中国工程科技知识中心
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《中国农业发展战略研究》专题快报

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【动态资讯】

1．North American Diets Require More Land Than We Have: Study

【University of Guelph】If the global population adopted recommended North American dietary guidelines, there wouldn't be enough land to provide the food required, according to a new study co-authored by University of Guelph researchers. The researchers found that global adherence to United States Department of Agriculture (USDA) guidelines would require one giga-hectare of additional land--roughly the size of Canada--under current farming practice. Their findings were published in PLOS ONE today."The data shows that we would require more land than what we have if we adopt these guidelines. It is unsustainable," said Prof. Madhur Anand, director of the Global Ecological Change and Sustainability lab where the study was undertaken.

链接:

https://news.uoguelph.ca/2018/08/north-american-diets-require-land-study/

2．Study: Human wastewater valuable to global agriculture, economics

【University of Illinois at Urbana-Champaign】CHAMPAIGN, Ill. — It may seem off-putting to some, but human waste is full of nutrients that can be recycled into valuable products that could promote agricultural sustainability and better economic independence for some developing countries. Cities produce and must manage huge quantities of wastewater. Researchers at the University of Illinois at Urbana-Champaign have developed a model to clarify what parts of the world may benefit most from re-circulation of human-waste-derived nitrogen, potassium and phosphorus from cities and back into farm fields. They report their findings in the journal Nature Sustainability. “We grow our crops in

the field, apply nutrient-rich fertilizers, eat the crops, excrete all of the nitrogen, phosphorus and potassium and then those nutrients end up at the wastewater treatment plant," said Jeremy Guest, a civil and environmental engineering professor and study co-author. "It is a very linear, one-directional flow of resources. Engineering a more circular nutrient cycle would create opportunities that could benefit the environment, economy and agriculture."

链接:

https://news.illinois.edu/view/6367/683147

3. China to phase out high-toxic pesticides in 5 years, reevaluate pesticides registered for above 15 years

【AgroNews】At the council meeting of the China Association of Pesticide Development & Application held in Wuhai of Inner Mongolia on August 9, 2018, Ji Yin, the chief agronomist of the ICAMA, in a summary report of pesticide registrations of 2017, disclosed that the Ministry of Agriculture and Rural Affairs would phase out high-toxic pesticides in the next five years, conduct a reevaluation of old pesticides registered for above 15 years, including glyphosate, carbendazim and imidacloprid, and expedite the process of formulation of industry standard applicable to niche crop pesticide registration and pesticide limit governance. Pesticide registration in China is characterized by a large number of products and homogenized products, which lead to the emergence of a large number of cheap products in the market. This results in the oversupply of products and fierce market competition as well as a lack of market activeness. On the other side, registration of high-toxic pesticides is decreasing while that of environment-friendly pesticide formulations is increasing, which reflect the change of Chinese pesticide production towards green development.

链接:

http://news.agropages.com/News/NewsDetail---27310.htm

4. American Farmland Trust awarded grant to accelerate adoption of soil health practices

【AgroNews】American Farmland Trust, the organization behind the national movement No Farms No Food, was awarded a highly competitive 2018 Conservation Innovation Grant from USDA's Natural Resources Conservation Service. Authorized by the 2002 Farm Bill, CIG helps develop the tools, technologies and strategies to support next-generation

conservation efforts on working lands. "Through programs like the Conservation Innovation Grants Program, we're fueling the development of new and exciting tools and technologies, helping farmers improve their agricultural and conservation outcomes," says NRCS Acting Chief Leonard Jordan. The grant will fund a new AFT project called "Accelerating Soil Health Adoption by Quantifying Economic and Environmental Outcomes & Overcoming Barriers on Rented Land" that is designed to give farmers and landowners the quantitative evidence they need to make better conservation decisions. One barrier to wider use of soil health practices that improve water, save soil, protect climate, and often increase profit has been limited quantitative data proving their benefits.

链接:

http://news.agropages.com/News/NewsDetail---27101.htm

5．Brazilian grain production expected to increase 30% in 10 years

【AgroNews】While U.S. farmers are rightly concerned about short-term trade policies, Brazilian farmers have a long term optimistic view of Brazilian agriculture. This optimism is reflected in a recent study titled "Agribusiness Projections, Brazil 2017/18 to 2027/18" released from the Agricultural Policy Secretary of the Ministry of Agriculture along with Embrapa, which is the Brazilian Agriculture and Livestock Research Company. The main takeaway from the study is that crop acreage in Brazil will increase 14.5% over the next ten years, while grain production will increase 30% and meat production will increase 27%. The key for the increased grain production will be improved productivity. The study utilized data from Conab, Embrapa, the Brazilian Institute of Geography and Statistics (IBGE), the Institute of Applied Economic Research (IPEA), the Food and Agricultural Policy Research Institute (FAPRI) and the USDA.

