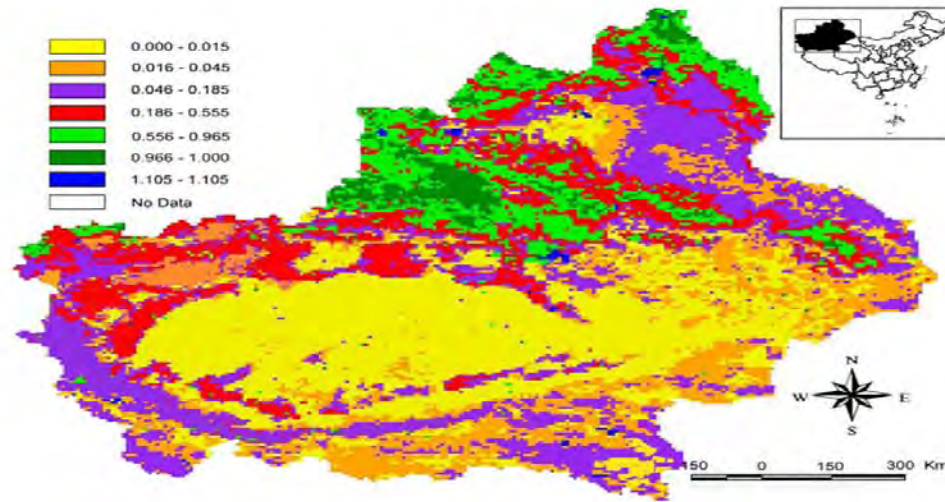


新疆气候与土地利用变化及其影响

Climate and Land Use Changes and Their Impacts in Xinjiang



Professor Dr. Zhang Xiaolei

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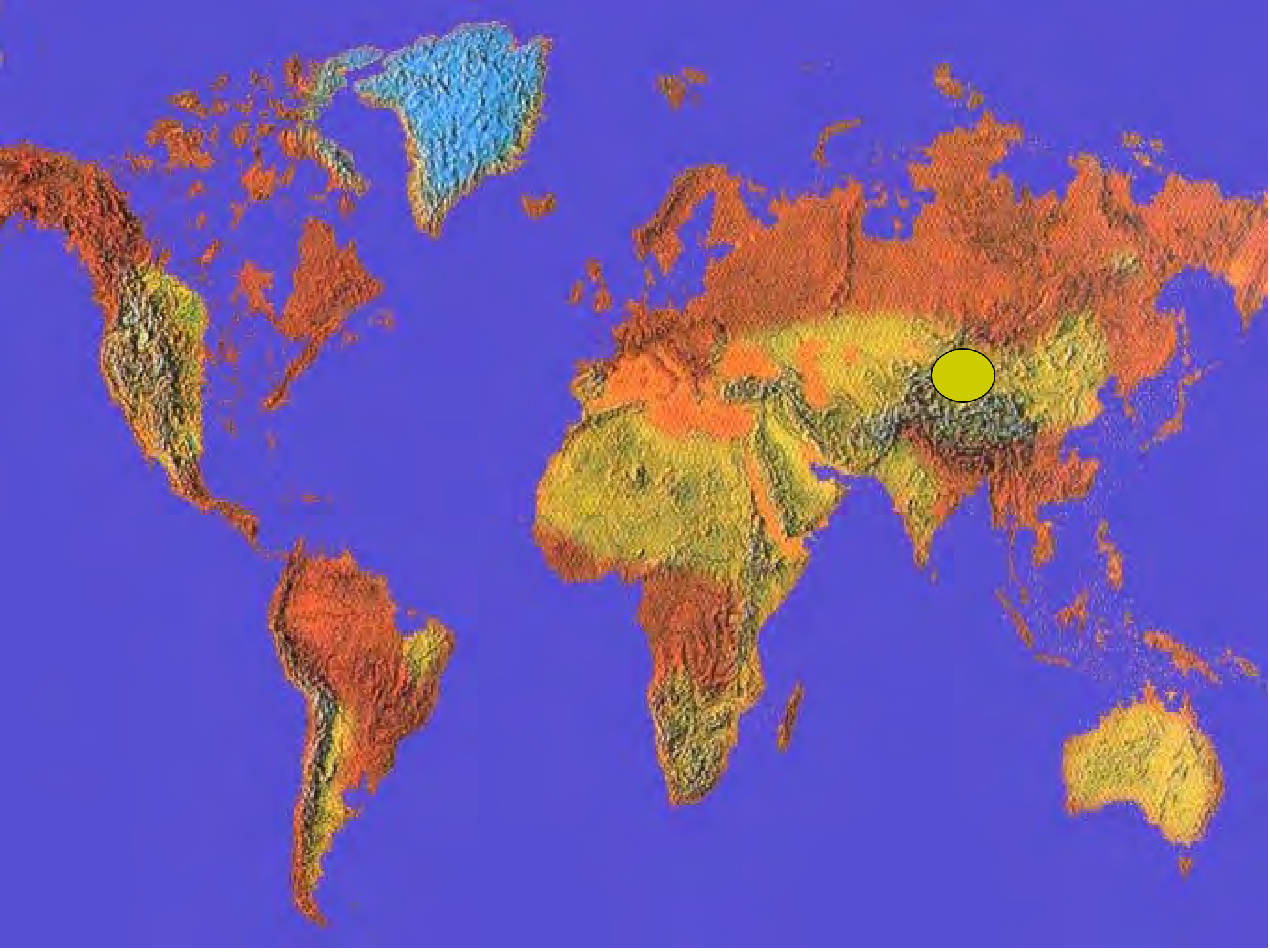
新疆维吾尔自治区科技厅厅长 (Director General of Xinjiang DOST)

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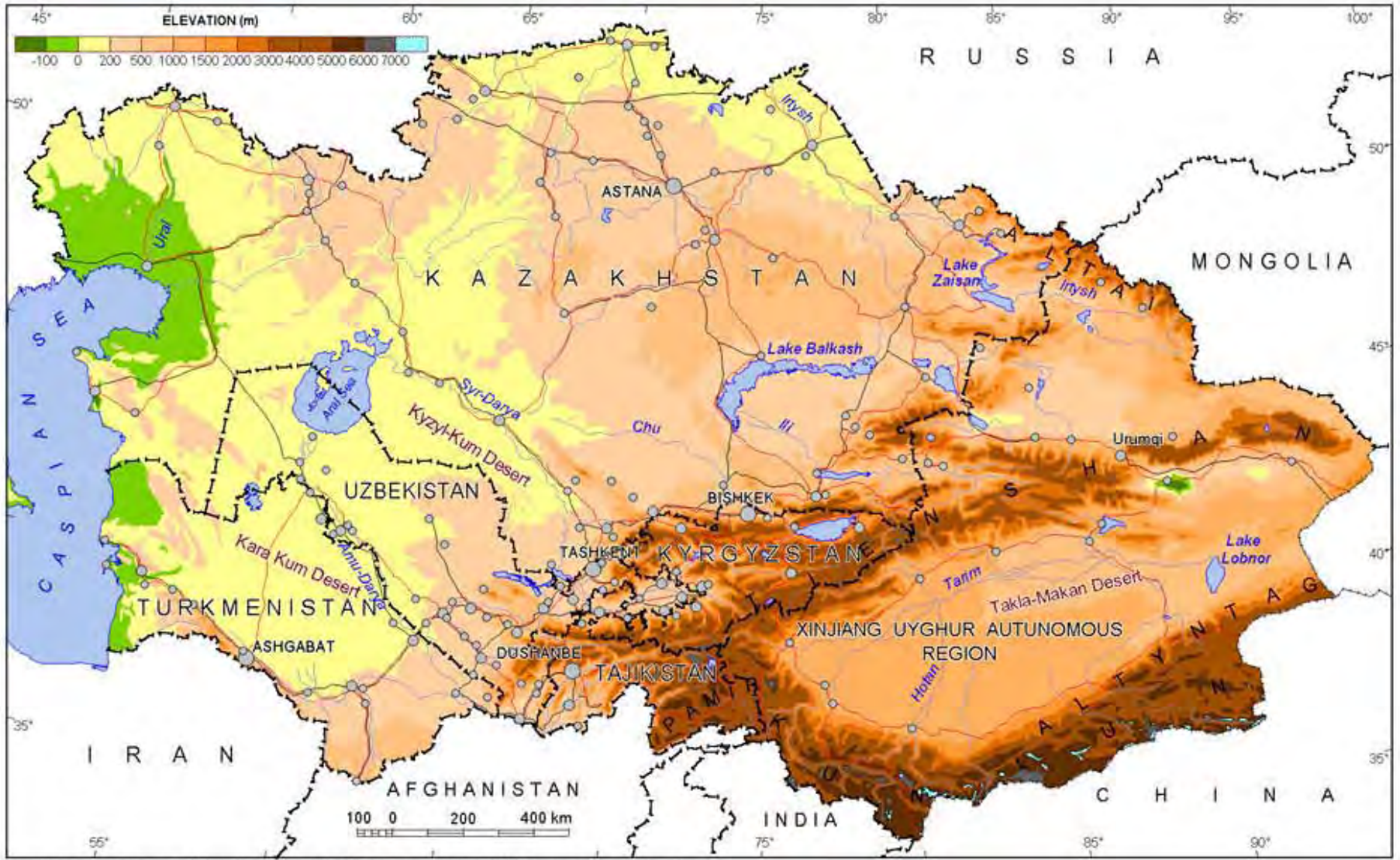
1. 气候变化及其影响 Climate Change
2. 土地利用变化及其影响 Land Use Change

