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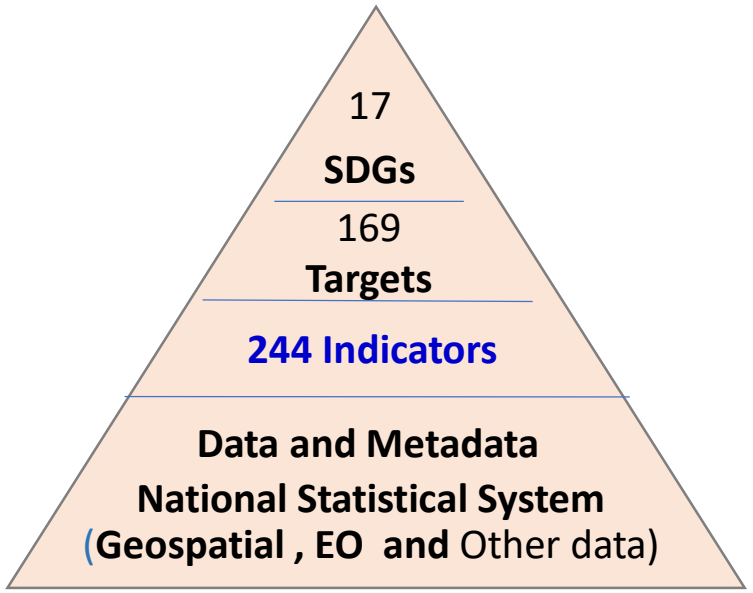
Contents

Measuring and monitoring progress towards UN 2030 SDGs

Becoming a crucial task for national/ local governments



- **UN called upon indicator-based monitoring**
  - with globally agreed indicator framework
  - by integrating geo-statistical data

Challenges

appropriate indicators for a given sub-national

integrate geospatial and statistical data

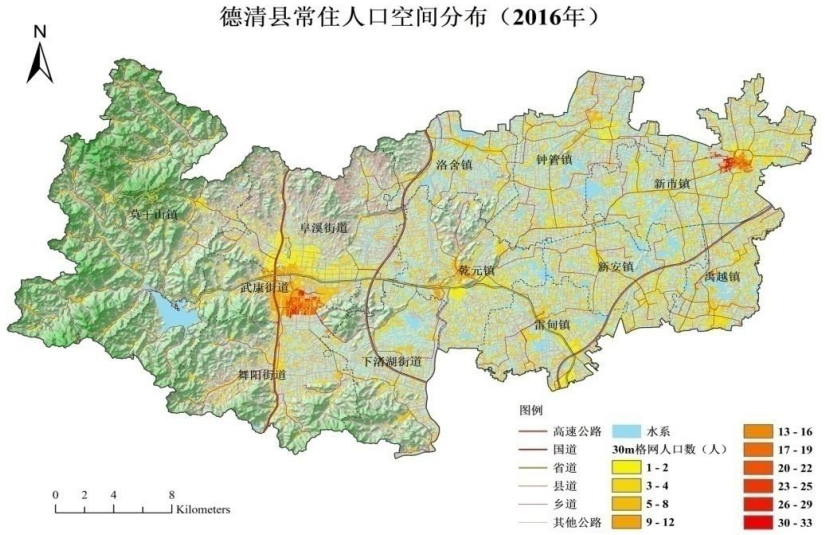
perform overall progress assessment

Transfer to knowledge

China’ s Pilot Practice- Deqing Case

Deqing county, Zhenjiang Province, selected as a pilot study area, when it became the 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



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

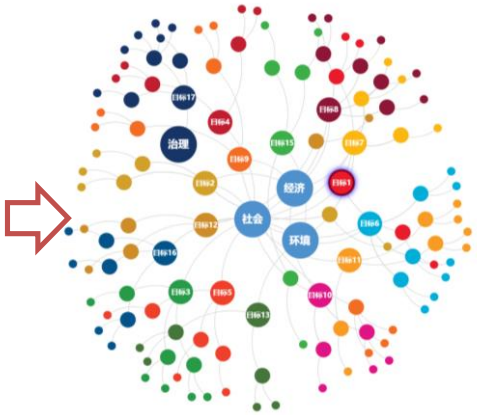
Two tasks completed in last two years

- **Task 1 (2018):** Monitoring progress towards SDGs with geo-statistical data
- **Task 2 (2019)** : Develop a SDGs knowledge Service Portal

From Local SDGs Profile to SDGs Knowledge Service

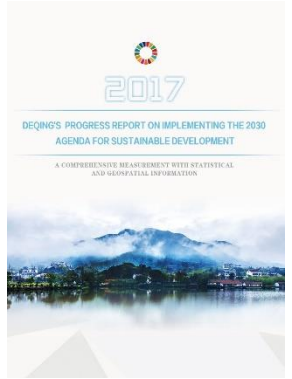
SDGs Knowledge Service

Constructive Modeling | **Knowledge Extraction** | **Knowledge Connection** | **Knowledge Representation** | **Knowledge Service**



Regional SDGs Assessment and Monitoring

Localization of Indicators | **Spatio-temporal data processing** | **Computing indicators with geographical angle** | **Indicator and evidence-based analysis**

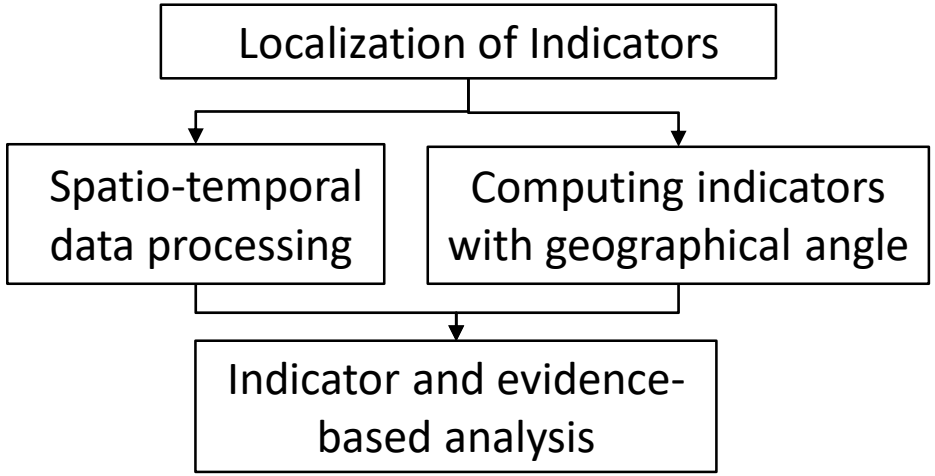


Methodology

Progress

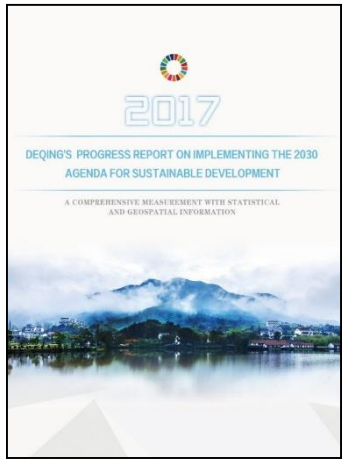
Task 1: Two Major Outputs

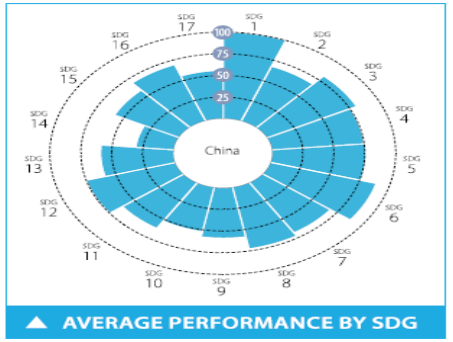
(1) A data-driven and evidence-based approach