链接:

http://news.agropages.com/News/NewsDetail---27298.htm

6．农业高质高效绿色可持续发展成为主基调

【中国农业新闻网】中经农业经济景气监测预警结果显示，2018年二季度，中经农业经济景气指数为100.1，比一季度回落0.8点，与去年同期持平。二季度，农经预警指数为87.0，比一季度回落2.7点，仍保持在“绿灯区”运行。景气分析的结果表明，上半年夏粮收成较好，农业生产基本平稳；农业劳动生产率持续快速增长；农产品出口保持快速增长；受部分农产品价格下跌和农资成本上升影响，农民务农收入增速有所回落。目前的

农业经济景气指数主要依据多年来农业数量增长的历史数据加以分析。从预期看，2018年是“农业质量年”，农业从增产导向转向提质导向，农业高质、高效、绿色可持续发展成为主基调。农业生产成本增加和农产品价格下跌影响农业生产积极性的问题不容忽视，在多方面提高务农积极性的同时，要大力发展农业产业融合，重点发展农产品加工业、休闲农业等，提高农业生产经营效益，多渠道促进农业提质，农民增收。要做好产业融合要素保障工作，建立紧密的利益联结机制，让农民从产业融合中分享到实实在在的利益。

链接:

http://www.farmer.com.cn/xwpd/jjsn/201808/t20180816_1398926.htm

7．哈尔滨出台秸秆综合利用计划

【中国农业新闻网】本报哈尔滨8月1日电（记者方圆）记者从哈尔滨市农委获悉：《秸秆综合利用三年行动计划（2018—2020年）实施方案》近日出台，计划2018年全市秸秆综合利用率达到75%以上，到2020年秸秆综合利用率达到95%以上，基本实现全部转化利用，基本杜绝秸秆露天焚烧现象。根据方案，哈尔滨将围绕肥料化、燃料化、饲料化、原料化、基料化5个领域，推广秸秆综合利用技术，提升作业装备能力，建设一批示范工程，提高秸秆综合利用率。重点任务包括秸秆肥料化利用、燃料化利用、饲料化利用、收储运体系建设等方面。据悉，秸秆综合利用项目建设所需资金，采取政府补贴、市场化运作与农民自筹相结合的方式筹集。

链接:

http://www.farmer.com.cn/jjpd/nz/nzdt/201808/t20180802_1395383.htm

8．吉林公主岭市开展黑土地保护试点3年

【中国农业新闻网】吉林省公主岭市位于素有世界“黄金玉米带”之称的松辽平原腹地，曾被中国粮食行业协会命名为“中国玉米之乡”。它宛如一弯新月，依傍在东辽河畔。2015年以来，公主岭市进行了黑土保护项目试点。通过科学施肥、深松深翻、秸秆还田等措施，对黑土地进行了有效修复，同时发展有机农业，当地老百姓尝到了甜头。据统计，项目正式实施以来，全市土壤有机质含量提高了2.3%，耕层厚度提高了7厘米。通过实施玉米秸秆粉碎翻压还田配套增施有机肥、养分调控、米豆轮作技术模式，农民一般可增产10%—15%，同时减少20%的化肥投入。于平认为，耕地的主要利用方式是生产，这和保护在某种程度上存在矛盾，既要保粮食，又要保护黑土地。当前，黑土地的高科技保护技术还比较缺乏，黑土地保护的基础科学研究需要重视起来。“实施乡村振兴战略，土地是根基。”吉林省人大法制委主任委员孙首峰说，自然形成1厘米厚的黑土地要