地理位置 (Geographical Location)





Central Asia and Xinjiang



Boundaries are not authoritative. © Digital layers created by GIS-Service Ltd. Bishkek, 2001. Source: maps and other references

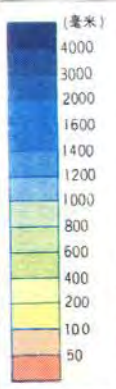
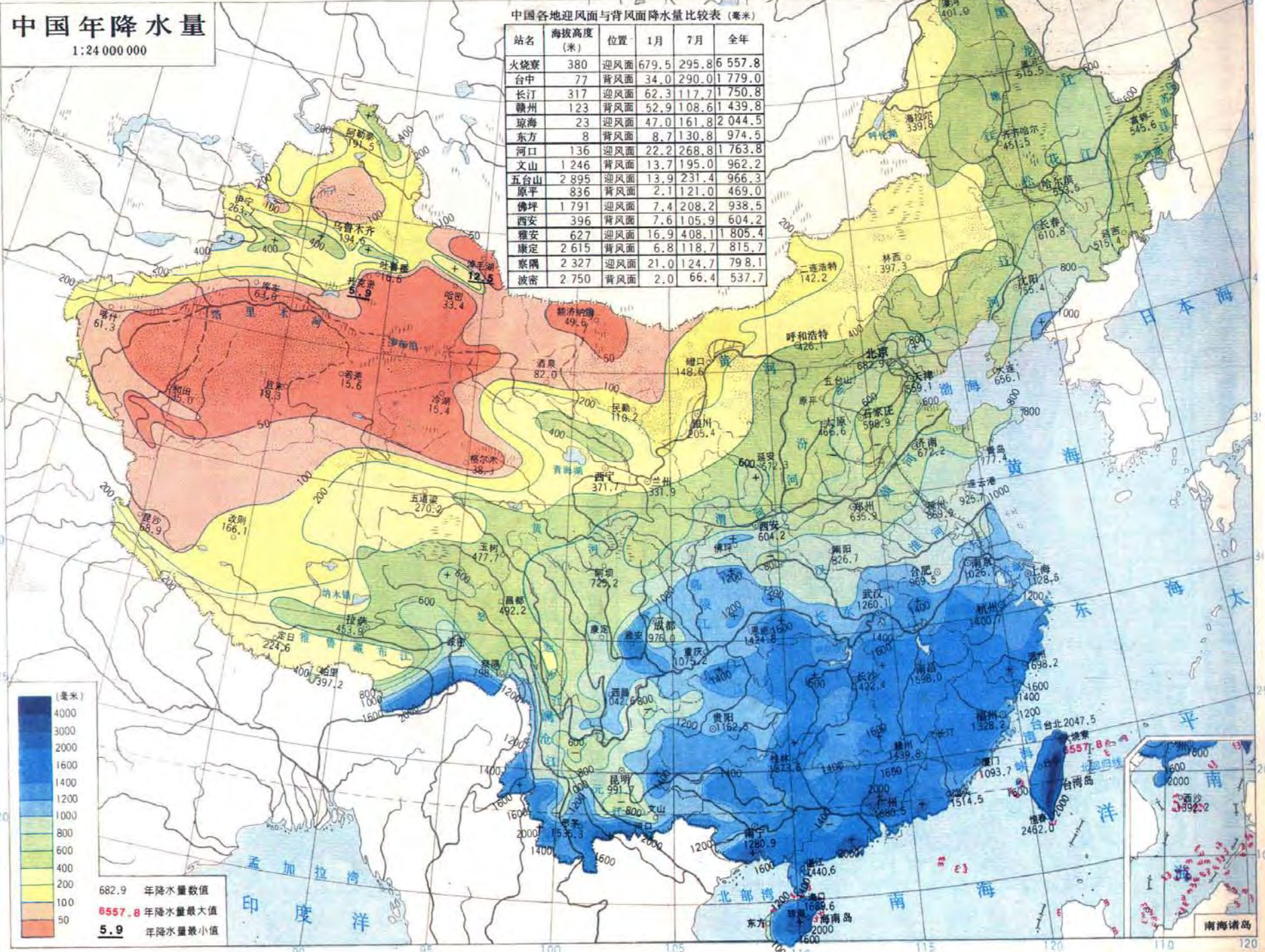
- | | | | |
|-----------------------|-------------------------|-------------------|-----------------------|
| INFRASTRUCTURE | TOWNS AND CITIES | BOUNDARIES | OTHER FEATURES |
| — Railroad | ● Capital Cities | --- International | — Rivers |

中国年降水量

1:24 000 000

中国各地迎风面与背风面降水量比较表(毫米)

