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Study on Chinese agricultural policy change

From “Grain for Green” to “Forests to Arable Land”

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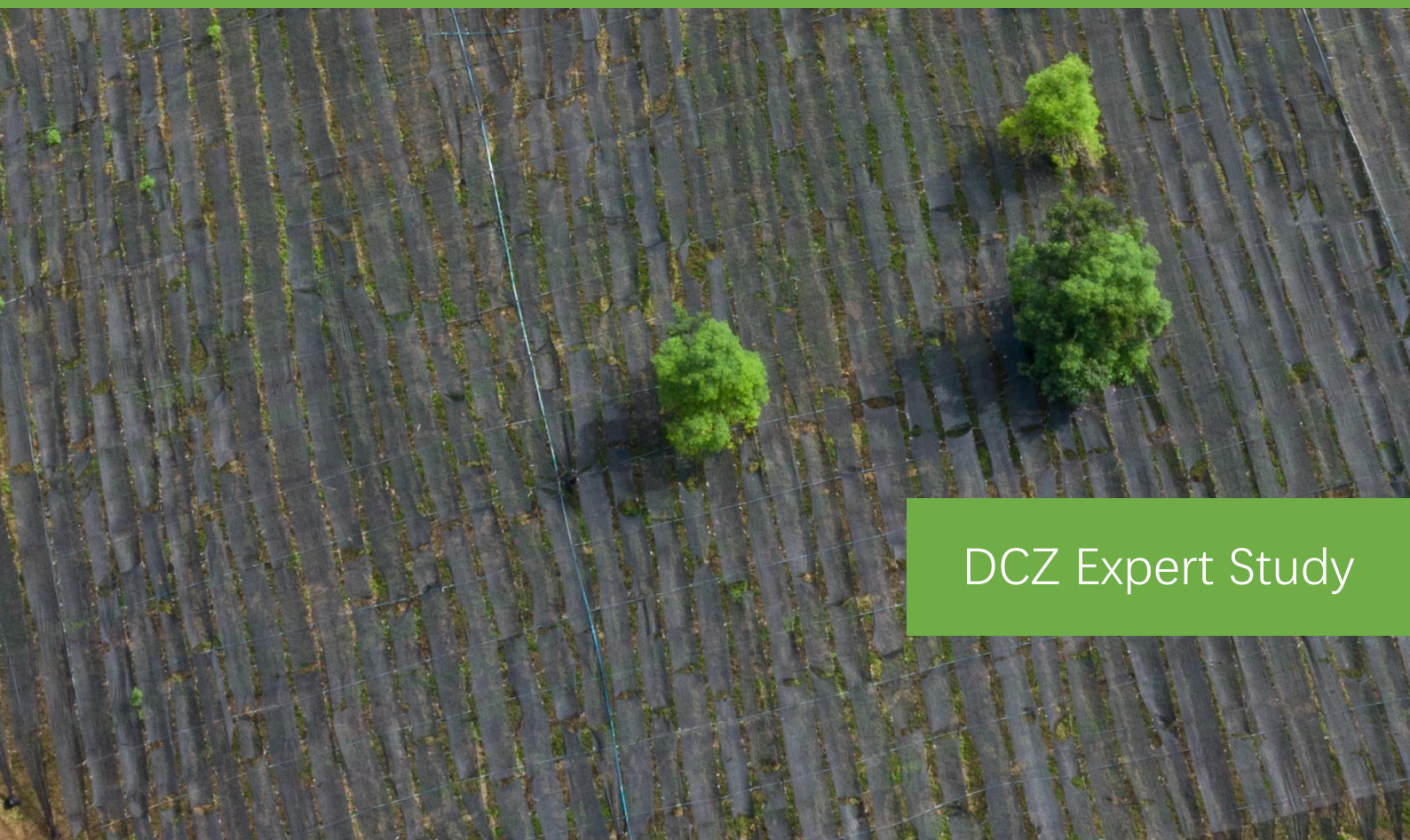

DCZ Expert Study

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1. Introduction

The intricate interplay between agricultural land use and environmental sustainability is a central concern for nations worldwide. China, although endowed with vast and diverse landscapes, has limited agricultural land relative to its colossal population (OECD, 2018) and faces the challenge in pursuing sustainable agricultural production. Therefore, China has adopted various strategies and policies to ensure agricultural production and ecological conservation.

