

《中国农业发展战略研究》专题快报

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【动态资讯】

1. AI-powered agriculture: India Govt uses Artificial Intelligence to boost farming

【AgroNews】 Artificial Intelligence: Prime Minister Narendra Modi's government has begun the use of Artificial Intelligence on pilot basis for crop cutting and yield estimation under its flagship scheme Pradhan Mantri Fasal Bima Yojana. The move is aimed at cutting down the cost of farming while increasing productivity. It is also aimed at ensuring better prices for farmers. The government said this cutting edge technology can be leveraged in providing information and advisory services to farmers which will help in increasing productivity. Talking about the government's initiative to use Artificial Intelligence in farming, Narendra Singh Tomar, agriculture and farmers welfare minister said: "AI can be used in multiple domains of agriculture such as weather, crop and price forecasting, and yield estimation." The government has carried out many pilot studies for optimization of crop cutting experiments, in which AI was used to optimization and yield estimation. It's a significant departure from the traditional farming practiced in the country since ages that has resulted in low yields and excessive dependency on monsoon rains which has kept Indian farming at subsistence level. And failure of monsoon in the country has often resulted in failure of farming and suicides of farmers. But the use of cutting edge technologies like Artificial Intelligence may help Indian farmers to choose the right crop and minimise the risks.

链接:

<http://news.agropages.com/News/NewsDetail---31334.htm>

2. Rising CO₂ levels could boost wheat yield but slightly reduce nutritional quality

【AgroNews】 Levels of atmospheric carbon dioxide (CO₂) are rising, which experts predict

could produce more droughts and hotter temperatures. Although these weather changes would negatively impact many plants' growth, the increased CO₂ availability might actually be advantageous because plants use the greenhouse gas to make food by photosynthesis. Now, researchers reporting in ACS' Journal of Agricultural and Food Chemistry say that a much higher CO₂ level could increase wheat yield but slightly reduce its nutritional quality. Wheat is one of the world's most important crops; its flour is used as a major ingredient in a large variety of foods such as bread, pasta and pastries. Previously, scientists have shown that elevated CO₂ can increase wheat yields at the expense of grain quality traits such as nitrogen and protein content. However, scientists don't yet know the full range of grain quality changes that can occur at different stages of wheat development or the biochemical mechanisms behind them. Iker Aranjuelo and colleagues wanted to examine the effects of elevated CO₂ on wheat yield, quality and metabolism during grain formation and at maturity.

链接:

<http://news.agropages.com/News/NewsDetail---31277.htm>

3. 秦皇岛卢龙县多举措加快推进农村环境整治“清零”行动

【中华人民共和国农业农村部】秦皇岛卢龙县为了加快推进农村环境整治，首先是全面清理农村垃圾。持续推进“双周推进”行动，推动村容村貌提升，将未达标的村列入整治重点、难点，彻底清理历史积存垃圾、柴草堆、粪土堆，引导农民规范安置生活杂物、农机具等生产生活资料，坚决做到“房根净、墙根净、树根净”。对已经整治并通过验收的村庄，认真“回头看”，防止反弹。其次是整治“两高”沿线环境卫生。对“两高”沿线两侧可视范围内的垃圾、秸秆等进行彻底整治，做到全覆盖、无遗留。结合沿线村庄的自然条件，引导群众利用房前屋后空地，发展果菜、花卉等庭院经济。再次是广泛宣传发动群众。制定群众普遍接受和遵守的村规民约，深入开展宣传教育，结合农村工作特点，认真制定整治行动宣传方案，充分利用政府门户网站、标语、横幅、广播、宣传栏等平台载体，大力宣传农村环境整治工作的重要意义、实施步骤、具体要求，让农民群众明白整治工作的重大意义。最后是建立长效管理机制。建立长效管理机制，把实施农村环境整治中的好经验、好做法总结成制度，加强对保洁公司的业务指导和日常监督，实现保洁常态化、管理长效化。

