

Integrated Land and Water Resources Management for Food Security and Environmental Sustainability in China



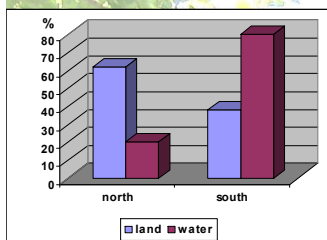
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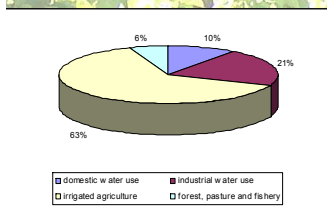
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Water and Food Challenges in China

- ◆ **Population:** The population in China had increased from 673 billion in year 1961 to 1282 million in year 2000 and is projected to reach 1470 million by year 2030 and 1420 million by year 2050;
- ◆ **Arable land and water availability:** The arable land area in China is projected to drop to 113-118 million ha, approximately 0.084-0.08 ha per capita by year 2010, to 0.073 ha per capita by year 2020, and to less than 0.067 ha per capita by year 2030;
- ◆ **Climate change:** Global climate change poses an ever greater threat to food security.



Uneven Land and Water Distribution across China



Percentage of various water uses in the year 2000

Scenarios Development

Scenarios for population growth (million)

Scenarios	1980	2000	2010	2020	2030	2040	2050	
Low variant		999	1282	1349	1376	1370	1312	1211
Medium variant		999	1282	1362	1432	1470	1460	1420
High variant		999	1282	1374	1489	1576	1620	1660

Arable land and irrigation area development (million ha)

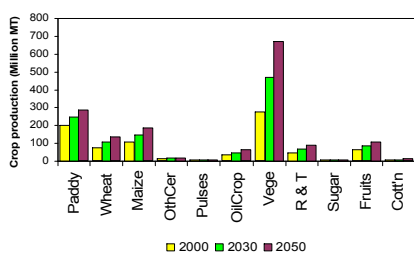
Year		1980	2000	2010	2030	2050	
Arable land area		99.70	128.30	126.12	122.00	117.80	
Irrigation area	High development scenario				56.67	59.67	60.93
	Medium development scenario		48.89	55.37	56.14	58.33	58.94
	Low development scenario				55.40	57.15	57.61

Methodology of Analysing Water for Food
PODIUMS consists of four major components:
◆ Crop consumption
◆ Crop production
◆ Water Demand
◆ Water supply

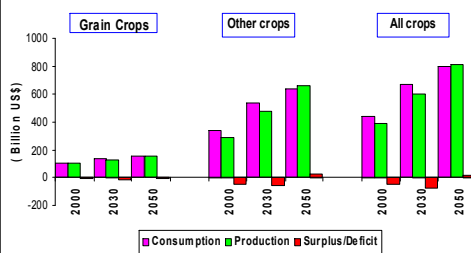
This paper is attempted to answer the following questions:
◆ How much food should be produced under various population growth scenarios?
◆ To produce that amount of food, at what scale should the irrigated area expand?
◆ To realize the development of that irrigated area, how much improvement in irrigation efficiency would be needed with the total irrigation water use within the range of the goals set up by the Chinese government?
◆ What kind of water management options should be adopted to meet that irrigation efficiency gains?
◆ How much food would a country have to import to feed its population, if there are no new investments in developing additional water resources?

Results and Conclusions

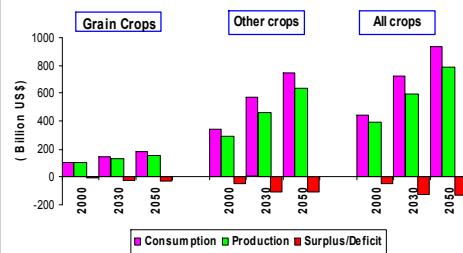
- ◆ The total grain demand for China would increase from 427.3 million tons in 2000 to 608.9 million tons by 2030 and 714.3 million tons by 2050;
- ◆ The estimated financial value of food production in 2030 and 2050 will be US\$600.2 and US\$816.2 billion;
- ◆ There would be US\$10.8 billion and US\$3.2 billion worth of grain deficits in year 2030 and 2050 at the medium population growth and medium irrigation area development scenarios;
- ◆ To meet the total food demand in year 2030 and 2050, 137.86 and 109.07 million ha of gross irrigated area need to be reached respectively, which requires 69% and 85% of surface water and groundwater irrigation efficiencies in year 2030 and 63% and 83% of surface water and groundwater irrigation efficiencies in year 2050 provided the total irrigation diversion is maintained at 420 and 400 billion cubic meters for the respective years.



Crop productions in the year 2000, 2030 and 2050 at medium irrigation area development scenario



Crop production, consumption and surplus or deficit in the year 2000, 2030 and 2050 at medium population growth and irrigation area development scenarios



Crop production, consumption and surplus or deficit in the year 2000, 2030 and 2050 at high population growth and low irrigation area development scenarios