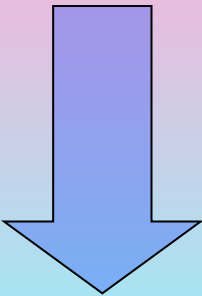


**Asia-Pacific Regional Collaborative
Mechanism on Drought Monitoring
and Early Warning and
Its Service Node of China**

**WU Guoxiang, Senior Advisor
National Remote Sensing Center of China**

Roles of satellite data based Products/Services

Partners	Technical resources	EO satellite data		
Satellite data providers		System-corrected images		Primary products
	Application models and methodology		Information extracted thematic products	Interim P/S
Local service providers (including technical supporting team of end users)	Locally available information		Information extraction by Capable LSP	
		End users from central to field levels	User systems and practices	Incorporate with other decision-making needed information
		For decision making		Final P/S

A Mechanism under United Nations

- **Promoted by Regional Space Applications Programme (RESAP) of UN ESCAP**
 - **Supported by Service Nodes of China and India**
- **Operational provision of satellite data based monitoring services in the Asia-Pacific region**
 - **For agriculture/herd drought related decision-making**
 - **Contributes to development issues of**
 - **Food security**
 - **Climate change adaptation**
 - **Disaster reduction**

Towards collaborative capacity

- **Almost all regional countries**
 - **Have built technical and institutional capacities in use of EO at different levels**
- **Most remain far from operational, if work individually**
- **Collaborative capacity is the solution, through**
 - **External assistance in**
 - **Customizing EO P/S to suit local conditions**
 - **Operational providing interim P/S**
 - **Operational providing customized P/S**
 - **Internal efforts to build operational service network for national user communities**

Operational partnership

- **A distributed network**
 - **Comprising service nodes, beneficiary bodies' network and ad hoc secretariat**
 - **For continued monitoring of drought signals**
 - **From beginning of major crop seasons**
- **To work as a collaborative capacity**
 - **Satellite data and technical resources contributed by Service Nodes**
 - **Operational national services by EO institutions to user communities**
 - **Coordinated by the secretariat**

Modalities of the Mechanism (1)

National consultation – when needs a pilot project

- On requests with likely commitment
- Participated by Service Nodes and stakeholders
- To identify project components

Implementation of pilot project

- Verification and selection of monitoring indices
- Development and validation of localized P/S
- Customizing analysis and management systems
- Building operation and reporting system

Provision of satellite data through Internet

- In most situation, timeliness is limited by bandwidth for accessing data

Space Information Usages

Function	General monitoring	Watching	Alerting	
Service functions	Identifying risky areas	Monitoring identified high risky areas	Impact estimation, DRR planning, early-warning	
Spatial resolution	1000 – 250m		250-25m, or higher when necessary	
Service provider	Mechanism service nodes	Service nodes & local ones	Mechanism service nodes	Local service provider
Models	Cross-checking of fundamental physical models	Combined multi-model analysis	Localized M/EW models	Detailed local M/EW models
Local profile and in-situ information	Historical information expected	Historical information necessary	Historical and in-situ information crucial	
Service provision by Mechanism	Automatically for agreed vulnerable areas	On request for identified high risk areas	On request for alerted areas	
Result delivery	To national focal points by Mechanism		To governments at necessary action levels by national focal point	

Three types of services

- **Technical Assistance services**
 - To customize well demonstrated methodology and models
 - Adapting to local conditions
 - For different areas of needed countries
- **Satellite Data Services**
 - To provide satellite data at near-real-time
- **Monitoring Services**
 - To provide interim of customized P/S to requested countries
 - That lack of sufficient capability to access and process satellite data operationally

Stages for Monitoring Services

– General monitoring

- Low-resolution satellite data based indices

– Watching

- Low- and mid-resolution satellite data based interim products for risky areas
- Supported by timely *in-situ* observations

– Alerting

- Mid- and high-resolution satellite data based thematic products for alerted areas
- To support actions to be taken

Training and advisory services by Service Nodes

- **Regional and sub-regional courses for decision makers**
 - **Operation of the Mechanism, best practices on policies and institutional arrangement, decision supporting tools**
- **Technical training courses at sub-regional and national levels and hand-on training**
 - **Operational products and services**
 - **National training for operation personnel**
- **National advisory services on both technical and institutional aspects**

Service Node of China

- **Organized and coordinated by National Remote Sensing Center of China, Ministry of Science and Technology**
- **Supported by**
 - **Institute of Remote Sensing & Digital Earth, CAS**
 - **National Disaster Reduction Center, MCA**
 - **Institute of Regional Planning, Chinese Academy of Agriculture, MoA**
 - **National Satellite Meteorological Center, CMA**
 - **Beijing 21st Century Space Technology Corporation**
 - **Academy of Disaster Reduction and Emergency Management, Beijing Normal University**
- **As a service of China GEOS Data Sharing Platform**
 - **Promoted from regional to contribute to global**

Space data accessible to Chinese Node

- **Chinese satellite data**
 - **FY-3 series: meteorological satellites**
 - **VIRR (like AVHRR): 10 channels @1.1km**
 - **MERSI (like MODIS): 20 channels @ 0.25-1.0km**
 - **HJ-1 A/B: environment and disaster monitoring**
 - **MS CCD camera: 4 channels @30m/360km**
 - **GF 1: Experimental high-resolution satellite**
 - **4 channels @16m/800km**
 - **CBERS: Earth resources satellites**
 - **MS CCD camera: 5 channels @20m/113km**
 - **BJ-2 A/B/C commercial satellites to be launched 2015**
 - **MS CCD camera: 4 channels @4m/23.6km**
- **Data sets derived from other satellites: MODIS, TRMM, Landsat/MSS, ...**

Implementation of Pilot Project for Mongolia

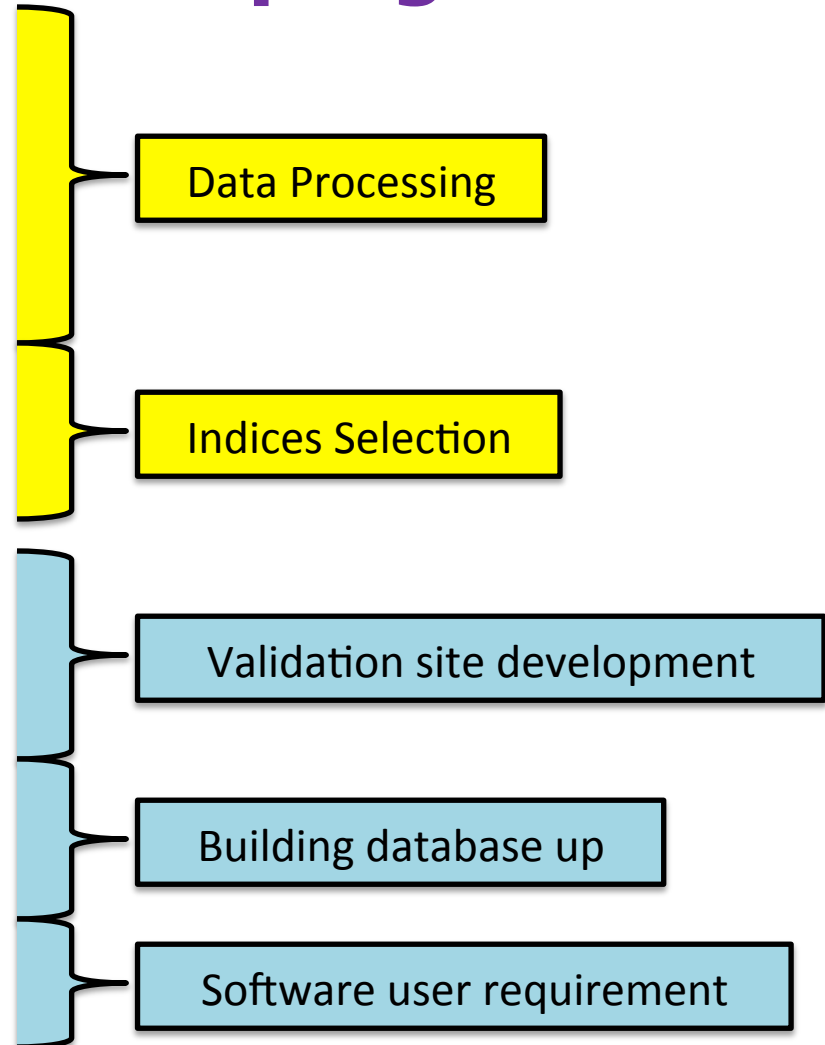
- **Technical Advisory Meeting**
 - Ulaanbaatar, 4-6 Sept. 2013
 - Determined work-plan of the pilot project
- **Indices selection and historical data collection**
 - By Mongolia and China, Oct. 2013-Feb. 2014
- **Hand-on training for processing, database building and system customization**
 - 3 Mongolian experts in Beijing, Feb.-Apr. 2014
- **System installation**
 - Ulaanbaatar, end May, 2014
- **In season field operation and validation**
 - 3 selected sites in Mongolia
 - Completed by Sept. 2014

