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中国水资源安全评价 / Water Resources Security Assessment of China

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提纲/Outline

1. 众说纷纭水安全/ Divergent opinions about water security of China
2. 水资源安全综合评价指标体系/Indicative system
3. 中国水资源安全评价结论/Assessment conclusions
4. 中国水资源安全对策/Countermeasures

众说纷纭中国水安全/Divergent opinions about water security of China

美国参议院听证会 / The US Senate hearing

China faces its worst economic crisis: water

(July 31, 2013) Water woes ranging from polluted drinking water to contaminated groundwater reserves and toxic rivers, to cross-border water disputes with neighbours over transboundary river flows, are moving China towards a catastrophe with "profound implications." In testimony to the U.S. Senate last week, the Council on Foreign Relations' Asia director Elizabeth Economy names industry as the key culprit. The Wall Street Journal's MarketWatch.com reports.

By Michael Kitchen for The Tell, MarketWatch.com, published on July 31, 2013

> China has a serious problem, bigger than the slowdown in manufacturing growth or the housing-price bubble. It's water, and it's a catastrophe that could affect the rest of Asia and the larger world.

真有400座城市缺水吗 / Really over 400 cities lack water?

- 合理的怀疑：严重缺水影响在哪里 / Reasonable doubt: where is the impact of serious water shortage while rapid development?
- 缺水的定义与标准：供水不能满足需求 / Definition of water shortage

1. 不能把水量丰富、水质良好而因设施老化、管理不善影响供水的城市定性为缺水城市/Aging facilities, Poor management under abundant water. is not of water shortage
2. 不能把有可替代水源而超采地下水的城市定性为缺水城市/Over exploitation of groundwater while existing other water sources is not of WS city.
3. 不能把偶尔缺水的城市定义为缺水城市/occasional cutting off is not shortage.
4. 不能把区域缺水与城市缺水混淆 /Regional shortage not equal to city shortage

最重要的是不能把“潜在需求”等同于“需求”/ Potential need is not market demand

- 经济学不承认“没有支付能力的需求”/Don’t count on need without paying capacity.
- 说因为水价高、条件不好不来投资，就不是真正的投资需求！也说明这些企业可以在合适的其他地区投资/Possible investment (-moved to other better water condition region finally) is not the real investment

具体的城市“缺水”标准/Standards for water shortage city

- 没有合适的供水水源来满足合理的城市用水需求/without suitabe water supply source
- 只要能找到合适的供水水源就不能算是缺水城市/If only there exist suitable water supply source for a city, the city can’t be classified as WS city.

中国缺水城市只有80个/Only 80 cities of water shortage

- 松花江流域 6个
- 辽河流域 8个
- 海河流域 25个
- 黄河流域 15个
- 淮河流域 12个
- 长江流域 3：六盘水、贵阳
- 华南 6个：北海等
- 内流河 5个：乌兰察布等

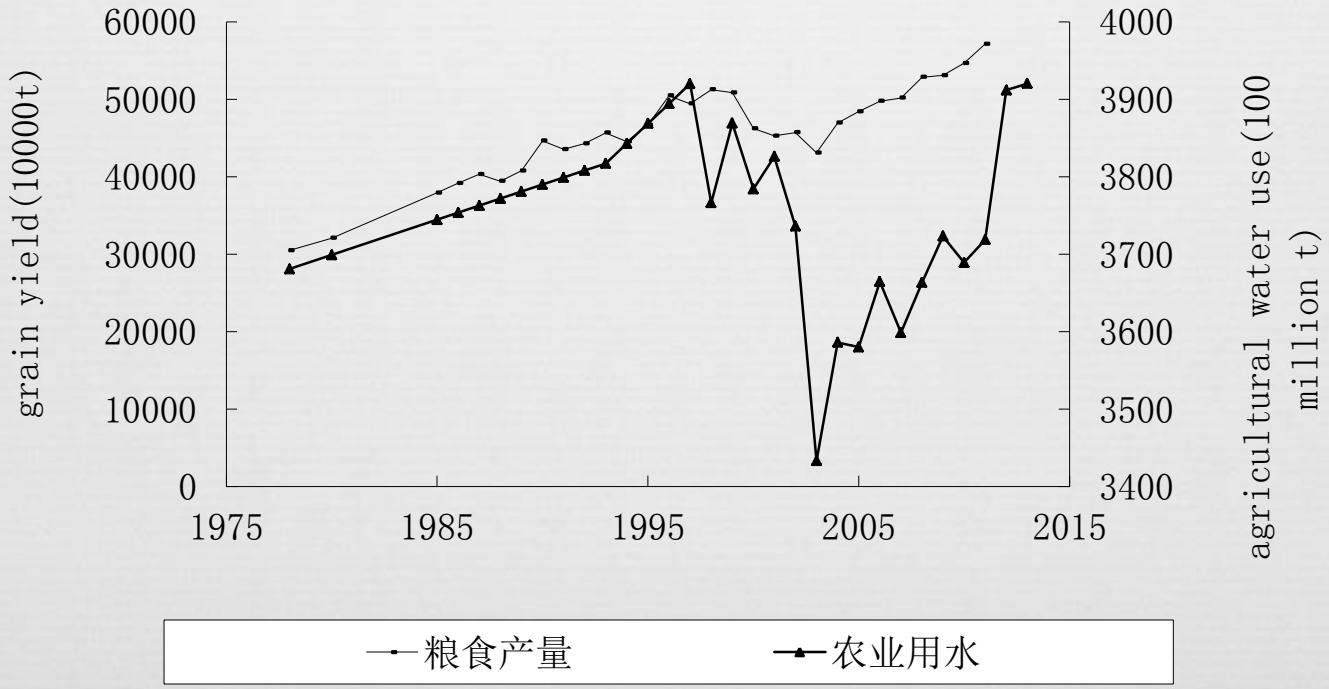
严重缺水城市只有32个/Only 32 cites of serious water shortage