链接:

http://www.moa.gov.cn/xw/qg/201907/t20190725_6321591.htm

4. 临翔区绿色产业高质量发展

【中华人民共和国农业农村部】临翔区依托绿色资源优势，紧扣“绿色食品”牌目标，培育绿色产业发展新动能，巩固提升脱贫攻坚成果。提升管护质量建基地。围绕核桃、坚果、畜牧、茶叶、生物药、蔗糖、油菜、咖啡等特色产业，建成高原特色产业基地238万亩，其中：核桃92万亩、坚果25万亩、茶叶23.5万亩、油菜6.68万亩、生物药业6万亩、咖啡4.2万亩，培育蚕桑、红薯、芭蕉玉等新兴绿色产业基地0.72万亩。强化基地管理，打造生态绿色产业基地，建成生态茶园1.4万亩，无公害认证茶园面积达14.6万亩；核桃提质增效10亩；坚果示范基地3.6万亩。临翔区农产品交易批发市场、南美坡脚茶庄园等项目建成投入使用，建成10个标准化清洁化茶叶初制厂，临翔区现代农业产业发展示范园、牲畜屠宰场等项目加快推进。依托龙头企业树品牌。培育发展龙头企业、农民专业合作社、家庭农场、种养大户等新型农业经营主体。拓宽销售渠道促增收。以临沧万昌农业开发有限公司为龙头，采取“公司+合作社+基地+农户”的运作模式与26家农民专业合作社发展订单农业1.17万亩。

链接:

http://www.moa.gov.cn/xw/qg/201907/t20190725_6321615.htm

5. Climate change could revive medieval megadroughts in US Southwest

【EurekAlert!】About a dozen megadroughts struck the American Southwest during the 9th through the 15th centuries, but then they mysteriously ceased around the year 1600. What caused this clustering of megadroughts -- that is, severe droughts that last for decades -- and why do they happen at all? If scientists can understand why megadroughts happened in the past, it can help us better predict whether, how, and where they might happen in the future. A study published today in Science Advances provides the first comprehensive theory for why there were megadroughts in the American Southwest. The authors found that ocean temperature conditions plus high radiative forcing -- when Earth absorbs more sunlight than it radiates back into space -- play important roles in triggering megadroughts. The study suggests an increasing risk of future megadroughts in the American Southwest due to climate change. During the time of the medieval megadroughts, increased radiative forcing was caused by natural climate variability. But today we are experiencing increased dryness in many locations around the globe due to human-made forces. Climate change is setting the stage for an increased possibility of megadroughts in the future through greater aridity.

链接:

https://www.eurekalert.org/pub_releases/2019-07/eiac-ccc072319.php

6. Alternative grains can help India allay impact of global heating on Agriculture

【AgroNews】 Alternative grains like millets and sorghum could help India cope better with the impact of global heating on agriculture and variations in supply than continuing to rely on rice and wheat alone. This is the heartening conclusion of a new study, but it also cautions that the cultivation area should be selected with care to avoid any production shortfalls. An international team of scientists modelled crop cultivation and growth and found that, compared to finger millet, pearl millet and sorghum, “rice yields are significantly more sensitive to inter-annual fluctuations in monsoon rainfall on both irrigated and rain-fed croplands.” The team included scientists from universities in the US University of Delaware, Columbia University, Yale University and Washington State University and from the International Institute for Applied Systems Analysis, Laxenburg, Austria; and the Indian School of Business, Hyderabad. Their study shows that allocating more cropland to alternative grains can help stabilise grain production in a variety of climatic conditions. It “adds to the empirical information needed for comprehensively assessing the potential co-benefits and tradeoffs associated with increased alternative grain production,” their paper, published on June 13 this year, says.

