Major Disaster Loss Assessment in China

中国重大自然灾害损失评估

UNSPIDER北京年会（2016·中国北京）

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National Disaster Reduction Center of China

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Major disaster loss assessment

01 Background

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Background to develop disaster loss assessment(Why)

Aggravation of natural disaster risks

Complication and diversification of disaster losses and impacts

Increasing demands of disaster relief and reduction

Emergency Response Law of the People's Republic of China
(Implemented in Nov. 1, 2007)

Regulations of Natural Disaster Relief
(Implemented in Sep. 1, 2010)

Contingency plan of emergency responses for natural disaster relief (2005)

Major disaster risk assessment

Major disaster loss &needs assessment

Contents system of disaster loss assessment (What)

***The Instruction of Enhancing Natural Disaster Relief Assessment*,** introduced by Ministry of Civil Affair in 2012, based on relief needs, is aimed to actively push the formulation of mechanism of natural disaster relief assessment, standardize assessment program, improve workflow, complete the indices system, explore working approaches.

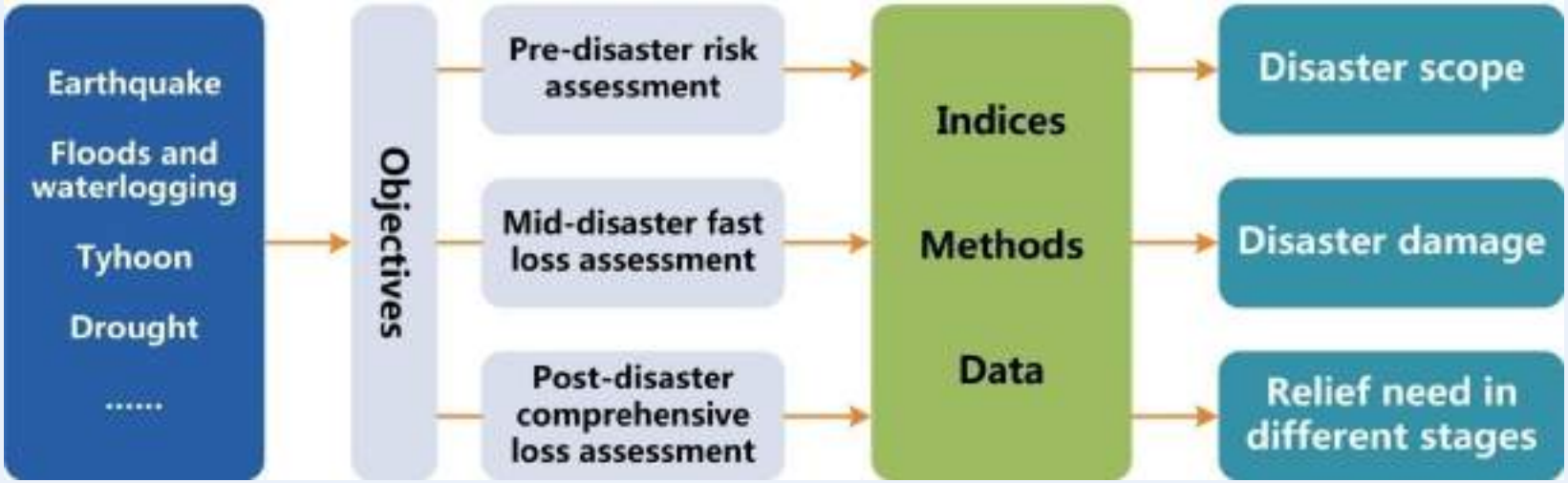
Assessment of natural disaster relief mainly includes 4 major categories, which are relief preparedness assessment, emergency relief assessment, post-disaster relief assessment and annual comprehensive assessment, and 12 subcategories focusing on specific fields.

Relief Preparedness Assessment	Disaster risk assessment	Needs assessment of disaster relief	Capabilities assessment of disaster relief	
Emergency Relief Assessment	Disaster losses assessment	Needs assessment of emergency relief	Effects assessment of emergency relief	
Post-Disaster Relief Assessment	Needs assessment of disaster relief for rebuilding damaged rural houses	Needs assessment of disaster relief in transition	Needs assessment of disaster relief for winter and spring livehood	Effects assessment of post-disaster relief
Annual Comprehensive Assessment	Annual disaster losses assessment	Annual effects assessment of disaster relief		

Framework of major disaster loss assessment(What&When)

The objectives of loss assessment:

- Objectively and timely learn about the damages and economic losses caused by disasters.
- Timely launch national and local emergency plans, and take emergency relief measures.
- Formulate the plans for recovery and reconstruction.



The software system for major disaster assessment(Where)

Achievements of major disaster loss assessment(Who)

From 2012, NDRCC has carried out major disaster loss assessment for 300 times, with the annual average 70 and 1-5 times per major disaster.
The average time is showing in the right tables.

Disaster kinds	Average time
earthquake	**30min**
Flood/typhoon	**2hours**
drought	**2-3hours**

year	times	Response times	indicator	sum	Pre-	Mid-	After-
2016（截至目前）	34	16省次/8过程响应或拨款	评估次数	47	7	25	15
			应对次数	34	7	25	8
			应对率	100%	70%	74%	80%
2015	49	20省次/12过程响应或拨款	评估次数	62	16	35	11
			应对次数	49	12	35	11
			应对率	100%	71%	71%	92%
2014	54	28省次/15过程响应或拨款	评估次数	82	16	54	12
			应对次数	53	11	45	11
			应对率	98%	58%	83%	73%
2013	63	34省次/19过程响应或拨款	评估次数	98	16	60	22
			应对次数	56	14	46	15
			应对率	89%	52%	73%	79%
2012	46	42省次/23过程响应或拨款	评估次数	39	14	25	0
			应对次数	34	14	22	0
			应对率	74%	56%	48%	0