- 严重缺水的判断依据是长期而言当地水源不足、外调水成本高、不会有供水成本较低的城市供水水源/The standards of serious WS: no enough water source, high cost of water supply

1. 主要分布在海河流域，有19个/19 cities in Hai basin
2. 其次是黄河流域有9个，其中山西省汾河流域占了7个/9 in Yellow river basin
3. 内流河流域2个（乌兰察布，金昌）/2 in inland basins
4. 东北嫩江流域1个（霍林郭勒）/1 in Nenjiang basin
5. 淮河流域一个（亳州）/1 in Huai basin

中国的粮食生产用水有保障吗/Can China guarantee water supply for grain?

- 第一句话：中国用更少的水生产了更多的粮食/First judgement: having produced more grain with less water



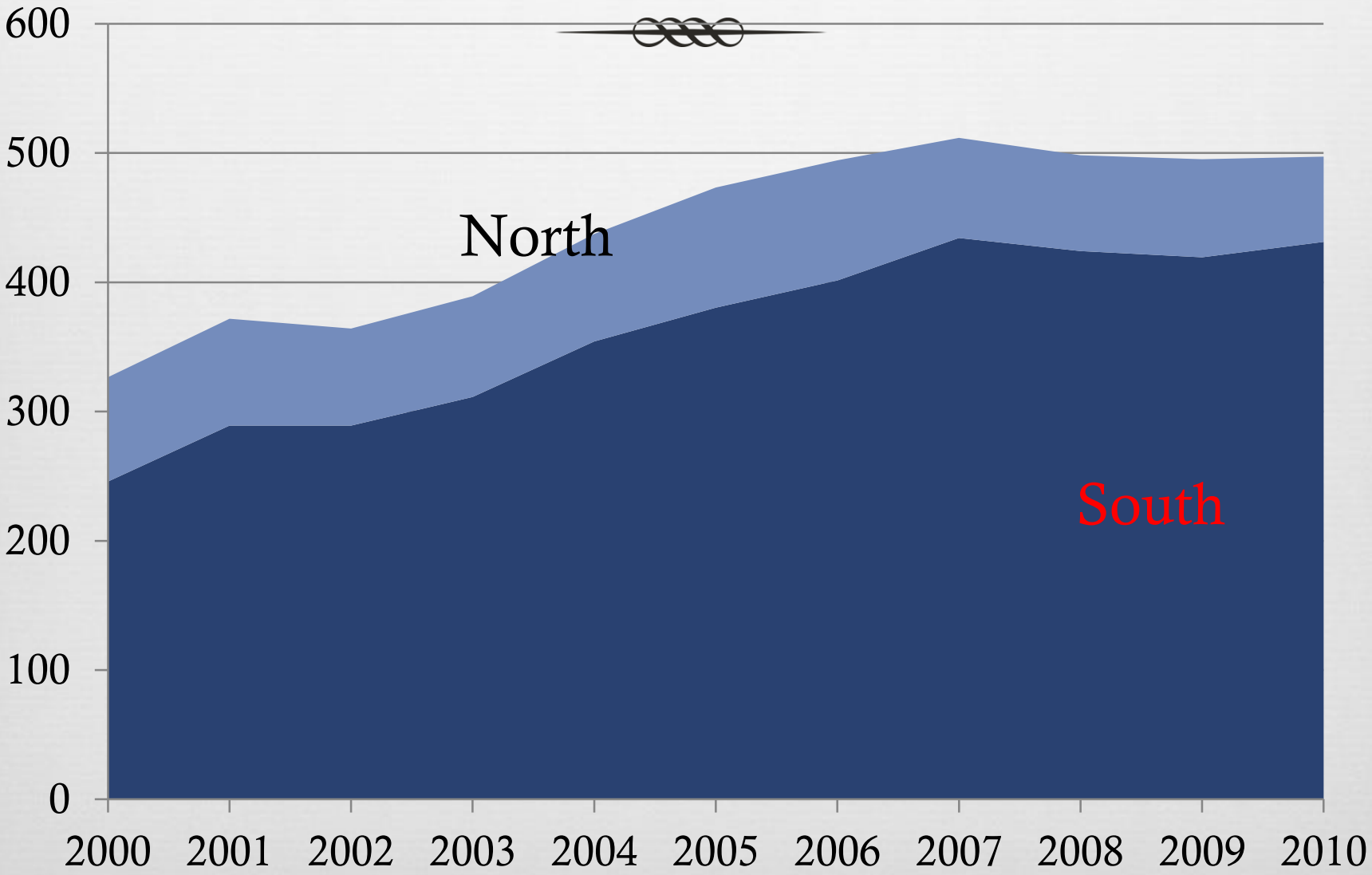
第二句话/second judgement

- 2014年粮食产量6.071亿吨已经超过了2020年规划产量5.5亿吨，接近2030年14.5亿人、人均420千克的需求量6.09亿吨
- China produced 607.1 million ton of grain in 2014, greatly surpassed the planned output for year 2020 and neared the demand in 2030 for 1.45 billion population and 420kg/person grain standard.