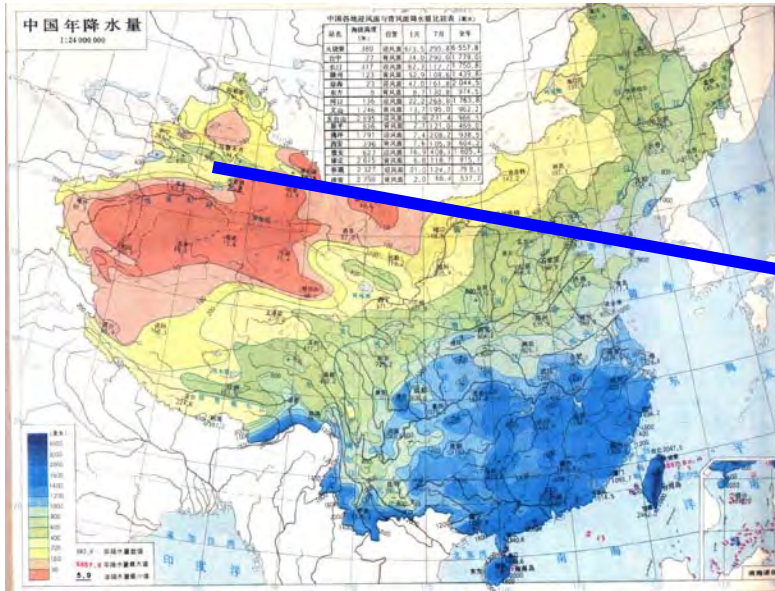
站名	海拔高度(米)	位置	1月	7月	全年
火烧寮	380	迎风面	679.5	295.8	6 557.8
台中	77	背风面	34.0	290.0	1 779.0
长汀	317	迎风面	62.3	117.7	1 750.8
赣州	123	背风面	52.9	108.6	1 439.8
琼海	23	迎风面	47.0	161.8	2 044.5
东方	8	背风面	8.7	130.8	974.5
河口	136	迎风面	22.2	268.8	1 763.8
文山	1 246	背风面	13.7	195.0	962.2
五台山	2 895	迎风面	13.9	231.4	966.3
原平	836	背风面	2.1	121.0	469.0
佛坪	1 791	迎风面	7.4	208.2	938.5
西安	396	背风面	7.6	105.9	604.2
雅安	627	迎风面	16.9	408.1	805.4
康定	2 615	背风面	6.8	118.7	815.7
察隅	2 327	迎风面	21.0	124.7	79.8
波密	2 750	背风面	2.0	66.4	537.7



682.9 年降水量数值
6557.8 年降水量最大值
5.9 年降水量最小值

南海诸岛

Location of Xinjiang in China



north-west of China



Xinjiang has the typical continental arid climate
Yearly mean precipitation is 147mm