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

(2) Deqing's SDGs progress report

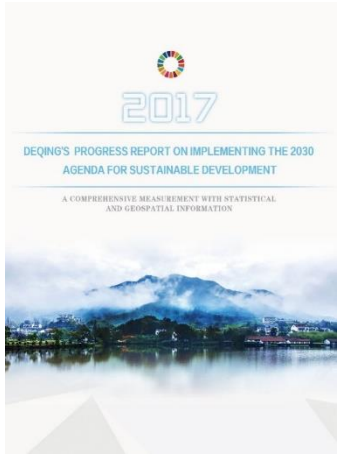


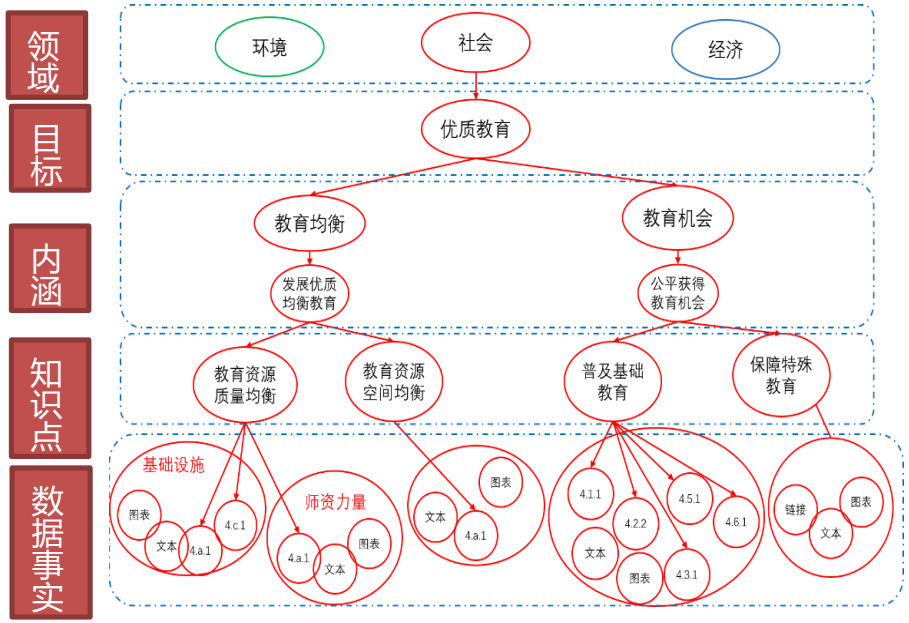


- **How far is Deqing from 2030 SDGs (德清离2030SDGs有多远)?**

Task 2: A Knowledge Service System and its Application

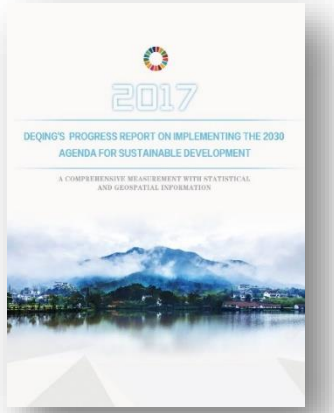
(1) Develop a SDGs Knowledge Service System to facilitate the utilization



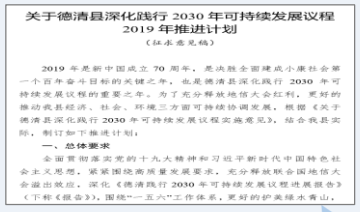


Task 2: Used for Formulating Three-years Action Plan

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



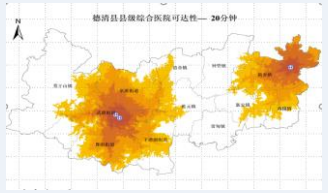
Action plan


关于德清县深化践行2030年可持续发展议程
2019年推进计划

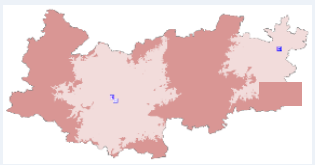
- Optimize the hospital distribution
- Improve the road network
- Increase family doctor

Target 3

System knowledge (Current stage)

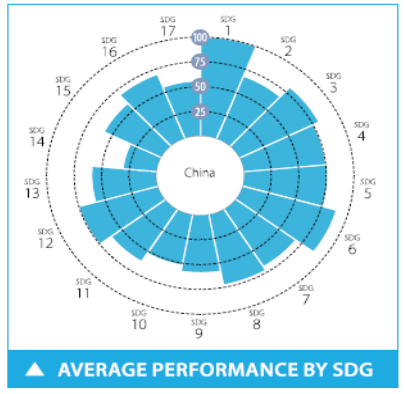


Residents can reach the general hospital within 50 minutes



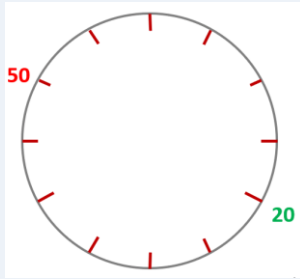
Area of residents need more than 20 minutes to reach the hospital

Transformation knowledge



How far is Deqing from SDGs?

Goal knowledge

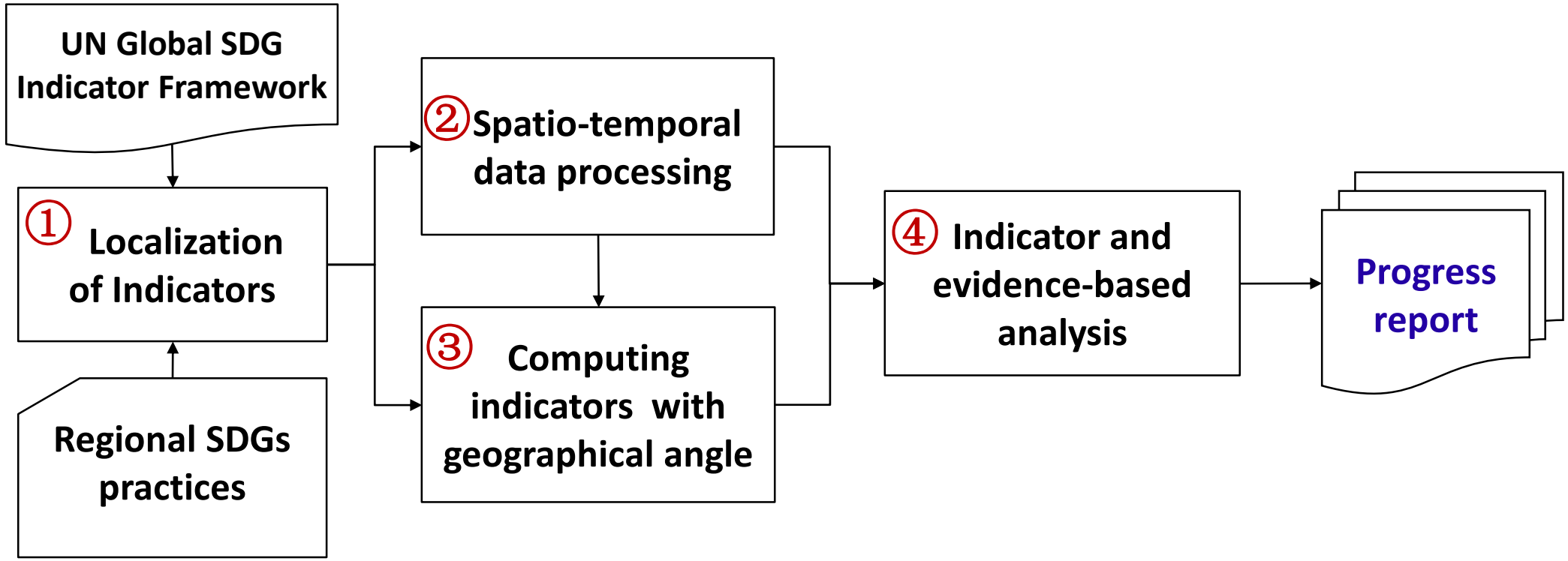


20 minutes medical service circle

Contents

2.1 A data-driven and evidence-based approach

This approach has four elements



102 SDGs Indictors Selected for Deqing

■ A set of 102 indicators was selected for Deqing County

Criteria for Localization

- adaptability
- comprehensiveness
- measurability

A	Adopted	47
E	Extended	6
R	Revised	42
S	Substituted	7

definition → **calculation method** → **data requirements**

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	

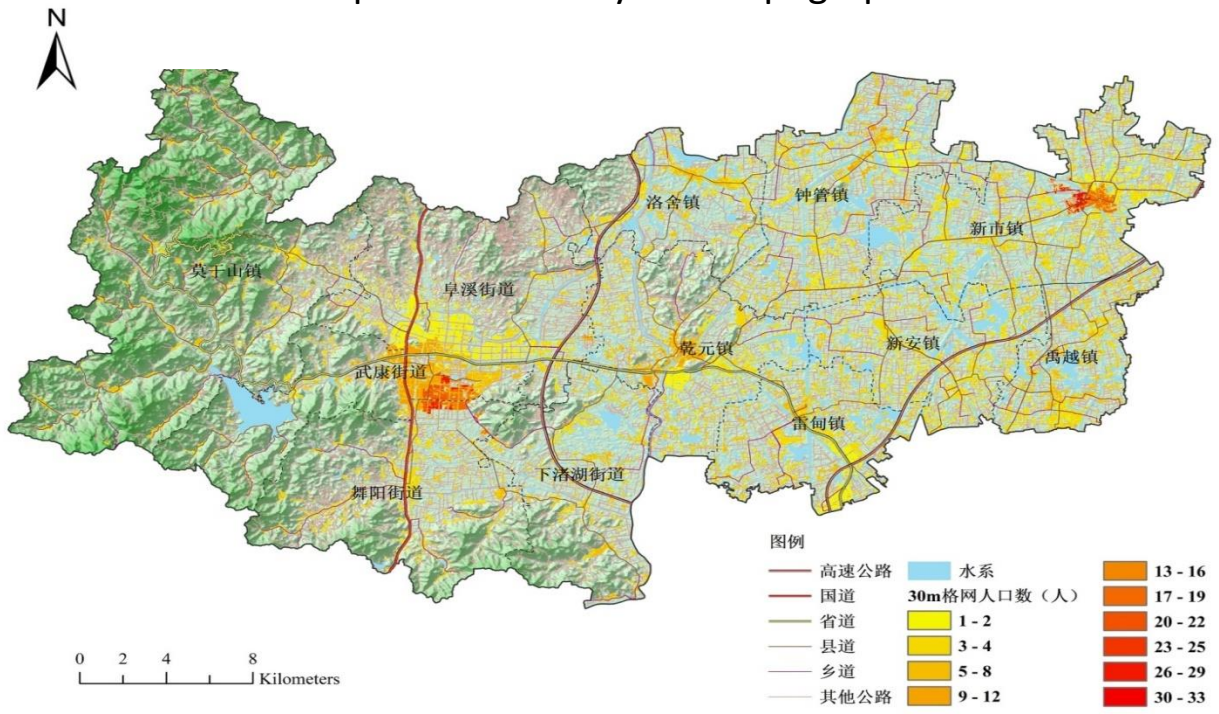
All the 16 SDGs are covered that is essential for a comprehensive measurement

Spatio-temporal Data Handling

45 geospatial datasets, 385 statistical datasets, 66 thematic datasets, and 27 other datasets were collected and processed.

