Technology-Led "Targeted Poverty Alleviation and Elimination": Practice and Exploration of Designated Sci-Tech Poverty Alleviation in Huanjiang County, Guangxi by the Chinese Academy of Sciences (Postprint)

Authors: Zeng Fuping, Zeng Zhaoxia, Zhang Hao, Duan Rui

Date: 2018-06-24T00:00:00+00:00

Abstract

Targeted poverty alleviation is the fundamental pathway to achieving the grand goal of building a moderately prosperous society in all respects. This article reviews the three stages experienced by the Institute of Subtropical Agriculture and Ecology, Chinese Academy of Sciences, during its more than 20 years of poverty alleviation work in Huanjiang County, Guangxi, summarizes the main achievements and social impacts of the "targeted poverty alleviation" model in Huanjiang County at different stages, analyzes the challenges faced by this model under the new situation, and explores new ideas for using science and technology to assist "targeted poverty elimination" in Huanjiang County.

Full Text

Science and Technology Leading "Targeted Poverty Alleviation and Targeted Poverty Elimination" —Practice and Discussion of CAS' s Targeted Poverty Alleviation Work in Huanjiang County, Guangxi

ZENG Fuping[12*], **ZENG Zhaoxia**[12], **ZHANG Hao**[12], **DUAN Rui**[3]
[1]Key Laboratory of Agro-ecological Processes in Subtropical Region, Institute of Subtropical Agriculture, Chinese Academy of Sciences, Changsha 410125, China
[2]Huanjiang Observation and Research Station of Karst Ecosystem, Chinese Academy of Sciences, Hechi 547100, China
[3]Bureau of Science & Technology for Development, Chinese Academy of Sciences, Beijing 100864, China

Abstract

Targeted poverty alleviation and elimination is the fundamental pathway to achieving the ambitious goal of building a moderately prosperous society in all respects. This paper reviews the three distinct stages of the 25-year poverty alleviation journey undertaken by the Institute of Subtropical Agriculture, Chinese Academy of Sciences (CAS) in Huanjiang County, Guangxi. We summarize the principal achievements and social impacts of the "targeted poverty alleviation" model at different phases, analyze the challenges confronting this model under new circumstances, and explore innovative approaches for leveraging science and technology to support Huanjiang County's "targeted poverty elimination."

Keywords: targeted poverty alleviation, poverty alleviation by science and technology, ecological industry, karst area

*Corresponding author. E-mail: fpzeng@isa.ac.cn

Introduction

President Xi Jinping's report at the 19th National Congress of the Communist Party of China set forth the objective of lifting all rural impoverished populations out of poverty by 2020, pointing out the correct direction for achieving this goal. To ensure that rural poor populations escape poverty on schedule, targeted poverty alleviation represents the fundamental approach [1,2]. Poverty alleviation through science and technology constitutes a vital component of China's poverty reduction and development strategy. For an extended period, the Chinese Academy of Sciences (CAS) has regarded poverty alleviation work as an extremely important political task, making it one of the earliest institutions to participate in national regional poverty alleviation efforts [3].

Huanjiang Maonan Autonomous County (hereinafter referred to as "Huanjiang County") in Guangxi Zhuang Autonomous Region is a designated county in the contiguous destitute area of rocky desertification spanning Yunnan, Guangxi, and Guizhou provinces, with karst landforms covering 39.9% of its total area. This unique geographical and geological background has resulted in barren soils, low environmental carrying capacity, fragile ecosystems, acute human-land conflicts, and low, unstable productivity [4]. Consequently, it ranks among Guangxi's 28 nationally designated poverty-stricken counties and was one of the five counties designated by the State Council in 1996 for targeted assistance from CAS. The Huanjiang County case study offers valuable lessons for poverty alleviation work in Southwest China's karst regions [4,5].