200年到400年的时间，保护黑土地不能用“占补平衡”的办法。应在立法中重视源头保护，把黑土地作为一种宝贵资源加以科学的保护。

9．上海:湿垃圾变肥料种出有机菜

【中国农业新闻网】垃圾分好类之后,被运去了什么地方,进行了哪些处理,以前一直是个“黑匣子”。但如今,上海不少小区实现了“湿垃圾不出小区”,居民亲眼见证果皮菜叶变成肥料,还吃上了种出来的有机蔬菜。上海市徐汇区梅陇三村的陈阿姨刚刚从居委会领到有机农场种出来的蔬菜。梅陇三村作为上海市垃圾分类的试点小区,目前小有成果。居民日常的菜皮果皮扔在专门的桶中,待专门人员将其粉碎后,与酵素一起发酵,密封于桶中,为青浦万亩春、崇明冠华等合作农场提供有机肥。作为回馈,农场则免费为小区居民提供部分有机蔬菜。而在上海奉贤区西渡街道和松江区的泗泾镇、九亭镇、佘山镇、车墩镇等区域,不少小区都有湿垃圾处理机,处置工艺略有不同。以西渡街道为例,湿垃圾处置设备功能更完善,除了物理粉碎、清洗、脱水功能,还增加了废水处理和臭气处理装置。据设备提供商上海市恒霞环保设备公司总经理黄根林介绍,脱水后得到的有机质残渣,运往他处做发酵。也有专家认为,目前大规模推广湿垃圾生产有机肥,时机有待成熟。环境影响方面,湿垃圾的有机残渣发酵会有臭味外溢,小区是否要有污水预处理等问题还要进一步探讨。

链接:

http://www.farmer.com.cn/jjpd/nz/nzdt/201808/t20180817_1399056.htm

10．青海：草地生态畜牧业走向可持续

【中华人民共和国农业农村部】自2011年启动实施草原生态保护补助奖励政策（以下简称“补奖政策”）以来，青海省落实天然草原禁牧面积2.45亿亩、草畜平衡面积2.29亿亩。截至2018年7月，已累计核发草原补奖资金169.75亿元，全省近80万户牧户享受到政策实惠。补奖政策的全面实施，促进了牧民收入持续增收，助力精准脱贫，推动草地生态畜牧业走上了可持续发展的良性道路，实现了生态好转、牧业发展、农牧民增收三方共赢。草原生态保护成效显著。据监测数据显示，与政策实施前相比，青海省草原植被盖度提高了5.8个百分点，亩产鲜草产量增加13%。草原总体退化趋势得到初步遏制，局部地区出现好转，生物多样性增加，草原生态功能逐渐得到恢复。

链接:

http://www.moa.gov.cn/xw/zwdt/201808/t20180815_6155744.htm

【统计数据】

1．Crops and livestock products export conditions in China mainland in 2016（FAOSTAT）

发布源：FAOSTAT

发布时间：2018-06-27

摘要：根据FAOSTAT，提供了中国大陆作物与牲畜产品出口量及价值的最新（2016年）统计数据，其单位分别为tones和 1000 US$。具体数据见附件内2个表单，sheet1-作物及牲畜产品出口总量和sheet2-作物及牲畜产品出口总价值。

链接:

http://agri.ckcest.cn/ass/ea307a3d-2efc-466f-9554-2c0fb18dd448.xlsx

2．Crops and livestock products import conditions in China mainland in 2016（FAOSTAT）

发布源：FAOSTAT

发布时间：2018-06-27

摘要：根据FAOSTAT，提供了中国大陆作物与牲畜产品进口量及价值的最新（2016年）统计数据，其单位分别为tones和 1000 US$。具体数据见附件内2个表单，sheet1-作物及牲畜产品进口总量和sheet2-作物及牲畜产品进口总价值。

链接:

http://agri.ckcest.cn/ass/e6eb4422-75ad-4b6c-8f08-4bd14a9c4639.xlsx

【文献速递】

1．基于虚拟耕地流动视角的省际耕地生态补偿研究

作者：梁流涛; 樊鹏飞; 许明军; 张思远

文献源：中国人口·资源与环境,2018

摘要：作为生态补偿的一个重要组成部分,耕地生态补偿不仅能有效解决耕地生态系统"外部性"溢出问题,而且能够成为促进区域协调发展的重要杠杆,对于协调好我国吃饭、建设和生态之间的关系具有重要意义。虚拟耕地是生态系统循环中的重要物质流,在区域生态系统运行过程中发挥着重要作用。本文通过核算和分析我国省际间粮食流动格局,以"虚拟耕地"为载体,提出构建我国省际耕地生态补偿思路。结果表明:(1)2000—2015年间我国耕地生态补偿支付区和受偿区分布一直较为稳定。受偿区主要集中在我国东北、华北和西北地区,具体包括黑龙江、吉林、辽宁、内蒙古等省区,支付区主要集中在我国东南、西南和中部部分地区具体包括广东、浙江、福建、上海等省区;(2)我国省际间耕地生态补偿标准存在较大差异。2000年有五个省区的应获额度在20亿元以上,有六个省区的应付额度在10亿元以上。2005年有五个省区的应获额度在40亿元以上,有五个省区的应付额度在20亿元以上。2010年有五个省区的应获额度在80亿元以上,有五个省区的