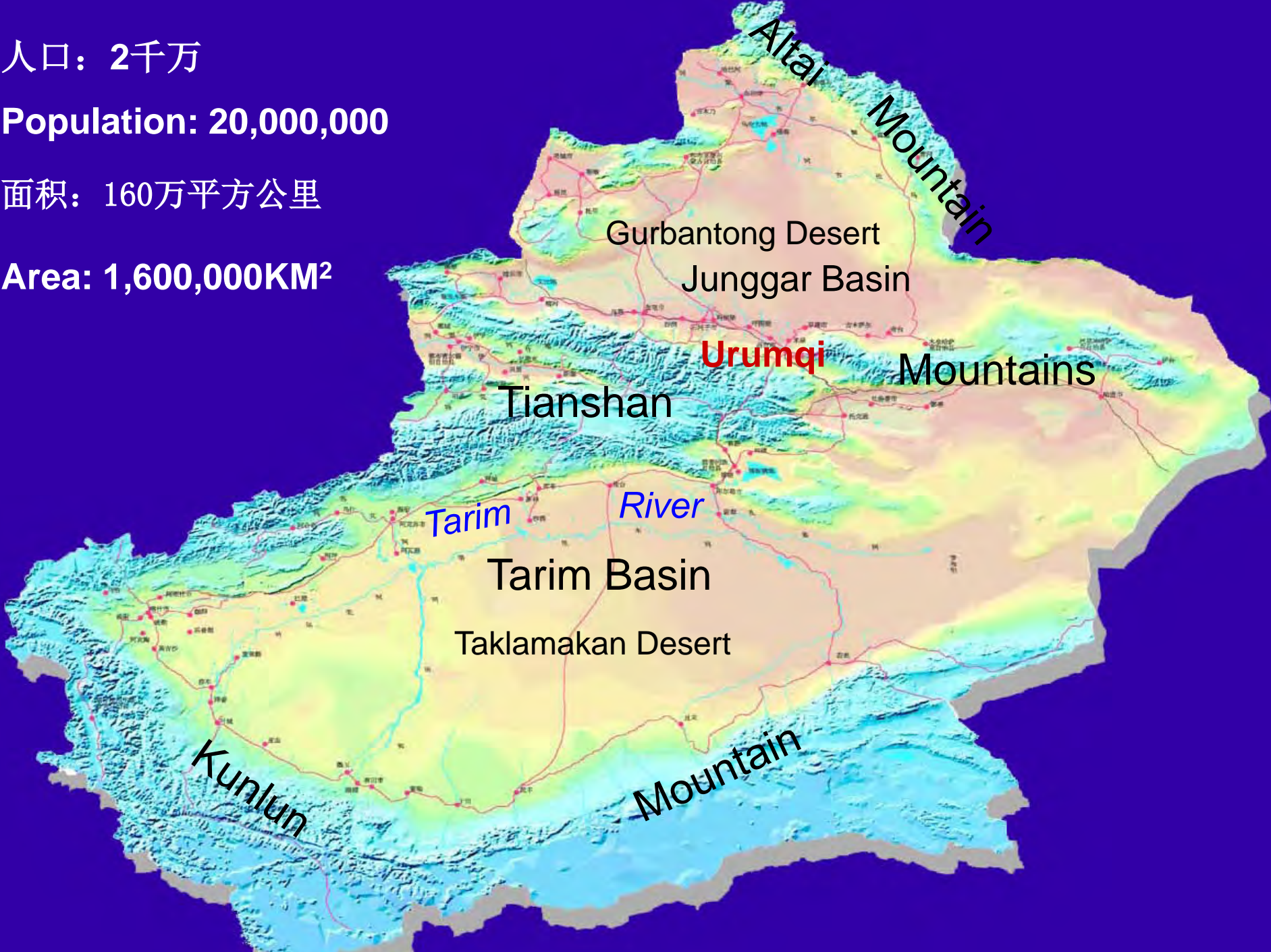


人口: 2千万

Population: 20,000,000

面积: 160万平方公里

Area: 1,600,000KM²



Altai Mountain

Gurbantong Desert
Junggar Basin

Urumqi

Tianshan

Mountains

Tarim River

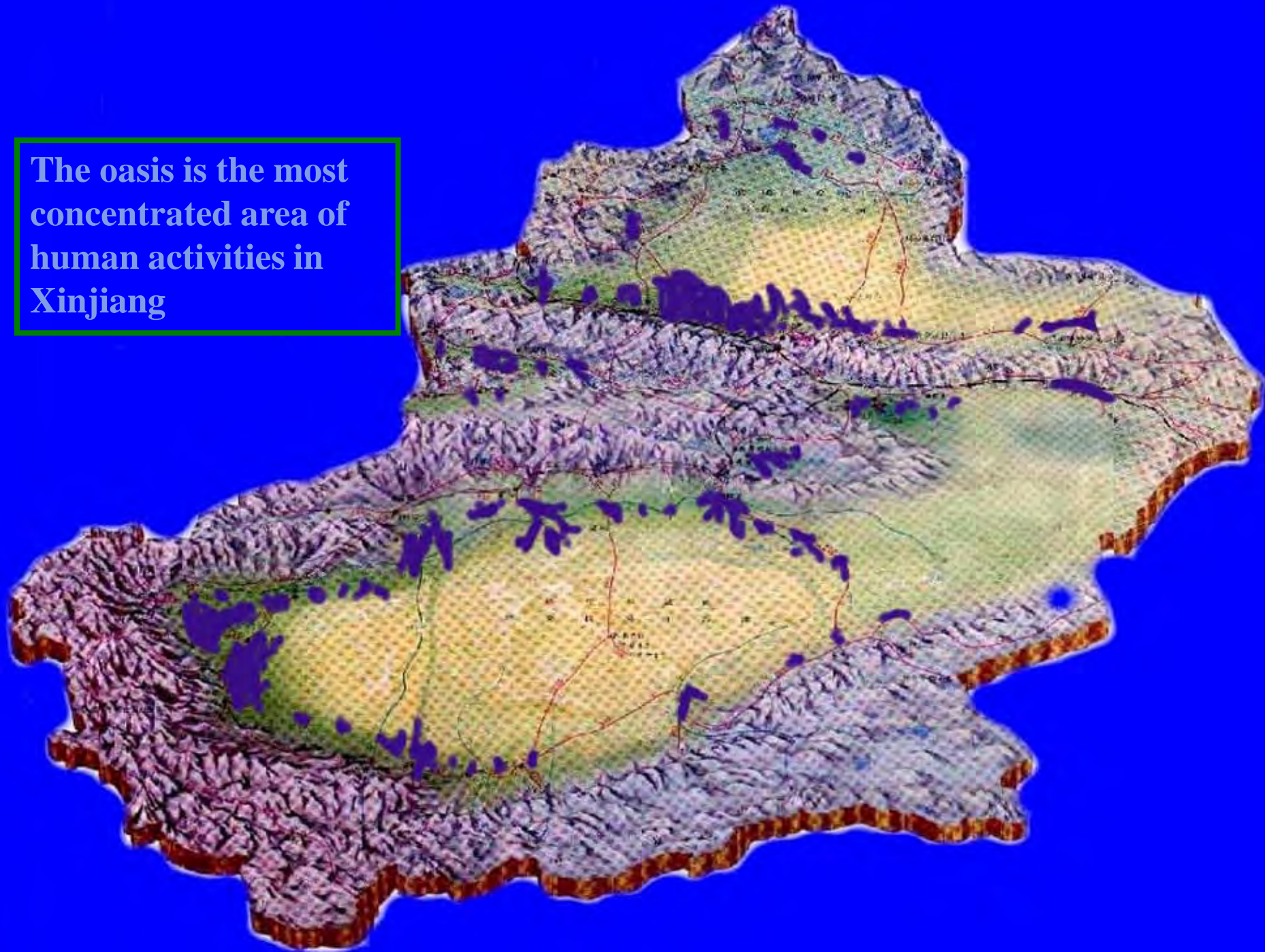
Tarim Basin

Taklamakan Desert

Kunlun

Mountain

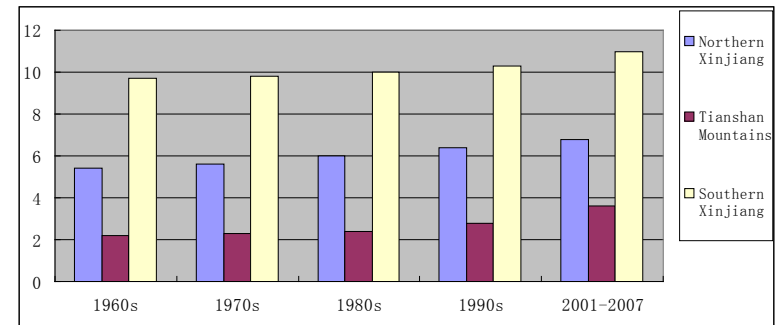
The oasis is the most concentrated area of human activities in Xinjiang



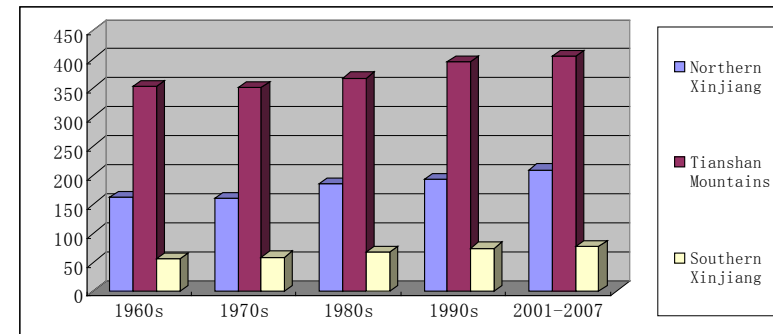
一、气候变化及其影响 (Climate Change and its Impact)

◆ 新疆专家:(expert of Xinjiang views that)

As a consequence of global warming , Xinjiang exists an outstanding climate **warming and wetting tendency** in the recent 50 years and will **continue until the end of 21 century** (由于全球变暖,近50年新疆气候存在着明显的**暖湿趋势**,这种暖湿趋势**将延续至21世纪末**) .



Temperature



Precipitation

- ◆ 国家气象局气候中心认为认为： (National Climate Center of State Meteorological Administration claims that:)
 - 根据政府间气候变化专门委员会第四次评估报告中参与评价的22个气候模型，对新疆21世纪气温与降水的季节与年际变化的详细分析 (Detailed analysis on seasonal and yearly changes of temperature and precipitation of Xinjiang in 21century based on the involved 22 climate models in the Fourth Assessment Report of IPCC) .
 - 今后100年温度将保持增加趋势，增幅为2.5 ° C ; 降水增幅为9%-12% 。 (The temperature will keep increased by 2.5 ° C /100a; and precipitation by 9%-12%/100a.)

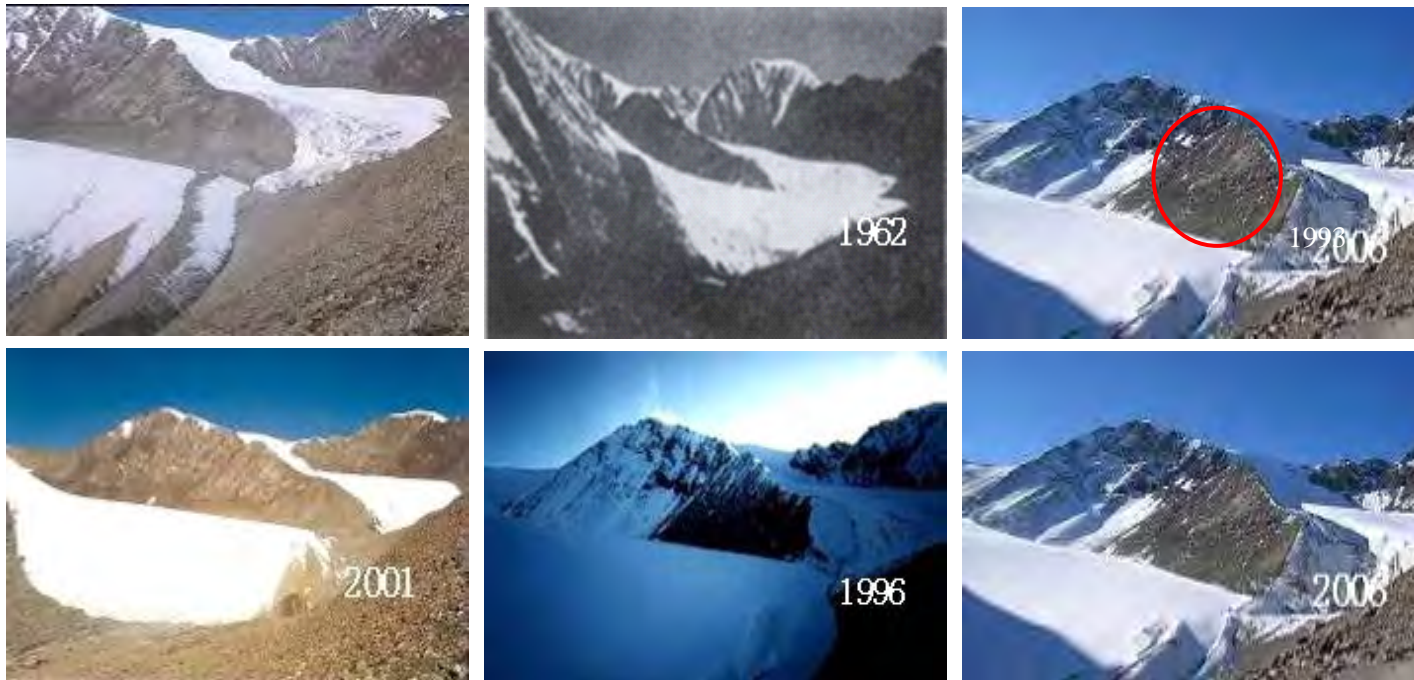
◆ 中国科学院研究组的结论是（**Research Groups in CAS conclude that:**）