During its counterpart assistance to Huanjiang County, the Institute of Subtropical Agriculture, CAS (hereinafter "Institute of Subtropical Agriculture"), through its Huanjiang Karst Ecosystem Observation and Research Station

(hereinafter "Huanjiang Station"), has focused on President Xi Jinping's strategic thinking on targeted poverty alleviation and elimination. Integrating national strategic needs and addressing issues such as fragile ecological environments, prominent human-land contradictions, lack of industries, and economic backwardness in contiguous destitute areas of Southwest China, the Institute has explored new concepts of "green ecological poverty alleviation" and "characteristic industry poverty alleviation." It has proposed appropriate environmental capacity for resettlement and rational resettlement models, providing decision-making foundations and demonstration templates for large-scale relocation-based poverty alleviation and the planned resettlement of 400,000 people in Guangxi, while also offering technical support for relocation-based poverty alleviation in Huanjiang County.

Development History of Science and Technology Poverty Alleviation in Huanjiang County

CAS initiated its science and technology poverty alleviation work in the 1980s. According to national unified deployment and closely integrating with local realities, CAS has carried out poverty alleviation through cadre dispatch, achievement transformation, and other methods, actively leading impoverished rural populations toward prosperity [3]. In 1993, CAS's Institute of Subtropical Agriculture dispatched Researcher Zeng Fuping to Huanjiang County to conduct poverty alleviation work. Over the past 25 years, Zeng Fuping's team has continuously explored and summarized valuable experiences and poverty alleviation models. The journey of science and technology poverty alleviation can be broadly divided into three stages.

Stage 1: Ecological Migration and Relocation Model Research and Demonstration (1996-2005) To achieve the dual objectives of rocky desertification control and poverty alleviation, the Institute of Subtropical Agriculture collaborated with Huanjiang County Government, Guangxi Department of Science and Technology, Guangxi Poverty Alleviation Office, and other units to establish the Huanjiang Karst Ecological Migration Demonstration Zone (including the ecological migration source area in Guzhou Village, Xianan Township, and the ecological migration destination area in Kenfu Village, Sile Town). The team conducted comprehensive planning for the establishment and coordinated development of agriculture, forestry, and animal husbandry in the core demonstration zone. They designed four pillar industries—fruit, sugarcane, livestock, and vegetables—adapted to rational resource utilization and sustainable, healthy economic development in the demonstration zone. The team provided regional layouts, development steps, and main measures for these industries, creating an innovative enterprise-oriented science and technology poverty alleviation mechanism of "research institution + company + demonstration base + farmers."

Kenfu Ecological Migration Demonstration Zone was the nation's first ecological migration area, achieving relocation within one year and solving food and

clothing needs within another year. In October 1997, the Guangxi Regional Government convened a regional poverty alleviation work site meeting in Kenfu Village, Huanjiang County, fully affirming the Kenfu ecological migration model and its successful experiences. The meeting proposed relocating 500,000 people through ecological migration across the region from 1998 to 2003, including 200,000 people in Hechi City, with implementation beginning that same year. Consequently, Huanjiang County became the nation' s largest ecological migration resettlement county, resettling 100,000 migrants in total, including 80,000 people from Du' an, Dahua, and Donglan counties in Hechi City. The "Kenfu" ecological migration model provided scientific foundations and technical support for Huanjiang County' s implementation of "100,000 ecological migrants," offering a scientific and technological support and demonstration template for large-scale ecological migration.

Through implementing the relocation-based poverty alleviation model, the per capita net income of ecological migrants in Huanjiang County increased from 294 yuan in 1996 to 2,478 yuan in 2005 [4], reaching 9,664 yuan in 2017. This model not only improved the economic benefits for farmers in the ecological migration demonstration zone but also significantly enhanced its ecological efficiency: vegetation coverage reached 90%, soil erosion modulus decreased by 31%, water and soil loss reduced by 54%, and water use efficiency increased by 36%–45%. Due to its excellent ecological and social benefits, this ecological migration model has been termed the "Kenfu Model" by UNESCO.