Work Plan Year 1 (2013-2014)

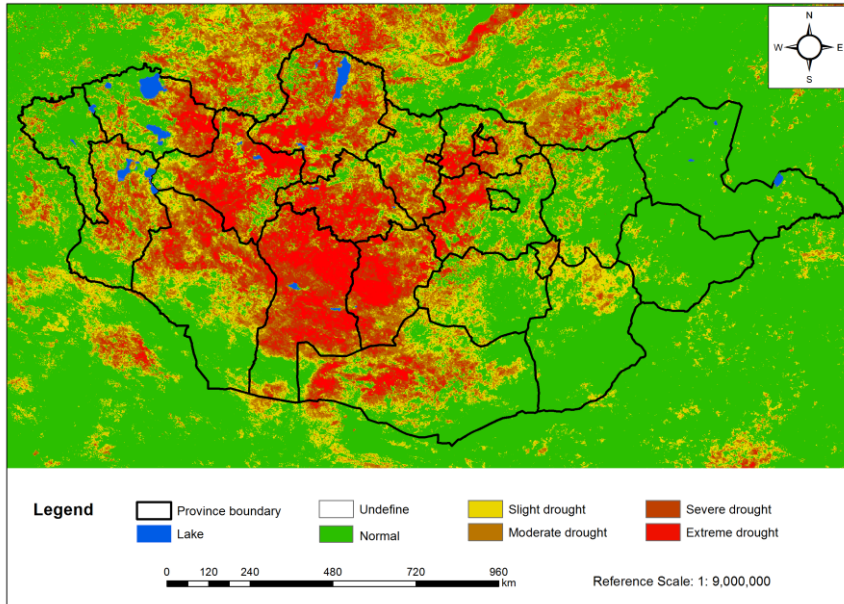
No	Activities	Contributions			Duration	Deadline
		ESCAP	RADI	NRSC		
1	Kick-off, Objective identification, Communication platform				1 week	Sept 6th 2013
	1.1 Kick-off meeting and fact finding 06/09/2013	XX	X	X		
	1.2 Objective identification through expert discussion	X	X	XX		
	1.3 Communication platform	X	X	XX		
2	Index candidate list, suitability test and selection, Preparation of Country Profile, Data list and requirements, data preparation in house	ESCAP	RADI	NRSC	2 months	Nov 6th 2013
	2.1 Preparation of Country Profile			XX		
	2.2 data preparation in house		X	XX		
	2.3 Index candidate list		XX	X		
	2.4 suitability test and selection		XX	X		
	2.5 Data list and requirements (MODIS, soil moisture, meteor. data, climate zone, soil map, boundary of soum)		XX	X		
3	hand-on training and processing, building database up, final indices decision for 2 persons in RADI, China	ESCAP	RADI	NRSC	2 months	March 6th 2014
	3.1 hand-on training	air tickets for two persons	XX	X		
	3.2 data processing		XX	X		
	3.3 final indices decision		XX	X		
	3.4 validation site (number and place) development		X	XX		
	3.5 building database up		X	XX		
4	System customization, including database development and data integration	ESCAP	RADI	NRSC	2 months	April 6th 2014
	4.1 data integration		X	XX		
	4.2 software user requirement		X	XX		
	4.3 System customization and development		XX	X		
5	System installation and deploy and operational practice, for 1 person in NRSC, Mongolia	ESCAP	RADI	NRSC	1 month	May 6th 2014
	5.1 System installation		XX	X		
	5.2 System operation test and practice		X	XX		
6	In season operation and validation from May to Sept 2014, in-situ measurement, 1 or 2 time field measurement support	ESCAP	RADI	NRSC	5 months	Sept 12th 2014
	6.1 in-situ measurement plan		X	XX		
	6.2 in-situ measurement implementation			XX		
	6.3 field measurement support		XX	X		
	6.4 monitoring operation			XX		
	6.5 In season validation from May to Sept 2014		X	XX		
7	Middle term-review Workshop including field checks, second year implementation plan,in Ulaanbaatar	ESCAP	RADI	NRSC	1 week	Sept 15th-19th. 2014
	7.1 Middle term-review Workshop in Ulaanbaatar	XX	X	X		
	7.2 Second year implementation plan	XX	X	X		
8	Second year implementation	X	X	X		Oct 10 2015

Training programme

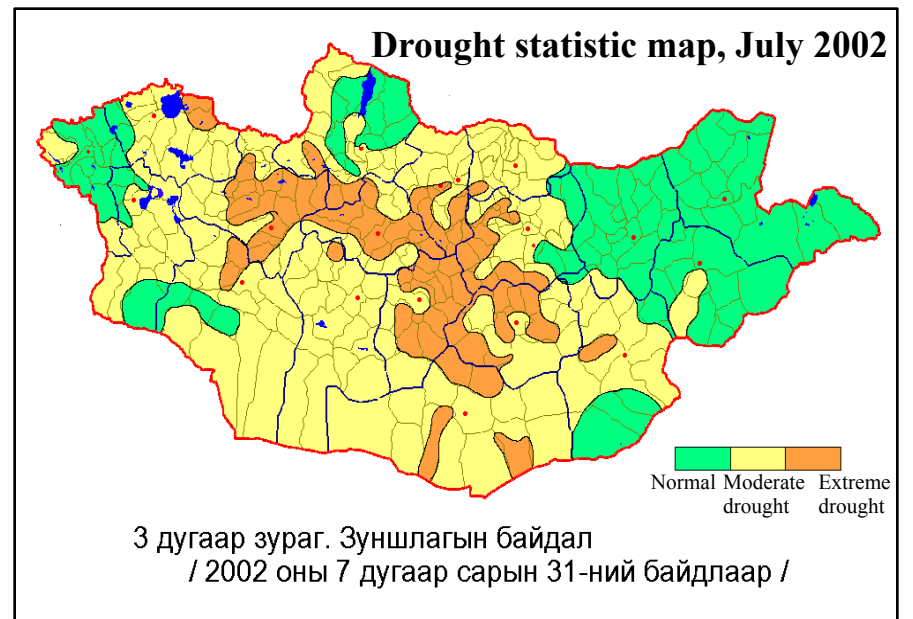
Training Plan Schedule			
17 February to 16 April 2014, Venue: RADI Olympic Campus			
Days	Activities	Contributions	
		RADI	NRSC
I Introduction			
Day 1	Introduction of training programme Introduction ground data (data list)	○	○
II Data processing			
Day 2-5	MODIS data downloading		○
Day 8	Introduction of satellite data processing method	○	
Day 8-12	The Satellite data pre-processing (historical long time series data)		○
Day 15	Introduction of field data processing	○	
Day 15-19	Analysis ancillary data (climate zone, soil map, boundary, soil moisture, rainfall, air temperature and so on)		○
Day 22	hand-on practice of drought monitoring by MODIS data	○	
Day 22-25	Drought indices calculation and statistics by MODIS data		○
Day 26	Summarizing of data processing	○	○
III Indices selection			
Day 29	Introduction of indices suitability test and analysis method	○	○
Day 29-32	Selected indices suitability test and analysis		○
Day 33A	Summarizing from all analysis results	○	○
Day 33P	Intensive discussion and indices decision	○	○
IV Validate site development			
Day 36	Requirement analysis and available validation site description	○	○
Day 36-37	Validation scheme development		○
Day 37-39	Field works	○	○
Day 40	Discussion about the scheme, and determine the experiment plan	○	○
V Building database up			
Day 43	Explore the database status and requirement analysis		○
Day 44	Database design	○	○
Day 45-47	Database implementation		○
Day 46	Discussion and solving the problem	○	○
Day 47	Test and development		○
VI Software user requirement			
Day 50	Demand analysis of drought system	○	○
Day 51	Introduction of system framework and discussion	○	○
Day 52-56	Writing up of training report		○
Day 56	Presentation of traing report and farewell	○	○