能源用水：不会构成严重危机
Energy water: will not form a serious crisis

- 火电用水占工业用水的比重确实比较高（约1/3），但主要用于南方，北方缺水地区不多
- Thermal power is really the main industrial water user,taking up 1/3 water use
- But, most thermal power water use took place in South China as once-through cooling water, where there is enough water.

Water for power plants decreased ($10^8 m^3$)



黄河中上游是矛盾焦点/the middle-upper reaches of the Yellow River is the focus of conflict

- 未来主要的能源基地在这里/The main energy base of China, 70% of coal supply of China
- while coal constitutes of 70% total energy supply

But water demand of energy base is not so big!

- 当地目前的火电用水只有6.5亿方，未来规划15亿方（并不像一些危言耸听的100亿方、甚至300亿方） / The present thermal power water use is only 0.65 b.m3/year. The future demand is predicted at 1.5 b.m3, not so big as to 10-30 b.m3.
- 主要靠农业节水，万一不够，还可以修建南水北调西线的部分工程 / will mainly depend on the water saving of agricultural sector. If still not satisfied, the West-Route of SNWTP has been planned.

全国水资源安全综合评价

Synthetical assessment of water resources security of China

水资源安全概念 / definition of water resources security

Socio-economic and ecological water demand are satisfied with

1. 足够数量/enough quantity
2. 符合要求的质量/acceptable quality
3. 可长期持续（水资源、供水、生态）/sustainability
4. 可以承受的成本/affordable cost

评价指标体系/indicator system

- 4 aspects:quantity, quality, sustainability and cost
- 10 sub-principles
- 31 indicators