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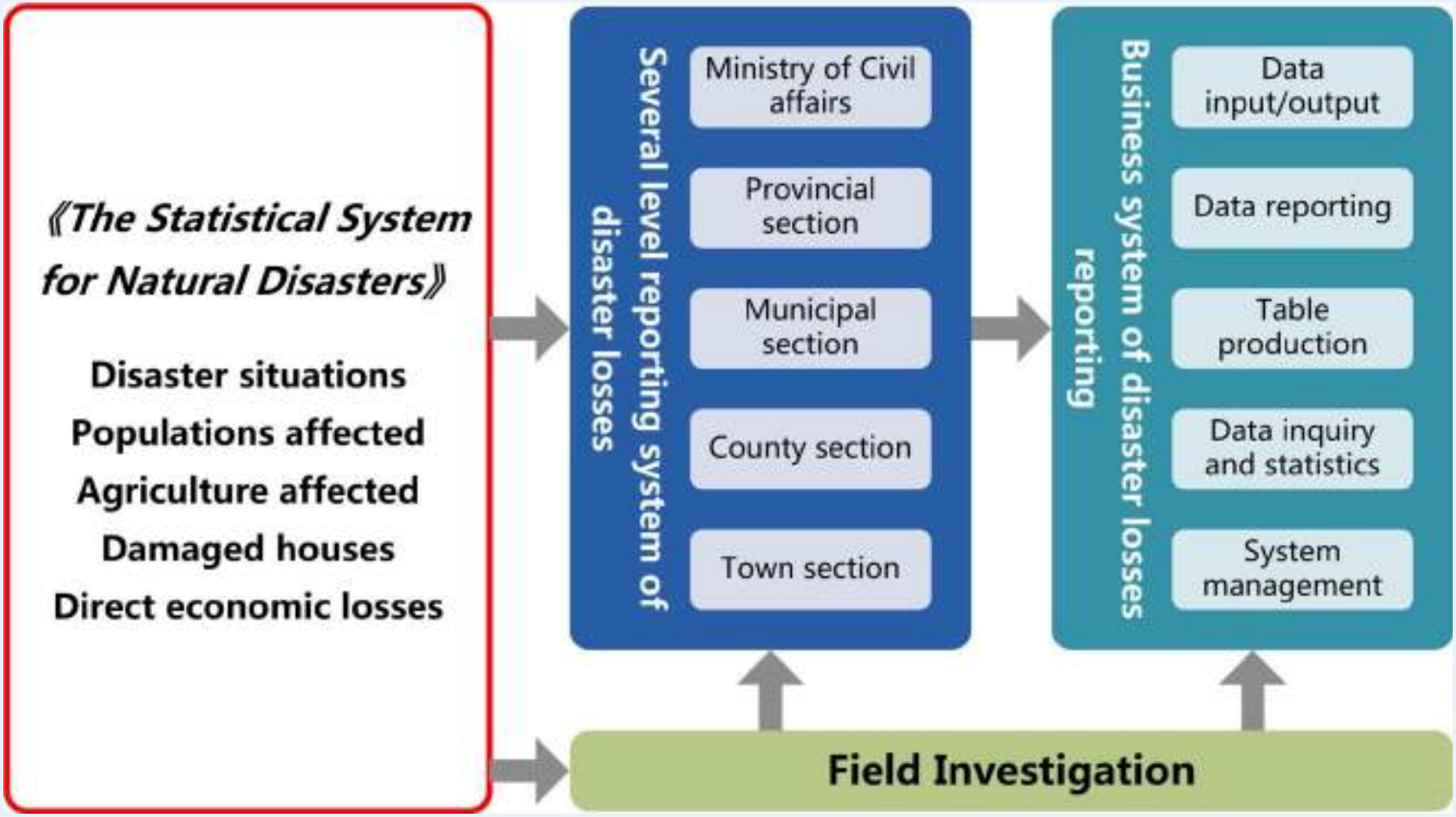
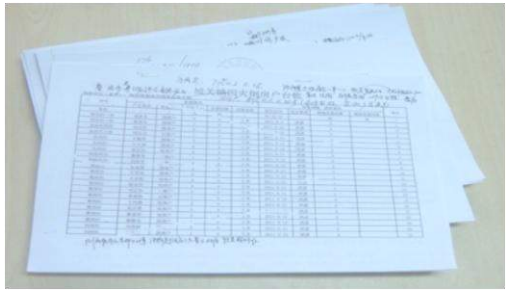
On-the-spot Investigation and Grassroots Statistics and Reporting of Natural Disaster Losses



On-the-spot Investigation and Grassroots Statistics and Reporting of Natural Disaster Losses




GB
中华人民共和国国家标准


MZ
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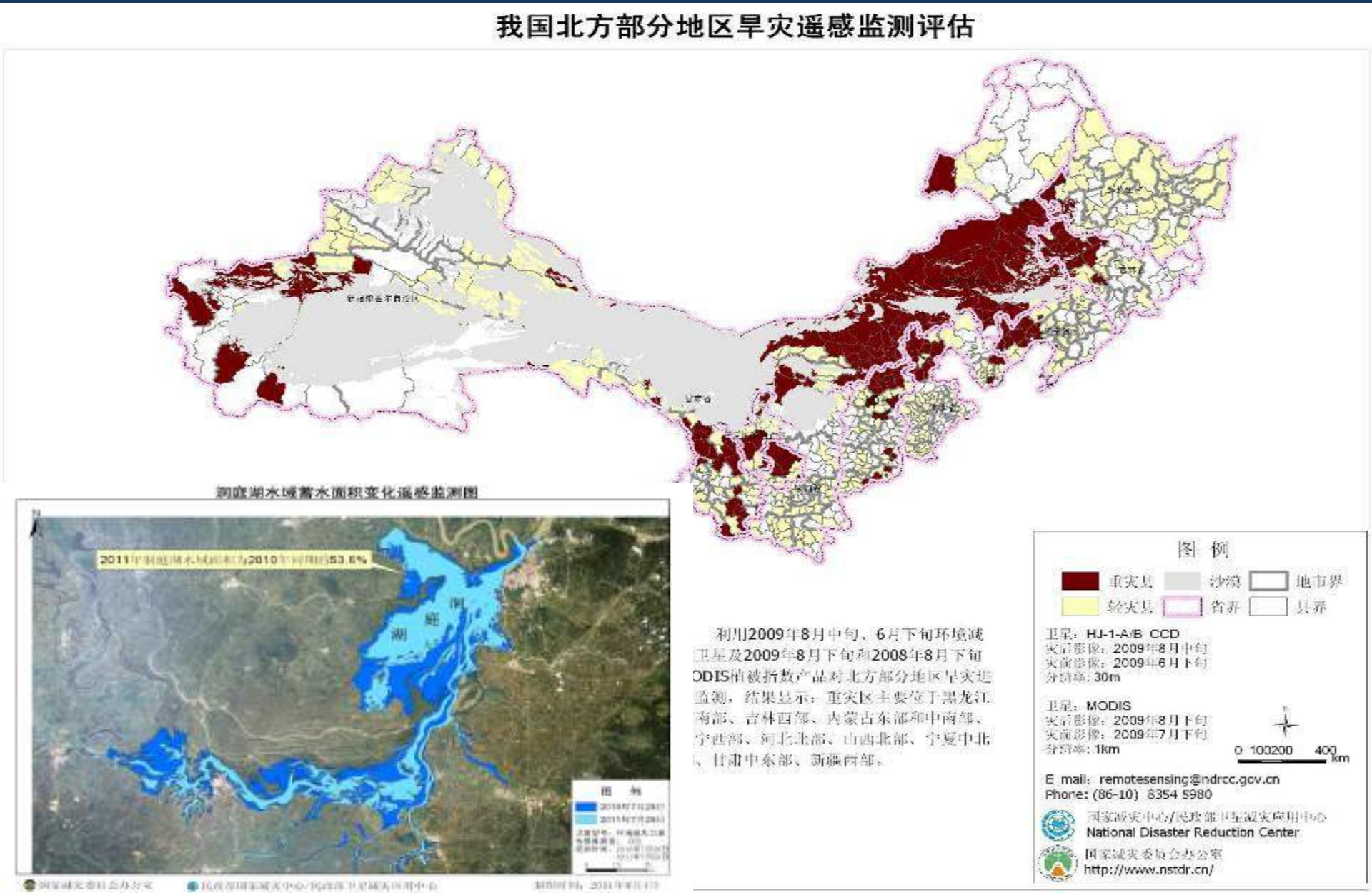
Make Use of Remote-Sensing Technology in Disaster Monitoring and Assessment