Since 1999, China has implemented the Grain for Green (GFG) Program (退耕还林) as a response to rampant deforestation and soil erosion across China (National Forestry and Grassland Administration, 2020). This policy incentivizes farmers to convert sloping and marginal cropland into forests or grassland by providing subsidies and other forms of compensation. So far, the GFG Program has undergone two rounds, marked by notable achievements in environmental protection. The first round was implemented from 1999 to 2007, followed by a consolidation phase, in which no new tasks of converting cropland to forests were assigned. The second round started in 2014. In 2022, the Ministry of Natural Resources (2022) announced that the GFG Program has entered another consolidation phase.

Recently, China has been vigorously advancing a seemingly contrasting policy marked by the impactful slogan "退林还耕", which can be translated into “returning forests to arable land” (hereafter “Forests to Arable Land”) (China Agricultural University, 2023). Although the term “退林还耕” has not appeared in official documents from the Chinese central government, the localized implementation in provinces such as Henan, Sichuan, Yunnan, and Hebei has sparked considerable attention and debate (see e.g. Department of Natural Resources of Henan Province, 2022). This shift prompts critical questions regarding the motivations behind such a policy reversal and the implications for environmental sustainability, biodiversity, and rural livelihoods.

This study employs a mixed-methods approach, combining a review of national policies and available literature, to dissect the origins, objectives, practices, and implications of these two policies. It further presents the status quo of present discussion and potential conflicts between the two policies in practice. In the end, a few recommendations are made to balance the goals of ecological conservation, food security, and rural development.

2. The Grain for Green Program (退耕还林)

2.1 Background and objectives

The rapid population growth after the establishment of the People’s Republic of China in 1949 required farmers to acquire more arable land by converting forests, grasslands, wetlands, etc. According to the results of China’s First National Land Survey in 1997, among the 1.95 billion mu[1] (1.3 million km2) of cultivated land in China, 9.6% were on slopes between 15 and 25 degrees, and 4.6% on slopes steeper than 25 degrees (National Forestry and Grassland Administration, 2020). The majority of the cultivated sloping land concentrated in western China. The extensive deforestation and cultivation especially on sloping land had led to soil erosion, severe land

[1] mu (Chinese: 亩) is a unit of area measurement used in China. 1 mu corresponds to 1/15 of a hectare, or about 666.67 m2.

degradation, and recurrent droughts and floods. However, due to the high food demand and limited supply at that time, grain production was China’s priority.

After the extreme drought in 1997 and the massive floods in the Yangtze River basin in 1998, the GFG Program was introduced in China in 1999 with the overarching objectives of addressing multifaceted ecological challenges, including deforestation, ecological deterioration, excessive cultivation on sloping terrain, and soil erosion. By providing subsidies to farmers, the GFG Program encouraged them to convert sloping and marginal land to forests or grassland. The GFG Program later became possible at national scale as China experienced a period of grain supply surplus due to a steady yield increase in the mid-to-late 1990s.

2.2 Policy regulations and implementation

The focus of the GFG Program has been adapted in response to the evolving macroeconomic conditions and food supply-demand relationship in China. So far, the GFG Program has experienced two rounds.