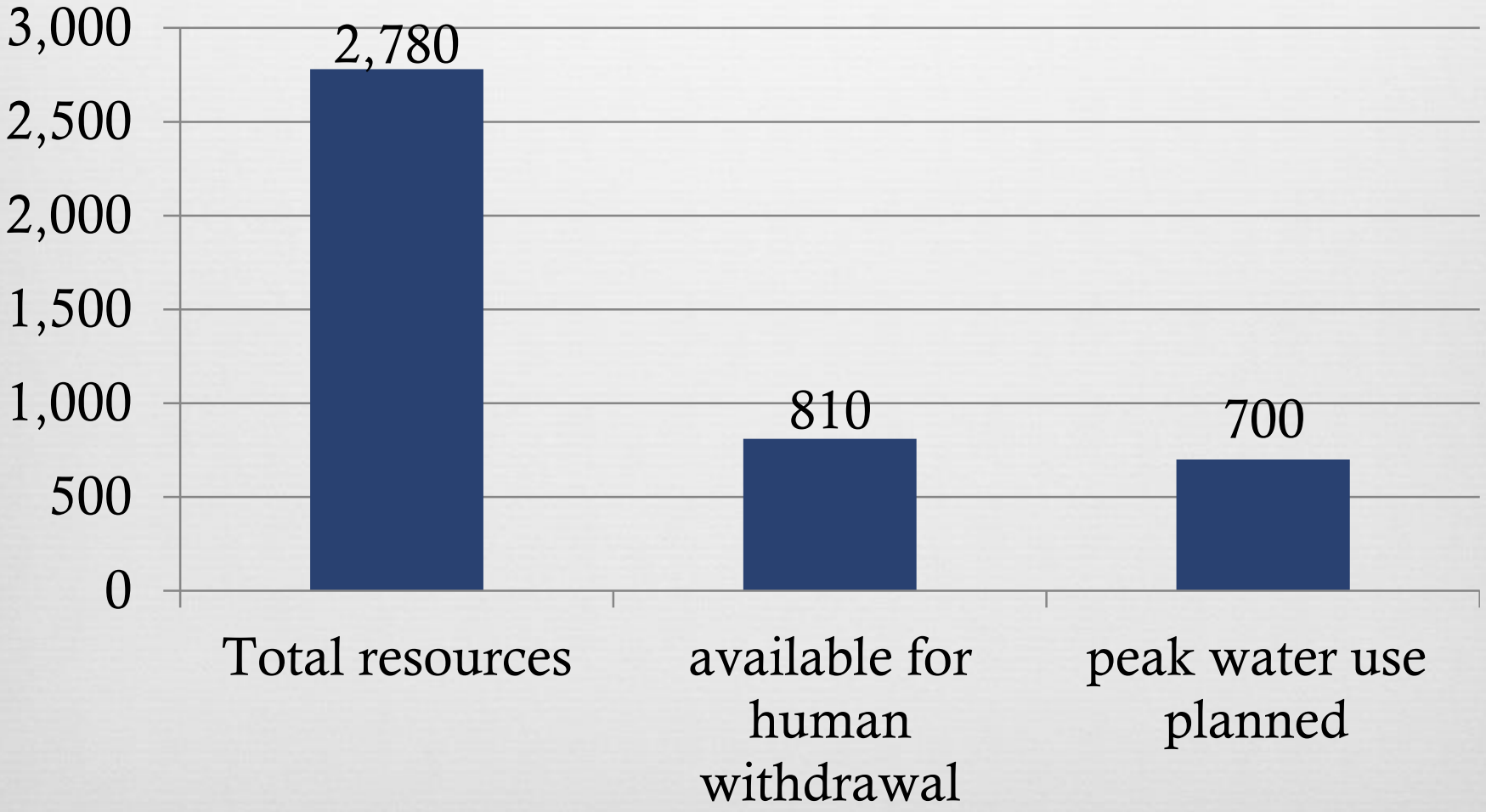
约束条件 / main principle	子约束/sub-principle	评价指标 / indicators
水资源数量足够 enough quantity	常年需水数量满足程度 Satisfaction degree	总需水满足率/ratio of total water satisfied
		生活需水满足率/ratio of domestic and commercial Water satisfied
		农业灌溉需水满足率/
		工业需水满足率
	供水保证率 Guarrantee ratio	城镇供水保证率
		农村生活供水保证率
		灌溉用水保证率
水质 acceptable quality	自然水体水质 source water quality	河流水域功能达标长度比例
		湖泊水域功能达标面积比例
		近海水域功能达标率
		城市饮用水水源达标率
		农村饮用水水源达标率
	供水水质 Terminal use water quality	城镇自来水水质达标率
		农村饮用水供水水质达标率
		工业用水水质达标率
		灌溉用水水质达标率
可持续性 sustainability	水资源可持续性 Resource sustainability	当地水资源减少的可能性与幅度