Stage 2: Vegetation Management Research and Demonstration in Karst Mountain Areas (2005–2015) This stage emphasized both ecological governance and science and technology poverty alleviation, achieving dual effectiveness. Because impoverished households in karst mountain areas migrated out during the previous stage, farmers' economic conditions improved and rocky desertification was curbed. Therefore, this stage focused on introducing and screening karst-adapted economic crops, addressing characteristics of karst rocky mountain areas such as uneven rainfall distribution, severe seasonal droughts, and frequent waterlogging in depressions.

The team introduced new varieties of corn and potatoes to karst regions in Guangxi and Guizhou, screening drought-resistant, high-yield corn varieties Keyu 7, Keyu 8, and the Xiangyu series, with a promotion area of 130,000 mu. They screened early-maturing, flood-avoiding, high-yield potato varieties Kexin 3 and 4, achieving yield increases of over 50% across 60,000 mu. Simultaneously, they conducted screening of suitable species for rocky desertification control in karst areas, identifying 12 well-adapted species: *Caesalpinia sappan*, *Leucaena leucocephala*, *Broussonetia papyrifera*, *Diplospora dubia*, *Albizia chinensis*, *Zenia insignis*, *Sapindus mukorossi*, *Fraxinus rhynchophylla*, *Fraxinus stylosa*, *Deutzia setchuenensis*, *Vernicia tonkinensis*, and *Sinosideroxylon pedunculatum*. Fourteen basically suitable species were also identified: *Choerospondias axillaris*, *Quercus acutissima*, *Acrocarpus fraxinifolius*, *Albizia kalkora*, *Cleidiocarpon cav-*

aleriei, *Styrax chinensis*, *Sterculia lanceolata*, *Sterculia nobilis*, *Cephalomappa sinensis*, *Cyclobalanopsis glauca*, *Acer cinnamomifolium*, *Bischofia javanica*, *Malania oleifera*, and *Hainania trichosperma*. Nine poorly adapted or non-adapted species were identified: *Bridelia balansae*, *Syzygium hainanense*, *Aleurites moluccanus*, *Acacia crassicarpa*, *Ormosia henryi*, *Acacia mangium*, *Acacia confusa*, *Lysidice rhodostegia*, and *Apodytes dimidiata*.

Additionally, addressing the problems of large rocky mountain areas, scarce arable land, difficult water resource utilization, and limited corn cultivation, the team proposed an alternative herbivorous livestock development model. Through this model, Huanjiang County developed 176,000 mu of understory grass cultivation and raised 132,000 head of beef cattle, increasing farmers' per capita income by 3,500–5,000 yuan. This model has been extended to Tiandeng, Debao, Mashan, and Dahua counties in Guangxi, Dafang County, Qixingguan District of Bijie City, and Qinglong County in Guizhou, as well as Xichou and Luxi counties in Yunnan. In the "Evaluation Report on the Three-Year Pilot Phase Summary of Comprehensive Rocky Desertification Control Engineering in Karst Areas" (2012) by China International Engineering Consulting Corporation, the alternative herbivorous livestock development model was established as a typical demonstration case for rocky desertification control in Southwest China. Its control model and experiences were selected by the National Development and Reform Commission as a 典型案例 for industrial development in karst mountain areas and promoted for broader application.

Developing animal husbandry in impoverished areas constitutes a primary pathway for increasing farmers' income, but it also brings problems such as rural environmental pollution and treatment of livestock waste. Addressing severe non-point source pollution from animal husbandry, the project team conducted demonstrations of *Myriophyllum aquaticum* for wastewater treatment and resource utilization in Huanjiang County, achieving nitrogen, phosphorus, and COD (chemical oxygen demand) removal rates exceeding 95% and meeting Class III water quality standards. The ecological treatment of livestock wastewater using *Myriophyllum* received directives from Wei Chao' an, Deputy Secretary of the Guangxi Regional Committee. The Guangxi Regional Bureau of Animal Husbandry and Aquaculture, as well as bureaus in Hechi and Yulin cities, visited the demonstration base for exchanges. The model was incorporated into Guangxi' s rural environmental governance plan and widely promoted to Fuchuan, Bobai, Luchuan, Rongxian, and Ningming counties.