Temperature Condition Index (TCI), July 2002

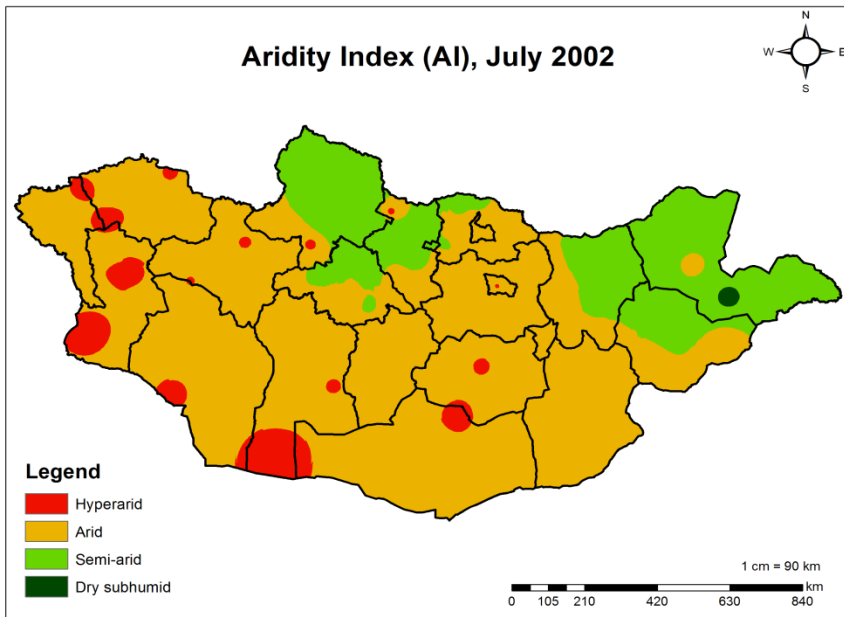


Drought statistic map, July 2002



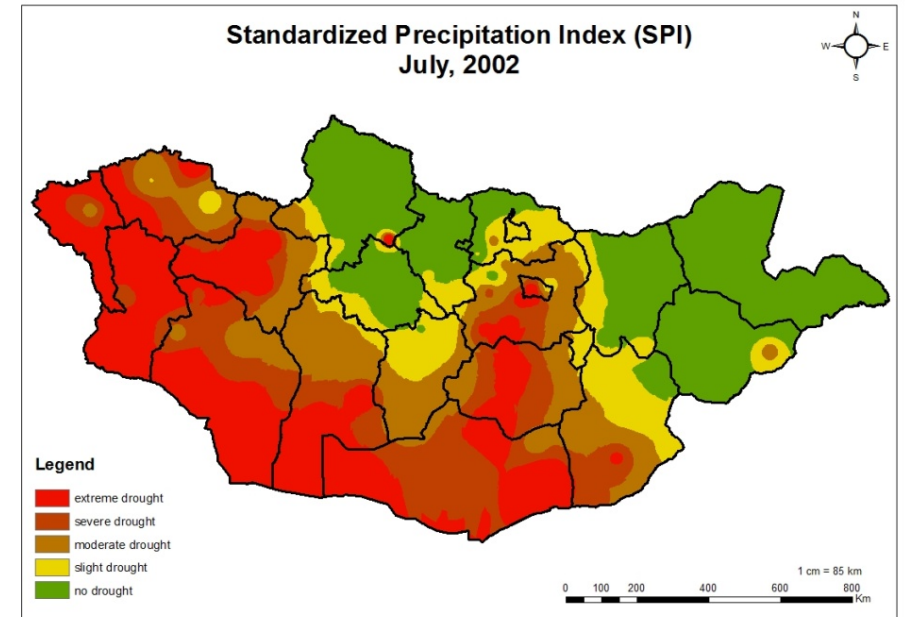
Reference

Aridity Index (AI), July 2002



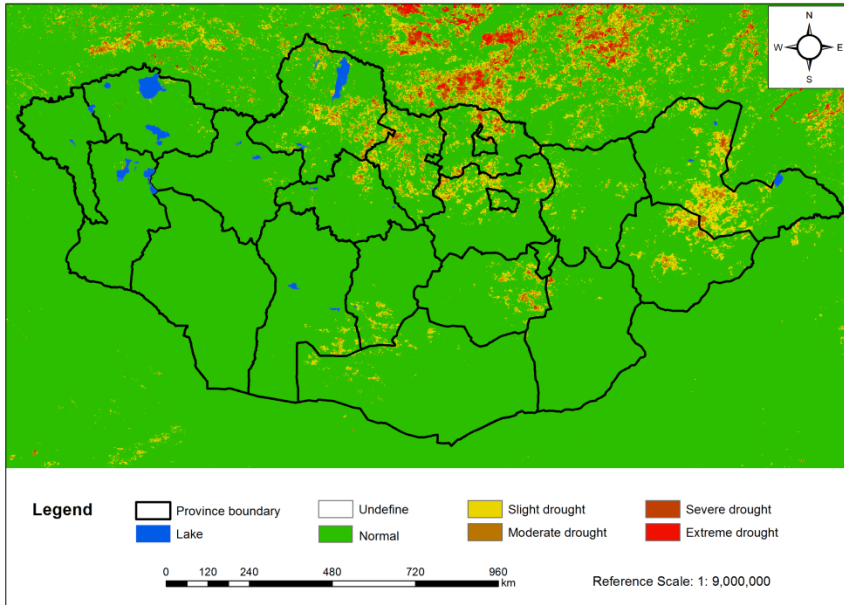
Reference

Standardized Precipitation Index (SPI)
July, 2002

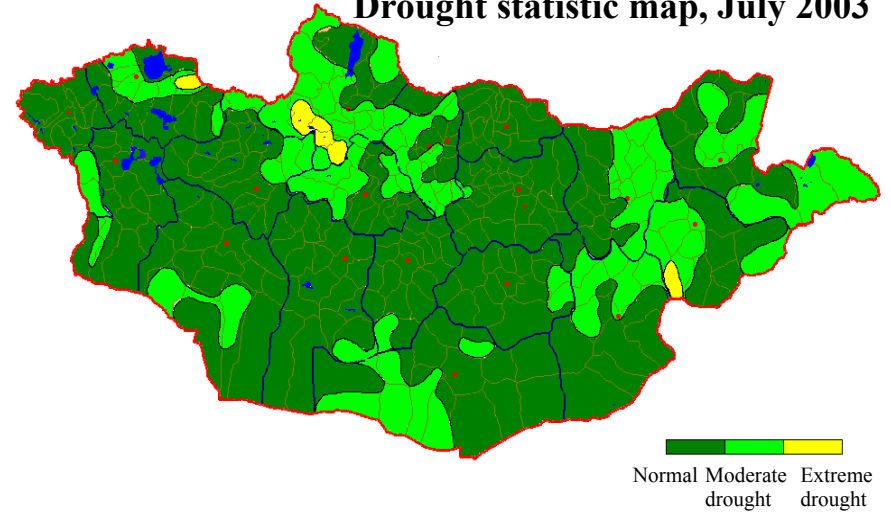


Reference