		客水减少的可能性与幅度
	开发利用可持续性 Development sustainability	水资源过度开发率
		地下水超采率
		有争议或未签协议水权占全部取用水权比例
	水生态可持续性 Ecosystem sustainability	生态需水满足率
		因缺水引起的绿洲萎缩率
		因缺水引起的湖泊萎缩率
成本与价格 affordable cost	生活水价居民是否可以承受 Domestic water price	生活用水水价与人均收入之比
		家庭水费支出占家庭可支配收入的比例
		低收入人群水费补助率
	生产水价企业是否可以承受 Industry water price	水费占总生产成本的比重
		生产水价与其它国家的比较
	供水成本社会是否可以承受 Social cost of supply	供水成本的国际比较
		供水成本的经济增长弹性

中国水资源安全评价结论 / Assessment conlusion no.1

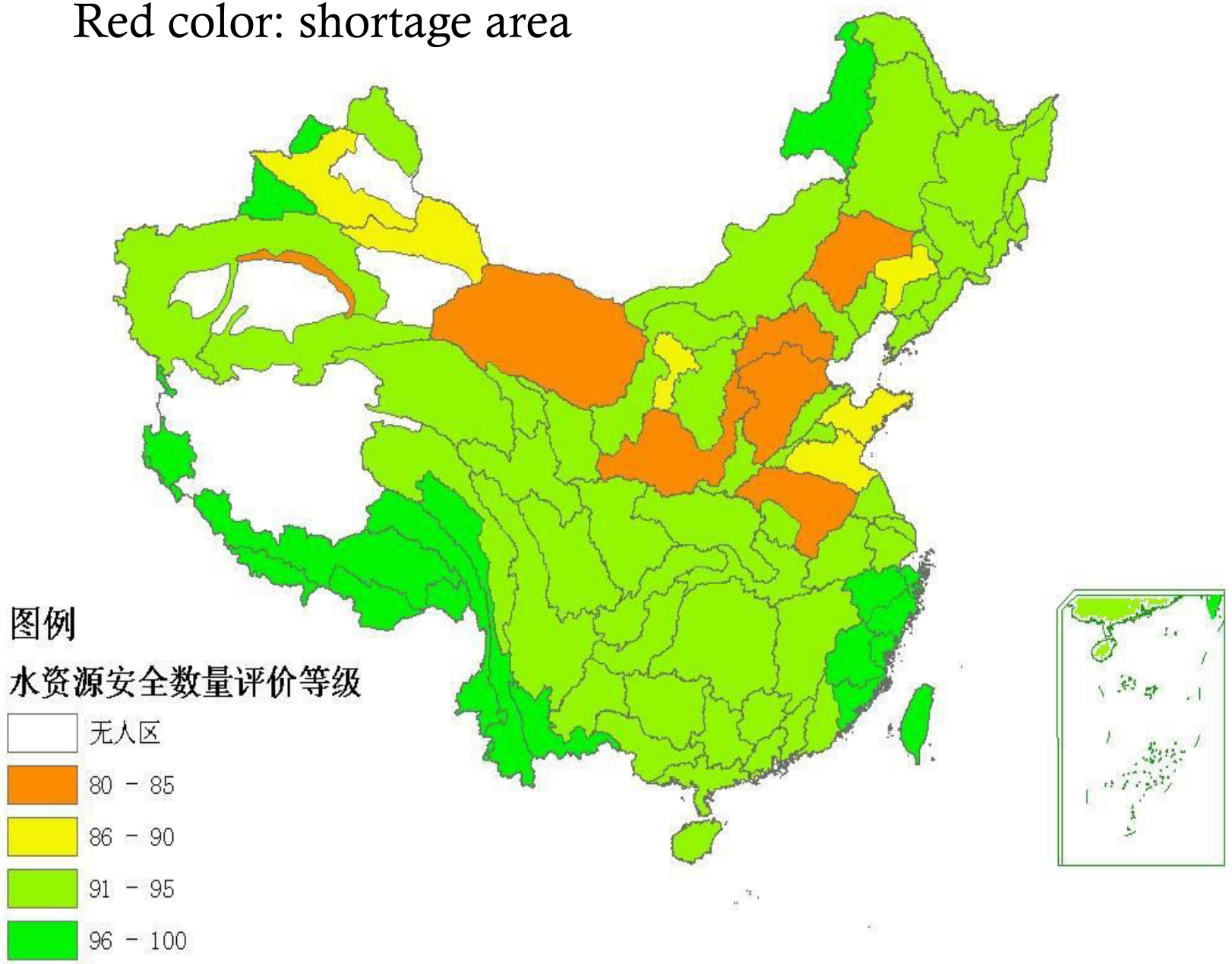
- 水资源数量：总量足够，但北方若干流域矛盾突出/total quantity is enough, but some local area in north and northwest China in shortage