应付额度在35亿元以上。2015年有四个省区的应获额度在160亿元以上,有五个省区的应付额度在80亿元以上。研究提出:一方面要建立基于虚拟耕地流动的耕地生态补偿机制,具体包括构建补偿管理平台,明确补偿资金来源,建立多元化补偿方式,建立相应的调控与监督机制四个方面;另一方面要建立耕地生态补偿机制的保障体系,具体包括建立健全耕地生态补偿立法体系,建立耕地生态环境监测体系,建立多元化融资体系,加强有关耕地生态补偿方面的宣传教育五个方面。

链接:

http://agri.ckcest.cn/ass/a6766a77-25bb-4583-9dd0-c64035b19320.pdf

2．基于三维 GIS 的农田环境模拟监测的研究及系统实现

作者：陈桂芬; 陈航; 卢健; 孟颖

文献源：中国农业科技导报,2018

摘要：随着三维GIS技术的日益成熟,将三维GIS应用于农业领域已成为农业信息技术的研究热点。针对精准农业发展的需求,以国家星火计划示范区——吉林省农安县开安镇为实验区域,利用Sketch Up和Arc GIS技术,进行了玉米精准作业区农田环境的模拟研究,并对农田地下4个层次(0~20 cm、20~40 cm、40~60 cm、60~80 cm)的土壤温湿度进行动态监测,开发了基于三维GIS的玉米精准作业农田环境模拟监测系统,实现了精准农业作业区三维虚拟场景的可视化展示。结果表明,该研究对该区域土壤墒情动态监测和玉米精准作业的实施奠定了基础。

链接:

http://agri.ckcest.cn/ass/88bf4de0-24bb-4812-b1f8-eeb31052802e.pdf

3．Global water transfers embodied in Mainland China's foreign trade: Production- and consumption-based perspectives

作者：Mengyao Han; Michael Dunford; Guoqian Chen, et al.

文献源：Journal of Cleaner Production,2018

摘要：Water resources are embodied in global trade. Although China is the largest water withdrawal economy in the world, 50% of its direct water withdrawal is embodied in Chinese imports and exports. Due to an increasing division of activities between different production units, economies such as Mainland China mainly import intermediate products for further processing and then export final goods to other economies. Overall, Mainland China is a net embodied water supplier not only in final consumption-based trade relations but also in intermediate production-based ones. China’s total per capita water use is much

lower than the global average, but yet China exports embodied water through trade activities. Pakistan, Myanmar and India are China's largest embodied water suppliers, and Hong Kong, the United States and Japan are its largest net recipients. The main water exporting sectors in Mainland China are Electrical and Machinery (Sector 9) and Textiles and Wearing Apparel (Sector 5) respectively, and the main importing sector is Agriculture (Sector 1) with imports coming mainly from Myanmar, Pakistan, the United States and North Korea. This analysis of China's global embodied water transfers can inform policies to increase China's water use efficiency and can be generated to build embodied water budgets for a systematic allocation of water resources on the globe especially from the production- and consumption-based perspectives.

链接:

http://agri.ckcest.cn/ass/dd80d50a-c401-43c4-9acd-025c13daa4e2.pdf

4. Theme Overview: U.S.–China Trade Dispute and Potential Impacts on Agriculture

作者：Mary A. Marchant; H. Holly Wang

文献源：Choices. The Magazine of Food, Farm, and Resources Issues,2018

摘要：The United States and China, the world's largest economic powers, have dueled in an escalating trade dispute since January 2018. This ever-changing story continues to evolve, with additional tariffs announced by the United States as we go to press in late May 2018. Given this recent dispute that has moved agriculture from the back pages to the front pages of media, Choices publishes this special issue on "U.S.-China Trade Dispute and Potential Impacts on Agriculture." This trade dispute is important to U.S. agriculture, because China has been the United States' top agricultural export market outside of North America since 2009 with an annual sale of nearly $20 billion in 2017 (USDA, 2018b). In 2017, top U.S. agricultural exports to China included soybeans, cotton, hides and skins for leather products, fish, dairy, sorghum, wheat, nuts and pork (USDA, 2018a).Although the current trade dispute continues to evolve, it is valuable for us to understand the potential negative impact and to be informed of possible consequences. It is our sincere hope that U.S. and Chinese negotiators will reach an agreement, since both countries ultimately lose with a trade war, as seen from the 1930s Smoot-Hawley Tariff.