Furthermore, addressing the urgent needs arising from heavy metal contamination of 9,400 mu of farmland and land loss due to tailings dam failures in Huanjiang County, the project team collaborated with relevant teams from the Institute of Geographic Sciences and Natural Resources Research, CAS, to conduct bioremediation of heavy metals in the Dahuanjiang River basin farmland. They developed the Huanjiang farmland soil remediation engineering model, led by phytoremediation technology and characterized by "local government leadership, research institution technical support, and active farmer participation,"

remediating 1,280 mu of farmland.

Stage 3: Characteristic Ecological Industry Cultivation and Demonstration (2015–Present) Following the research and demonstration of ecological migration-relocation poverty alleviation models in impoverished karst mountain areas and vegetation management research and demonstration, local livelihoods have improved and fragile ecological environments have largely recovered. The current focus of science and technology poverty alleviation has shifted to cultivating and demonstrating characteristic ecological industries.

(1) Understory Grass Cultivation and Cattle Raising. The team established cattle raising demonstration bases through grass cultivation in Guzhou Village and Xiatang Village, Huanjiang County, for targeted poverty alleviation. They established a 500-mu demonstration base for the cyclic ecological agriculture model of returning farmland to forest/grassland for cattle raising, a 200-mu demonstration base for returning farmland to mulberry for sericulture, a 300-mu ecological forest demonstration base, 91 key households for grass cultivation and cattle raising, 2,770 m^2 of cattle sheds, 516 mu of high-quality forage grass, 21 chaff cutters, 365 mu of afforestation, 420 m of village field roads, and 120 mu of slope farmland improvement. In 2017, the demonstration zone area increased by 210 mu, expanding from Yuhuan and Bochuan to Xiarong and other villages. In 2017, the Institute of Subtropical Agriculture, together with Huanjiang County Science and Technology Bureau and Fruit Bureau, guided villagers in Xiarong Village, Chuanshan Town, to plant 160 mu of forage grass understory and raise 186 head of cattle. In the Xiarong Village grass cultivation and cattle raising demonstration base in Chuanshan Town, they planted 160 mu of forage grass and raised 186 head of cattle, involving 83 households with 312 people.

(2) Ecological Cultivation of Chinese Medicinal Herbs. The team established a rare and endangered Chinese medicinal herb germplasm conservation and breeding base, researching and promoting techniques for wild tending, ecological cultivation, and understory wild-simulated cultivation of medicinal herbs. In 2016, under the guidance of the Institute of Subtropical Agriculture and Huanjiang County Science and Technology Bureau and Fruit Bureau, 118 mu of medicinal herbs were planted in Xiakai, Xiajie, and Neixi villages of Yuhuan Village, radiating to 2,880 mu of medicinal herb cultivation throughout the county, involving varieties such as *Euchresta japonica*, *Millettia speciosa*, *Spatholobus suberectus*, *Sarcandra glabra*, *Paris polyphylla*, and *Dendrobium officinale*. In 2017, 126 mu of *Euchresta japonica* were planted in Xiangdong Village, Xianan Township, and Aidong Village, Changmei Township. In Aidong Village, Changmei Township, a Chinese medicinal herb demonstration base was established, planting 66 mu of *Sophora tonkinensis*, involving 23 households with 96 people.

(3) Characteristic Fruit Industry. The team cultivated characteristic high-value economic fruit forests such as red-heart pomelo, 砂糖橘 (*Citrus reticulata*), *Citrus* 'Orah', and macadamia, with a promotion area of 135,000 mu. Red-

heart pomelo alone has reached 68,000 mu in promotion area, with an output of 7,200 tons and output value of 43.2 million yuan, becoming one of Huanjiang County's "eight major poverty alleviation industries."In 2017, Huanjiang County established its first autonomous region-level agricultural science and technology demonstration park and characteristic agricultural demonstration garden, with a demonstration area of 10,000 mu.