2.2.1 First round of the GFG Program

In 1999, China initiated pilot GFG demonstrations by gradually involving more and more provinces mainly in the west and middle parts of China. The nationwide scaling up of implementation started in 2002. The "Regulation of Grain for Green" (The State Council, 2002) defined the targeted arable land that should be included in the GFG Program: 1) arable land with serious soil erosion; 2) arable land with serious desertification, salinization, and rock desertification; and 3) arable land with significant ecological importance but low and unstable grain yields. The regulation also prohibited converting basic farmland with favorable production conditions and without soil erosion. Converting such basic farmland for special ecological construction was only allowed after approval by the State Council.

As industrialization and urbanization in China continue, the quantity of arable land has been continuously decreasing, which poses a serious threat to China's food security. To protect cultivated land, the “Outline of the National General Land Use Plan (2006-2020)” set up a minimum level of 1.8 billion mu of arable land as a “red line”, which should be utilized for the production of grain, vegetables, fruits, cotton, sugar, oil, feed, etc. Within the 1.8 billion mu, 1.5 billion mu are determined as “permanent basic farmland”, which should mainly be used for grain production.

Therefore, from 2007 to 2013, the GFG Program was in a so-called “consolidation phase”, where no new task of converting arable land to forests was assigned to provinces. To address the long-term livelihood concerns of farmers who gave up their land for forestation, the government continued to support them with subsidies. The subsidy standards were increased and tilted in favor of areas with more difficulties, specifically for the following purposes: the construction of permanent basic farmland, the development of energy-related infrastructure such as energy crops, economic forests, biogas facilities as well as training for farmer employment and rural entrepreneurship. These adjustments aimed to ensure the sustainable impact of the program and the improved well-being of participating farmers.

2.2.2 Second round of the GFG Program

Since 2014, the new round of land conversion into forests and grasslands has been expanded further, emphasizing the importance of not crossing the "red line" of minimum arable land. Five permissible scenarios for land conversion were strictly specified: 1) arable land with slopes exceeding 25 degrees; 2) terraced land with steep slopes; 3) land sloping at 15 - 25 degrees with critical water sources; 4) severely sand-ridden arable land and heavily contaminated arable land; and 5) abandoned cultivated land after relocation (The State Council, 2014).

According to a notice by the government in October 2022 (more than 2 years after the outbreak of the COVID-19 pandemic, and 8 months after the outbreak of the Russia-Ukraine War), the GFG Program is now again in a consolidation phase. This is because 1) after more than 20 years of conversion, the room left for converting to forests is small; and 2) due to the current situation, China has to coordinate the protection of arable land and ecological conservation (Ministry of Natural Resources, 2022).

2.3 Policy impacts

2.3.1 Impact on ecological environment

According to the National Forestry and Grassland Administration (2020), until 2019, the GFG Program had converted a total of 500 million mu land to forests and grassland. The annual value of ecological benefits, estimated based on monitored data across all provinces encompassing carbon sequestration, oxygen release, generation of air ions, pollutant absorption, dust retention, and water and soil resource conservation, was around ¥1.38 trillion and equivalent to 2.7 times the annual project investment. Significant improvements have been observed in the control of soil erosion around the main stem and important tributaries of major rivers, as well as around key reservoirs and lakes (Deng et al., 2012). Water control projects including the Three Gorges Project (三峡工程) on the Yangtze River were effectively ensured. Severe sandification of farmland in northern regions has been effectively addressed, and the area affected by land desertification, primarily in the southwest, has notably decreased (Fan and Xiao, 2020). Biodiversity conservation has achieved significant improvement (Hua, 2016).

2.3.2 Impact on rural development

In total, 158 million farmers in 2435 counties gained subsidies from the GFG Program (National Forestry and Grassland Administration, 2020). Many farmers who have participated in land retirement have found new ways to increase the household income, by either practicing animal husbandry under economic forests or agroforestry (Feng et al., 2005).