- 由于全球变暖和水循环的增强，气候由19世纪末至20世纪70年代的暖干型转变为暖湿型（As a consequence of global warming and an enhanced water cycle, the climate was **warm and dry** from the end of the 19th century to the 1970s, and then changed to **warm and wet**）。
- 今后100年年平均温度将增高**2.7° C**，年降水将增加**25%**。（The annual temperature will increase by 2.0° C and annual precipitation by 19% in next one hundred years）。

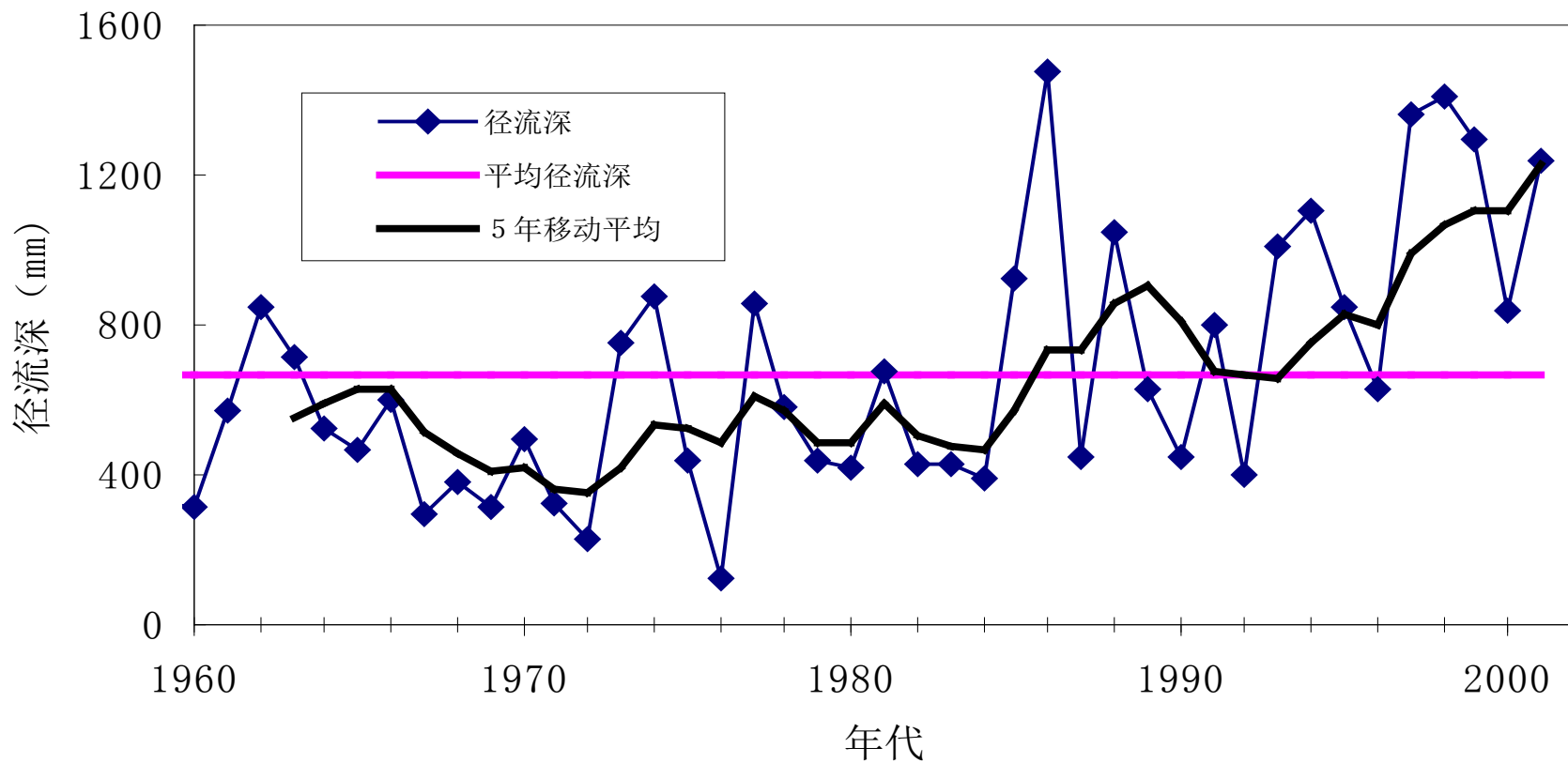
Major Impacts

Glacier Shrinking

- 受气温升高的影响，新疆冰川自20世纪50年代以来，一直处于萎缩状态。（The glacier has been shrunken due to temperature increase since 1950's of 20 Century ）。
- 最近20年多年又出现了加速退缩趋势。（The shrinking has been accelerated in recent 20 years ）。

