中国土地资源子系统
China's Land Resources Subsystem

梁书民
Shumin Liang
2006年3月
March, 2006

中国农业科学院农业经济与发展研究所
INSTITUTE OF AGRICULTURAL ECONOMICS AND DEVELOPMENT, CAAS

1、预期成果要求

Required expecting results

1.1 符合研究要求的中国土地资源数据库

Data base for China's land resources accord with research requirements

1.2 满足研究要求、通过专家评审的人口—耕地面积预测模型及粮食单产潜力预测模型

Population-arable land area forecast model and grain yield potential forecast model, which satisfies the research requirements and passes the examination and appraisal by experts

1.3 预测粮食单产潜力、耕地面积、粮食生产潜力、食物消费水平与土地承载力

Forecasts the grain yield potential, arable land area, grain production potential, food consumption level, and the land carrying capacity

1.4 建立耕地面积与粮食生产监测地理信息系统

Establishes geographic information system for monitoring arable land area and grain production

2、任务完成情况

Situations for task accomplishment

2.1建立了中国耕地资源数据库、种植结构数据库、自然地理背景地理信息系统数据库和典型城市建成区扩张地理信息系统数据库

Established database for China's arable land resources, database for sown structure, GIS database for China's physical geographic background, and GIS databases for buildup area expansion in 4 typical cities

2.2非农业人口—耕地面积预测模型及粮食单产潜力预测模型通过了专家评审

Nonagricultural population - arable land area forecast model and grain yield forecast model have passed the examination and appraisal by experts

1.3 预测了中国耕地的中长期变化；预测了种植结构的近中期变化进行

Forecasted the mid and long run change for China's arable land

Forecasted the short and mid run change for China's sown structure

2、任务完成情况续

Situations for task accomplishment continue

2.4 利用食物的粮油当量折算法对中国食物供需平衡和自给率进行了中长期预测;

Forecasted the mid and long run food supply and demand balance and self-sufficient rate, by applying grain and edible oil equivalent conversion method for food

2.5 利用地理信息系统的空间分析模型研究了中国土地资源的自然地理背景，以及耕地面积、土地利用、土地资源质量和种植结构的空间分布规律

Studied the physical geographic background for China's land resources, and the spatial distribution principles for arable land, land use, land resource quality, and sown structure, by applying spatial analysis model in GIS

2.6 研究了北京、上海、广州和成都城市扩张的空间分布; 利用毛边际人口密度法预测了4座大城市的建成区扩张。

Studied spatial distribution for urban expansion in Beijing, Shanghai, Guangzhou, and Chengdu; forecasted buildup area expansion in 4 cities by applying gross marginal population density method

3、取得的重大进展

Significant progress made

3.1 建立的自然地理背景地理信息系统数据库可用于计算复种潜力和定位宜农荒地的空间分布。

The GIS database for physical geographic background can be used to calculate multiple cropping potential and locate the spatial distribution of reclaimable waste land

3.2 非农业人口-耕地模型将耕地的减少同城镇化的进程相联系，是在中国耕地资源变化研究方法上的独创

Nonagricultural population – arable land model linked arable land decrease with the progress of urbanization, which is an original creation on the research method for arable land resource in China

3.3 利用毛边际人口密度法预测了四座大城市的建成区扩张，是国内首创

Forecasted buildup area expansion in 4 large cities by applying gross marginal population method, which is also a creative initiation domestically

3、取得的重大进展续

Significant progress made continues

3.4 在系统构建上，以土地资源为研究的主线，以食物供需平衡为最终研究目标，形成了一个连贯完整的子系统。

On the construction of the system, taking land resource as the main research theme, aiming food supply and demand balance as the final goal, the project has formed a continuous and integrated subsystem

3.5 利用食物的粮油当量折算法研究中国食物消费、供需平衡、库存变化和自给率，是本子系统的关键技术突破

Studied China's food consumption, supply-demand balance, storage change and self-sufficient rate by applying grain and edible oil equivalent conversion method for food, which is the key technology breakthrough for this subsystem

4、主要成果与应用 Major achievements and applications

4.1 发表学术论文5篇 Published 5 research papers

4.1.1 城镇化背景下的耕地资源，*经济参考报*，2006.1.21

Arable land resource under the background of urbanization, *Economic Information Daily*, January 21, 2006