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

Population were disaggregated at 30m spatial resolution using land cover/use data to facilitate integrated analysis of statistical and geographic data.

Data-driven Indicator Measurement

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**

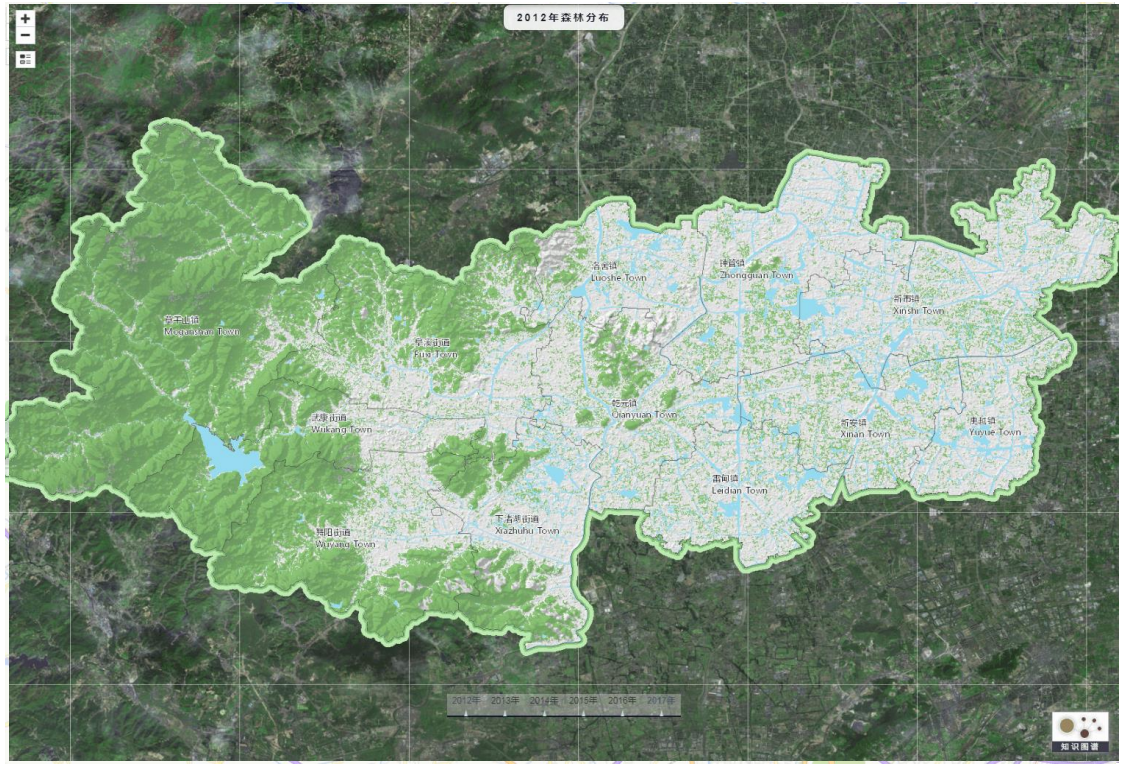
- using spatial density calculation, coverage classification and others

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

- based on quantitative measurement of spatial accessibility, coverage, spatial relations

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 that has convenient access to public transport, by sex, age and 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
15.2.1	Proportion of land that is degraded over total land area
15.4.1	protected area coverage of import. sites for mountain biodiversity



Hierarchical Assessment

A hierarchical assessment with three levels

- **Indicator Level:** **79/102** were Contracted and ranked

  - with SDGs Index and Dashboard, National Plan mandate requirements etc.

- **Single SDG level**: **16** were assessed

  - through grouped focused analysis with quantified indicators and evidences

- **SDGs cluster Level:** **3** , economy, society and environment

  - coherency analysis with degree of coordination, coefficient of variation

2.2 Deqing's SDGs Progress Report-2017

Approach briefing

Assessment of each Single SDG

SDGs Cluster analysis

Directory

Chinese version- around 70 pages

English version- around 80 pages

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

Indicator and Single SDG Assessment - SDG 6 as an Example

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.a 6.b*
- Protection of water-related ecosystems *6.6*

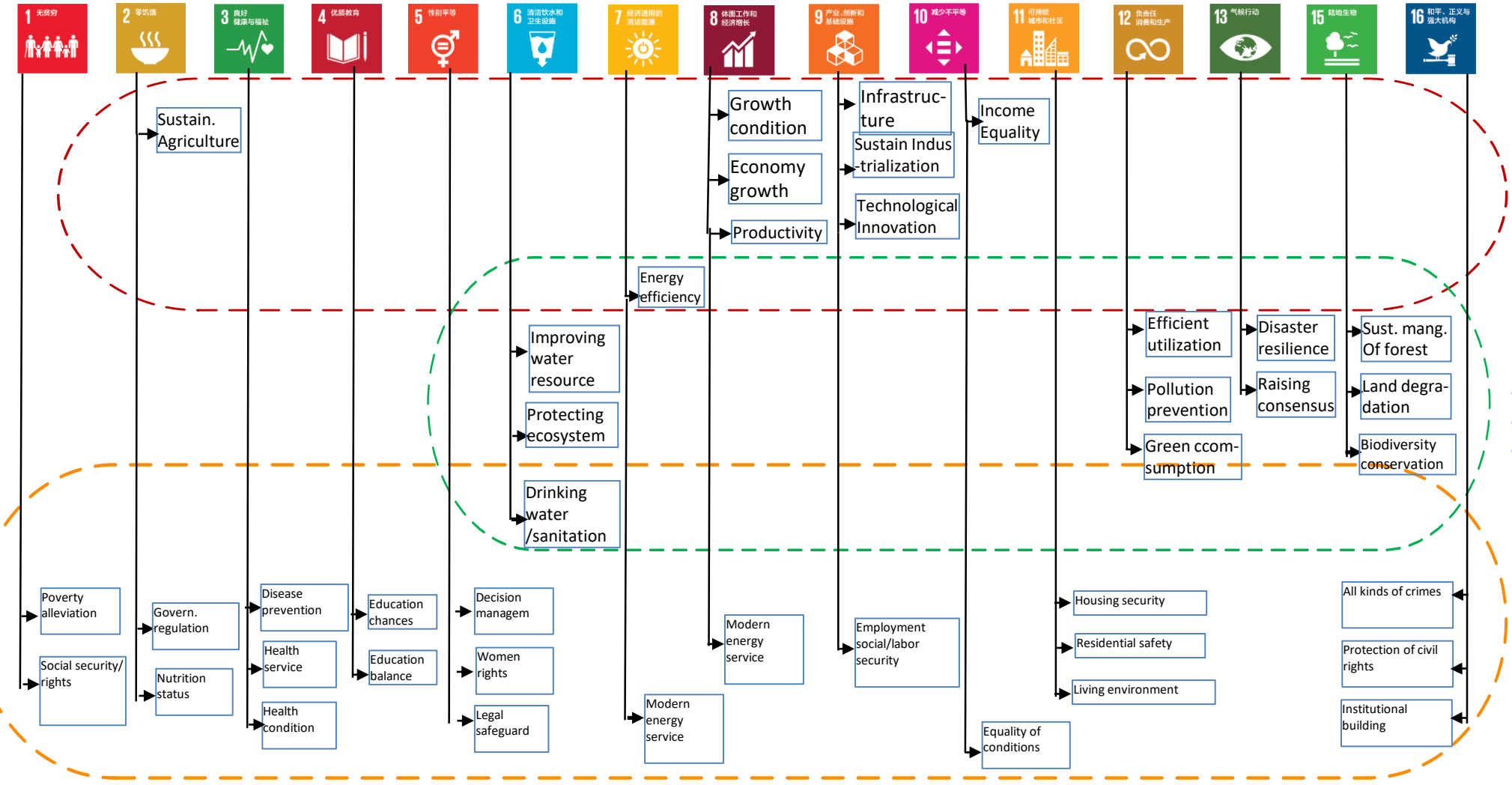
Content	Indicators	Quantitative result	Evaluation reference	
Clean Water	**6.1.1** Proportion of population using safely managed drinking water services	Urban：100% Rural：99.6%	Green≥98%	Ⅰ
	6.2.1.a Penetration rate of sanitary toilets in rural areas **6.2.1.b** Service convenience of urban public toilets	98% From all parts of town, the nearest public toilet can be reached with in 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 the typical wetland ecosystems	Xiazhuhu wetland: well		