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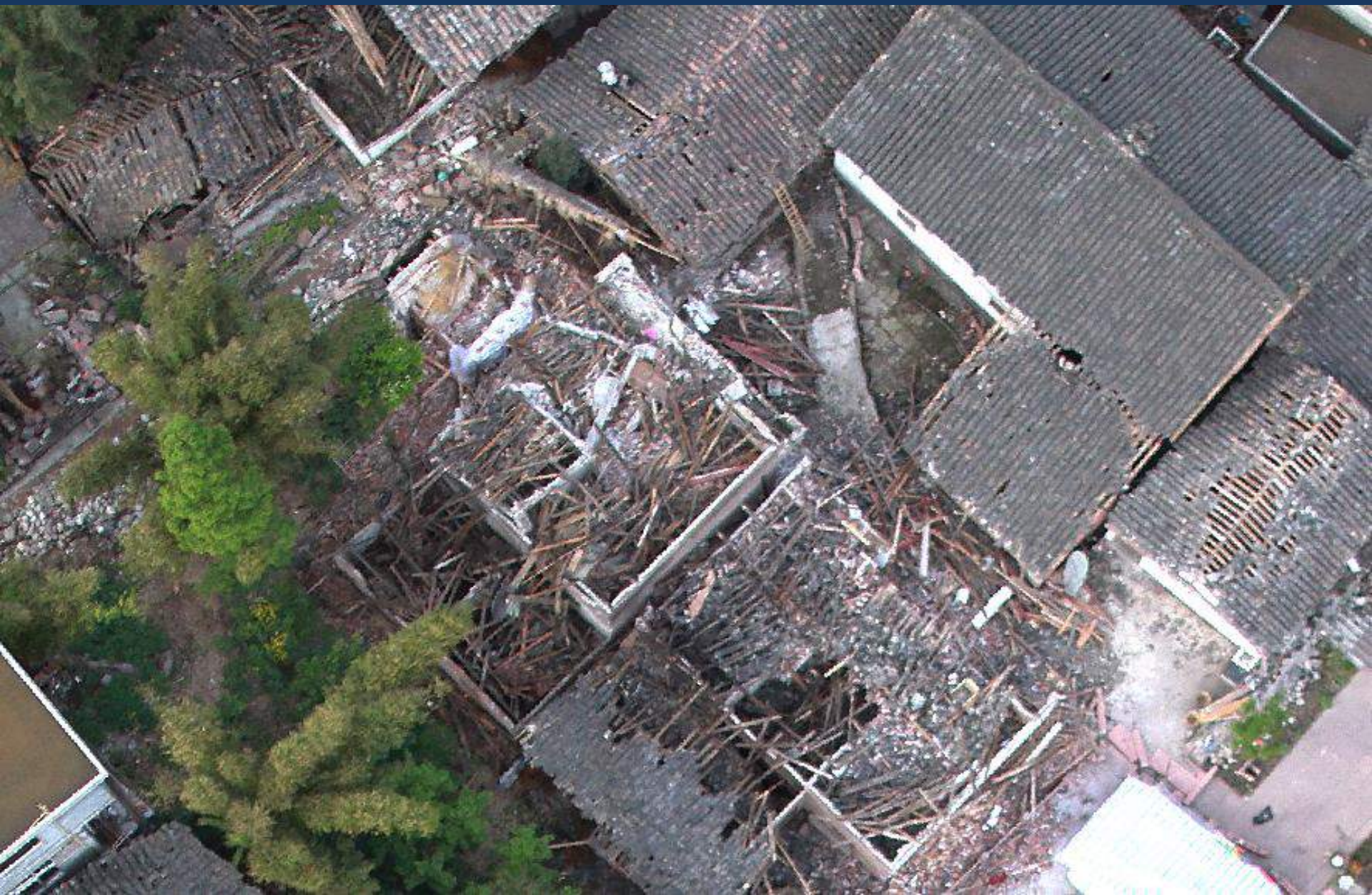
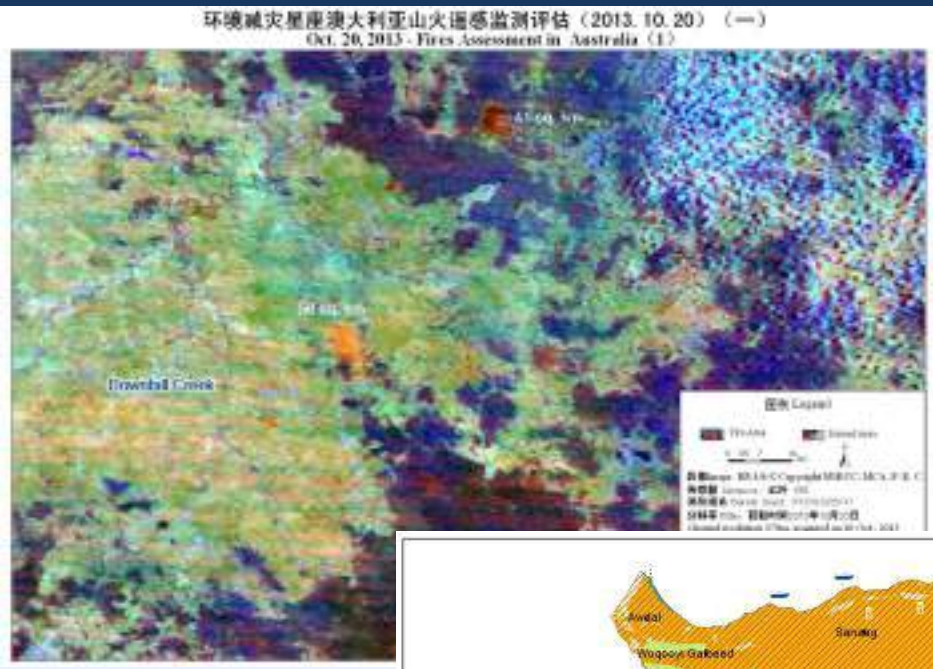
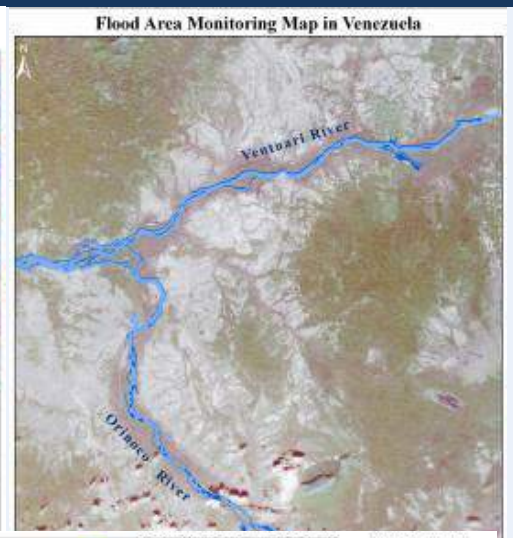


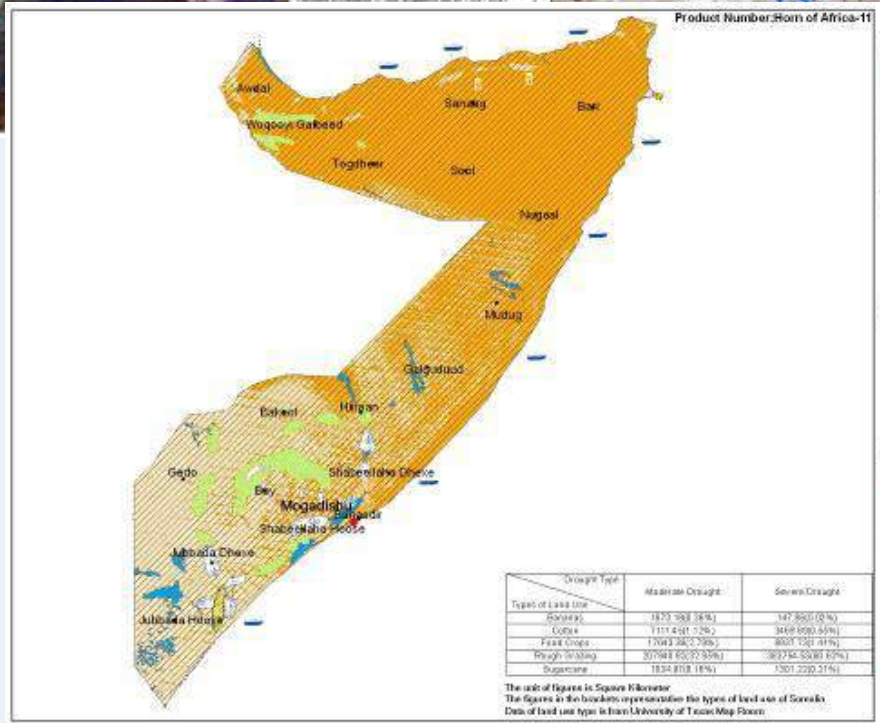
Make Use of Remote-Sensing Technology in Disaster Monitoring and Assessment

- In recent years, remote-sensing technologies have played important roles in the disaster loss assessment of major earthquakes such as the Wenchuan Earthquake, and major floods and waterlogging such as the collapse of a dam in Wuzhou City, Jiangxi Province, and the flood of the Heilongjiang River Basin in 2013.