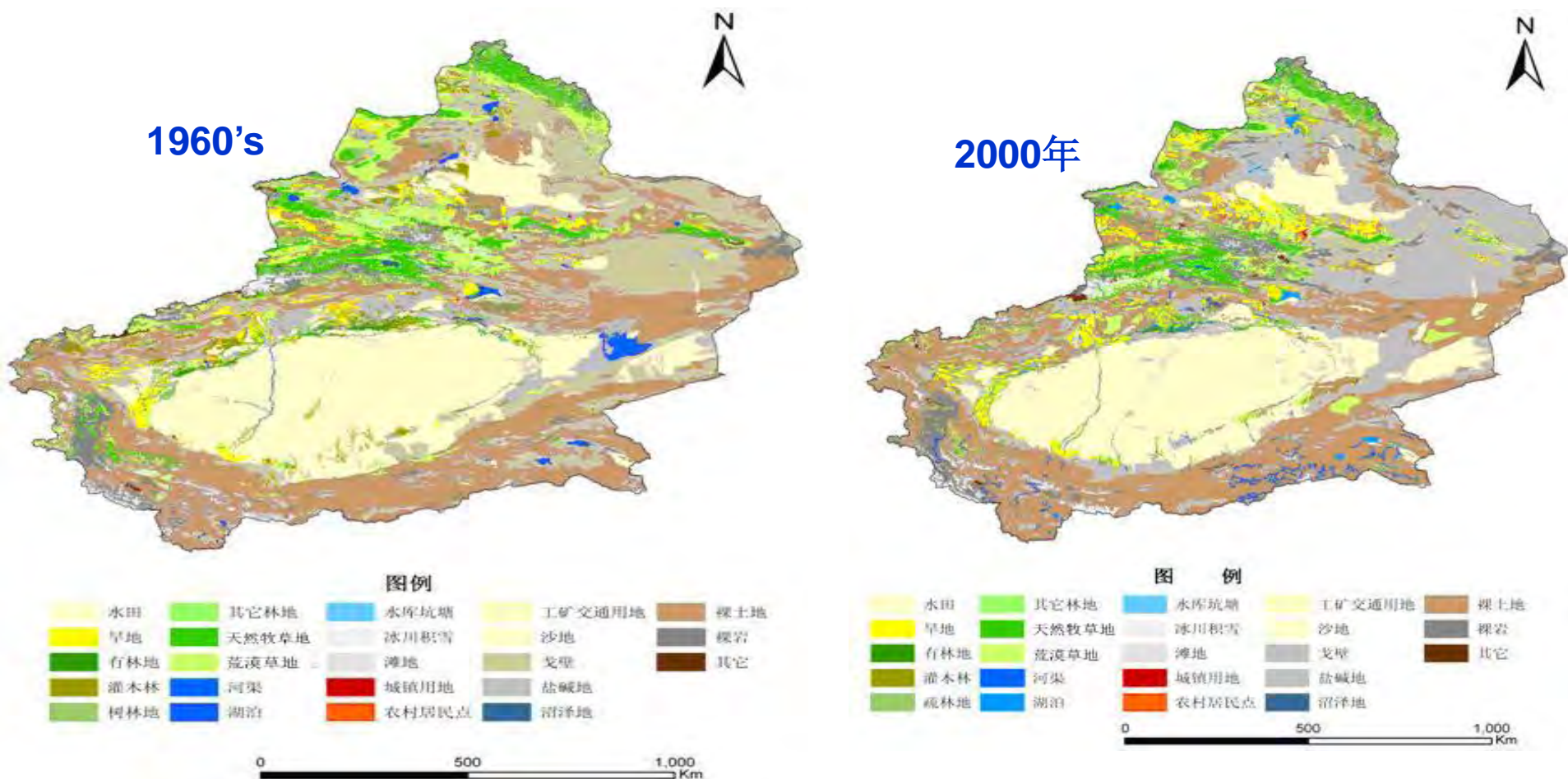


冰川融水与河川径流在近二十年里持续增加 (Glacier melting- water and river runoff have increased continuously during the last two decades)



二、土地利用变化及其影响

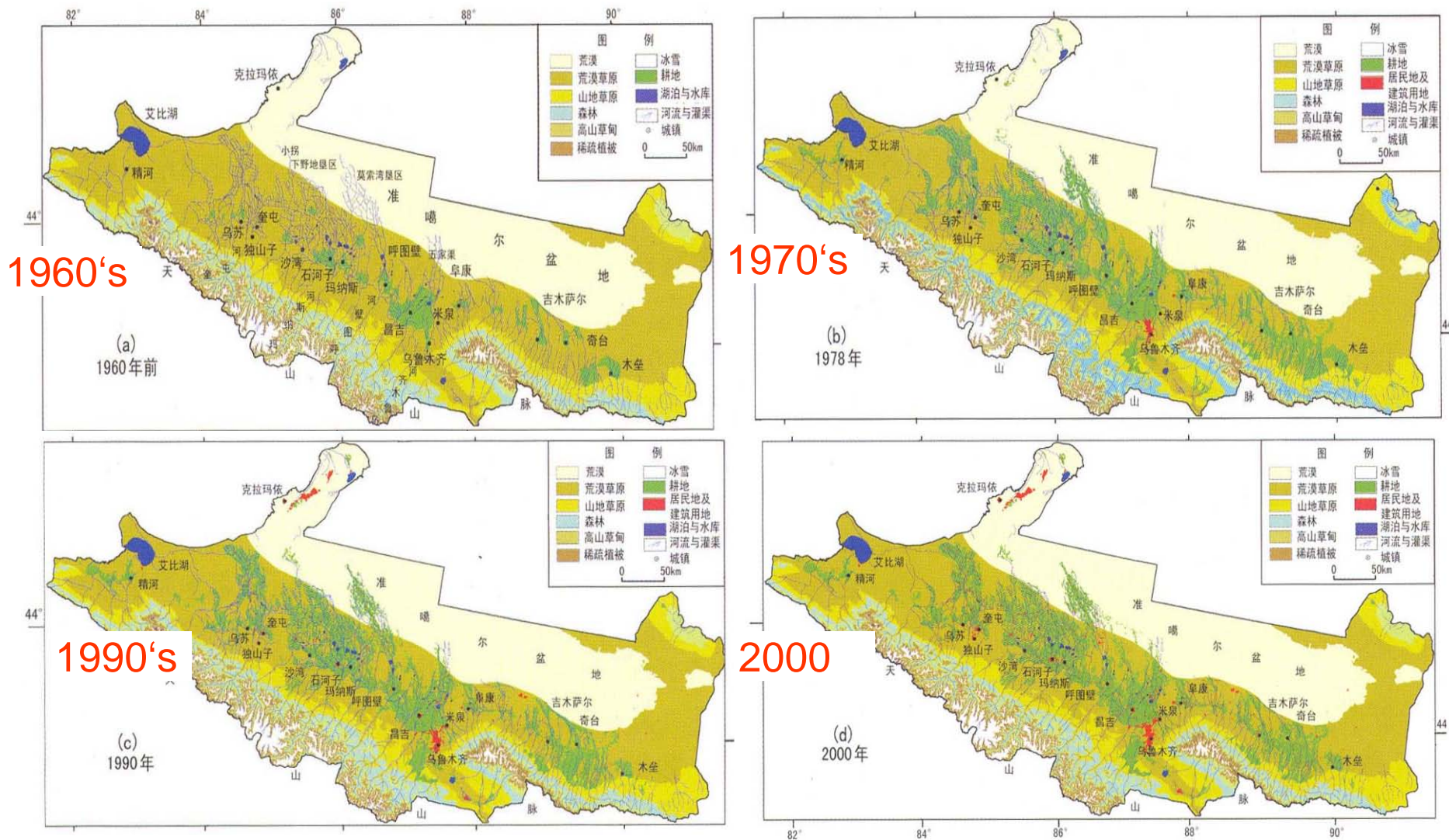
Xinjiang's LUCC (新疆土地利用与覆被变化)



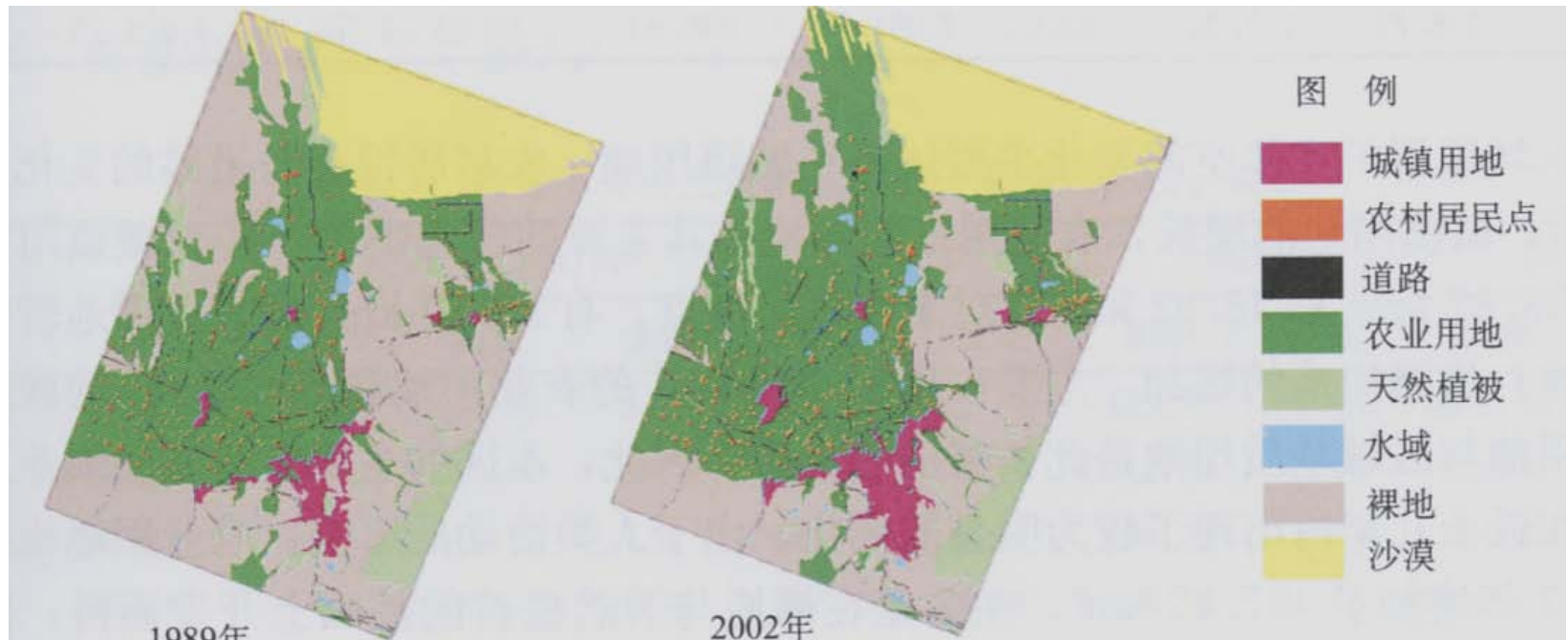
新疆近50年土地利用与覆被变化结果 (Result of LUCC over past 50 years)