Metrics Used for Comparing/ ranking

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

1st Quarter
2nd Quarter
3rd Quarter
4th Quarter
No ranking

SDGs Clusters Analysis



Economy growth (5)

- Growth condition
- Growth trend
- Growth development

Natural Beauty (5)

- resources utilizing
- environment protection
- response to global change

Social harmony (12)

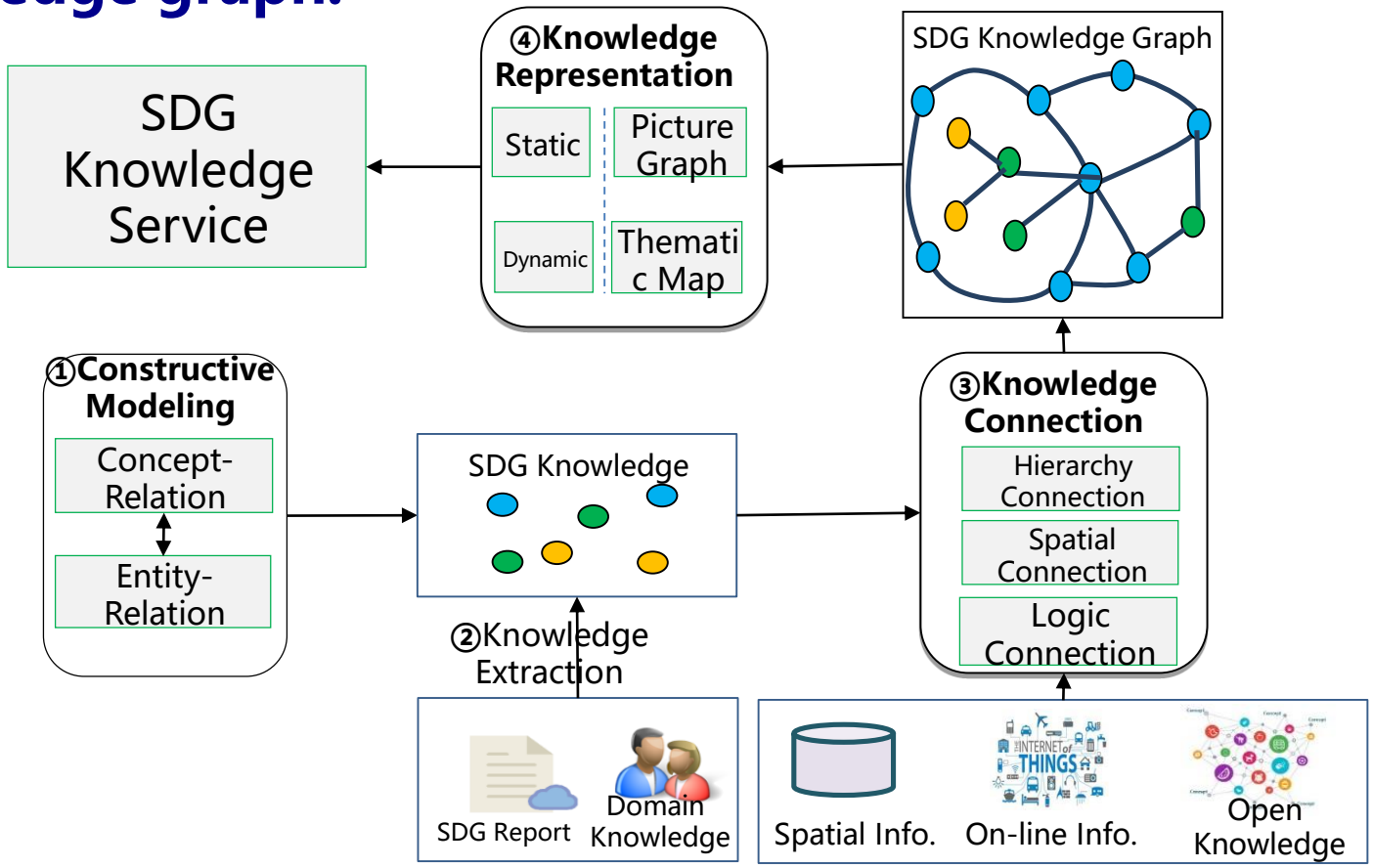
- survival needs
- security needs
- development needs

Lower Coefficient of Variation means a better coordination

Contents

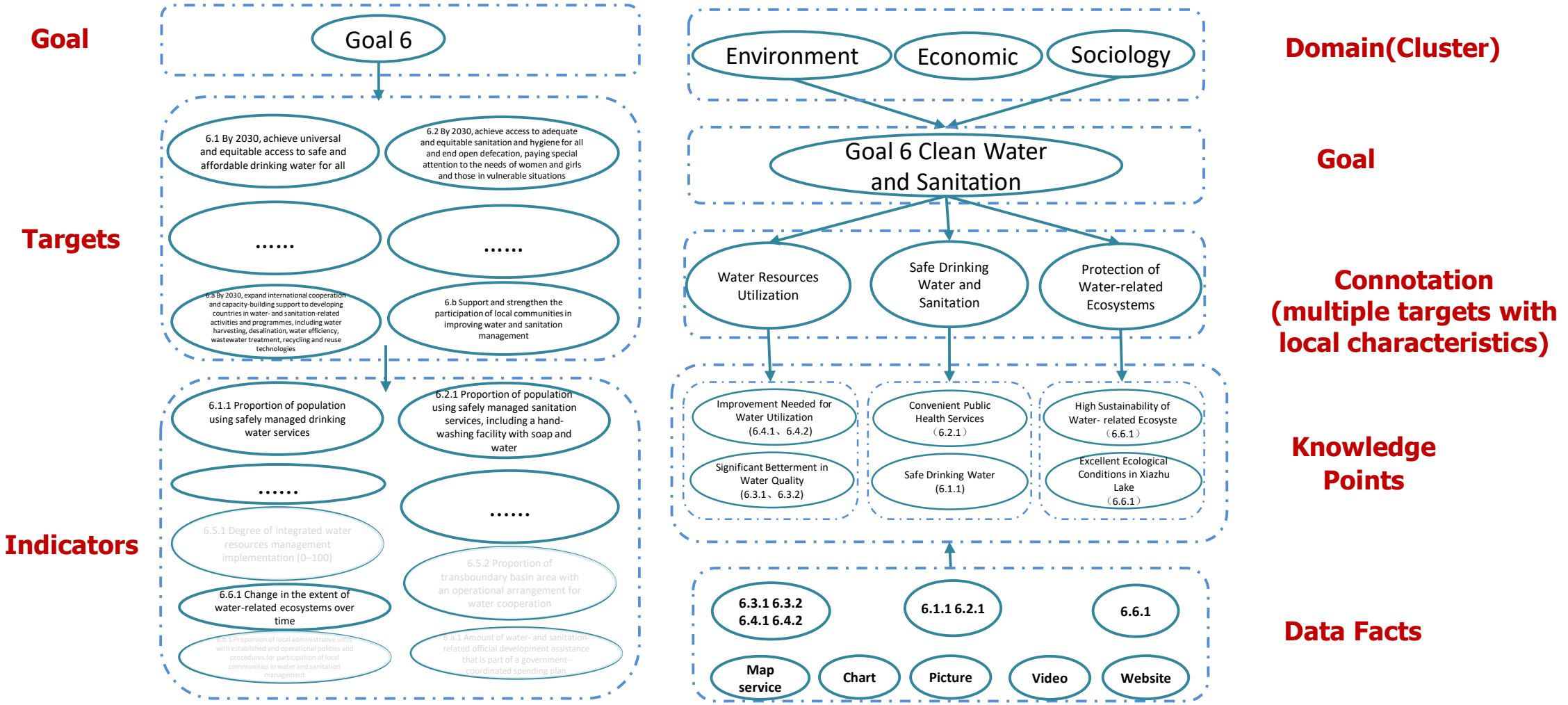
3.1 SDG Knowledge Modeling and Service

Based on the characters of SDG, the constructive model has been built , then extract knowledge from the report with the process of knowledge connection to form the knowledge graph.