Make Use of Remote-Sensing Technology in Disaster Monitoring and Assessment



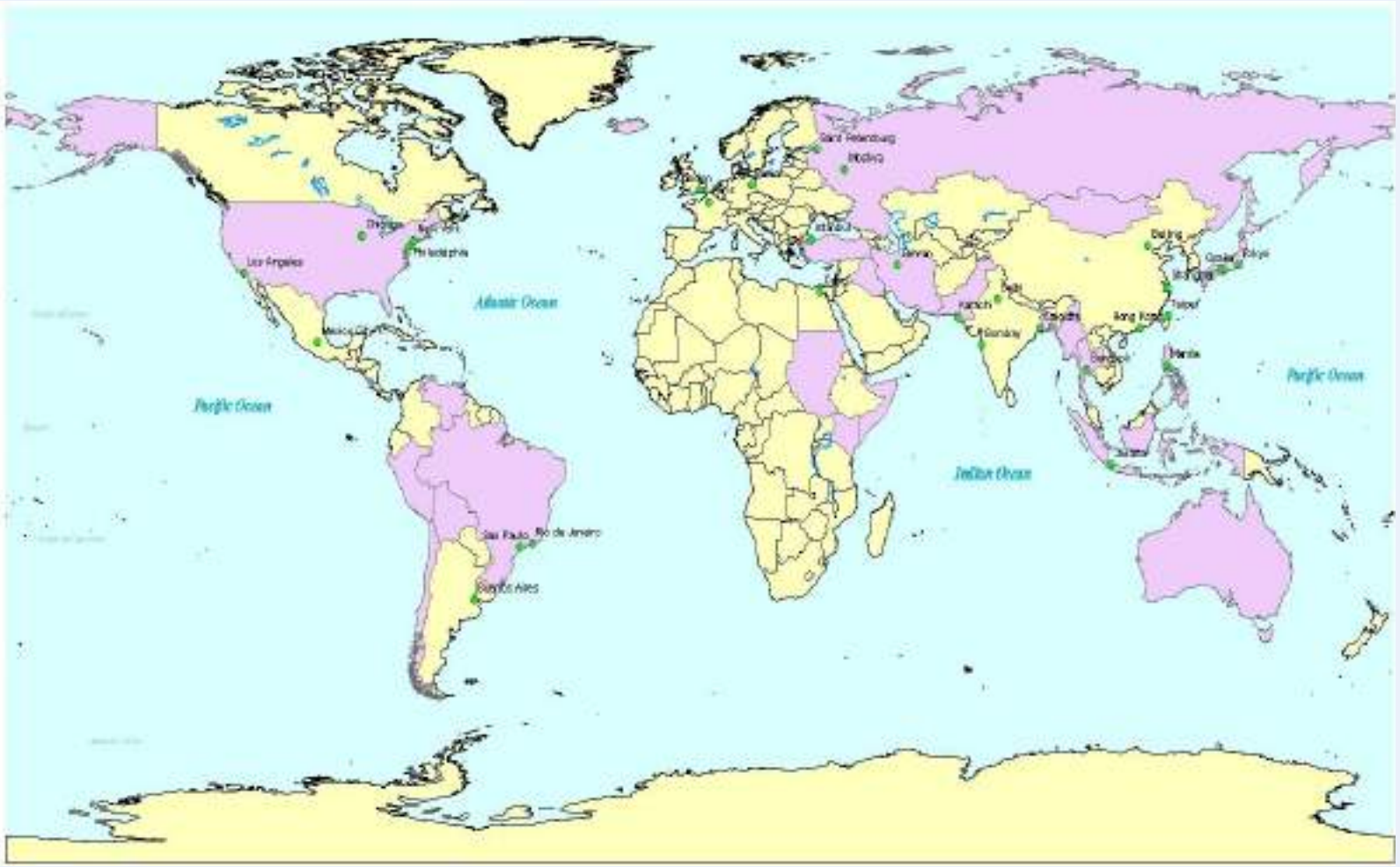




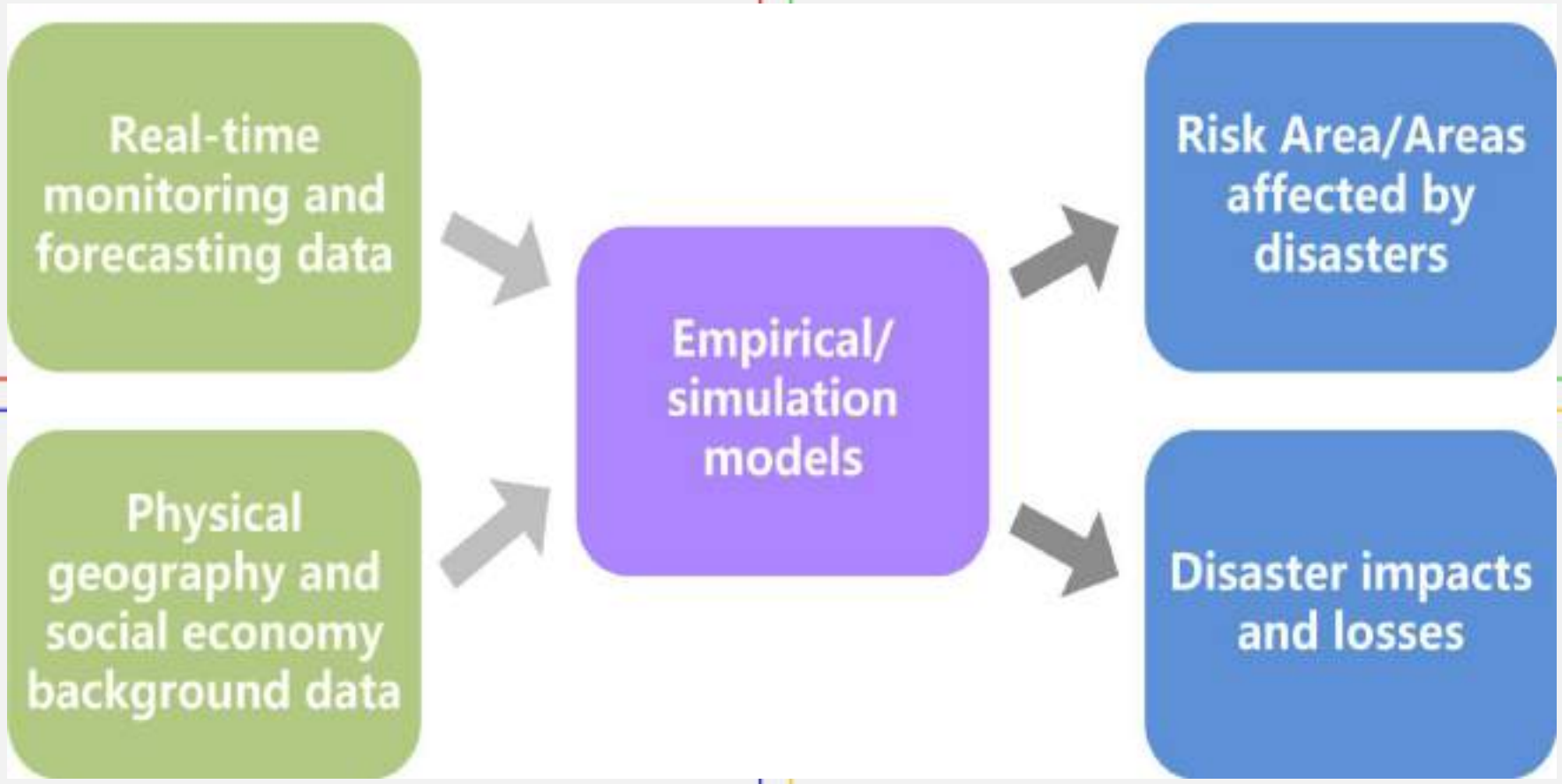
NDRCC has successively carried out monitoring and assessment for over 20 major disasters occurring in foreign countries, such as fires in Australia, a fire in Bolivia, the Haiti Earthquake, the Chile Earthquake, the Japan Earthquake, the Pakistan Flood, the Venezuelan Flood, the drought in the Horn of Africa, the Pakistan earthquake, the Iraqi flood, etc.