(4) Other Industries. The "Jiupeng Shiya Tea" cultivated by the Institute of Subtropical Agriculture and Huanjiang County Agriculture Bureau and other relevant units was designated as the state guest tea at the 2016 ASEAN Expo. The tea factory has an annual processing capacity of 132,000 kg, distributed over 100,000 seedlings, benefiting more than 2,000 households and increasing annual per capita income by over 2,000 yuan. Household-based, scattered understory cultivation of Shiya tea can both increase farmers' income and protect the ecological environment. The Guangxi Mulun Natural Food Co., Ltd. cultivated by the team has become a well-known brand in Hechi City, Guangxi, with its packaged drinking water becoming a regional pillar industry widely sold in Guangxi and Guangdong regions. In 2015, "Mulun Spring" won the "World' s Good Water Source" and "Best Health Water" awards at the 8th China High-end Drinking Water Exhibition. The cultivated Damaonan Flavor Food Factory develops high-end products such as Huanjiang characteristic beef cattle and fragrant pigs, increasing production value and benefiting impoverished households in six townships, with annual per capita breeding income increasing by over 2,000 yuan.

Research and Social Impact

To implement the central government' s major poverty alleviation deployment and accelerate the implementation of CAS's important instructions on leveraging institutional technical and talent advantages to increase support for counterpart assistance counties, CAS launched industrial demonstration research for science and technology poverty alleviation in Huanjiang County. From March to June 2017, CAS' s Guangzhou Branch and the Institute of Subtropical Agriculture organized scientific and technical backbone personnel to conduct extensive field investigations in Huanjiang County over four months, visiting farmers' homes [Figure 1: see original paper].

This investigation involved 950 person-times, comprehensively surveying 12 towns (townships) in Huanjiang County, covering 145 administrative villages (communities), visiting 1,300 households, distributing 1,820 questionnaires, and collecting 36,000 data points. The survey content included basic town (township) conditions, industrial status, and basic household information, covering traditional industries such as sugarcane planting, sericulture, fragrant pig and beef cattle breeding, and forestry, as well as emerging industries such as characteristic fruits, Chinese medicinal herbs, and tourism. Through the investigation, the dominant and secondary industries of each town (township) were basically identified, and development designs for the dominant industries of each town

(township) were formulated. Based on the intentions of counties, townships, villages, and farmers, industrial poverty alleviation demonstration project proposals for each town (township) were compiled .

Through the investigation, scientific researchers, according to farmers' wishes and current industrial development status and combining their professional backgrounds, focused on discussing urgent scientific and technological issues in industrial development. These included breeding issues for fragrant pigs and beef cattle, disease problems in sericulture cultivation, standardization issues in fruit cultivation, model optimization for understory Chinese medicinal herbs, and the unified construction of a Huanjiang agricultural product e-commerce platform to address online sales of fragrant pigs, beef cattle, and fruits. Based on these issues and focusing on the core industrial development of each township, targeted solutions were proposed. Accordingly, 12 township industrial plans and implementation schemes were compiled, 12 township industrial project proposals were written, preliminary industrial demonstration bases were identified, and the Huanjiang County industrial poverty alleviation investigation report and poverty alleviation industrial implementation plan were completed.

The assistance work of the Institute of Subtropical Agriculture in Huanjiang County has received full recognition from CAS, Guangxi Autonomous Region, and society at large. In 2016, CAS President Bai Chunli and Vice President Zhang Yaping attended the CAS science and technology poverty alleviation work exchange meeting held in Huanjiang County, highly praising the achievements of Huanjiang Station in rocky desertification control and science and technology poverty alleviation over the years. Consequently, the Huanjiang County science and technology poverty alleviation team received the 2017 CAS Science and Technology for Development Award.