链接:

http://agri.ckcest.cn/ass/4cc597f2-17be-42d1-9ce0-421476d20d21.pdf

5．Rural landscape planning through spatial modelling and image processing of historical maps

作者：Alfonso Tortora; Dina Statuto; Pietro Picuno

文献源：Land Use Policy,2018

摘要：Rural land has been affected over the years by profound, complex and difficult to understand transformations due to natural events, human intervention and changes in natural cycles. Nowadays, the analysis of rural land as well as the environment and landscape is made easier and more complete through the use of powerful and reliable tools; many changes can be considered to be models of territorial development that may prove useful in the appropriate planning of interventions in a rural area. In this paper the land use changes in a rural area located in Southern Italy were analysed by comparing some historical cartographic supports produced by the Italian Geographic Military Institute at different periods over about 160 years with modern maps, in order to evaluate the morphological and vegetation variations of agroforestry land. The results in terms of landscape modification of the study area show significant changes: the agricultural and forestry land has been affected by deep transformations. Land use and morphological changes at four time steps were conducted through the implementation of digital terrain models, which were enriched by draping land cover pictures over them; these finally enabled an evaluation in a scenic way of the morphological and vegetation variations of the agro-forestry landscape, allowing a virtual jump back to periods when digital aerial photography was not yet possible. Multi-temporal analysis with the support of GIS techniques has great potential for assessing and monitoring landscape diversity and typical changes of vegetation and for planning sound interventions in landscape structures.

链接:

http://agri.ckcest.cn/ass/9613b56c-4bc0-46d6-96a3-8cbe0f3b6fbf.pdf

6．Mapping major land cover dynamics in Beijing using all Landsat images in Google Earth Engine

作者：Huabing Huang; Yanlei Chen; Nicholas Clinton, et al.

文献源：Remote Sensing of Environment,2018

摘要：Land cover in Beijing experienced a dramatic change due to intensive human activities, such as urbanization and afforestation. However, the spatial patterns of the dynamics are still unknown. The archived Landsat images provide an unprecedented opportunity to

detect land cover changes over the past three decades. In this study, we used the Normalized Difference Vegetation Index (NDVI) trajectory to detect major land cover dynamics in Beijing. Then, we classified the land cover types in 2015 with the Google Earth Engine (GEE) cloud calculation. By overlaying the latest land cover types and the spatial distribution of land cover dynamics, we determined the main types where a land cover change occurred. The overall change detection accuracy for three types (vegetation loss associated with negative change in NDVI, vegetation gain associated with positive change in NDVI, and no changes) is 86.13%. We found that the GEE is a fast and powerful tool for land cover mapping, and we obtained a classification map with an overall accuracy of 86.61%. Over the past 30 years, 1402.28 km^2 of land was with vegetation loss and 1090.38 km^2 of land was revegetated in Beijing. The spatial pattern of vegetation loss and vegetation gain shows significant differences in different zones from the center of the city. We also found that 1162.71 km^2 of land was converted to urban and built-up, whereas 918.36 km^2 of land was revegetated to cropland, shrub land, forest, and grassland. Moreover, 202.67 km^2 and 156.75 km^2 of the land was transformed to forest and shrub land in the plain of Beijing that were traditionally used for cropland and housing.

链接:

http://agri.ckcest.cn/ass/60097cba-3738-4932-a60e-0c2adda2084f.pdf

7．Reconstructing production efficiency, land use and trade for livestock systems in historical perspective. The case of France, 1961–2010

作者：Souhil Harchaoui; Petros Chatzimpiros

文献源：Land Use Policy,2018

摘要：This paper provides an original accounting of changes in livestock production efficiency per livestock category in historical perspective and connects livestock consumption with land requirements and virtual land trade. We use France as a demonstration study and account for productivity changes in terms of energy. Feed rations composition are reconstructed per livestock production and feed crop group over time to account for changes in land use in relation to dietary changes. Land requirements for consumption in France dropped by 28% over the study period besides an increase by 35% of the human population and by 53% of the livestock consumption. The twofold increase in agricultural productivity is due, for half, to energy conversion efficiency improvements and for half to agricultural yields. Overall, the livestock energy conversion efficiency increased by