Make Use of Remote-Sensing Technology in Disaster Monitoring and Assessment

- **Over 20 countries in six continents have received NDRCC's service, in terms of such natural disaster types as fires, earthquakes, droughts, typhoons, floods and waterlogging, etc.**



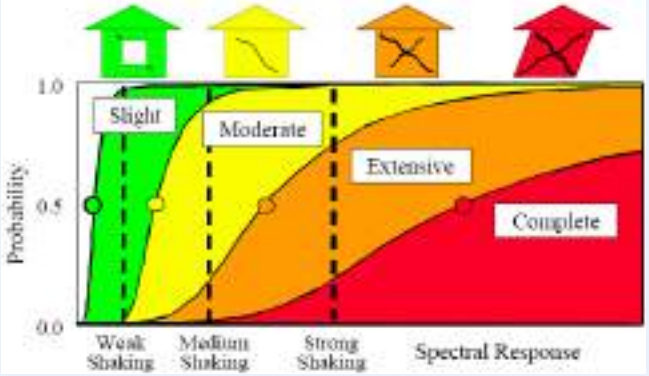
Carry out rapid assessment using empirical models



Carry out rapid assessment using empirical models

Earthquake

Vulnerability curve indicating damaged status slight ~ severe



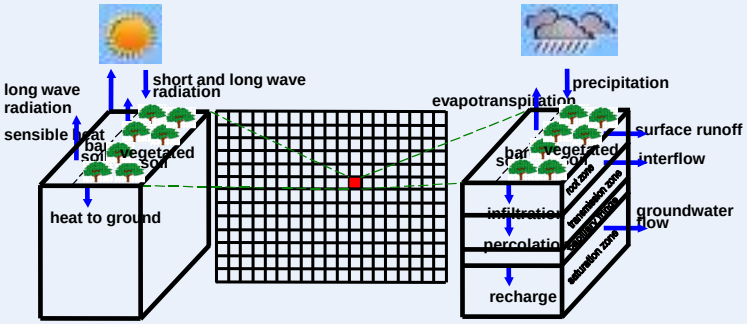
Earthquake damage matrix(%) for houses of steel and cement in areas with a basic intensity of IX

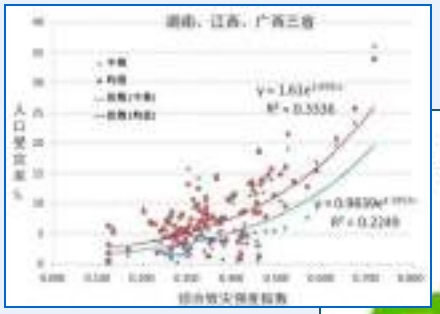
Intensity	Intact	Slightly damaged	Moderately damaged	Severely damaged	Completely destroyed
VI	95.0	5.0	0.0	0.0	0.0
VII	90.0	10.0	0.0	0.0	0.0
VIII	80.0	15.0	5.0	0.0	0.0
IX	55.0	35.5	8.5	1.0	0.0
X	30.0	35.0	27.0	5.5	2.5

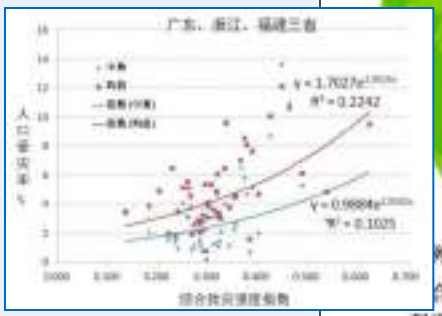
Carry out fast assessment using empirical/simulation models