Temperature Condition Index (TCI), July 2003



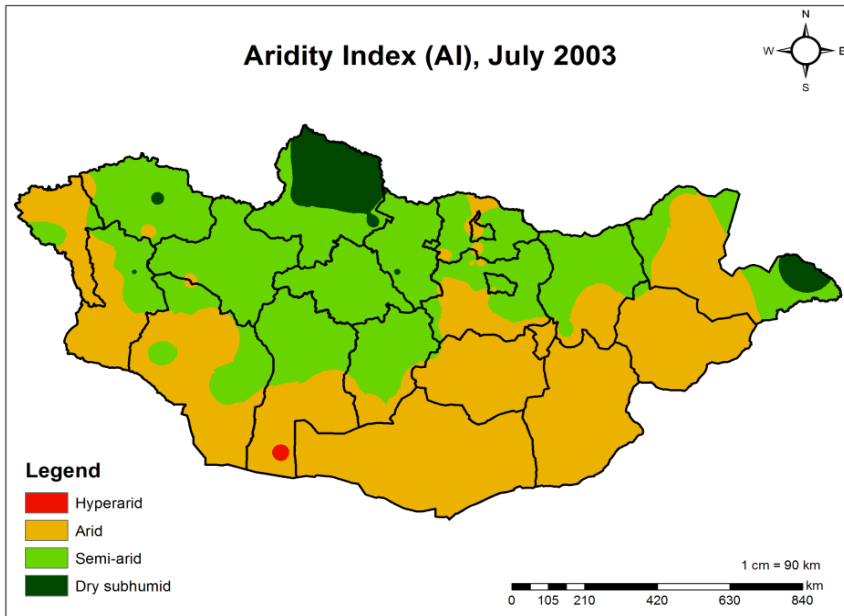
Drought statistic map, July 2003



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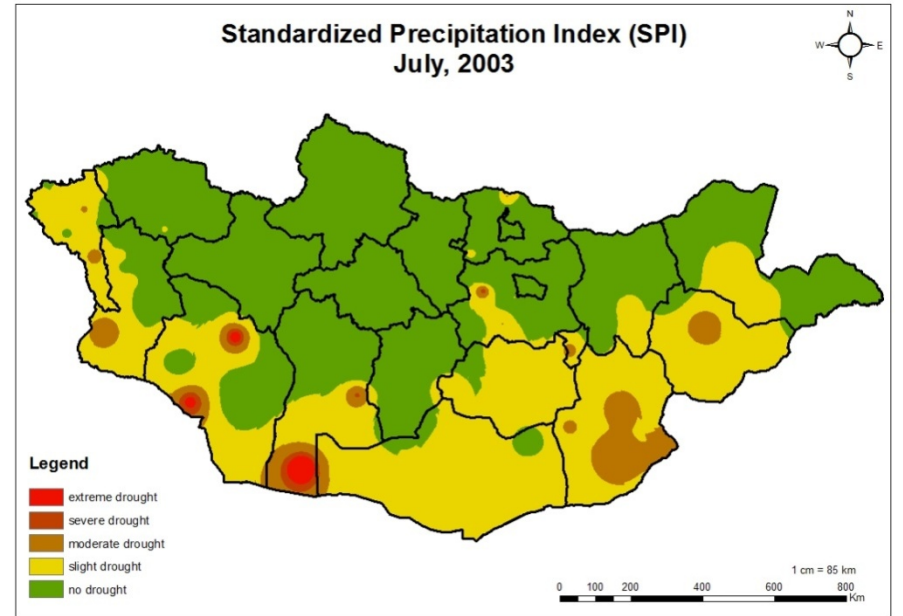
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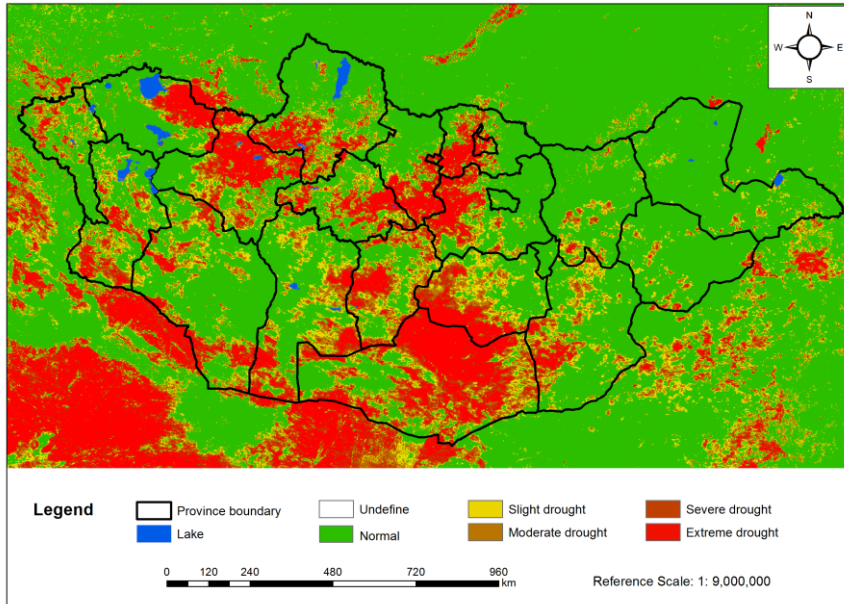
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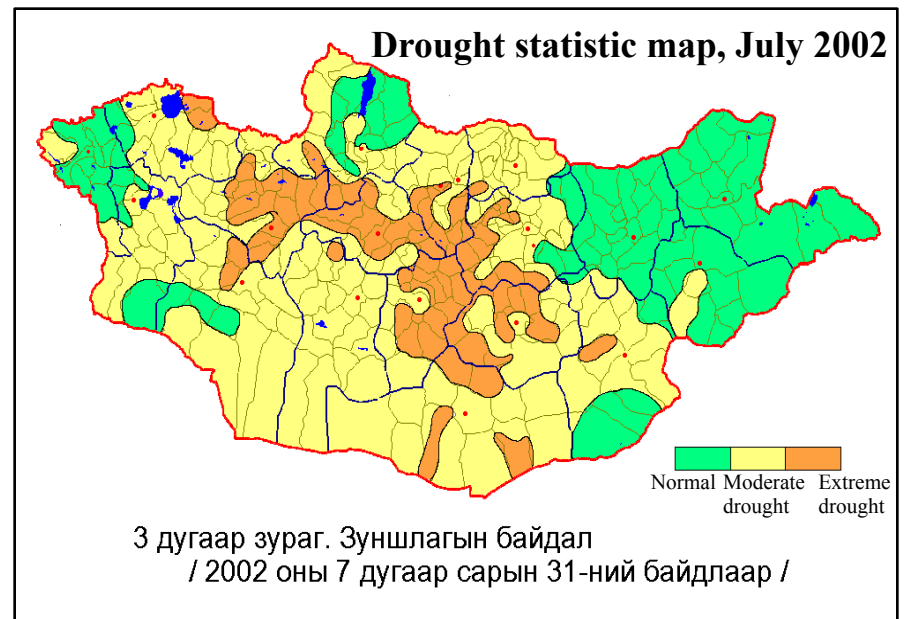