1. 全国2030年的高峰需水量被要求控制在7000亿方，实际上可能不会超过6500亿方/The future demand will most probably be lower than 650 b.m3
2. 考虑生态需水、经济可能性，全国可供水量约8100亿方/The available for human use is 810 b.m3
3. 但海河流域、汾渭盆地、河西走廊、天山北麓、西辽河流域水资源开发过度，水量不足/ Shortage area: Hai basin, middle reach of Yellow river basin, Hexi corridor, Xinjiang, etc.

Although there are some crises, Water Quantity is enough for China! (km^3)



Red color: shortage area

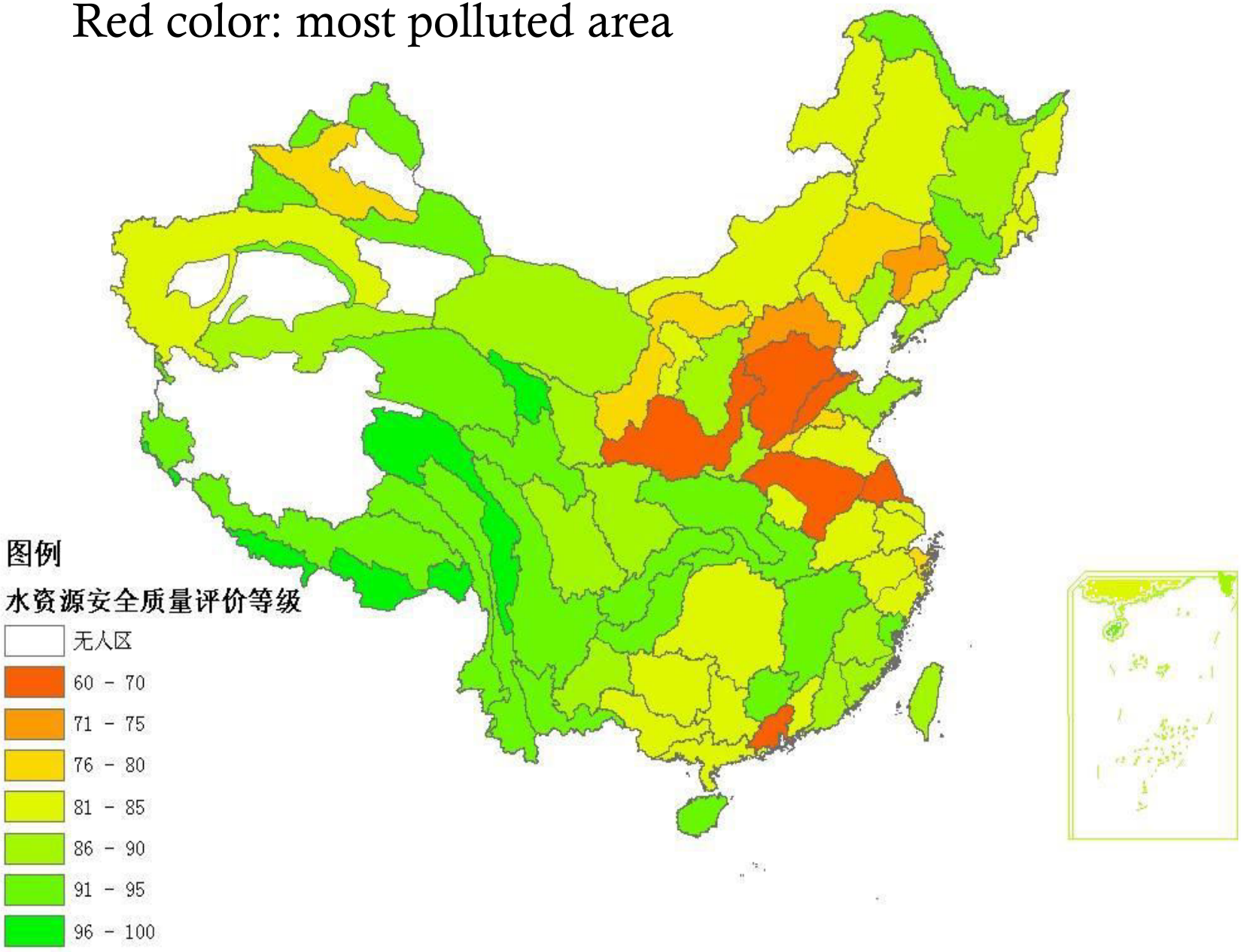


评价结论 / assessment conclusion no.2

- 水资源质量不安全是中国水资源安全的首要威胁/quality insecurity is the number 1 threat

1. 2/3河长被明显污染（达不到二类标准），1/3被严重污染（达不到Ⅲ 类）/2/3 river length polluted
2. 一半以上地下水采样点水质属于差、极差/more than half sample well quality poor
3. 自来水出厂合格率只有83%，终端合格率更低 / Water factory pass rate only 83%，terminal quality worse
4. 灌溉水质有风险，连带土壤被污染，农产品品质受影响/waste water irrigation not well controlled
5. 淡水水域、近海水域被污染，水产品质量堪忧/ risk of Aquatic products from polluted water