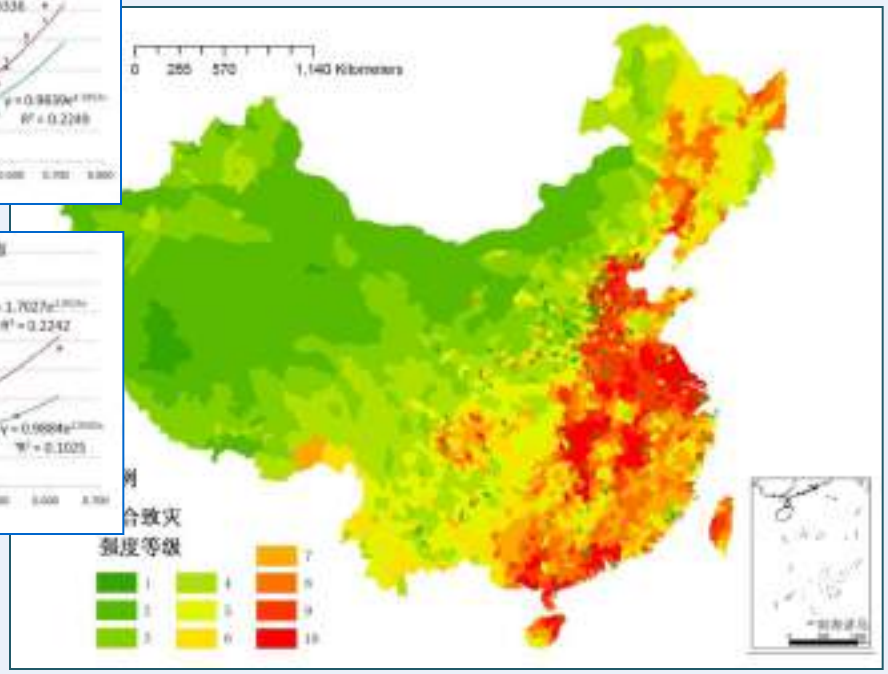
Flood and waterlogging

WetSpa distributed hydrological model









Carry out fast assessment using empirical/simulation models

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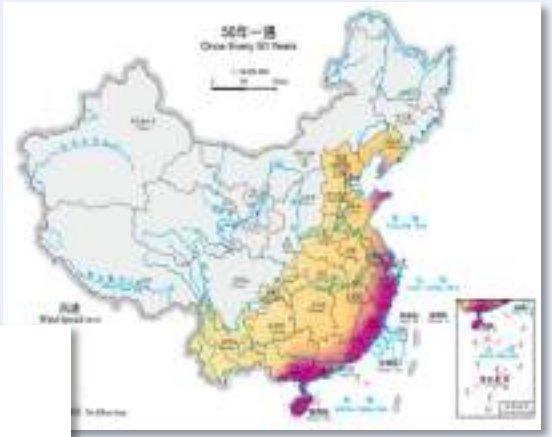
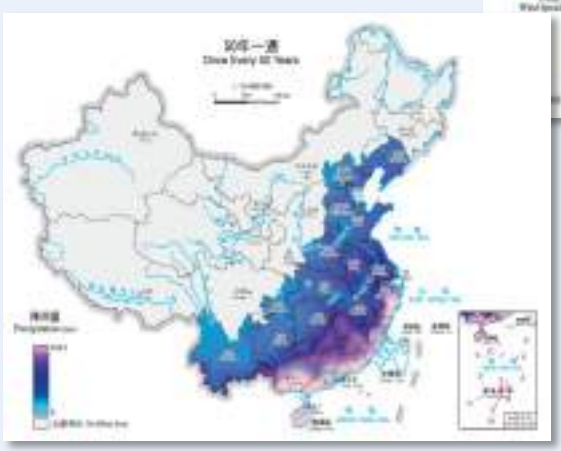
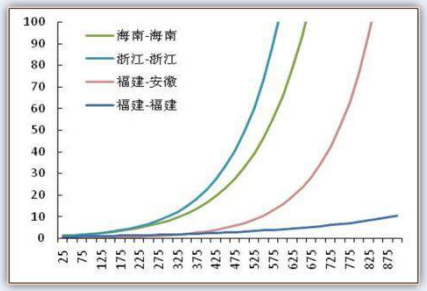
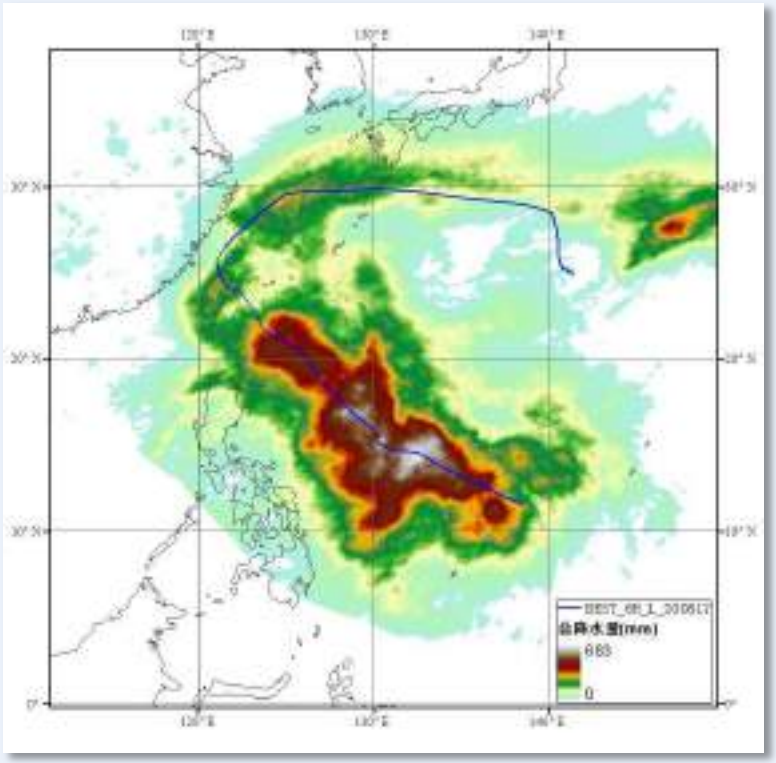
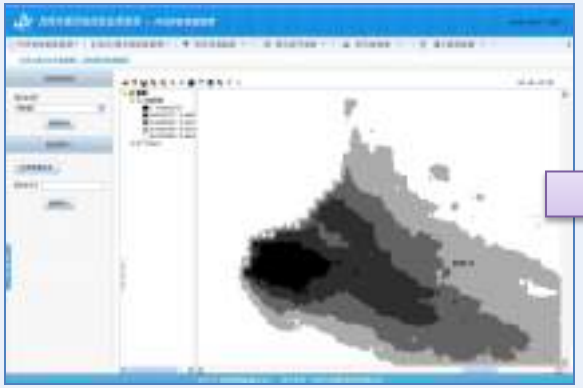