In recent years, central and local media have successively reported on Huanjiang County' s science and technology poverty alleviation achievements and social impacts, including *Guangming Daily*, *People' s Daily*, China News Service, *Economic Daily*, *Wen Wei Po*, *Science and Technology Daily*, and *China Science Daily*. CCTV-10' s "Approaching Science" program featured a special report titled "New Green on Rocky Mountains," introducing rocky desertification control and ecological restoration achievements. In January 2018, then CAS Deputy Party Secretary Liu Weiping conducted science and technology poverty alleviation research in Huanjiang County, fully affirming the effectiveness and models of poverty alleviation work. The Guangxi Poverty Alleviation Office also highly recognized Huanjiang County' s science and technology poverty alleviation achievements, noting that the Institute of Subtropical Agriculture' s karst environmental migration and ecological restoration regulation and management technologies have provided important foundations and technical support for Guangxi' s poverty alleviation and rocky desertification control. The three-dimensional cyclic ecological economic models and technologies for karst agriculture, livestock waste pollution prevention and control technologies, and human settlement environment improvement and rural beautification tech-

nologies researched, demonstrated, and promoted have provided experimental demonstrations and typical models for poverty alleviation development and comprehensive rocky desertification control in Northwest Guangxi.

Challenges and New Strategies for Huanjiang' s Science and Technology Poverty Alleviation Model

On February 12, 2018, President Xi Jinping chaired a symposium on fighting the targeted poverty elimination battle, emphasizing that fighting the poverty elimination battle is one of the three critical battles proposed at the 19th Party Congress. He called for improving poverty elimination quality, focusing on deeply impoverished areas, and solidly advancing the poverty elimination battle forward. On February 26, 2018, Liu Yongfu, Director of the State Council Leading Group Office of Poverty Alleviation and Development, required national poverty alleviation systems to further strengthen responsibility, target standards, basic strategies, problem orientation, and poverty elimination effectiveness according to President Xi Jinping' s important speech requirements, transforming the General Secretary' s important instructions into operational and targeted policy measures to ensure winning the poverty elimination battle.

New Challenges Facing Huanjiang County's Poverty Alleviation Work
Implementing the major policy of targeted poverty alleviation and elimination represents the era' s mission to achieve the 2020 goal of building a moderately prosperous society in all respects [7]. Recently, Huanjiang County Party Committee and County Government issued the "Overall Work Plan for Huanjiang Maonan Autonomous County to Escape Poverty and Remove Its Poverty-Stricken County Status in 2018." However, achieving the comprehensive poverty elimination task before the end of 2018 remains arduous. Currently, the main problems facing Huanjiang County' s poverty alleviation battle and industrial development include: rapid development of fruit and walnut industries but slow returns; insufficient follow-up investment in fragrant pig and beef cattle industries; and tourism development still in its infancy. To overcome these final challenges and win the poverty elimination battle, scientific researchers should assist the Huanjiang County government in implementing targeted measures for impoverished households, guiding impoverished populations to actively participate in economic development and achieve targeted poverty elimination for both poor households and individuals.

New Thinking on Huanjiang Poverty Alleviation Work Over the past 20-plus years, CAS has accumulated rich experience and achieved widespread promotion in science and technology poverty alleviation in Huanjiang County, Guangxi. The ecological migration model has served as a template for ecological migration across Guangxi; the vegetation management model has been demonstrated and promoted in karst regions of Guizhou, Yunnan, and other Southwest China areas; and the characteristic ecological industries cultivated according to regional characteristics have demonstrated significant ecological benefits while

greatly increasing local farmers' economic income, becoming highly favored by local populations. Under the new situation, Huanjiang County' s comprehensive poverty elimination and removal of its poverty-stricken county status has reached the stage of overcoming the final fortress. The Institute of Subtropical Agriculture will continue to focus on two aspects:

(1) **Continue strengthening targeted poverty alleviation model construction.** Integrating the development of Huanjiang County' s eight major poverty alleviation industries (sugarcane, sericulture, fragrant pigs, beef cattle, fruits, walnuts, forestry processing, and Chinese medicinal herbs) to solve poverty alleviation and prosperity issues for impoverished populations in karst rocky mountain areas. Newly identified poor households will be registered and filed for targeted poverty alleviation. Following the requirements of "demonstration in the first year, promotion in the second year, full coverage in the third year, and meeting standards in the fourth year," the industrial poverty alleviation model will be innovated. The Institute will assist the Huanjiang County government in integrating forces from all departments and levels. Through project implementation, the eight major poverty alleviation industries will become the main source of income for poor households.