Reference

Vegetation Condition Index (VCI), July 2002

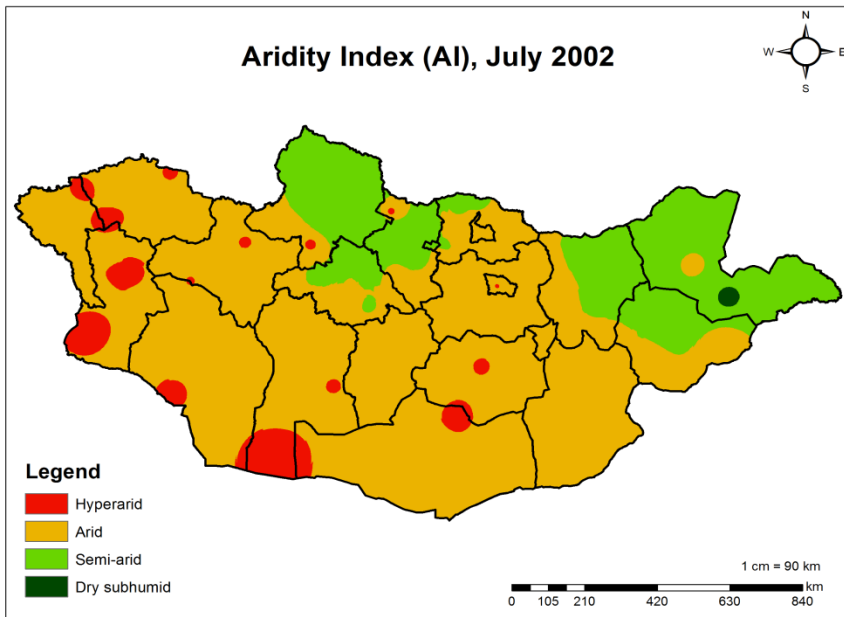


Drought statistic map, July 2002



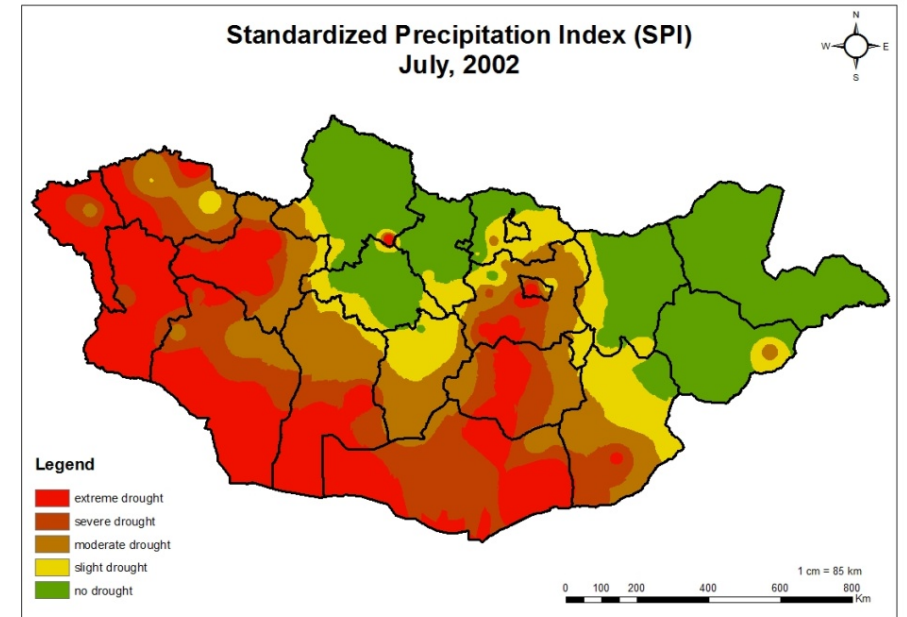
Reference

Aridity Index (AI), July 2002



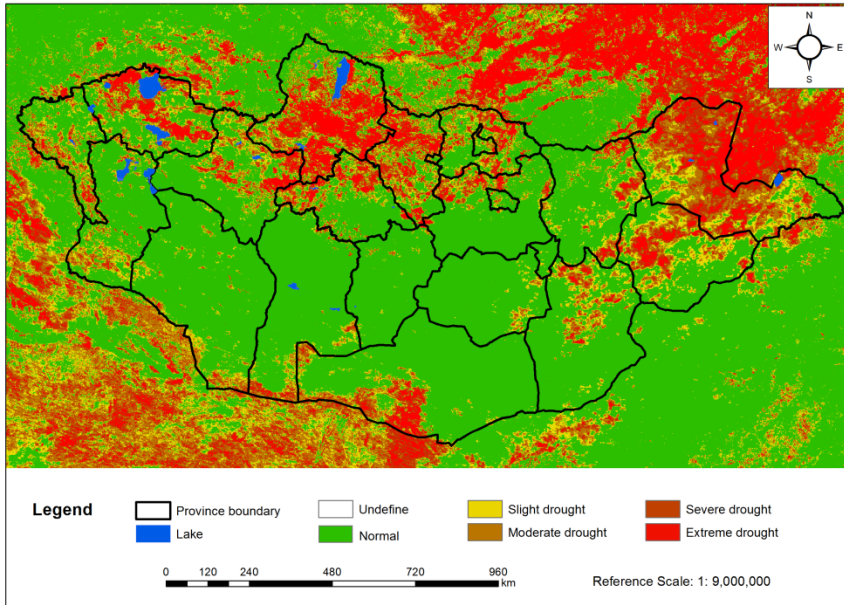
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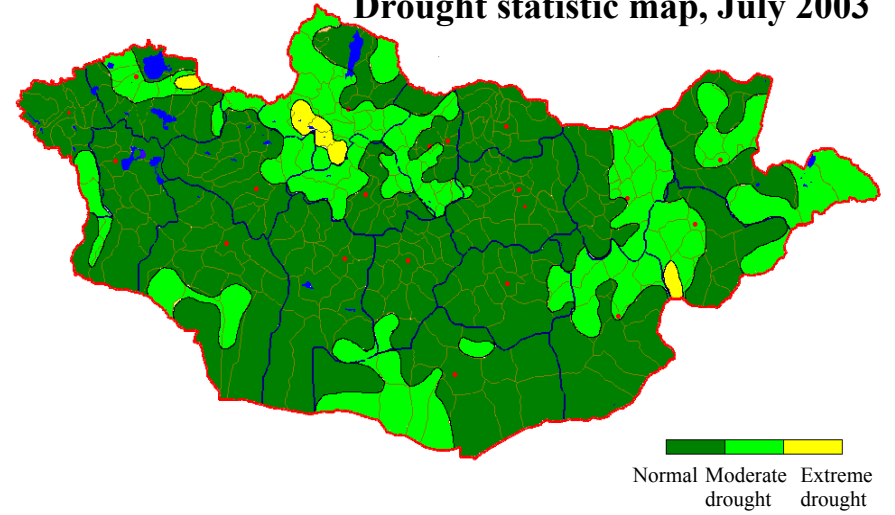