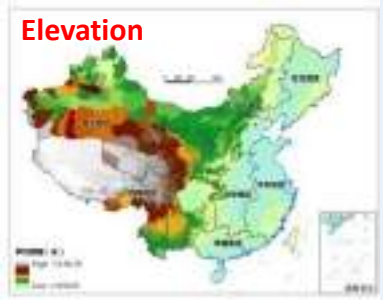


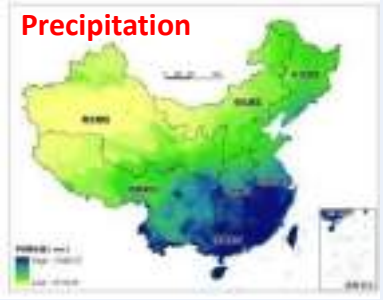


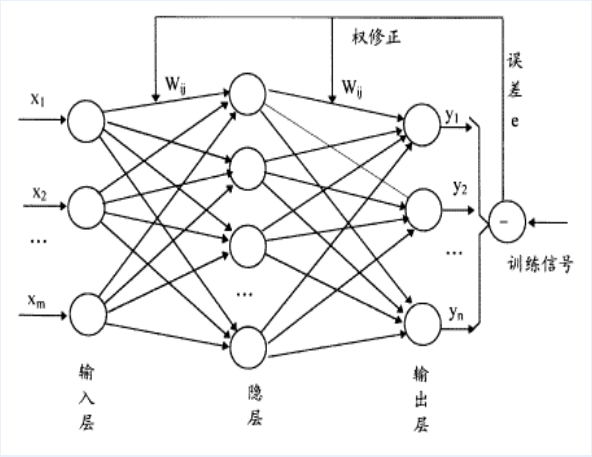


Carry out fast assessment using empirical/simulation models

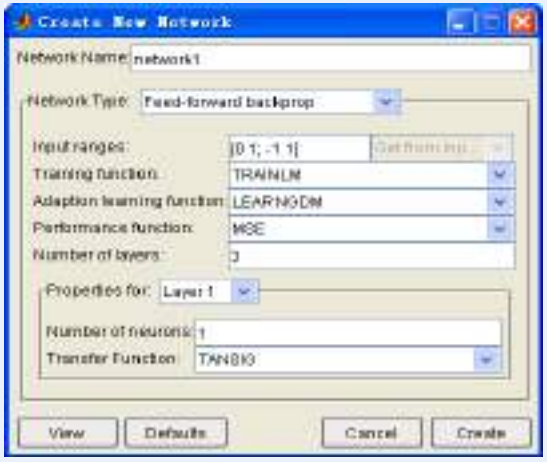
Drought



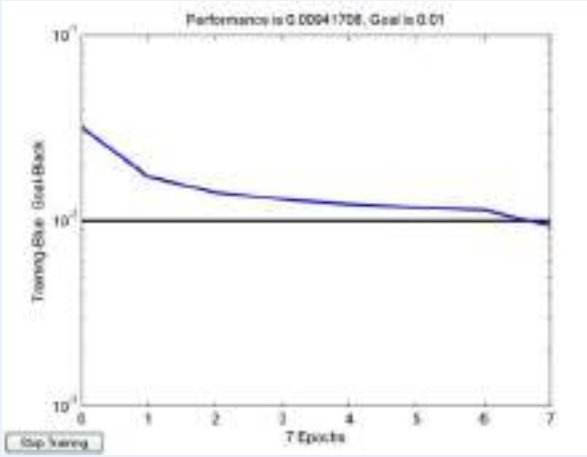




Model structure

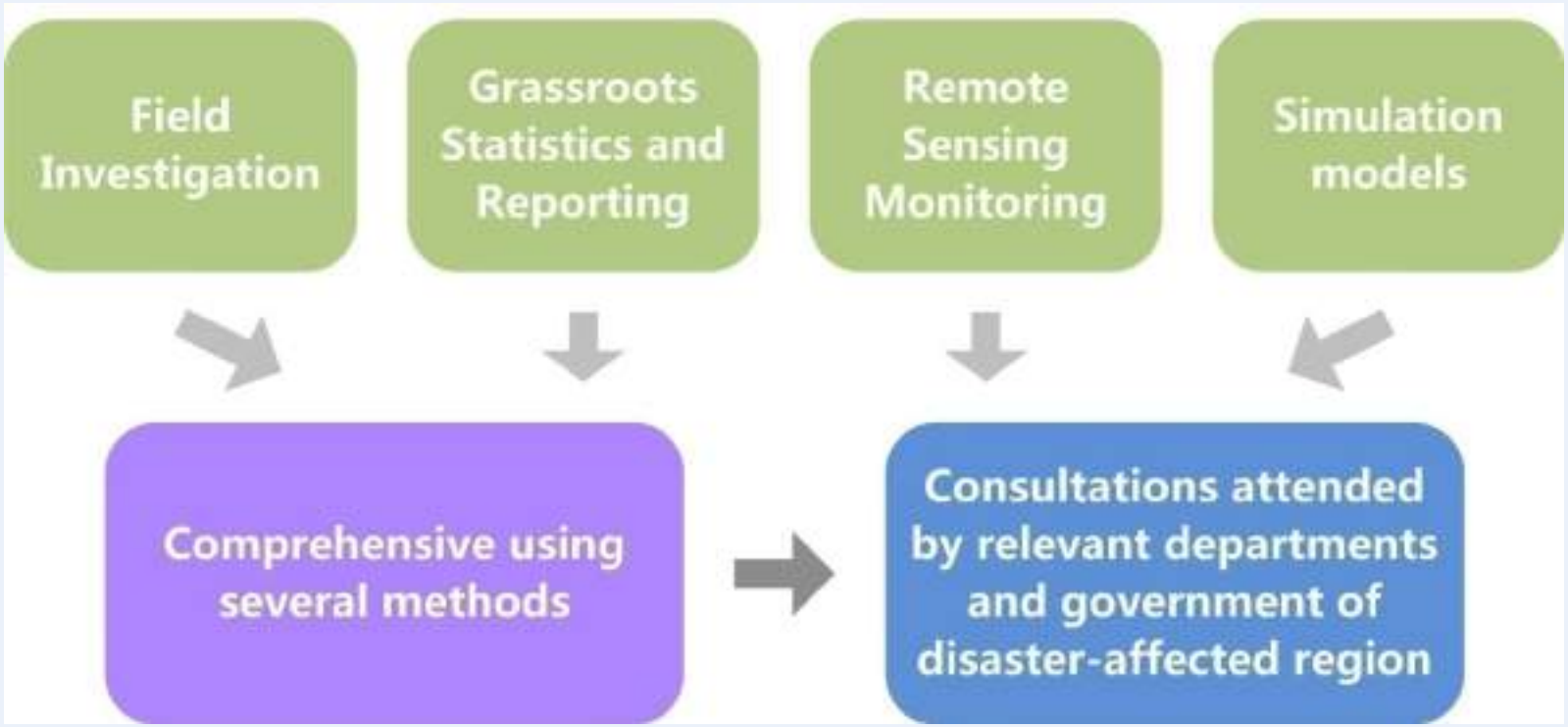


Model parameters



Model Precision

Carry out comprehensive assessment making use of the several methods



In recent years, using the mentioned-above methods, China central government carried out the losses assessment for about 70 major natural disasters to support the decision-making of the disaster emergency and relief.

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Major disaster loss assessment

01 Background

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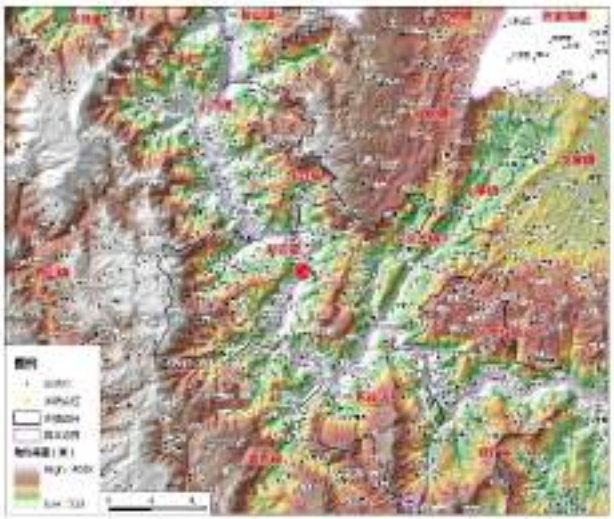
Ludian earthquake disaster loss assessment

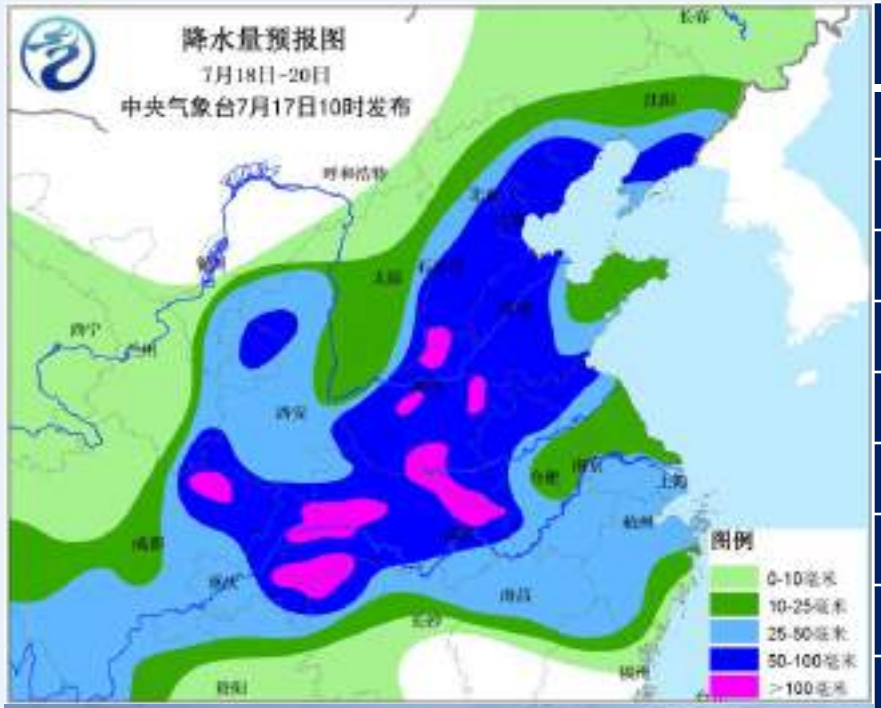
during the disaster: rapid loss assessment for disaster losses
After the disaster: comprehensive loss assessment



乡镇	倒塌间数	严重损坏间数	一般损坏间数	基本完好间数
龙头山	14133	10122	7409	2694
火德红	4974	3410	2423	920
乐红	7141	4781	3279	1213
新店	8379	5606	3608	1222
包谷垴	5861	4338	3173	1059
纸厂	2245	3485	4273	3486
合计	42734	31743	24166	10593

North China rainstorm and flooding disaster loss assessment

before the disaster: pre-assessment for disaster scope and losses
during the disaster: rapid loss assessment for disaster losses
After the disaster: comprehensive loss assessment

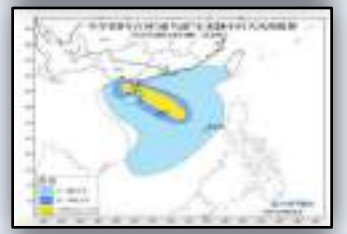


省份	上限	下限	均值
河北省	2628	681	1655
山西省	1853	973	1413
内蒙古自治区	1253	732	993
辽宁省	1890	829	1360
安徽省	706	546	626
山东省	2832	1189	2011
河南省	4219	2172	3196
湖北省	5488	3129	4309
湖南省	1692	1063	1378
四川省	4213	2575	3394
陕西省	7213	3123	5168
甘肃省	1291	806	1049
合计	35278	17818	26548

TC Rammasun disaster loss assessment

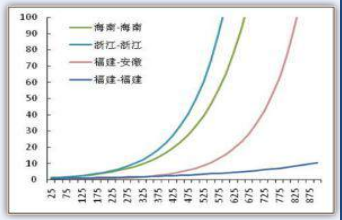
before the disaster: pre-assessment for disaster scope and losses
during the disaster: rapid loss assessment for disaster losses
After the disaster: comprehensive loss assessment