In the first round of the GFG Program, it was required that the share of newly restored economic forests could not exceed 20% of the total restored reforest area at the county level. As a result, the farmers of these lands had to seek alternative job opportunities in cities. For example, among the households surveyed in 2012 in Danjiangkou City, Hubei Province, an average of 70 people from every 100 households who participated in the GFG Program left rural villages for alternative job opportunities in cities (National Development and Reform Commission, 2013). This consequently enhanced farmers' income as well as its stability and diversity.

2.3.3 Impact on food security

It is believed by the Chinese government that the GFG Program does not threaten national food security due to a few reasons: 1) The targeted land in the GFG Program is mostly sloping and marginal land with low yield; 2) Using advanced agricultural technologies has increased the yield level of the existing arable land; 3) Afforestation can improve the ecological environment and thus protect the existing arable land (The Central People's Government of China, 2007). While some scientific studies supported this statement, e.g., Zheng et al. (2020) and Lyn & Xu (2020), others highlighted a notable spatial imbalance among provinces that in the western provinces food supply reductions have exceeded 40% (Feng et al., 2005; Xu et al., 2006).

3. The Forests to Arable Land policy (退林还耕)

3.1 Background and objectives

In recent years, the phenomena of "non-grain conversion" (非粮化) and "non-agricultural conversion" (非农化) of arable land have been increasingly observed in China (Su et al., 2020; Kong, 2020). The non-grain conversion of arable land means using arable land for non-grain production, e.g., planting cash crops, fruit trees, or other economic forests. The non-agricultural conversion of arable land means using arable land for non-agricultural purposes, e.g., building houses, industrial factories, roads, greening, and digging up lakes. Kong (2020) estimated that the rate of non-grain conversion of arable land in China was approximately 27%, which happened on both general arable land and permanent basic farmland. These conversions are believed to threaten the nationwide stabilization of grain production.

To protect the "red line" of 1.8 billion mu of arable land, the State Council (2020a and 2020b) released two notices to prohibit the non-agricultural and non-grain conversion of arable land in 2020. The Third National Land Survey revealed that China's arable land was 1.9172 billion mu by the end of 2019, a decrease of 113 million mu over 10 years (Ministry of Agriculture and Rural Affairs, 2021). Besides the fact that China is losing arable land for grain production, the COVID-19 pandemic and the Russia-Ukraine War made China rethink its strategy for national food security. Consequently, the "No. 1 Document" of 2023 emphasized the importance of arable land protection (The State Council, 2023). Later, the Ministry of Agriculture and Rural Affairs (2023) complemented the "No. 1 Document" and proposed a more concrete implementation plan to strengthen arable land protection.

Although China's rapid urbanization and industrialization have led to the conversion of agricultural land into urban and industrial areas, the principle of "requisition-compensation balance" (占补平衡) should theoretically guarantee that when a piece of farmland is converted for non-agricultural use, the authorities must make fields available elsewhere to mitigate the loss. Therefore, the main causes of the conversions are reported to be: 1) Conversion of arable land mainly to forests (mainly economic forests, e.g., fruit trees): With the increasing production cost of grain, farmers prefer to convert arable land for more profitable fruit trees. Some part-time farmers leave the arable land with economic forests, which require less labor investment and allow them to work in urban areas at the same time (Ministry of Agriculture and Rural Affairs, 2021; Kong, 2020); 2) Greening construction: Some local governments build green belts along railways and highways by occupying arable land; 3) Development of regional agricultural specialties: To promote rural revitalization, some local governments encourage farmers to

cultivate special agricultural products such as specialty fruits, tea, and Chinese medicinal herbs, or to use the land for livestock and aquatic products (Kong, 2020).

Therefore, according to the official documents, the goal of the new policy with the slogan "Forests to Arable Land" is supposed to prohibit the occupation of arable land for non-agricultural and non-grain use, especially protecting permanent basic farmland. Converting permanent basic farmland, which shall be mainly used for grain production, for non-grain use is seen as an illegal occupation. It is also notable that the "forests" to be removed in this policy include not only fruit trees and other types of economic forests but also livestock/poultry cottages, fish farms, greening construction, etc. as long as they occupy arable land for non-grain production.