链接:

<http://news.agropages.com/News/NewsDetail---31242.htm>

7. 多措并举发展绿色农业

【中华人民共和国农业农村部】对于西藏来讲，具有水、土壤、空气、人文环境“四不污染”的高原独特优势和资源禀赋以及农耕游牧文化源远流长，农畜种质资源极为丰富，具有发展无公害农产品、绿色食品、有机农产品、农产品地理标志产品并成为特色绿色农产品基地的独特优势。笔者认为，做好西藏绿色农产品发展工作，可以从以下几个方面着手。首先，要更新从事农业人员的观念。逐步破除传统农业发展观念，树立发展绿色农业的新理念。宣传建设绿色农业是农业发展的必然趋势，以加快农业结构调整和市场化农业为目标，以科技创新和体制创新为动力，推进绿色农业发展。其次，要创新发展绿色农业，逐步实现农业产业化。摒弃小规模、小农生产经营的方式，用经营企业的思维谋划农业产业，整合农产品的生产、加工、运输、销售等环节，形成一个完善的绿色产销管理体系。积极推进农业保险，继续加强农业基础设施建设，提高绿色农业应对自然风险的能力。再次，要加强对绿色农业发展的研发。同时，还要研发与新品种相配套的新技术，并迅速有效地进行推广。树立绿色农产品品牌。通过“三品一标”认证、注册商标等品牌建设，提高农产品及其加工产品的市场知晓度、认可度和竞争力，让绿

色农业品牌和绿色食品工业品牌形成互补效应，进一步推动绿色农业发展。

链接:

http://www.moa.gov.cn/xw/qg/201907/t20190723_6321408.htm

8. 农药瓶换肥皂换洗衣粉 散落田间的瓶罐有了“归宿”

【中华人民共和国农业农村部】种子袋、肥料袋、农药瓶.....过去，这些是田间地头随处可见的农业垃圾，风一吹，气味扑鼻。如今，忠县官坝镇固国村的这些瓶瓶罐罐有了“归宿”，农户将它们统统捡起，送到农药包装废弃物回收点，能换取肥皂、洗衣粉等生活用品。得益于忠县开展的农业投入品废弃物集中回收处置工作，村民不再受刺鼻气味的困扰，乡村的面貌也在悄然变化。有偿回收，村民成田间地头“环保卫士”；全县铺开，废弃物回收处置形成良性循环。经过一年试点，初步建立起了“政府扶持、市场运作、属地管理、集中回收、分类处置”的长效工作机制，全面调动起农业企业、种植大户和广大农民群众的积极性。据介绍，结合农村生活垃圾分类和资源化利用工作，忠县还将在全县372个村（社区）推广农业投入品包装废弃物回收处置工作，今年9月底前覆盖所有乡镇80%以上的行政村（社区），今年12月底前全面实现全县农村农药包装废弃物分类收集、运输和处置工作常态化。“回收只是第一步，做好收回来的废弃农药包装无害化处理更是重中之重。”县农业农村委负责人介绍，下一步，忠县将继续推进农业投入品废弃包装物的回收、无害化处理等全过程的回收处置工作，让种子袋、肥料袋、农药瓶更好地回收，还村民净土。

链接:

http://www.moa.gov.cn/xw/qg/201907/t20190723_6321378.htm

9. 重庆财政安排资金 支持农村厕所粪污治理

【中华人民共和国农业农村部】今年起，重庆财政将安排资金实施农村整村“厕所革命”。近日，市财政将今年农村综合改革、农村人居环境整治两笔共10亿多元的资金拨到区县，支持厕所粪污治理等事项。农村卫生厕所普及率达73.1%。用5年解决农村厕所问题。重庆市还组合财税、规划、用地、用电、用水、商业置换等多方面政策，引导社会资本参与建设，并引导社会单位厕所对外开放。比如，璧山区就发明了鼓励企业“认捐厕所”，企业出资建设，除了标示“公共卫生间”，还铭刻捐建企业名，公厕内播放的宣传公益广告可用于企业宣传，走出了以厕养厕的市场新路。