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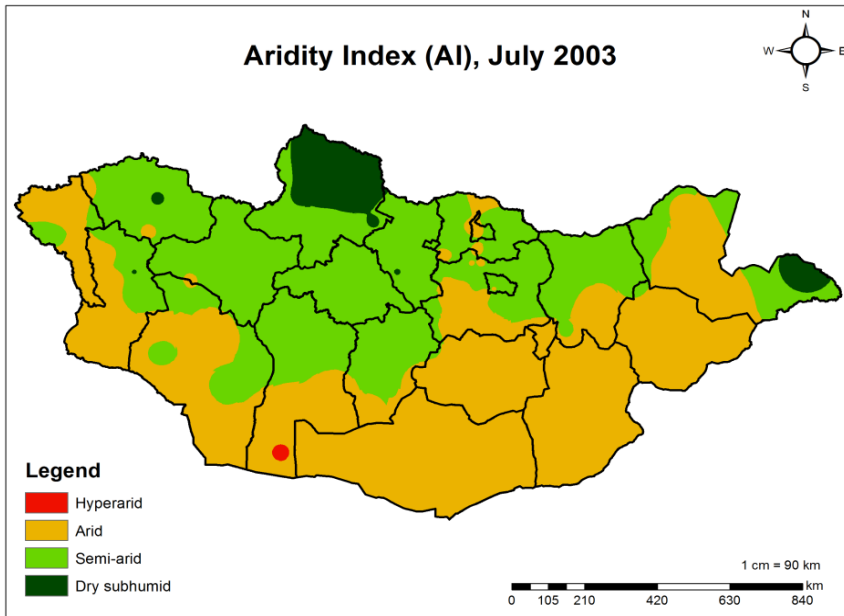
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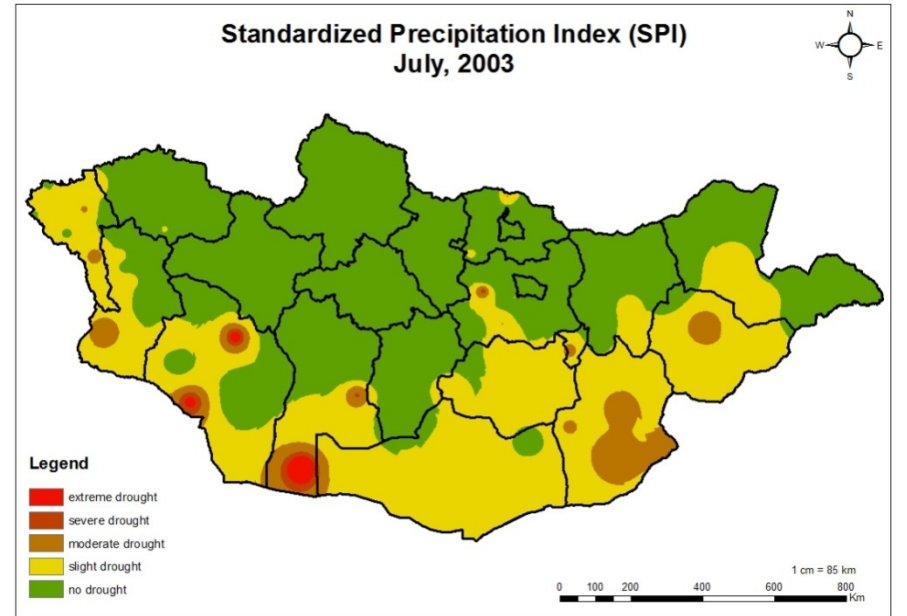
Reference

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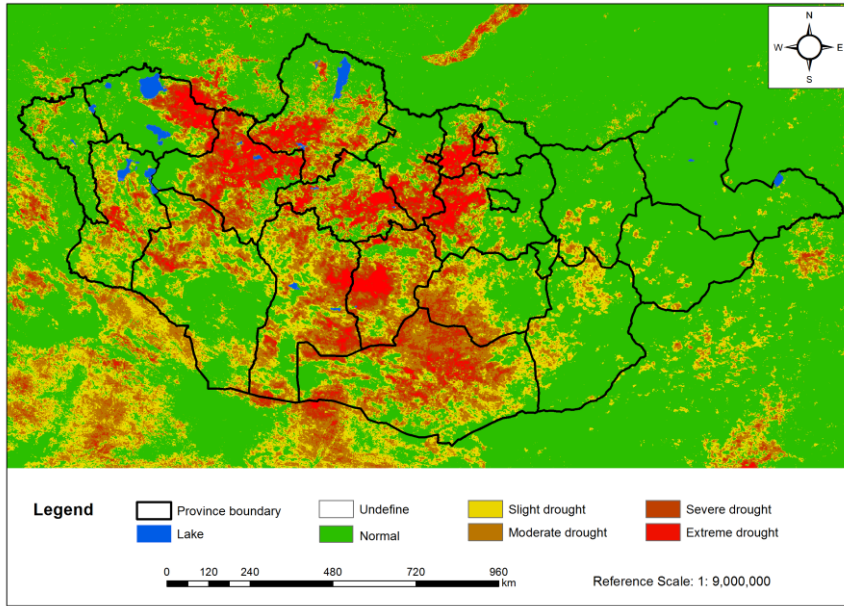
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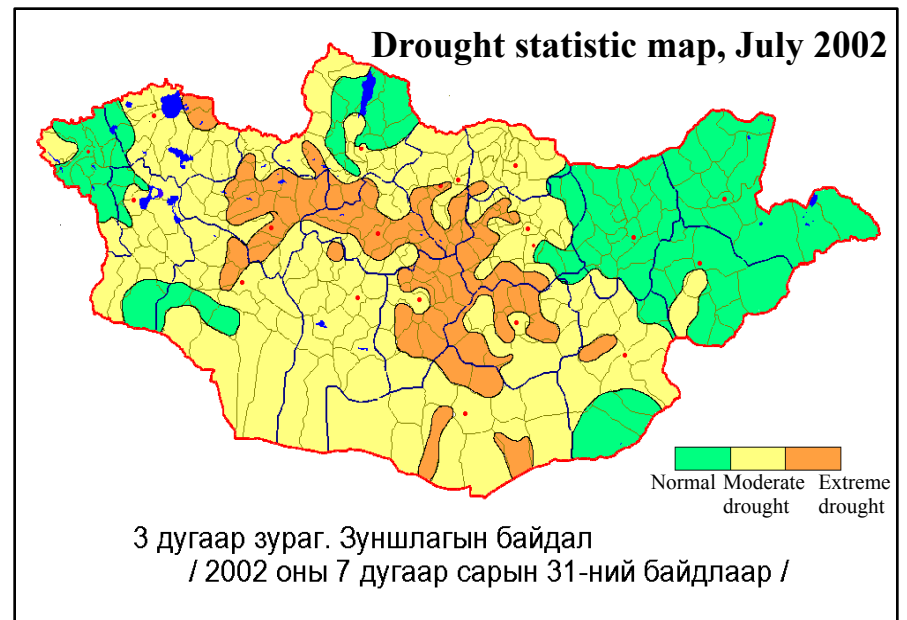