- Reservoir and pond increased by (水库水塘增加) 210%, 1430km²
- Town increased by (城镇增加) 33%, 600 km²
- Farmland increased by (农田增加) 55%, 23210 km²
- Woodland declined by (林地减少) 39%, 30702 km²
- Lake declined by (湖泊缩小) 54%, 6495 km²
- Glacier and snow declined by (冰川积雪减少) 1044 km²
- Sand land increased by (沙地增加) 2286 km²
- Salty-alkaline land increased by (盐碱地增加) 433 km²

天山北坡地带土地利用与覆被变化 (LUCC in the Northern Slope of Tianshan Mountain)



乌鲁木齐土地利用与覆被变化 (LUCC of Urumqi)



项目	城镇用地	农村居民点	道路	农业用地	天然植被	水域	裸地	沙漠
1989年	193.49	90.75	53.22	2 624.13	451.26	79.62	3 337.38	1 073.76
2002年	308.77	117.25	63.54	3 081.59	396.96	80.05	2 782.19	1 073.25
变化量	115.27	26.50	10.33	457.45	-54.29	0.43	-555.19	-0.51
年均变化量	8.87	2.04	0.79	35.19	-4.18	0.03	-42.71	-0.04
变化强度	0.11	0.03	0.01	0.45	-0.05	0.00	-0.54	0.00

注：表中的负号表示减少。用地变化强度表示年均变化的各类用地面积占土地总面积的百分数。计算公式： $M = U / (A \times \nabla_t) \times 100$ 。式中， A 为分析区域总面积， U 为用地的变化量， ∇_t 表示变化的时间，取年为单位。

变化的驱动因素（Driving Forces）

山区：气候变化是主要的驱动因素

For the mountainous area: climate change is key force.

绿洲：人类活动是主要的驱动因素

For the Oasis: anthropic activities is major forces.

- ❖ large-scale land reclamation and exploitation of water resources（大规模水土开发）

Desert（荒漠） \longrightarrow Anthropogenic oases（人工绿洲）

- ❖ Some native vegetation types have degraded and some were replaced by anthropogenic vegetation types or even totally eliminated by settlements（天然植被被被取代和破坏，退化或消亡）

Vegetation（植被） \longrightarrow Desertification（荒漠化）

对河流系统的影响 (Impact on River System)

塔里木河 (Tarim River)

- 下游断流320公里且地下水位降至8m以下 (320km cut-off and water table below 8m downstream)

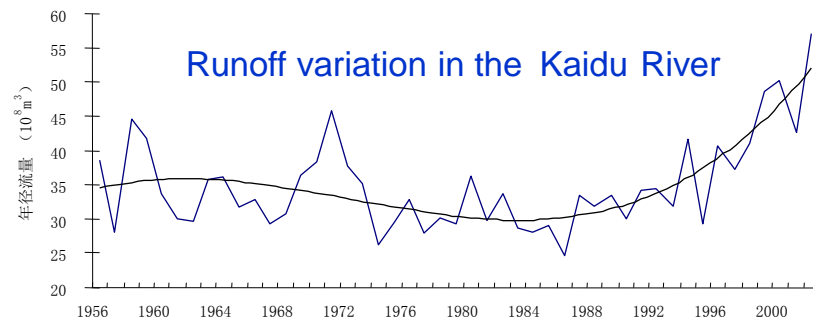
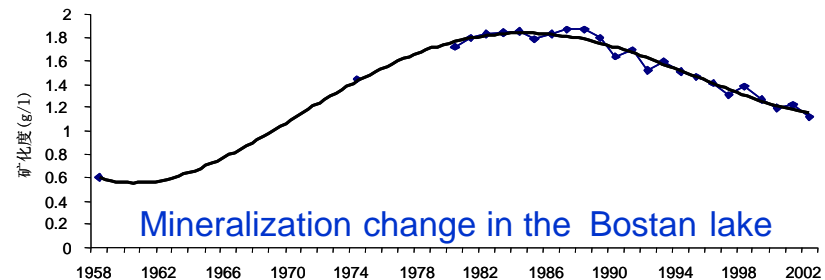
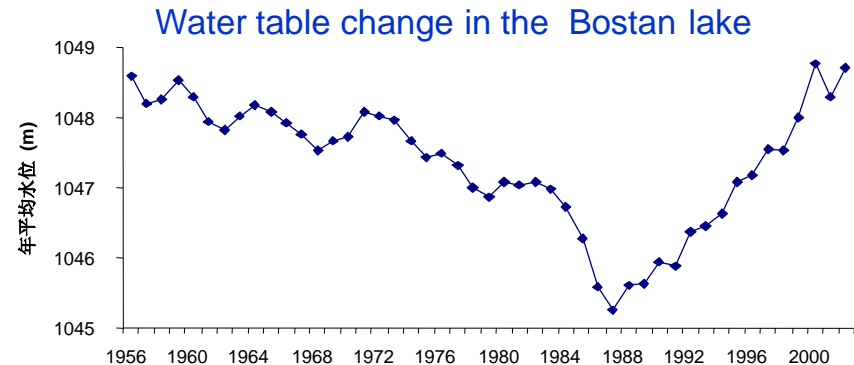


- 河岸林退化。近50年减少20万公顷，其中下游减少4.67万公顷。(Degraded riparian forest, reduced 200 thousand ha. in recent 50 years, of which 46.7 thousand ha. in the downstream)