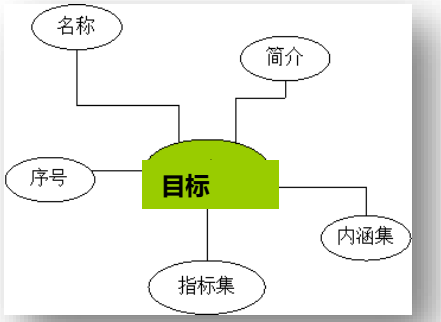
Constructive Modeling

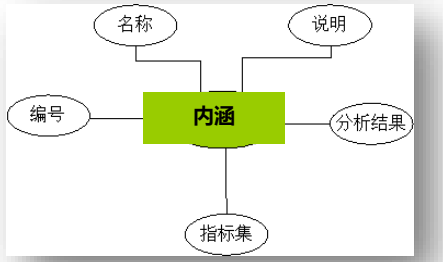
Expand a five Hierarchical model from the concept of UN GIF

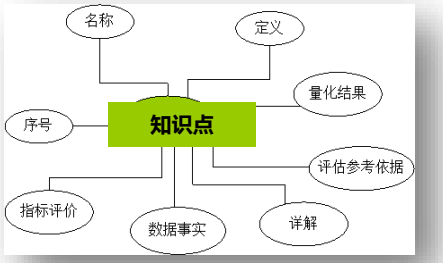


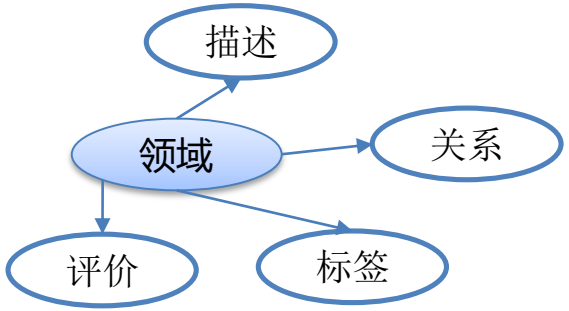
Constructive Modeling

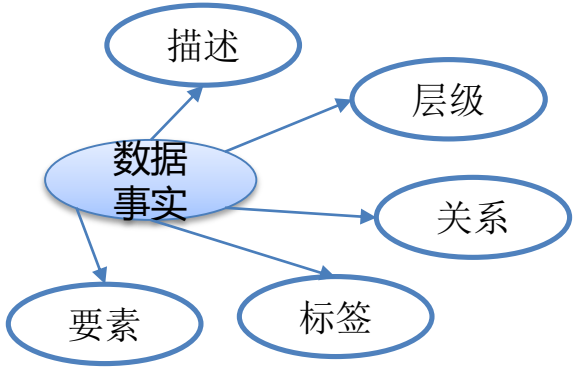
Define the entity-relation for each level to describe each level





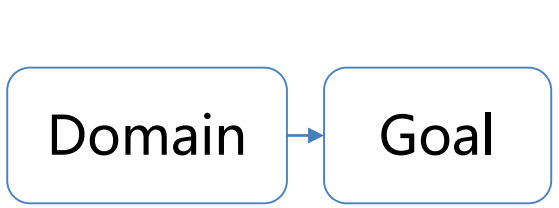


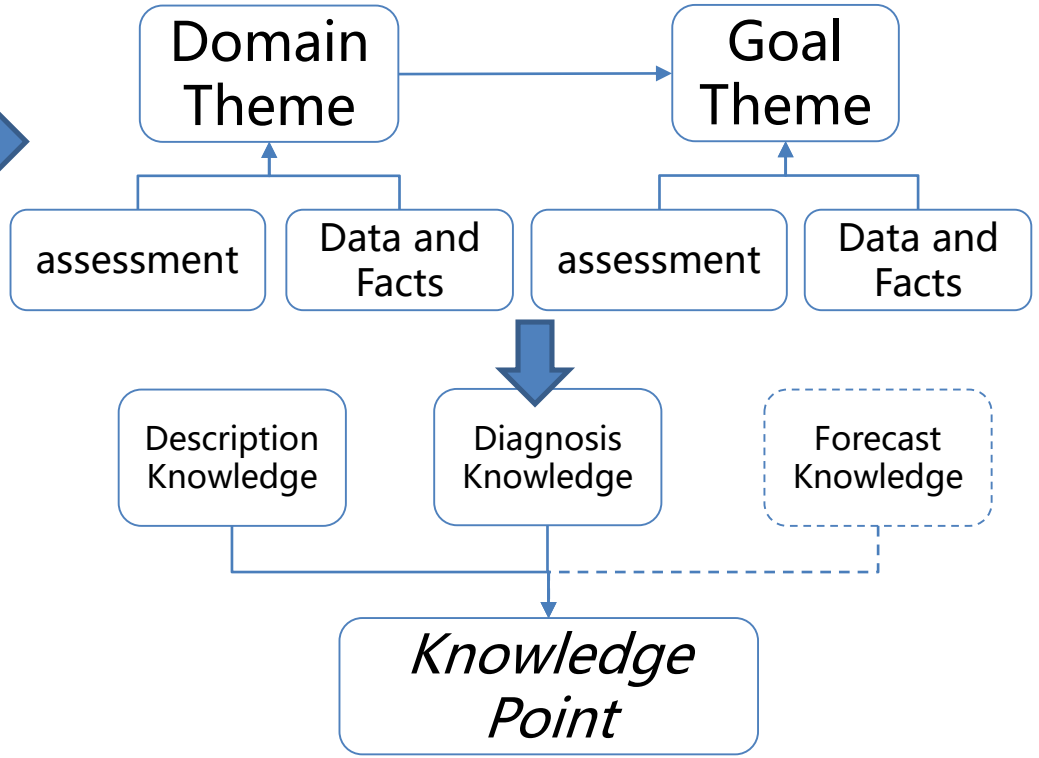




Knowledge Extraction

According to the domains and goals, integrate the quantitive assessment with facts to form the knowledge point





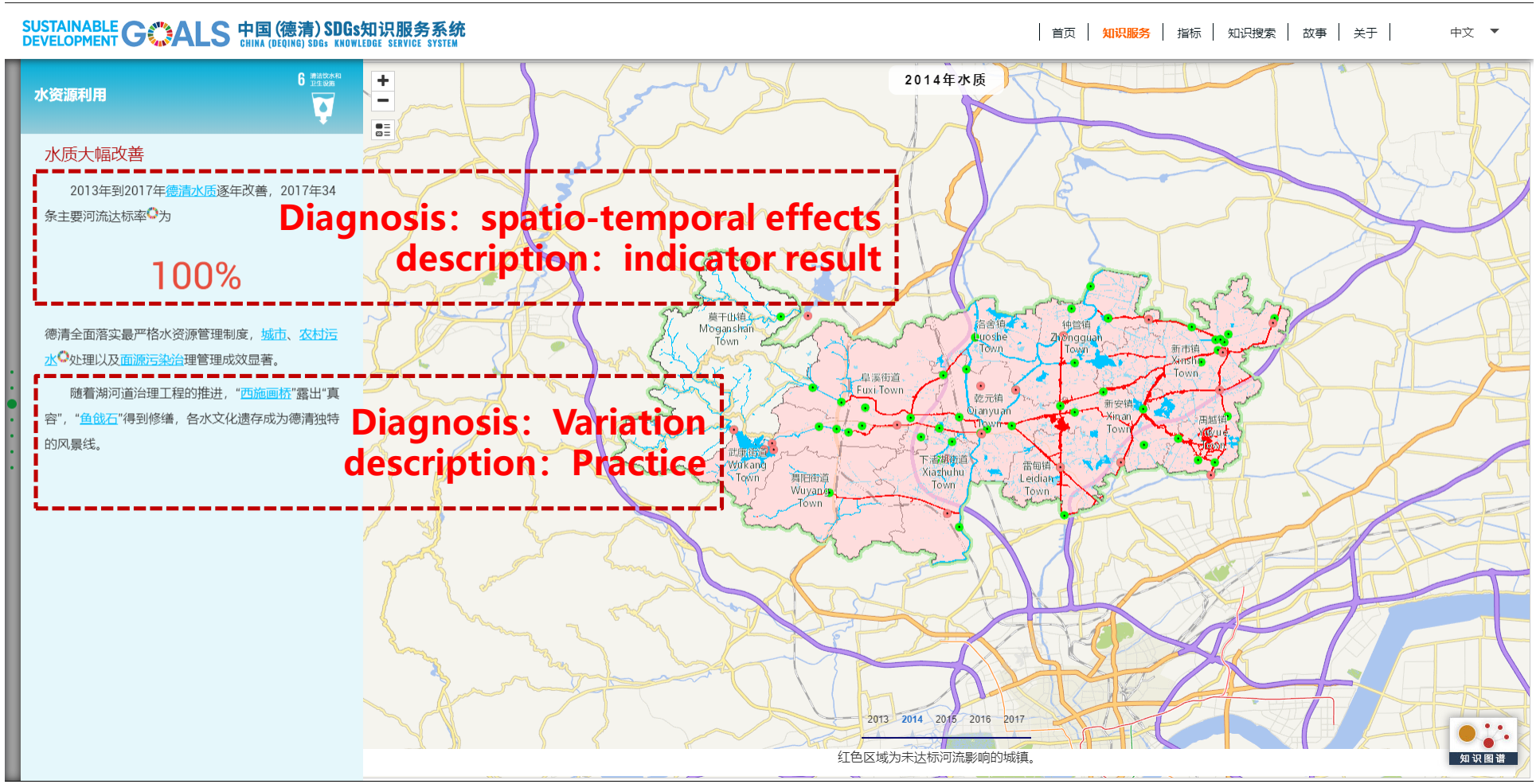
- 以领域、目标、内涵、指标为核心，抽取SDG核心知识内容
- 将核心知识内容与数据事实分别梳理成描述型、诊断型知识，经过组合，形成知识点

Over 130 knowledge points have been extracted from the progress report ,covered all domains and goals.