45% from 1961 to 2010, poultry gained 84%, pork 17%, sheep & goat 67% and cattle 27%. The feed share of oilcrops and cereals in animal rations doubled against a drop by 35% of feed from pastures. Virtual land imports for oilcrops in relation to livestock consumption in France today amount to 0.9 million ha against a maximum of 1.9 million ha in 1979. Besides its dependence on oilcrops imports, the French livestock sector displays net virtual land exports ranging from about 2.55.3 million ha per year over the study period. Gross virtual land trade is today five times higher than the net virtual trade. The difference highlights the share of circular product loops in increasingly integrated agricultural markets at the international scale.

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http://agri.ckcest.cn/ass/216d1b6e-d577-4dde-8b4c-cf4acce0751e.pdf

8. Review: Feed demand landscape and implications of food-not feed strategy for food security and climate change

作者：H. P. S. Makkar

文献源：Animal,2018

摘要：The food-feed competition is one of the complex challenges, and so are the ongoing climate change, land degradation and water shortage for realizing sustainable food production systems. By 2050 the global demand for animal products is projected to increase by 60% to 70%, and developing countries will have a lion's share in this increase. Currently, 800 million tonnes of cereals (one-third of total cereal production) are used in animal feed and by 2050 it is projected to be over 1.1 billion tonnes. Most of the increase in feed demand will be in developing countries, which already face many food security challenges. Additional feed required for the projected increased demand of animal products, if met through food grains, will further exacerbate the food insecurity in these countries. Furthermore, globally, the production, processing and transport of feed account for 45% of the greenhouse gas emissions from the livestock sector. This paper presents approaches for addressing these challenges in quest for making livestock sector more sustainable. The use of novel human-inedible feed resources such as insect meals, leaf meals, protein isolates, single cell protein produced using waste streams, protein hydrolysates, spineless cactus, algae, co-products of the biofuel industry, food wastes among others, has enormous prospects. Efficient use of grasslands also offers possibilities for increasing carbon sequestration, land reclamation and livestock productivity. Opportunities also exist for

decreasing feed wastages by simple and well proven practices such as use of appropriate troughs, increase in efficiency of harvesting crop residues and their conversion to complete feeds especially in the form of densified feed blocks or pellets, feeding as per the nutrient requirements, among others. Available evidence have been presented to substantiate arguments that: (a) for successful and sustained adoption of a feed technology, participation of the private sector and a sound business plan are required, (b) for sustainability of the livestock production systems, it is also important to consider the consumption of animal products and a case has been presented to assess future needs of animal source foods based on their requirements for healthy living, (c) for dairy animals, calculation of Emission Intensity based on the lifetime lactation rather than one lactation may also be considered and (d) for assessment of the efficiency of livestock production systems a holistic approach is required that takes into consideration social dimensions and net human edible protein output from the system in addition to carbon and water footprints.

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http://agri.ckcest.cn/ass/f639aecc-3115-44fe-b475-0d3590910c29.pdf

9. National water, food, and trade modeling framework: The case of Egypt

作者：A. Abdelkader; A. Elshorbagy; M. Tuninetti, et al.

文献源：Science of the Total Environment,2018

摘要：This paper introduces a modeling framework for the analysis of real and virtual water flows at national scale. The framework has two components: (1) a national water model that simulates agricultural, industrial and municipal water uses, and available water and land resources; and (2) an international virtual water trade model that captures national virtual water exports and imports related to trade in crops and animal products. This National Water, Food & Trade (NWFT) modeling framework is applied to Egypt, a water-poor country and the world's largest importer of wheat. Egypt's food and water gaps and the country's food (virtual water) imports are estimated over a baseline period (1986—2013) and projected up to 2050 based on four scenarios. Egypt's food and water gaps are growing rapidly as a result of steep population growth and limited water resources. The NWFT modeling framework shows the nexus of the population dynamics, water uses for different sectors, and their compounding effects on Egypt's food gap and water self-sufficiency. The sensitivity analysis reveals that for solving Egypt's water and food

problem non-water-based solutions like educational, health, and awareness programs aimed at lowering population growth will be an essential addition to the traditional water resources development solution. Both the national and the global models project similar trends of Egypt's food gap. The NWFT modeling framework can be easily adapted to other nations and regions.

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http://agri.ckcest.cn/ass/a499f752-dee6-4dcd-b431-8780dafa9bce.pdf