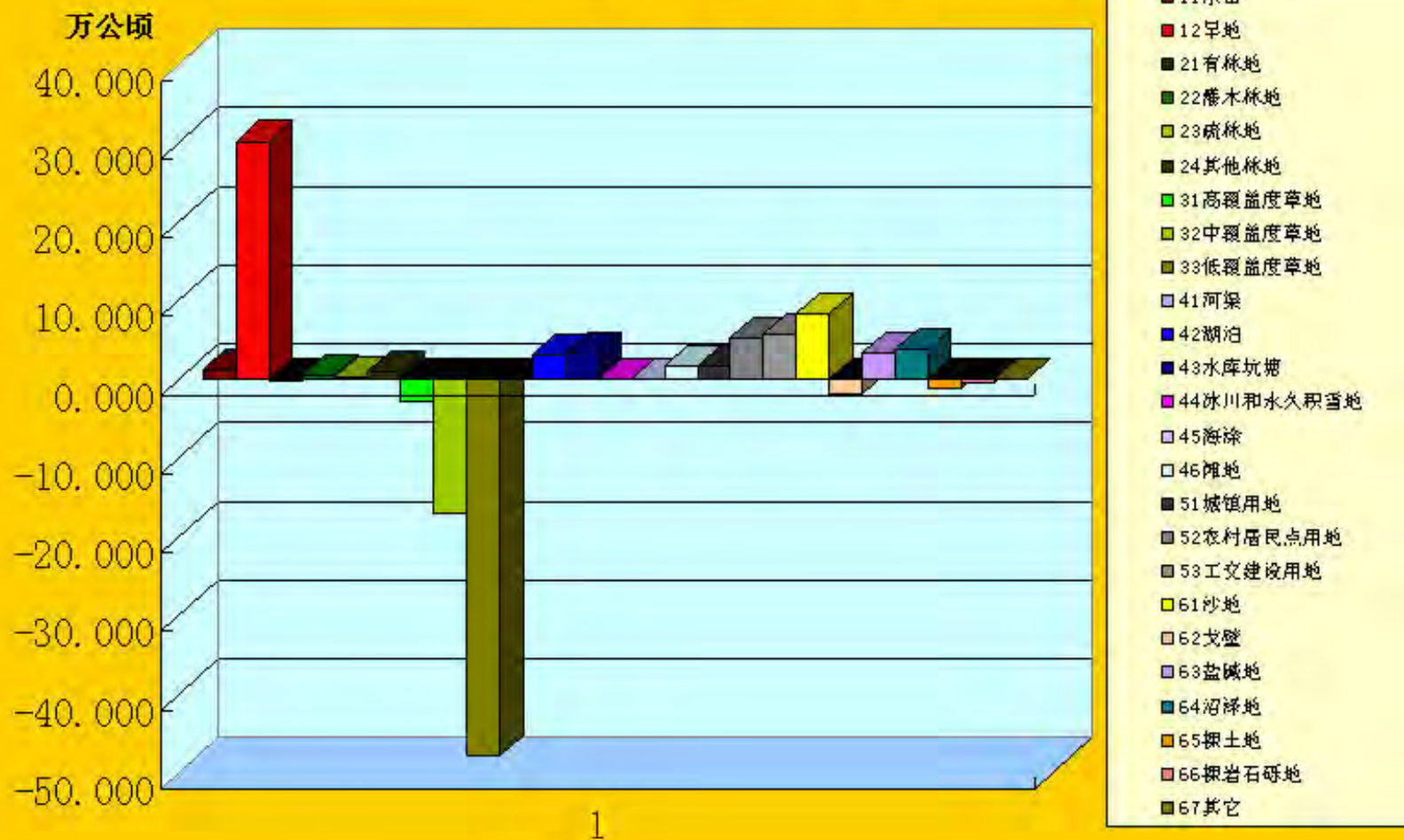
对湖泊的影响 (Impact on Lakes)

- Mountain lakes seldom influenced by human-induced LUCC
- Lakes in the Middle reaches (for example Bostan lake) doubly influenced by the runoff in the mountain and LUCC in the plain: dynamic water table and mineralization
- Lakes in the lower reaches reduced usually, most dry up.



LUCC 1990--2000

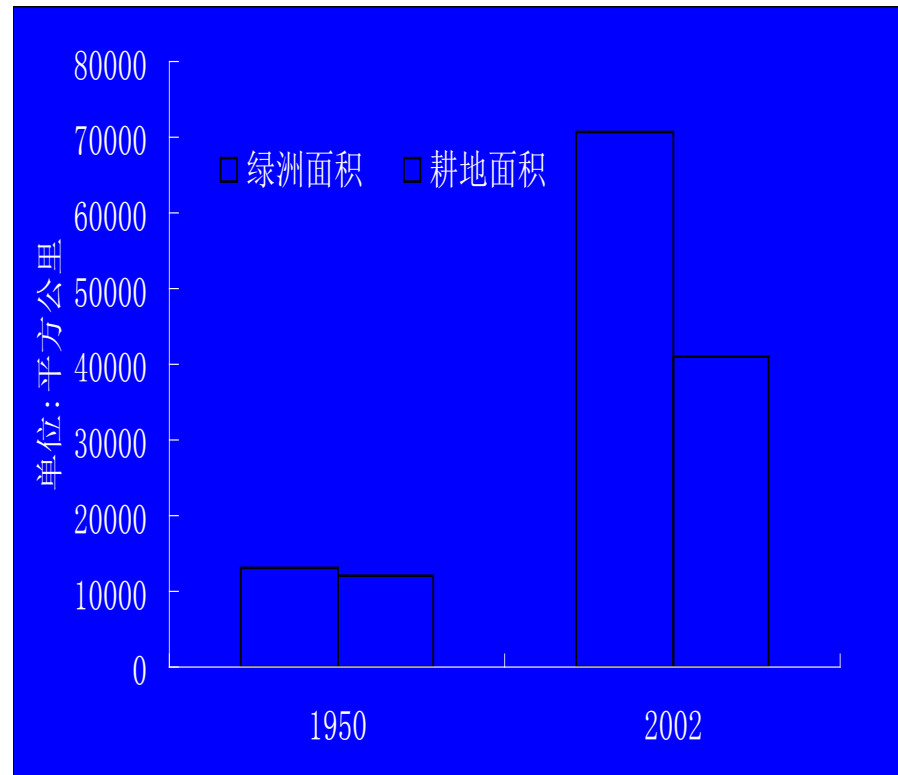
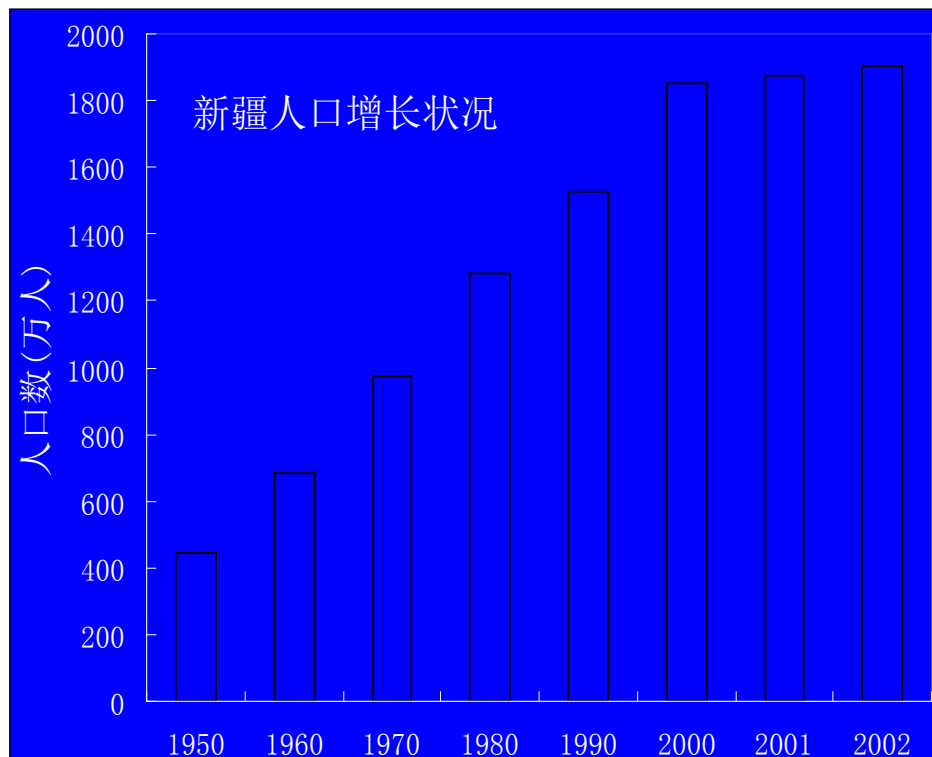
新疆十年土地利用动态变化



引自吴世新

Population and oasis 1950--2002

人口2000万人，绿洲面积7万多平方公里，占4.3%。
分别是50年代初的4.3倍和5.4倍。



Thank you for your attention

