China's Food Self-Sufficiency under Limitations of Natural Resources

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China is challenged by managing its finite water and land resources to support its population due to the mismatch of water and land resource, a large and growing population and more resource intensive dietary. This research is motivated by answering the question: could China be food self-sufficient under limitations of its natural resources. Based on the basic principle of water and land balance, crop water requirements, agro-climatic attainable yield and diet analysis, the assessment of limitations of water and land resources on food production can be formulated into an optimization model, with the objective function maximizing the number of people fed in a sustainable way. The optimization model presents a long term average analysis which distinguishes irrigated and rainfed agriculture and finally identifies a revised and sustainable resource allocation strategy that maximizes the population under a given diet. The results show that China cannot feed itself under current water and crop land resources. Expansion of irrigated land and multi-cropping are keys in enhancing China's food production to be self-sufficient.

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