Red color: most polluted area

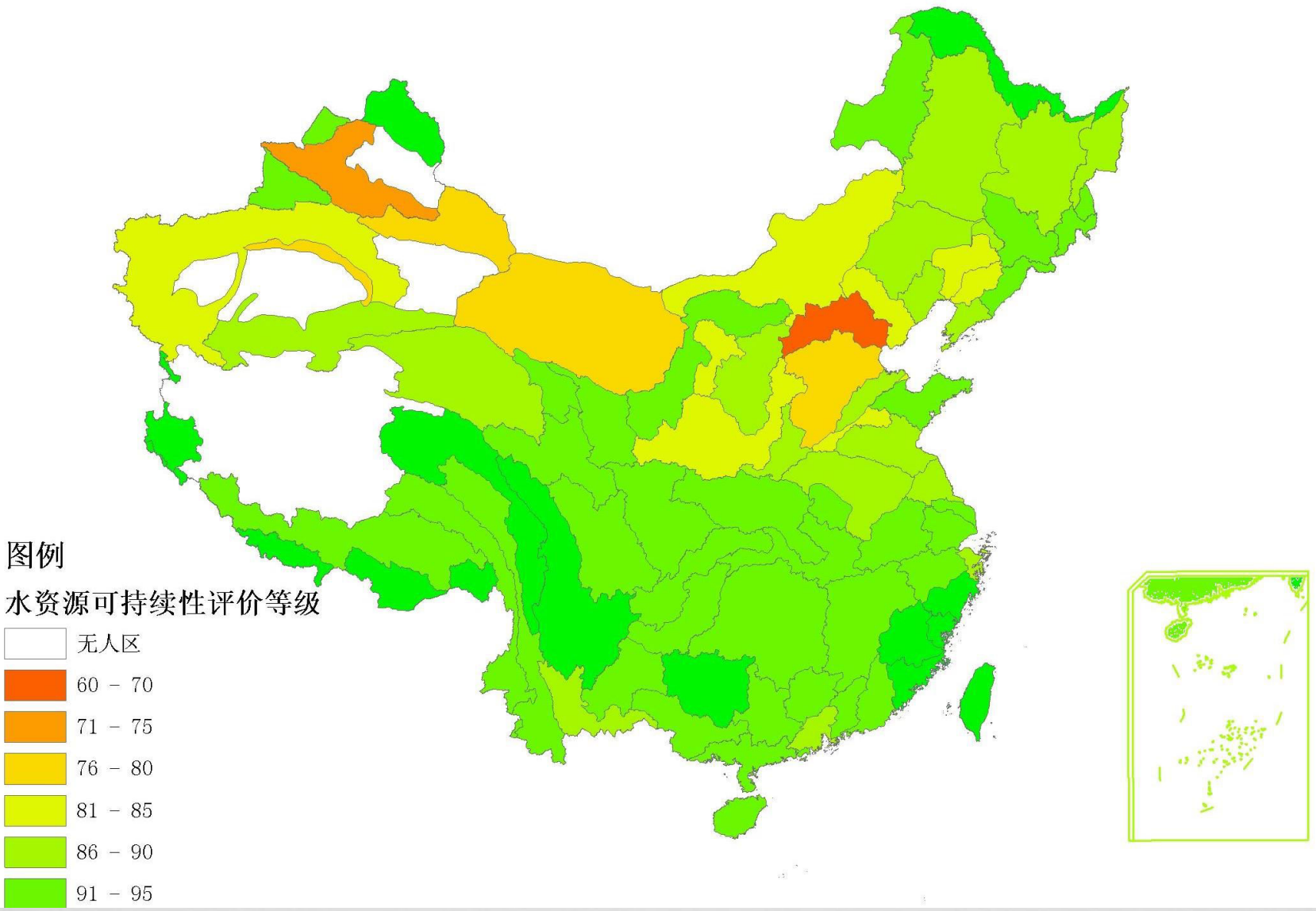


评价结论 / assessment conclusion no.3

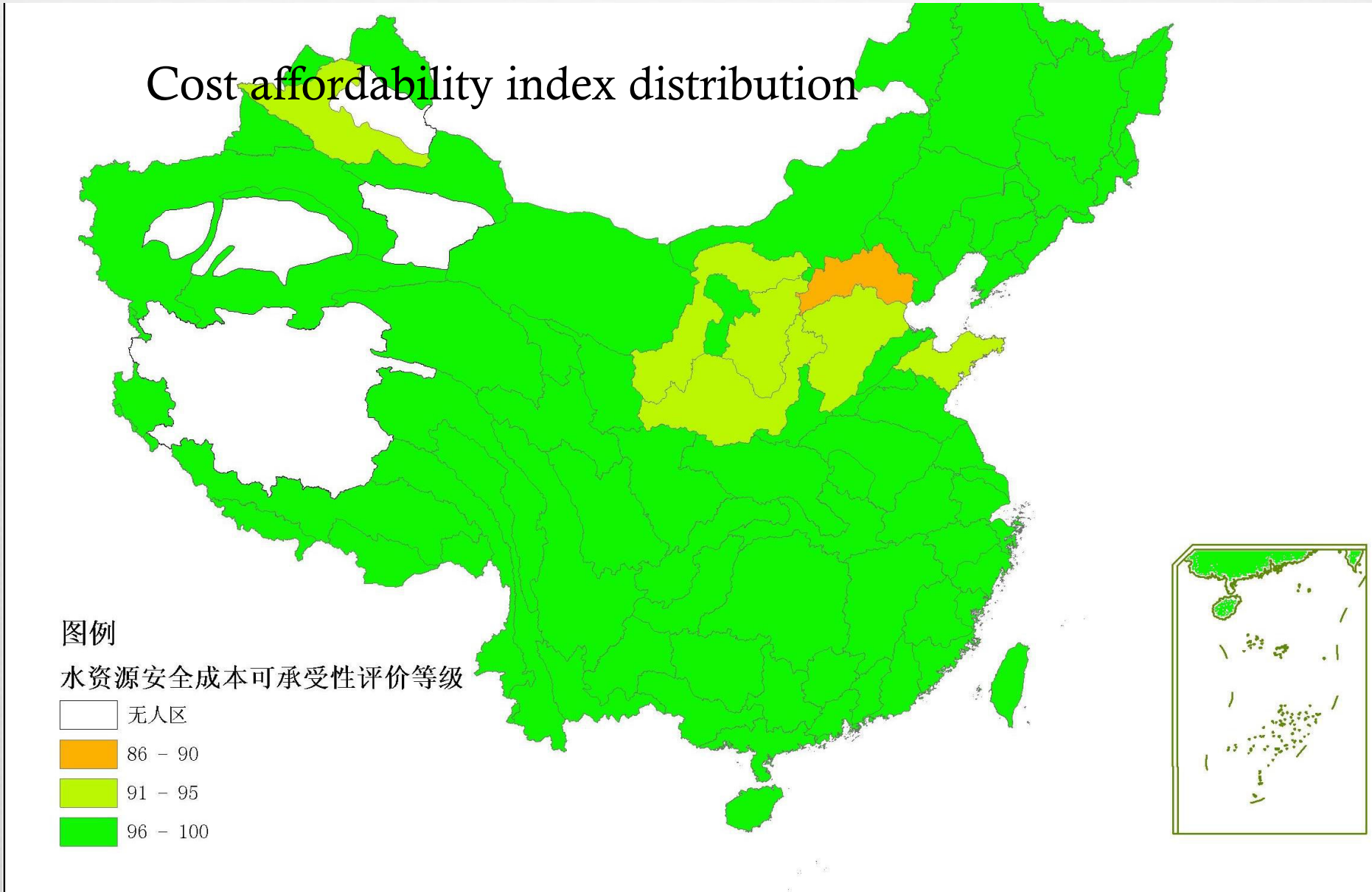
- 水资源安全的可持续性属于“安全”，近年有所改善/ sustainability improved

1. 北方降水有转多的迹象/transforming to rich precipitation period in northern China
2. 水资源开发过度的地方建成或在建调水工程、海水淡化工程、中水回用工程/new water supply projects finished or constructing
3. 生态需水得到部分恢复：黄河不再断流，干涸的湖泊又有了水面/ecological water requirement has been given more priority