Reference

Vegetation Health Index (VHI), July 2002

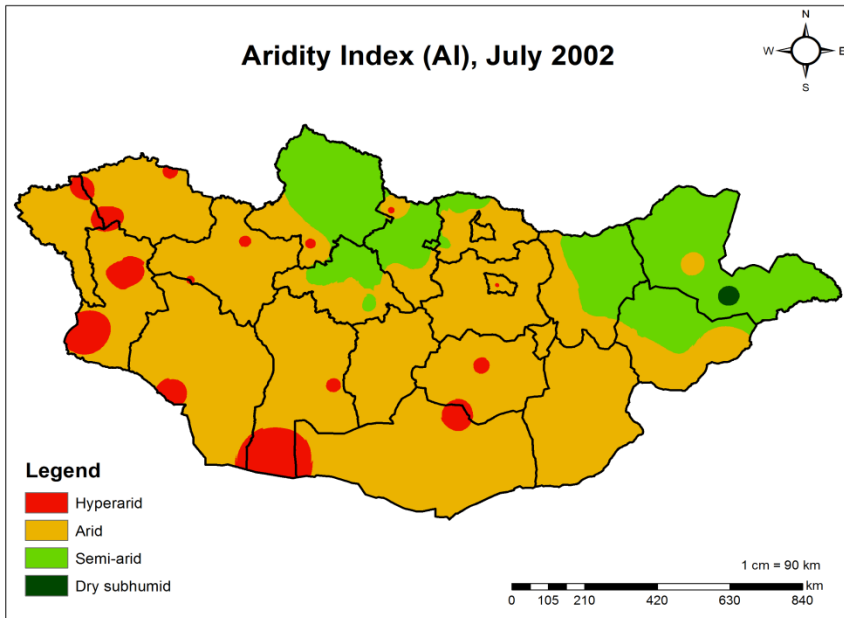


Drought statistic map, July 2002



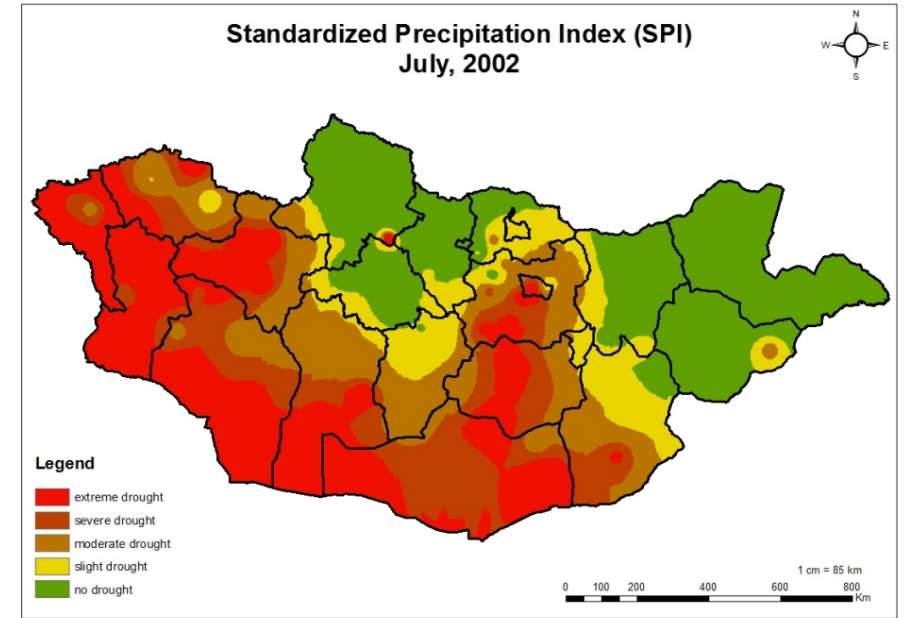
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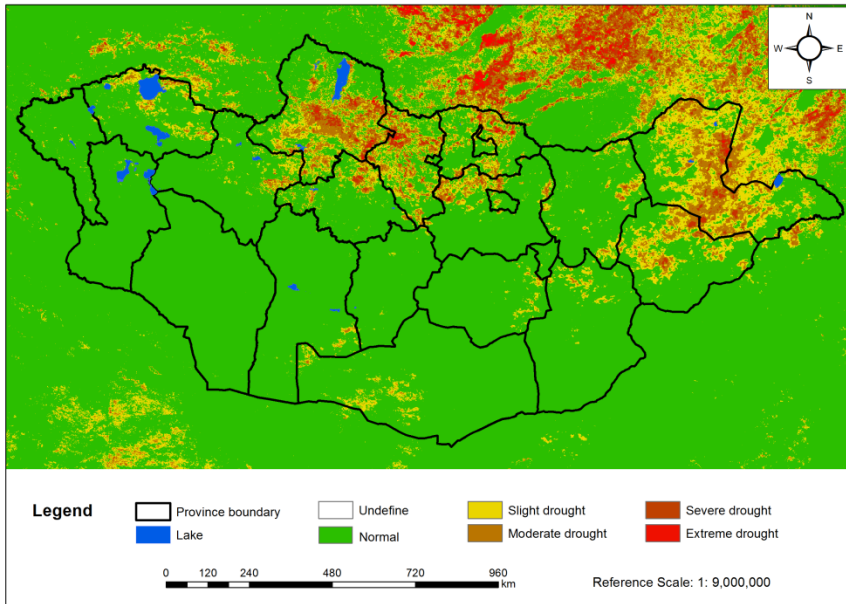
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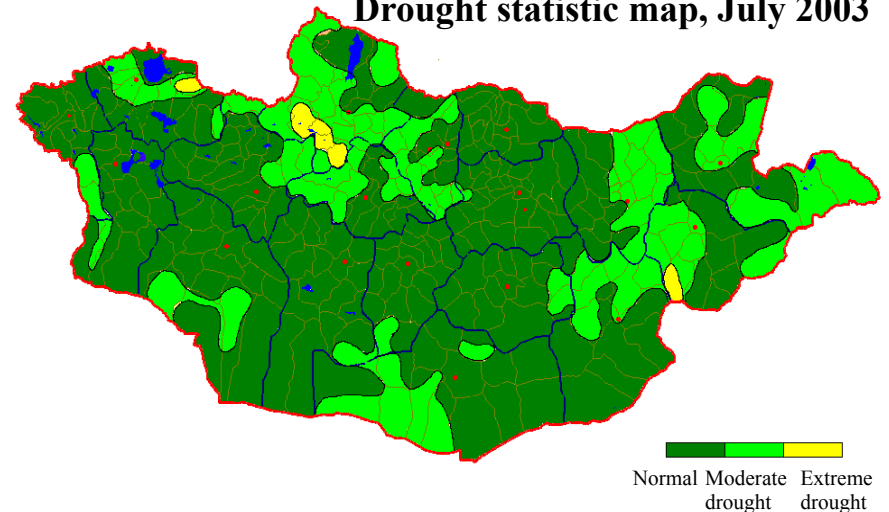