3.2 Policy regulations and potential issues

The State Council (2020a) has defined 6 types of illegal non-agricultural conversion of arable land: 1) illegal occupation of arable land for greening and afforestation; 2) construction of green corridors over the standards; 3) illegal occupation of arable land for digging lakes; 4) occupation of permanent basic farmland to expand the nature conservation area; 5) illegal occupation of arable land for non-agricultural construction; and 6) illegal land grants and land use against the official planning.

The State Council (2020b) points out how permanent basic farmland and general arable land should be used: 1) Permanent basic farmland should be used primarily for the development of grain production, in particular, to safeguard the planting areas of the three major cereal types: rice, wheat, and maize. Thus, occupying permanent basic farmland for any non-grain use (e.g., planting fruit trees or other types of economic forests) is prohibited; 2) General arable land should be used primarily for grain production and agricultural products such as cotton, oil, sugar, and vegetables, as well as forage and fodder.

As can be seen, there are a few potential issues in the regulations that might cause challenges in reality. The new policy prohibits using arable land to plant fruit trees, although they also provide agricultural products and contribute to food security. While it is clear that permanent basic farmland should be restored for grain production, it is ambiguous when and to what extent general arable land should be restored for grain production. Local governments might potentially adopt different standards during implementation.

4. Status quo of present discussions

4.1 Course of policy shift

The policy shift may appear sudden and contradictory, but this transition had been actually underway during the GFG Program. Arable land with good soil conditions is in principle not allowed to be converted to forests. The second round of the GFG Program also emphasized the importance of not crossing the "red line" of arable land. The consolidation phase after each round is based on the consideration of ensuring the "red line". Based on the fact that China is losing arable land, the potential risks caused by the COVID-19 pandemic and the Russia-Ukraine War are the only direct triggers that pushed China's changes in land use policy.

Besides the above-mentioned motivation for the policy shift, other possible reasons are also discussed. The tensions between China and the US as well as the Taiwan Strait Crisis might

intensify the Chinese government's concerns about domestic food security. Another speculation is that revitalizing arable land could serve as a means to address the prevailing high unemployment rates in urban areas in China.

Figure 1 summarizes the most important events related to the two policies.

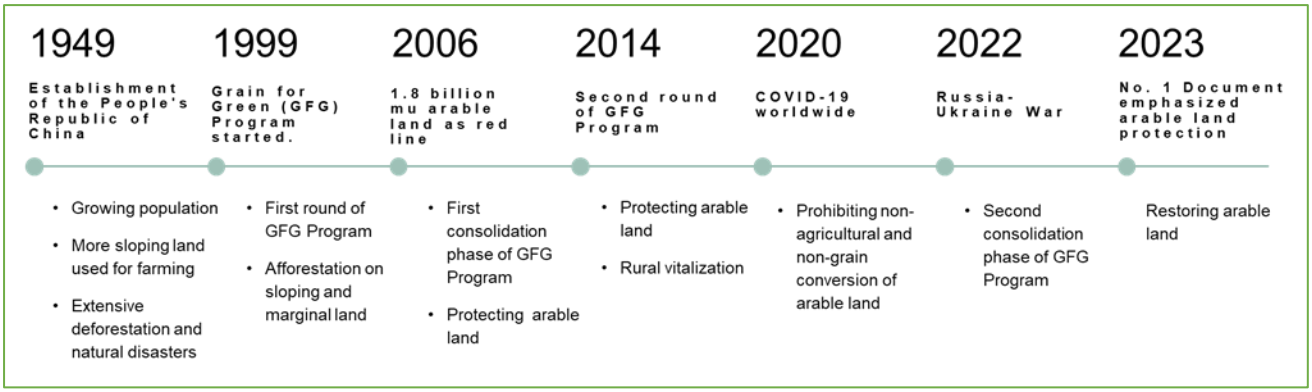

Figure 1: Timeline of the most important events related to the two policies

Source: Author's own illustration.