(2) **Actively deploy science and technology poverty alleviation projects.** By developing understory cultivation of Chinese medicinal herbs, demonstrating and promoting the cultivation of medicinal herbs such as *Euchresta japonica*, returning farmland to forest/grassland for cattle raising, and Huanjiang fragrant pig breeding, the team will implement ecological poverty alleviation industry projects with good ecological benefits, high economic value, and quick results, increasing farmers' per capita income by 2,000–3,000 yuan. Integrating the implementation of the county' s rural sewage treatment plan, the team will promote the establishment of ecological treatment systems for livestock waste and domestic sewage in each township and conduct relevant technical training. Based on the Huanjiang County industrial poverty alleviation investigation report' s recommendations and the 12 township industrial poverty alleviation project proposals, the team will actively seek strong support from CAS and relevant departments to organize implementation as soon as possible and establish demonstration bases. The Institute welcomes brother institutes and scientific and technical personnel to actively seek and undertake poverty alleviation tasks in Huanjiang County based on the 12 township industrial poverty alleviation project proposals and according to their professional and technical advantages.

In 2016, 28 nationally designated key counties for poverty alleviation and development reached exit standards and successively exited the ranks of poverty-stricken counties in 2017. The year 2018 is a critical year for fighting the targeted poverty elimination battle, with poverty-stricken counties removing their poverty-stricken status reaching a peak. Huanjiang County' s science and

technology poverty alleviation work will rely on Huanjiang Station, mobilizing the entire institute' s research forces, uniting multiple scientific research teams including healthy livestock breeding, utilizing all scientific and technological resources, implementing targeted measures, focusing efforts, driving industrial development, resolutely completing the poverty alleviation work objectives proposed by CAS for Huanjiang County, and fully supporting Huanjiang County in escaping poverty on schedule.

References

1. Liu Yan, Zhou Yang, Liu Jilai. Regional differentiation characteristics of rural poverty in China and its targeted poverty alleviation strategies. *Bulletin of Chinese Academy of Sciences*, 2016, 31(3): 269-278.
2. Liu Hui. Implementing targeted poverty alleviation and regional coordinated development. *Bulletin of Chinese Academy of Sciences*, 2016, 31(3): 320-327.
3. Duan Ziyuan, Zhang Changcheng, Duan Rui, et al. Persisting in science and technology poverty alleviation to achieve targeted poverty alleviation and promote economic development. *Bulletin of Chinese Academy of Sciences*, 2016, 31(3): 346-350.
4. Zeng Fuping, Zhang Hao, Duan Rui. Major demands promote innovation, coordinated development solves poverty—Practice and thinking on poverty alleviation work in Huanjiang County, Guangxi Zhuang Autonomous Region. *Bulletin of Chinese Academy of Sciences*, 2016, 31(3): 351-356.
5. Zeng Fuping, Zhang Hao, Duan Rui, et al. Environmental governance and science and technology poverty alleviation. *Bulletin of Chinese Academy of Sciences*, 2018, 33(2): 213-222.
6. Zeng Fuping, Zhang Hao, Duan Rui, et al. Adaptive restoration experimental demonstration research on heavy metal-contaminated farmland in Huanjiang River basin of Guangxi. *Science and Technology for Development*, 2015, 11(2): 179-183.
7. Liu Yan, Zhou Yang, Liu Jilai. "13th Five-Year Plan" strategic response to targeted poverty alleviation. *Bulletin of Chinese Academy of Sciences*, 2016, 31(1): 1-12.

Note: Figure translations are in progress. See original paper for figures.