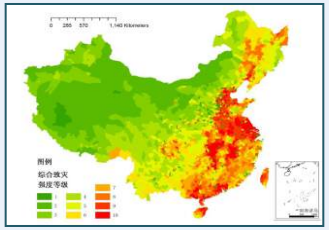
Inputs

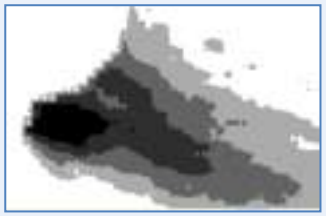


Forecasting/ real data …

Models







Similar route Vulnerability curves……

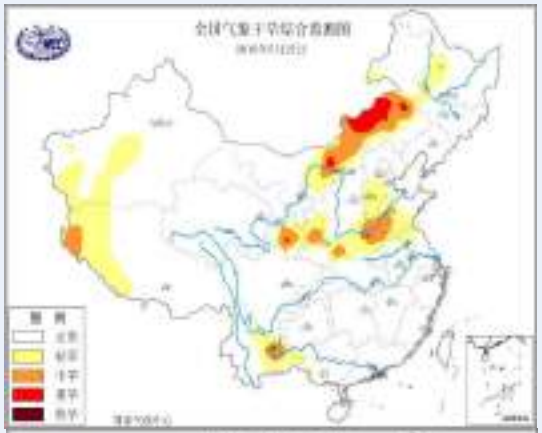
Outputs

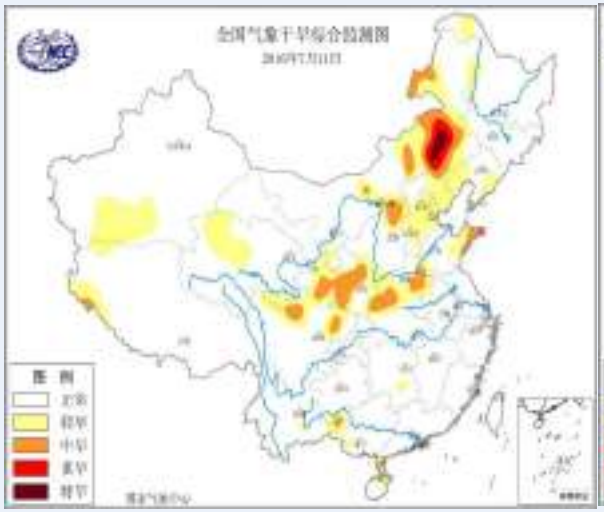
- **Risk areas**
- **Risk of damages& losses**

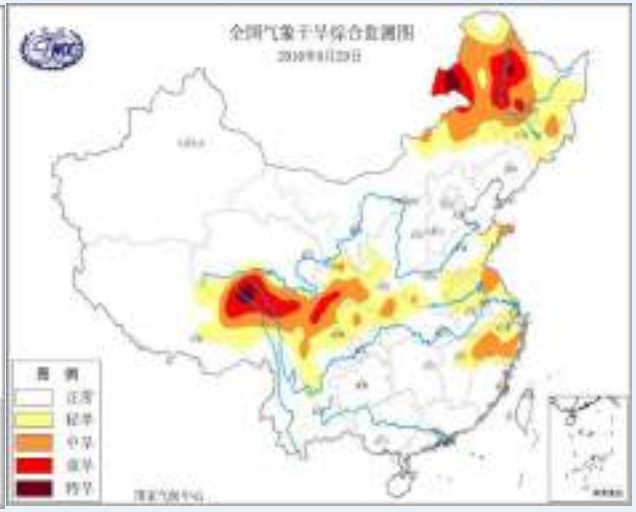
Collapsed houses and evacuated population

North China drought disaster loss assessment

before the disaster: pre-assessment for disaster scope and losses
during the disaster: rapid loss assessment for disaster losses
After the disaster: comprehensive loss assessment







受灾地区	地方上报（万人）	模型评估（万人）	模型评估结果占乡村人口百分比（%）
内蒙古	121.6	59.8	8.48
黑龙江	91.5	39.6	2.37
甘 肃	50.2	32.3	2.18
合计	263.3	131.7	——

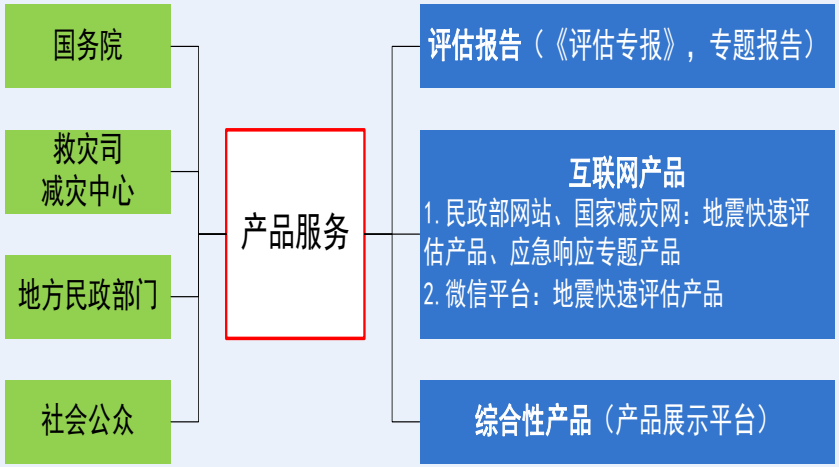
Reports of disaster loss assessment

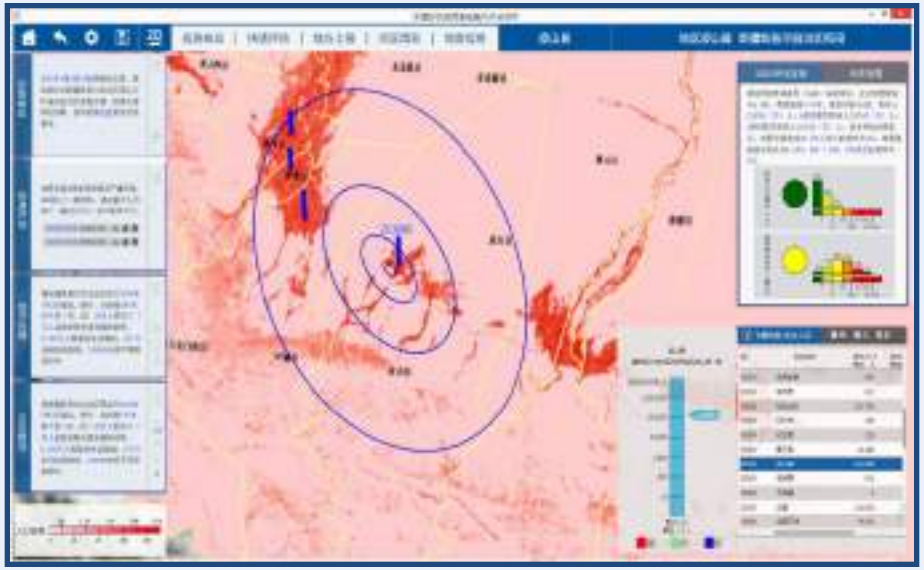
The reports of assessments for the disaster damages and losses will be provided to the decision-makers for the preparedness and emergency of the relief work.

区域	受灾人口	紧急转移安置人口	需紧急生活救助人口	倒塌房屋间数	严重损坏房屋间数	一般损坏房屋间数	直接经济损失
海南省合计	321.7	18.9	6.9	2.4	10.1	14.5	122.4
文昌市	42.4	6.7	1.5	1.7	6.5	10.8	59.7
海口市美兰区	44.6	2.8	0.9	0.3	2.6	0.0	16.8

Reports of disaster loss assessment

The results will be released to the public by the website and WeChat.





Thanks...