Knowledge Extraction

Description：assessment、practices，actions……

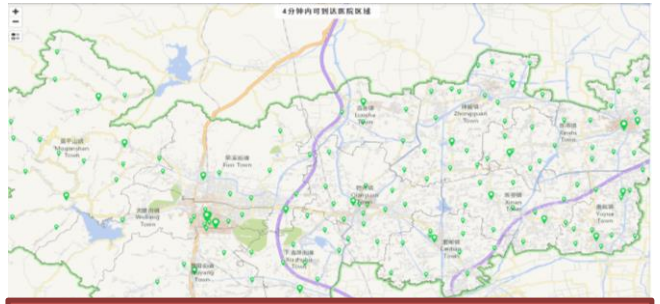
Diagnosis：indicator judgment 、variation，spatio-temporal effects……



Knowledge Connection

Using spatial connection to process the knowledge with spatial info.

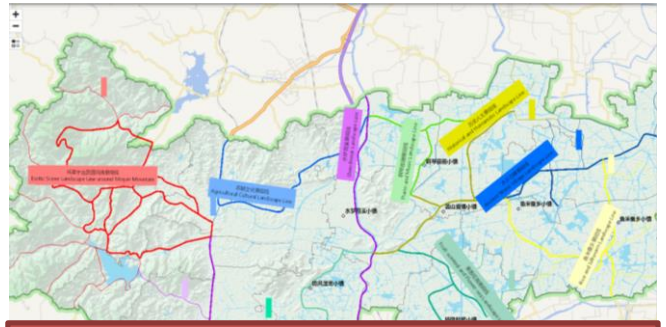
All knowledge is logically connected with related info. elements such as pictures, videos…



Hospital Distribution

Backbone channel

Spatial connection includes geocoding, semantic transformation and spatial situation simulation.



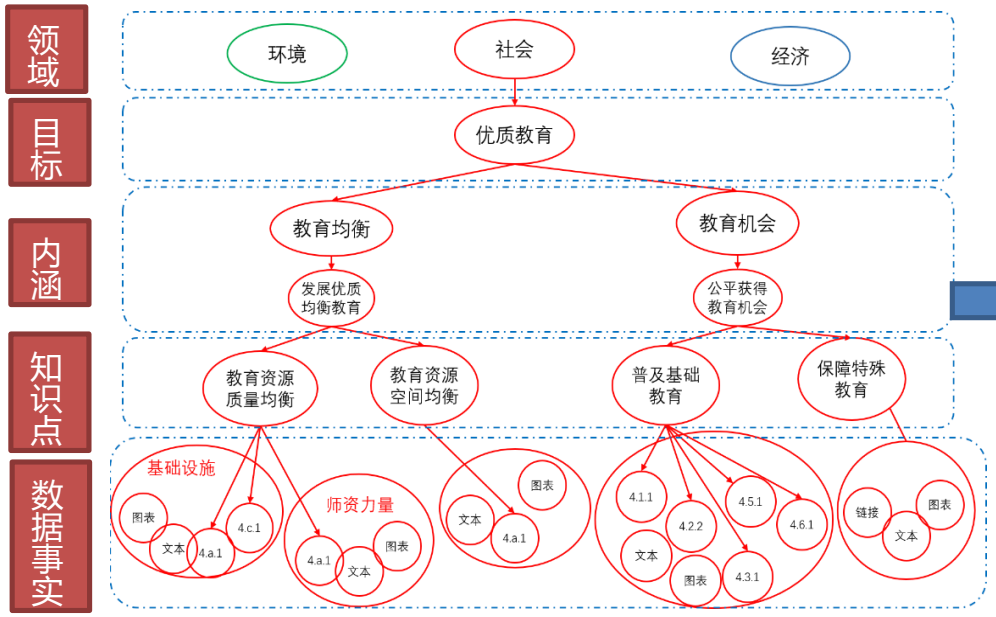
Afforestation landscape line

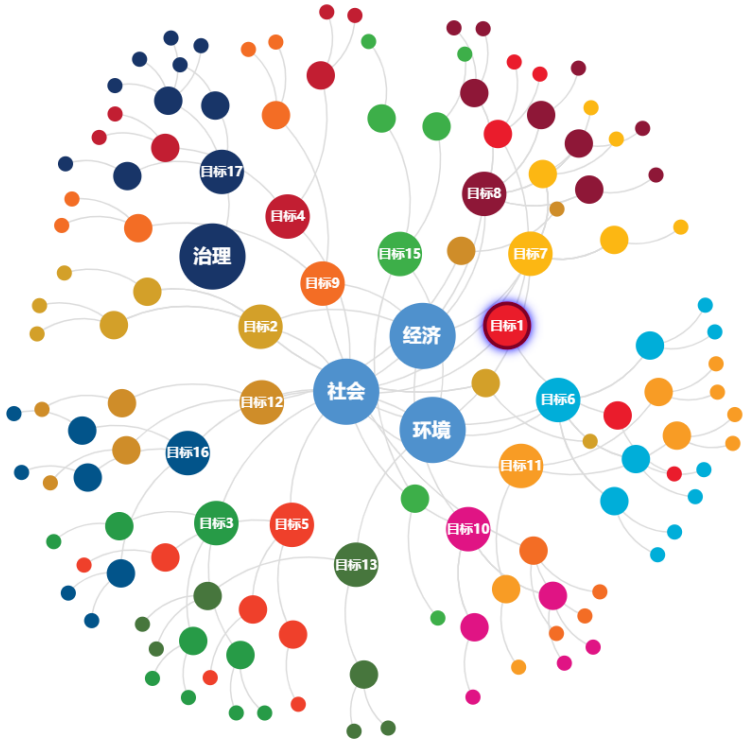
Situation relation

Over 100 spatial related facts have been processed

Knowledge Connection

According to the established SDGs hierarchical model, the knowledge nodes are connected hierarchically to form a knowledge network and construct a knowledge graph with hierarchy structure.

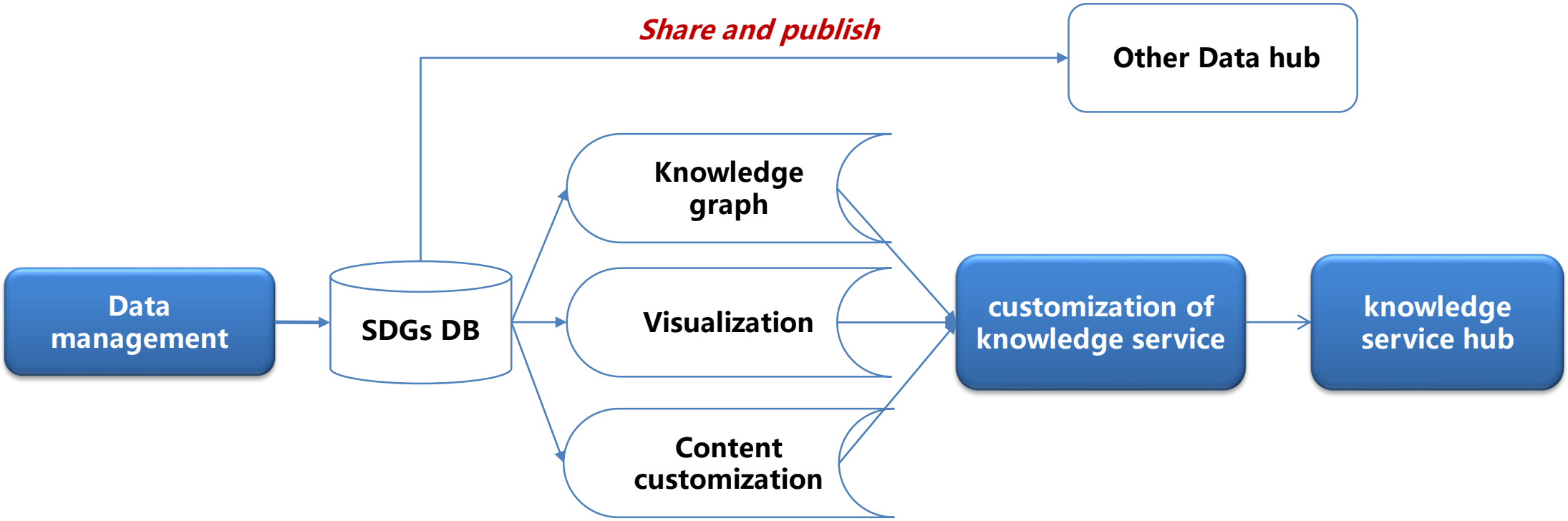




5 Levels of knowledge network，3 field nodes, 16 target nodes, 44 connotation nodes, 68 knowledge points， over 700 data facts.