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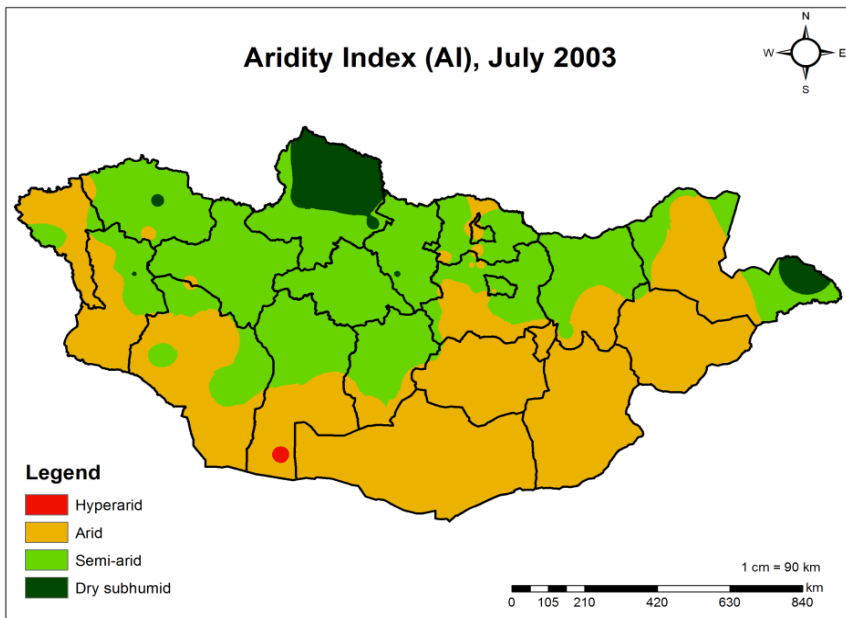
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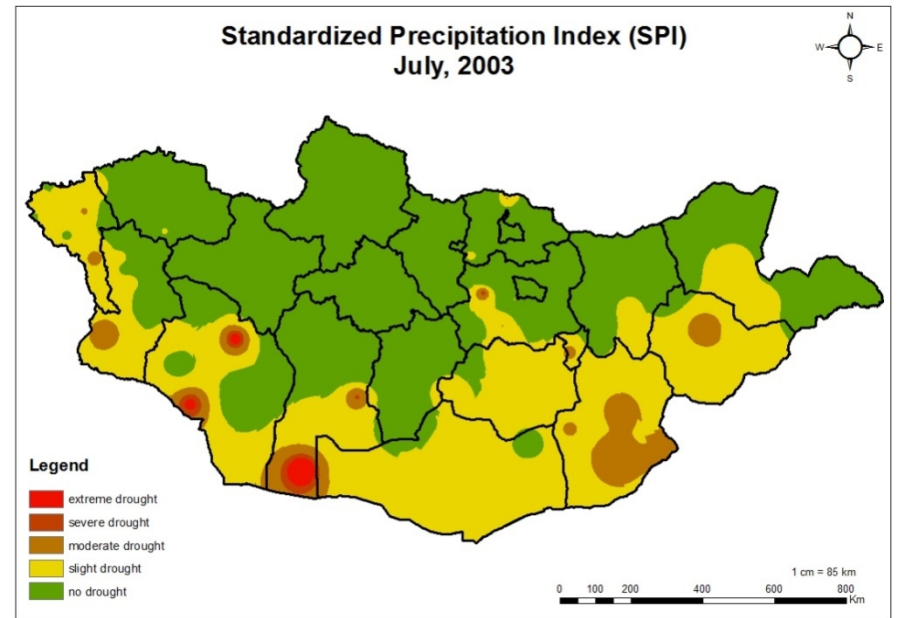
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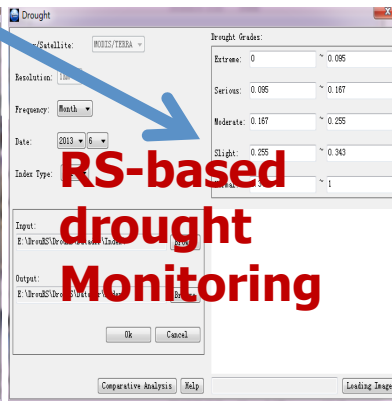
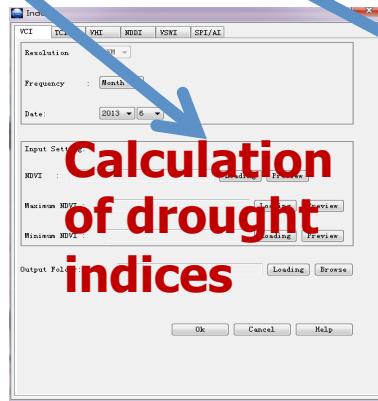
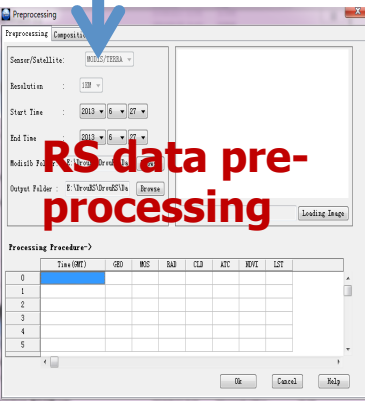
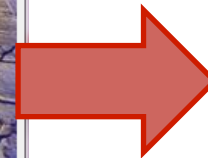
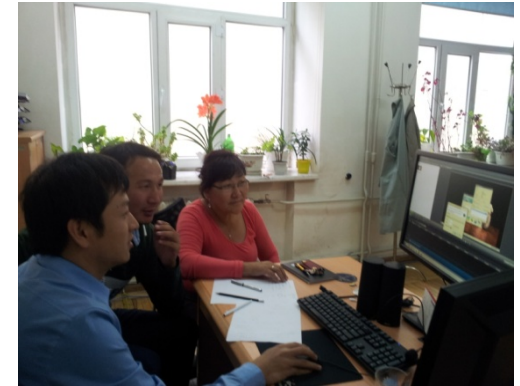
Reference

Standardized Precipitation Index (SPI)
July, 2003



Reference

Remote Sensing Drought Watching System for Mongolia



Prototype system provided by Service Node of China

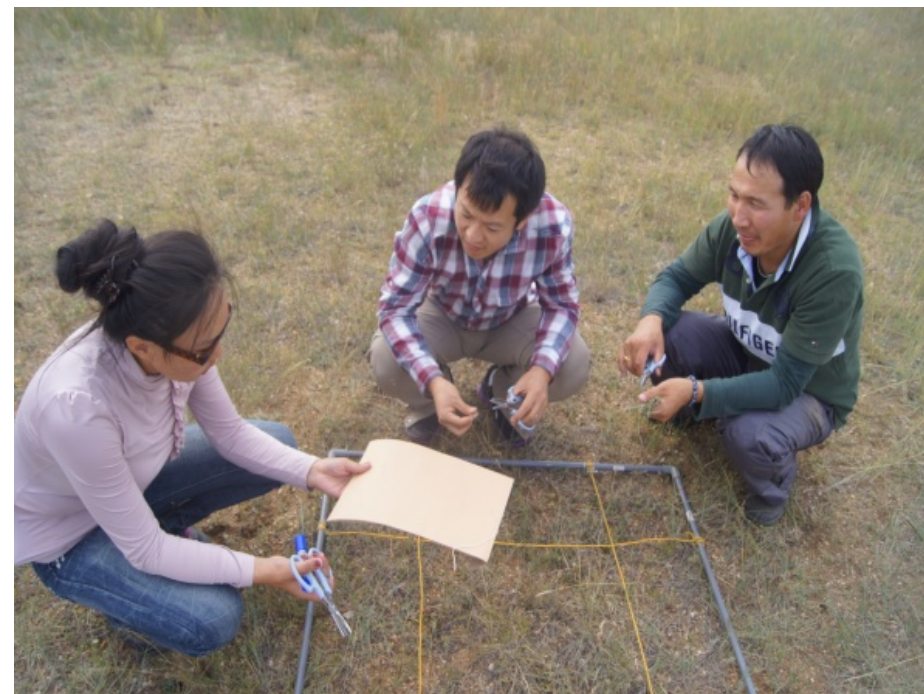
Customized to Mongolian situation through on-the-job training

Field Synchro- measurement in Mongolia

**For verification of
monitoring models**

**Measurement was
designed jointly with
Service Node of China**

**Chinese experts provided
training and guidance for
field measurement
operations**



Field measurement, monitoring model and software improvement

- **Field measurement and verification is to be finished soon**
- **Based on results of field measurement and verification, monitoring model for Mongolia was improved**
- **Relevant software was jointly revised by experts of Mongolia and China**
- **The pilot project will be summarized for further promotion of the regional Mechanism**

Other activities

- **A training course on the Mechanism was organized by ESCAP and National Remote Sensing of China in Oct. 2014 in Beijing**
- **A pilot project is implementing in Sri Lanka with India its major Service Node**
- **Cambodia and Myanmar are preparing pilot projects, subject to necessary resources**
- **Nepal is also considering a pilot project**
- **Standard Operation Procedure (SOP) will be formulated through pilot projects**

**Could the Regional
Mechanism be an example
for future UN-SPIDER
activities?**

**Thank you for
your comments**