链接:

http://www.moa.gov.cn/xw/qg/201907/t20190723_6321380.htm

10. Smart irrigation model predicts rainfall to conserve water

【Cornell University】 ITHACA, N.Y. - Fresh water isn't unlimited. Rainfall isn't predictable. And plants aren't always thirsty. Just 3 percent of the world's water is drinkable, and more than 70 percent of that fresh water is used for agriculture. Unnecessary irrigation wastes huge amounts of water - some crops are watered twice as much as they need - and contributes to the pollution of aquifers, lakes and oceans. A predictive model combining information about plant physiology, real-time soil conditions and weather forecasts can help make more informed decisions about when and how much to irrigate. This could save 40 percent of the water consumed by more traditional methods, according to new Cornell University research. Controlling plant moisture precisely could also improve the quality of sensitive specialty crops such as wine grapes, he said. The researchers' method uses historical weather data and machine learning to assess the uncertainty of the real-time weather forecast, as well as the uncertainty of how much water will be lost to the atmosphere from leaves and soil. This is combined with a physical model describing variations in the soil moisture. Integrating these approaches, they found, makes watering decisions much more precise.

链接:

<http://news.cornell.edu/stories/2019/07/smart-irrigation-model-predicts-rainfall-conserve-water>

【文献速递】

1. 中国农产品贸易格局变化及海外农业资源利用对策

作者: 贾盼娜; 刘爱民; 成升魁, 等

文献源: 自然资源学报, 2019

摘要: 2017年中国大宗农产品虚拟耕地净进口量达到6784万hm²,对外依存度为33.4%,其中巴西和美国是主要的进口来源国。以大豆为重点的土地密集型农产品的大量进口,在一定程度上保证了中国粮食供给,但要从根本上保障中国粮食安全也应实施农业“走出去”战略。尽管近年中国海外农业投资逐年增加,但由于缺乏长远的投资战略指导,海外农产品资源的控制能力差,生产风险高。为此,为保障中国粮食安全,应从构建人类命运共同体、提高全球农产品供给能力的战略高度,选择最佳海外投资区域,优先开发中国进口量大、对外依存度高的国际大豆和棕榈油等油脂油料资源;扶持多类型企业主体参与海外农业资源开发;在农业投资目的国通过“订单+农户”模式进行深度合作,并融入全球农产品贸易体系。

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-ol6ANgwUAAkRxdLG4sI591.caj>

2. Efficient allocation of agricultural land and water resources for soil environment protection using a mixed optimization-simulation approach under uncertainty

作者: Mo Li; Jiang Li; Vijay P. Singh, et al.

文献源: Geoderma,2019

摘要: This study proposes an optimization-simulation approach for simultaneously determining crop patterns and allocating irrigation water to improve soil environment. The approach incorporates an optimization model (a Chance-Constrained Programming (CCP) based multi-objective non-linear programming) integrated with a carbon footprint (CF) model and irrigation water use efficiency (IWUE) index, a soil water balance model and a groundwater dynamics model. The output of the optimization model constitutes the input to the soil water balance model which is calculated based on soil water content from soil samples representing the basin under study, and the resulting output is the input to the groundwater dynamics model. The output of the groundwater dynamics model is examined by whether the optimal results give rise to soil salinization. The proposed approach has advantages in addressing the tradeoffs of land and water resources for different crops in irrigation districts to reduce soil carbon emissions and improve land and water resources allocation efficiency, dynamically reflecting water transformation among precipitation, surface water, soil water and groundwater, and dealing with nonlinearity and uncertainties. The approach was applied to identify optimal land and water resources allocation schemes in the oasis of Heihe River basin, northwest China. Results demonstrated that in the studied area, soil carbon emissions decreased and water use efficiency increased by the simultaneous allocation of the interactive agricultural land and water resources in space and time. Choosing the violation probabilities in the range of 0.05 and 0.1 might be more beneficial to the comprehensive benefits of the contradictory objectives (i.e. reducing soil carbon emissions and increasing irrigation water use efficiency), because during this range the value of IWUE tended to be the largest and the value of CF was beginning to stabilize. From the perspective of spatial distribution, the value of CF showed an increasing trend from northwest to southeast, while the changes of groundwater table in the southern part were higher than in the northern part of the oasis. As the main limiting factor, increasing water availability led to an increase of cultivated land within a certain range, which significantly affected soil environment, leading to the necessity to contribute towards the efficient utilization of irrigation water resources and field activities to reduce soil pollution. Therefore, the proposed modelling framework can help to comprehensively manage agricultural land and water resources under complexity in an efficient and