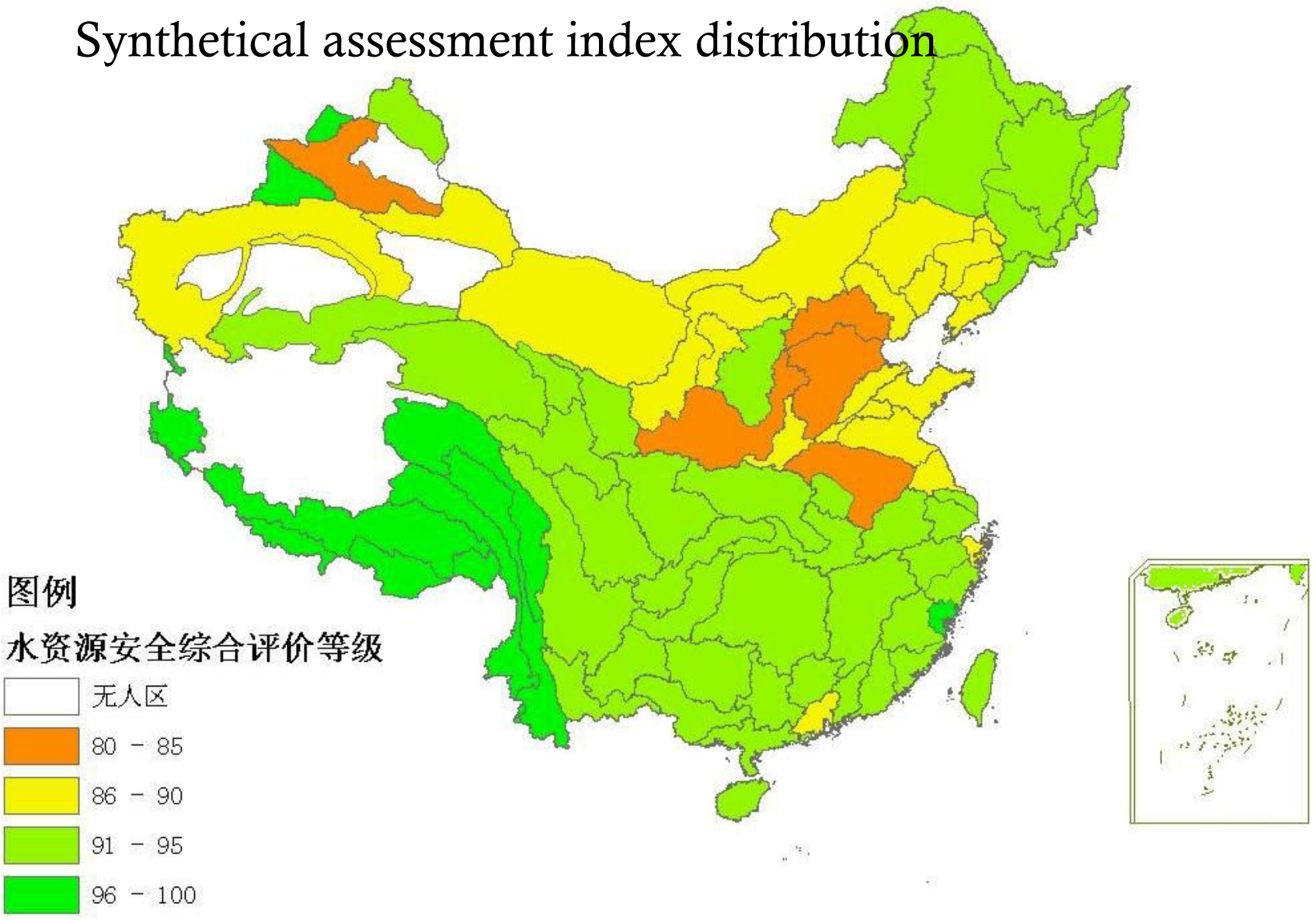
Sustainability index distribution



评价结论 / assessment conclusion no.4



Synthetical assessment index distribution



未来变化趋势/future trend

- 水量保障程度提高：修建了一系列调水工程、海水淡化工程/promoting quantity guarantee ratio
- 水生态继续好转/improving water ecology
- 水环境？更相信会好转/more strict water pollution control
- 水价会上升，但供水成本不会大幅度上升/water supply cost and price will rise
- 综合判断：水资源安全程度总体上升/Comprehensive judgment，security level promote

中国水资源安全对策 / Countermeasures

- 以水污染防治为重中之重 / Take the prevention and control of water pollution as the priority among priorities
- 以污染源控制为核心，真正控制住排污总量/Take the pollution source control as the core
- 借产业升级和污染防治的东风，促进用水零增长/By the east wind of industrial upgrading and pollution prevention and control, to realize water use zero growth
- 通过结构调整和提高效率来满足经济翻番的用水需求/Through structural adjustment and improve efficiency to meet the water demand of economy doubling
- 大力扶持非常规水源的开发（雨水、中水、海水）/Vigorously support the development of unconventional water resources
- 建立和完善水资源配置的市场机制：水权改革还得继续，水价制度得理顺，水资源管理体制要与市场经济相适应/Play the role of market in the allocation of water resources.

请批评指正／welcome criticism

谢谢／Thanks

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