4.2 Potential conflicts of the two policies in practice

Both policies are major strategies of China to integrate food security, ecological conservation, and rural development. Theoretically, the two policies should not conflict with each other because the forests restored from the GFG Program should be documented and not be seen as arable land anymore. In the Forests to Arable Land policy, the arable land occupied by non-agricultural and non-grain purposes (e.g. economic forests) is the target.

However, potential conflicts may still arise in practice: 1) To finish the tasks of restoring arable land, some local governments might destroy the restored forests from the GFG Program; 2) When the restored forest land was not documented during the GFG Program, it might be treated as illegal occupation of arable land in the Forests to Arable Land policy; and 3) Abandoned sloping land that has not yet converted to forests might become the restoring target in the Forests to Arable Land policy.

4.3 Practices of the Forests to Arable Land policy in reality

Provinces take their own responsibilities for the task of returning forests back to arable land. To finish their tasks efficiently, some problems occurred in practice.

(1) Returning to grain cultivation without considering the sunk costs

In some regions, farmers were required to remove fruit trees, tea trees, higher-yield cash crops, fish farms, etc. immediately without a buffer period. This caused a huge amount of economic loss to those farmers, who had purchased specialized equipment, bought seeds, or made changes to the land. Some huge construction projects must also be removed to restore more arable land regardless of how much was invested before.

(2) Returning to grain cultivation ignoring soil conditions and potential risks

In some regions, forests are converted for grain production ignoring the current conditions of the soil, including its nutrient level and structure, which may result in inadequate crop

management and unnecessary waste of time and resources. This oversight could contribute to soil degradation, reduced fertility, and increased susceptibility to pests and diseases. Furthermore, some wasted land on hillsides is plowed again for grain production, which leads to the risk of soil erosion in case of flood thus causing huge damage to existing arable land and the villages.

4.4 Implications of Forests to Arable Land policy

Since there are no empirical studies analyzing the impacts of the Forests to Arable Land policy yet, this study only discusses some potential implications and critical challenges here.

4.4.1 Implication on food security & farmers' income

The intention of the new policy is to protect arable land and ensure the food security of the nation. However, returning forests back to agricultural land may negatively impact those farmers who depend on forest resources for a living. Besides, an overproduction of staple food can also lead to a low crop price on the market, which can further decrease farmers' income. Thus, it is important to provide farmers with alternative livelihood opportunities, retraining, or supporting transitions to other forms of sustainable agriculture.

Furthermore, reducing the production of other types of food (e.g. fruits, vegetables, and fish) can lead to a shortage in the supply of such food. It can also change people's diet structure thus causing unbalanced nutrition. Therefore, balancing conservation goals with the socio-economic needs of local communities is a challenge in developing effective policies.

4.4.2 Implication on agri-ecosystem

Uncontrolled deforestation poses a threat to biodiversity, disrupts ecosystems, and can exacerbate climate change. This includes reduced water regulation, increased vulnerability to pests, and a decline in soil fertility, all of which can adversely affect agriculture. Short-term economic gains from agricultural expansion may overshadow the long-term sustainability of both agriculture and forests. Policies need to adopt a holistic and sustainable approach to ensure the well-being of ecosystems and future generations.

4.4.3 Implication on rural development in the long run

Although forests are restored to arable land, the question remains: Who will farm on the restored arable land? In the long run, smallholders would probably rather transfer their land use rights to large business farms. Another possibility is that people who have been working in urban areas would return to rural areas to continue farming. In this case, it is crucial to find solutions to ensure farmers' income by improving the profitability of grain production, developing innovative business models, and promoting effective farming technology.