environmental-friendly way, and thus promote soil environment protection.

链接:

http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-q0yAl4ylAC_aqqvrR2Y562.pdf

3. 河南省农业水土资源承载力的时空分异

作者: 文倩; 李小弯; 鄢雨旱, 等

文献源: 中国水土保持科学, 2019

摘要: 为深入了解区域农业水土资源承载能力,保障粮食安全,作者从农业水土、社会、经济、生态4方面构建农业水土资源承载力评价体系,采用投影寻踪模型和核密度分析模型,研究2006—2015年河南省农业水土资源承载力的时空分异特征。结果表明:1)河南省农业水土资源承载力主要受这些因素的影响:灌溉面积、农林水利工程投资比例、第一产业比重、农田化肥使用量、农作物受灾面积比例、人口密度、农机化程度、单位耕地面积用电量与农业水资源供需平衡指数等,它们对农业水土资源承载力的累计贡献率为81.55%。2) 2006—2015年,河南省农业水土资源承载力逐渐降低,由2006年的-0.06下降到2015年的-0.20,降低了233%,研究期内,全省仅郑州、济源的农业水土资源承载力有所增加,其余城市都有不同程度的降低。3) 2006—2015年,河南省农业水土资源承载力空间分异明显:中西部最高、南部中等、东部与北部最低;同时两级分化不断加剧:高水平承载力城市由4个减少为2个,低水平承载力城市由4个增加到10个。

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-oQ6AGRBkAAjfhRqWJ4034.pdf>

4. 以绿色托举中国农业

作者: 叶兴庆

文献源: 中国农业大学学报(社会科学版), 2019

摘要: 面对严峻挑战,农业的出路在于走绿色发展之路。对绿色的理解有三个维度:一是从产品本身的质量来看,要符合绿色标准;二是从环境的角度来看,农业生产应当是资源节约和环境友好的;三是从农业支持政策来看,应由“黄”转“绿”。在现在这个时间节点,从这三个维度思考农业未来的绿色发展之路,强调农业的绿色发展,其重要性体现在四个方面:第一,农业绿色发展这篇文章做得多好是决定未来中国农业中速增长平台水平的重要变量;第二,是提高中国农业可持续发展能力的必由之路;第三,是增强农业竞争力的必然选择,因为我国的小规模农业与新大陆国家,或者东南亚、中亚这些国家相比,价格竞争力较低,只能在质量上进行竞争;第四,走绿色发展之路是调整农业支持政策结构的重要方向。

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-oJSA440AAJVkt92pE0999.pdf>

5. 南方山地丘陵区资源环境承载能力监测预警技术方法探讨——以福建省为例

作者: 王佳韡; 伍世代; 王强, 等

文献源: 地理科学,2019

摘要: 以福建省为例,综合运用文献研究法、地理比较法、GIS空间分析和数理模型等研究方法,按照评价技术与区域特色相匹配、开发阈值与主体功能相协调、划分结果与自然分异相统一的设计思路,构建适宜山地丘陵区的资源环境承载能力监测预警改进方案。提出:①评价模型中引入山地丘陵区的特征要素,着重探讨土地资源评价中坡度、生态保护红线、行洪通道等影响因子分值的调整,水资源评价方法的替换,重点生态功能区集成方法的调整等。②在地形复杂多变、区域差异显著的情况下,宜尽可能采用具有全域覆盖特征的数据替代孤立点位数据。集中体现在农产品主产区采用的耕地质量等别评定数据,生态评价采用的以地灾点为中心的地质灾害综合影响指数中。