Service System Development

According to the idea of centralized management, customization and knowledge service, data and information resources are integrated and managed to realize customization of knowledge service and build knowledge service hub



Knowledge Service Customization Tool

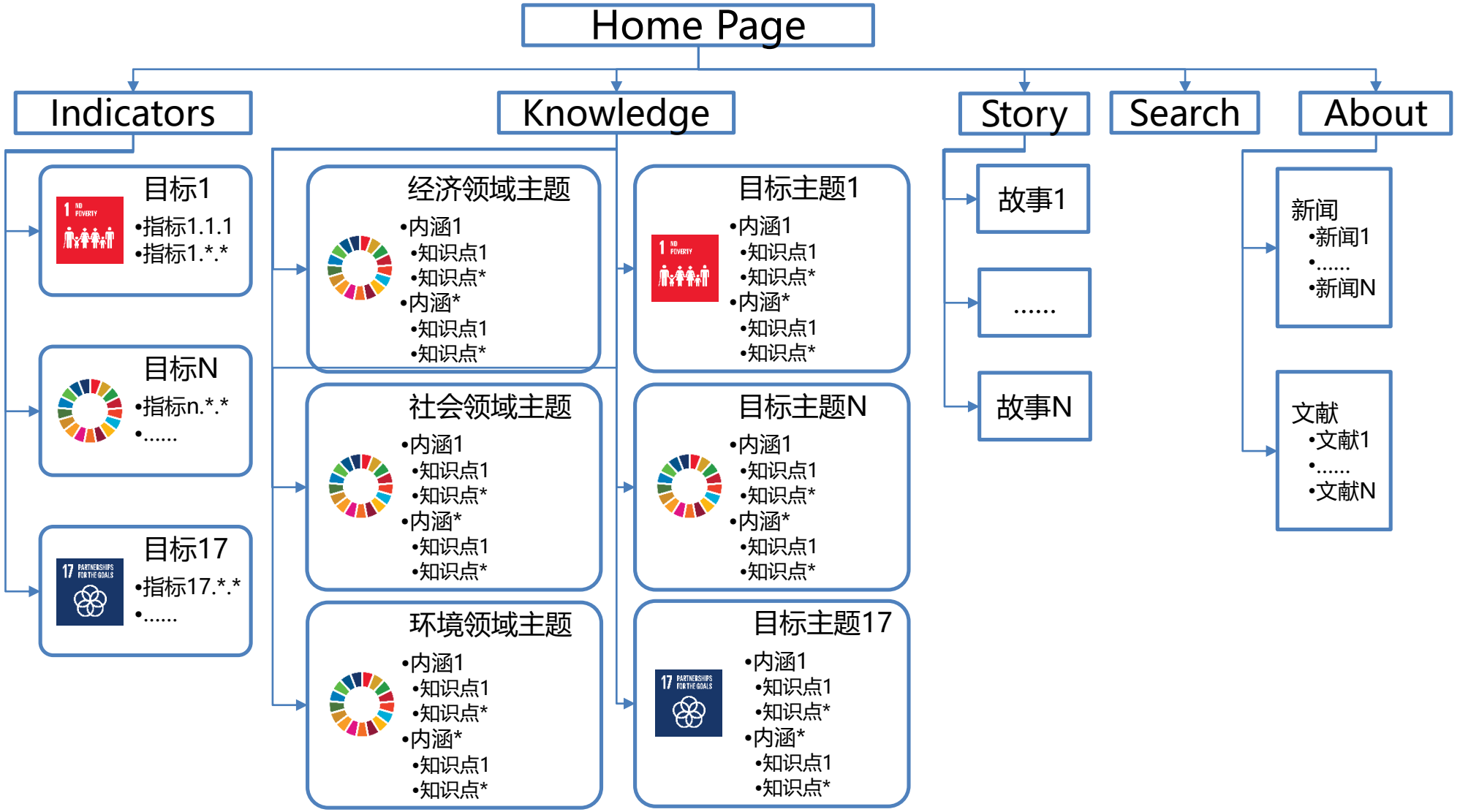
Using component model to customize knowledge service page, what you see is what you get.

The knowledge content editing window on the left provides rich styles and multiple interactive response modes.

The data fact element window on the right provides multiple data visualization functions such as chart, geographic information configuration, etc.

Website Map of the Hub

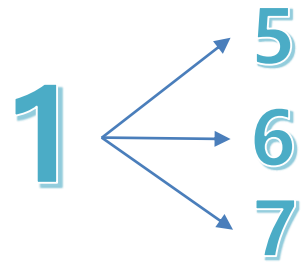
All pages of the website are customized by the customization tool



Hub Function

Seven Functional Modules

1. Menu
2. Language Switch
3. SDG Turntable
4. Domain Button
5. Introduction
6. Search Box
7. Story map Button

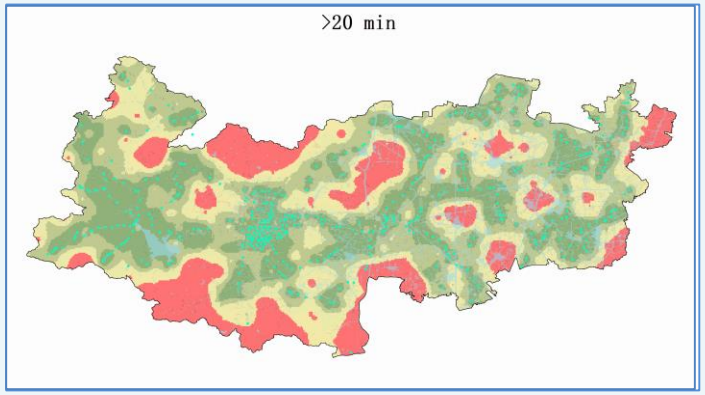


Multi-entrance and interactive

SDGs Hub Demo

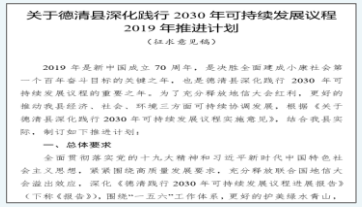
3.2 From Knowledge to Action

Three types of knowledge: Present Situation Knowledge，SDGs knowledge，and Transformation Knowledge



Present situation knowledge

Action plan


关于德清县深化践行 2030 年可持续发展议程
2019 年推进计划
（征求意见稿）

2019 年是新中国成立 70 周年，是决胜全面建成小康社会第一个百年奋斗目标的关键之年，也是德清县深化践行 2030 年可持续发展议程的重要之年。为了充分释放地信大会红利，更好的推动我县经济、社会、环境三方面可持续协调发展，根据《关于德清县深化践行 2030 年可持续发展议程实施意见》，结合我县实际，制订如下推进计划：

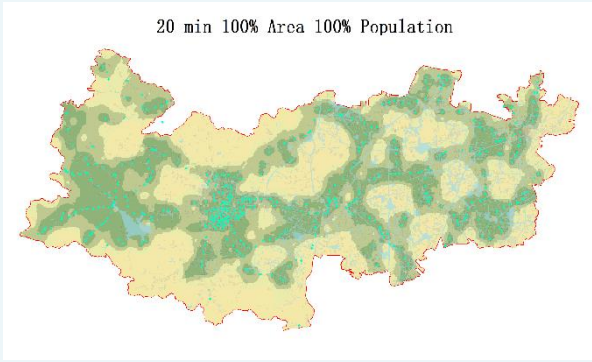
一、总体要求

全面贯彻落实党的十九大精神和习近平新时代中国特色社会主义思想，紧紧围绕高质量发展要求，充分释放联合国地信大会溢出效应，深化《德清践行 2030 年可持续发展议程进展报告》（下称《报告》），围绕"一五六"工作体系，更好的护美绿水青山，