4.1.2 中国农业种植结构及演化的空间分布和原因分析，*中国农业资源与区划*，2006.2

Spatial distribution and cause analysis on agricultural sown structure and its evolution in China, *China Journal of Agricultural Resources and Regional Planning*, 2005 No.1

4.1.3中国食物消费与供给中长期预测，*中国食物与营养*，2006.2

Mid and long run forecast on food consumption and supply in China, *Food and nutrition in China*, 2006 No.2

4.1.4 中国大城市建成区扩张与城郊耕地保护研究，*环境保护*，2005.11

Research on the buildup area expansion and suburban arable land preservation in China's large cities, *Environmental Protection*, 2005 No.11

4.1.5 城镇化背景下我国耕地的中长期预测，*农业经济问题*，2005特刊

Forecasting arable land in the mid and long run under the background of urbanization in China, *Issues in Agricultural Economy*, Supplementary Issue 2005

4、主要成果与应用续 Major achievements and applications continue

4.2 项目研究成果之一以中国城市化背景下的土地资源问题为题为北京大学经济学院中国环境系列讲座作了首讲，得到了师生的高度评价。

One of the research result, titled land resource issues under the background of urbanization in China, has been presented to the serial lecture hold by the College of Economics, Peking University, and gained highly appraise by the audients

4.3 研究成果之一在北京大学环境学院举办的人口、资源与环境国际研讨会上以中国大城市建成区扩张与城郊耕地保护研究为题作了演讲，其中的研究理论和方法引起了与会者的广泛兴趣。

One of the research result, titled research on buildup area expansion and suburban arable land preservation in China's large cities, has been presented to the international symposium on population, resources and environment hold by the college of environmental sciences, Peking University, in which the research theory and method evoked wide interests among the audients

4.4 "城镇化背景下的耕地资源"一文以一整版的篇幅发表于《经济参考报》，在新华网、中国网和人民网等21个网站转载。对学术界和全社会起到了一定的影响。

The paper titled arable land resource under the background of urbanization was published on Economic Information Daily by taking a whole page, and it is reprinted by 21 web sites including xinhuanet.cn, china.com.cn, and people.com.cn. The paper enforced considerable influence on the academic circle and the whole society in China

5、成果应用推广前景评价

Evaluation on the prospect of application and extension for the achievements

5.1 子系统建立的数据库可用于建立分省市区耕地资源和种植结构的动态模型，预测各省市区的耕地资源和农业种植结构动态变化。

The database established by the subsystem can be used to construct dynamic model for arable land resource and sown structure at provincial level, and forecast the dynamic change of arable land resource and agricultural sown structure in each province

5.2 城镇扩张的毛边际人口密度预测方法可推广应用于研究平原农区的城镇扩张，用于探索城镇的空间发展规律。

The forecast method for urban expansion by using gross marginal population density can be extended and applied on the research for urban expansion in the agricultural regions at plain area, and applied to probe their urban spatial development principles

5.3 农业生产潜力预测模型和食物消费水平预测模型可用于预测各省市区的食物供给与消费平衡，从而对中国食物平衡进行分区。

The forecast model for agricultural production potential and the forecast model for food consumption level can be used to forecast food supply and demand balance at provincial level, and thus we can classify China onto regions according to the food balance situation

5、成果应用推广前景评价续

Evaluation on the prospect of application and extension for the achievements continues

5.4 在自由贸易的前提下，通过研究交通网络和运费，以最低运费原则利用线性规划求算区际食物物流和国际农产品贸易的最优途径。

Under the presupposition of free trade, through study on the transportation network and transportation cost, the optimum route for interregional food flow and international trade for agricultural products can be calculated by applying linear programming in accord with the principle of minimum transportation cost

5.5 通过绘制各地的食物供给曲线和需求曲线，进而利用多步线性规划计算各地的最佳食物生产量和贸易量，定量确定中国及各地的食物生产和贸易的发展策略。

And further more, through plotting each region's food supply curve and demand curve, each region's optimum quantity of food production and trade can be calculated, and thus the development strategy of food production and trade for China and each region can be determined quantitatively