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-qj-AHW4kADK7AWo4pYI170.pdf>

6. Evaluation of the comprehensive carrying capacity of interprovincial water resources in China and the spatial effect

作者: Yuxi Wang; Yong Wang; Xuelian Su

文献源: Journal of Hydrology,2019

摘要: There has been a series of water resource problems, such as imbalances of the water supply and demand and serious water pollution, in China. It is important for the Chinese government to formulate a sustainable development strategy for water resources and to effectively guarantee the national water resource security. This paper divides the comprehensive carrying capacity of water resources into the following three aspects: the water resource balance capacity, the water resource pressure and driving force, and the water resource development and utilization capacity. Taking 31 provinces, municipalities and autonomous regions of China as research objects, the catastrophe progression method is adopted to evaluate the comprehensive carrying capacity of interprovincial water resources in China from 2010 to 2016. The direct effects and spatial spillover effects of different factors on water resources are discussed by constructing a spatial Durbin model (SDM). The results show that there are obvious spatial differences in the water resource balance ability, pressure and driving force, and development and utilization ability. The spatial distribution follows a decreasing trend from east to west and from south to north. The water supply, water demand, investment in environmental management, economic

development and balance of the ecosystem have obvious direct effects on the carrying capacity of water resources. The spatial spillover effect of the water supply and demand, energy consumption, the proportion of protected areas and the newly increased areas of soil erosion control are significant and will have a strong impact on the water resource carrying capacity of surrounding areas. The conclusion of this paper can provide a reference for the government in making water resource management policies.

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-ppaAL08oAD0uiR-Tn1g480.pdf>

7. Land use change in an agricultural landscape causing degradation of soil based ecosystem services

作者: Mike Baude; Burghard C. Meyer; Marcus Schindewolf

文献源: Science of the Total Environment,2019

摘要: Landscape structure and ecosystem service (ES) provision in Central Europe have changed fundamentally and some ES have been irreversibly degraded over the last 250 years. The land use change analysis of a typical agricultural landscape near Leipzig (Germany) uses digitized historical GIS-data, serial cadastral maps and documents in time steps 1750, 1850, 1950 and 2005. Arable land area increased from 73.4% (1750) to 87.2% (2005) and grassland decreased from 22.1% to 4.2%. ES provision change analysis has resulted e.g. in a significant increase of winter wheat production comparing the decades 1990—1999 to 2000—2009. However, natural soil production capacity has degraded based on the interpretation of historical soil assessment maps (1864, 1937) and the actual erosion risk hazard has increased strongly in the same period. Caused by the Prussian agricultural revolution between 1750 and 1850 a high biodiversity level is found, followed by a slight decrease during the industrialization in the second half of the 19th century. By industrialized production and collectivization since 1960 devastation of vegetation structures has brought habitat degradation and a dramatic biodiversity loss. Driving forces analysis shows that significant drivers of land use and ES changes since 1750 are socioeconomic, political and technical drivers. It clarifies the impact of landscape changes by Prussian agrarian reforms, industrialization, technical and land management innovations, Kolkhoz system and Common Agricultural Policy on ES degradation based on the indicators crop production, natural soil production capacity, soil degradation caused by erosion hazards and biodiversity.