Increase the number of bus stops and optimize its layout

Improve the road network

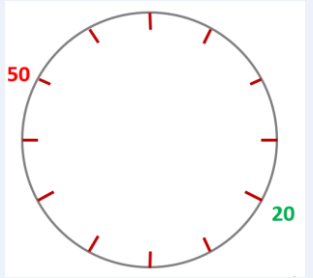
Increase the number of buses



Transformation knowledge

Indicator 1.4.1

Indicator 11.2.1

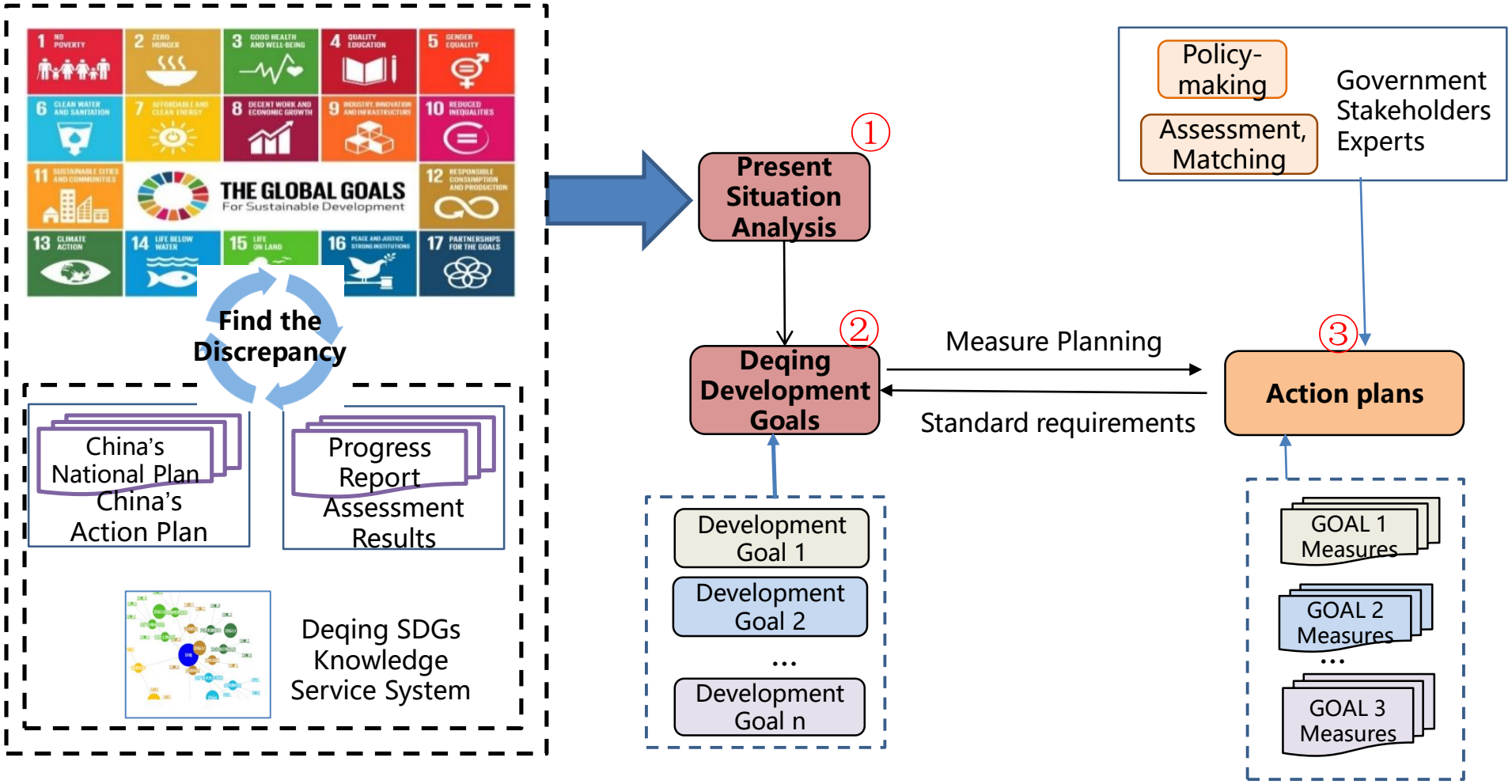


Convenient public transport service
<20 minutes

Goal knowledge

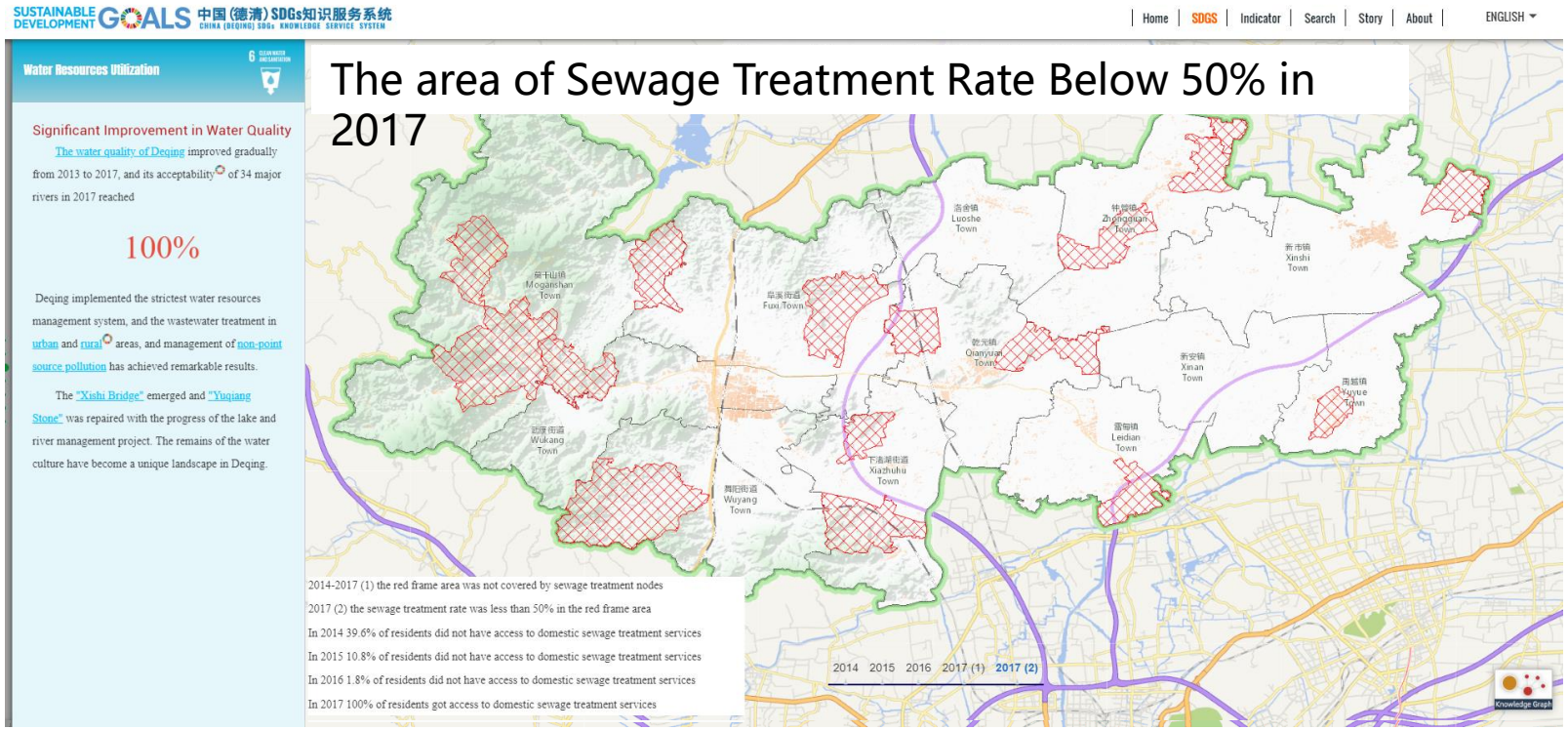
Knowledge-based Decision-Making Process

Through comparison and analysis of the current situation, the local development goals are obtained, and the action plan is formulated.



Action plan—Example

Goal 6: Rural sewage treatment



Qualitative Analysis

Rural sewage treatment coverage has room for further improvement.

Three years-Development Goals

Improve sewage treatment system

Action Plan

Accelerate the construction of sewage pipe network and the new renovation and expansion of sewage treatment facilities. To achieve full coverage, full collection and full treatment of sewage treatment in the county.

Formulate The County Level Plan

Formulate “Deqing’s county level Plan on Implementation of the 2030 Agenda for Sustainable Development”

Three-years Local Development Goals: 44

Action plans: 86

6 CLEAN WATER AND SANITATION 【GOAL 6】

Ensure availability and sustainable management of water and sanitation for all

Practicing SDG6 in Deqing

Water is the source of life. Deqing, as a canal Towns in south of the Yangtze, is abundant with water resources. The water quality has been improved significantly and the health conditions of the water-related ecosystem have been greatly enhanced through the comprehensive water resources management

- **Water Resources Utilization** -- The water enjoys a fine quality, still there is room for improvement in efficiency of water utilization.
- **Safe Drinking Water and Sanitation** -- All residents have access to safe drinking water and convenient public health services.
- **Protection of Water-related Ecosystems** -- The water-related ecosystem has been effectively protected, and the ecological health of Xiazhu Lake National utilization Park has been in good condition.

Qualitative analysis	Three-year development goal	Action plan
Water Resources Utilization: ①The treatment rate of urban living and industrial sewage needs to be improved; ②The quality of water environment is generally good and can be further improved; ③Water use efficiency is not high and nee	Deepen the "five water co-governance", improve the sewage treatment system, comprehensively improve the environmental quality of the county water bodies. Build the water-saving society, improve water use efficiency, and optimize the total amount and intensity of water resour	Continue to promote and accelerate the construction of sewage pipe network and the renovation and expansion of sewage treatment facilities. Focus on the improvement of clean discharge standards for sewage treatment plants. Strengthen sewage treatment monitoring to achieve full coverage, full collection and full treatment of urban sewage treatment in the county. The water quality section above the county level is continuously maintained above the Class III water. Improve the global surface water mo

Practicing SDG 6 in Deqing

Qualitative Analysis

Three-years Development Goals

Action Plans

Contents

Summary

- This pilot project realize a practice to realize a comprehensive measurement of an entire administrative region' s progress towards SDGs by combing geospatial and statistical information.
- Three different methods were utilized to measure and analyze SDGs with geospatial information
  - geospatial disaggregation of statistical data
  - derivation of indicators with geospatial parameters (such as spatial density, accessibility, coverage and relations)
  - location-based visualization and knowledge representation as the provision of spatial-temporal evidences

Monitor-Knowledge-Decision-Implementation

Decision-Making oriented Application

Implementation

SDGs Knowledge Service

Constructive Modeling | **Knowledge Extraction** | **Knowledge Connection** | **Knowledge Representation** | **Knowledge Service**

Regional SDGs Assessment and Monitoring

Localization of Indicators | **Spatio-temporal data processing** | **Computing indicators with geographical angle** | **Indicator and evidence-based analysis**

Infrastructure | Data | Tools | Standards

Partnership