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-qDqAU-SeACetrJRutE4781.pdf>

8. 中国不同技术复杂度农产品出口特征分析

作者: 王腾坤; 林海; 李军

文献源: 世界农业,2019

摘要: 本研究通过改进技术复杂度测算指数,利用联合国商品贸易统计数据库等相关信息,对中国不同技术复杂度农产品出口特征进行分析。研究发现:(1)农产品出口以中等偏下技术复杂度为主,且出口结构由低技术复杂度向中等偏下及以上技术复杂度产品优化;(2)技术复杂度越高的农产品受国际宏观经济条件影响程度越大,且低技术复杂度农产品更易受到区域经济条件影响;(3)农产品技术复杂度越高,则贸易集中程度越高,同时贸易集中程度下降趋势越明显,则越有利于市场结构优化和风险分散。

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-ot-AZT-5ACJ-krq7S1M367.pdf>

9. 齐齐哈尔市土地利用生态安全预警研究

作者: 杨凤海; 赫轩; 赵焯荣, 等

文献源: 东北农业大学学报,2019

摘要: 以黑龙江省齐齐哈尔市为研究区,基于RS和GIS技术,揭示1990~2015年土地利用变化特征及规律,运用"压力-状态-响应"模型构建生态安全预警指标体系,在500 m×500 m栅格单元内实现齐齐哈尔市土地利用生态安全预警测度及评价。结果表明,(1)研究区耕地、林地及未利用地面积持续增长,草地、建设用地面积呈波动式增长,水域面积大幅度缩减,土地利用变化过程由剧烈趋于平缓;(2)1990~2015年,研究区生态安全水平总体呈上升趋势,警情级别由中警转化为轻警,逐渐向预警区间过渡,退耕还林还草、水土流失治理等生态建设性投入取得成效;(3)区域生态安全警情时空分异特征显著,市辖区安全水平较低,中部地区、主要流域及林区水平较高,25年间警情综合指数低值分布范围逐渐缩减,高值范围持续扩张,轻警面积逐渐取代中警居于优势地位。研究结果可为区域土地生态安全监测治理、构建生态安全格局以及土地利用规划提供依据。

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-pQCAKo-FABrbFoOdIZY463.pdf>

10. Sustainable utilization of water resources in China: A system dynamics model

作者: Yuhuan Sun; Ningning Liu; Jixia Shang, et al.

文献源: Journal of Cleaner Production,2019

摘要: Water resources play an important role in demographic, social, and economic development. The present study divides the macroeconomic factors that affect the

sustainable use of water resources into five major subsystems: economy, population, water supply and demand, land resources, and water pollution and management. It then constructs a feedback loop and stock-flow chart of the systems with the system dynamics model to simulate water supply and demand conditions and future changes in the gap between supply and demand from 2005 to 2020. Further, this study designs different development programs to simulate the changes to the key variables by changing the value of important model parameters. It is found that a balanced development program can achieve not only steady economic growth, provide a demographic dividend, and protect arable land resources, but also maximize the sewage treatment rate and improve the reutilization efficiency of water. Moreover, we find that the fundamental way in which to bridge the gap between the supply and demand of water resources is to improve water supply rather than control demand.

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-p3-AcjopACCWtnw9ltc173.pdf>

【相关专利】

1. 一种虚拟水贸易作用下水资源节约量计算方法

发布源: 万方数据知识服务平台

发布时间: 2018-09-07

摘要: 本发明公开了一种虚拟水贸易作用下水资源节约量计算方法,包括步骤:采集产品产出量及生产产品所需的水资源量,确定虚拟水含量;根据水资源脆弱性指标计算水资源稀缺指数;采集产品出口量信息,综合考虑虚拟水含量、水资源稀缺指数计算产品出口所产生的水资源节约量。本发明将地区水资源稀缺情况纳入水资源节约评价的方法体系中,水资源节约或损失量计算更加科学、合理,对我国统筹实体水#虚拟水实现国家水安全具有一定的技术指导意义。

链接:

<http://agri.ckcest.cn/file1/M00/06/8C/Csgk0F0-n6CAc8SpAAWgt7HuN3I410.pdf>

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