Germany's compromise on agri-environmental regulations to ensure food security

Germany has a comprehensive set of rules and regulations governing agricultural activities with a strong emphasis on environmental protection. It has laws and regulations in place for the protection of natural habitats and biodiversity. As part of the national strategy for biological diversity, the federal government set itself a goal back in 2007 that 5% of the forests in Germany should be returned back to natural forests by 2020 (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2007). In 2019, the federal government made available 547 million euros to reforest German forests after severe damage caused by drought and pests and to better equip them against climate change. Together with state funds, the amount for the reforestation of a total of 180,000 hectares of damaged forest area amounts to 800 million euros (Federal Ministry of Food and Agriculture, 2023).

However, since the beginning of 2022, the Russia-Ukraine War and its effects on the global grain supply, especially wheat, have become a huge concern for Europe. Due to the currently strained global grain markets, the German federal and state governments decided to suspend GAEC (Good Agricultural and Environmental Condition) 7 (crop rotation) and GAEC 8 (non-productive areas) for the year 2023 (The Federal Government, 2022). First, the requirements for annual crop rotation on arable land will be suspended in 2023. For example, the cultivation of wheat is possible two years in a row. Second, the 4% of set-aside arable land will be suspended for 2023. On this land, farms can grow cereals (except corn), sunflowers, and legumes (except soybeans). The aim of these regulations is to enable a short- and medium-term increase in food production, while at the same time considering biodiversity and climate protection concerns.

5. How to balance the goals: ecological conservation, food security, and rural development

To make sure that both policies are contributing to the comprehensive goals of ecological conservation, grain supply, and rural development, the following aspects must be considered.

First, the achievement of the GFG Program must be protected to make sure the two policies do not conflict with each other. This requires local governments to make historical afforestation data transparent to the public so that no forests are destroyed to fulfill the arable land restoration tasks. Transparency and supervision in this context serve as a crucial mechanism to prevent unintended consequences and conflicts of interest.

Second, expanding arable land should not be the only way to ensure grain supply. While the quantity of arable land is an important indicator, increasing the productivity of arable land is also crucial. This can be reached by increasing the mechanization level, using more precision and digital farming technologies, and adopting high-yield varieties. This multifaceted approach is essential for meeting the growing demand for food while addressing environmental concerns.

Third, identifying soil conditions and suitable land use purposes with a high spatial resolution can provide valuable information for local governments to set task priorities and boundaries. Harnessing advanced technologies, such as Geographic Information Systems (GIS), remote sensing, and soil sensors, empowers local authorities with precise data about the composition,

fertility, and health of the soil. This detailed understanding allows for optimized resource allocation, ensuring that land is used efficiently and sustainably.

Last but not least, in the process of restoring arable land, it is crucial to align with the preferences and established farming practices of the farmers. Additionally, it is important to introduce suitable economic incentives/compensation for farmers to ensure their income. The success of any land restoration program hinges on the cooperation and acceptance of the local farming community. Understanding and respecting the farming practices and cultural nuances of the community is essential.

6. Conclusion

This study provides a comprehensive analysis of China’s GFG Program (退耕还林) and the recent policy of restoring arable land with the slogan Forests to Arable Land (退林还耕) by reviewing their backgrounds, objectives, implementation in reality, and multifaceted implications.

The GFG Program is designed to restore forests from sloping and marginal arable land. By prioritizing ecological stability, this policy contributed significantly to mitigating soil erosion and preserving biodiversity. With the ongoing non-agricultural conversion and non-grain conversion of arable land in China, the Forests to Arable Land policy underscores China's concern about grain supply in the current situation. Theoretically, the two policies do not conflict with each other because the forests restored from the GFG Program should have been documented and not be seen as arable land anymore. In the Forests to Arable Land policy, the arable land occupied by non-agricultural and non-grain purposes (e.g. economic forests) is the targeted land.

However, some problems occurred during the practice of the Forests to Arable Land policy. Restoring arable land while ignoring farmers’ loss and potential ecological risks shows that Chinese agricultural policy implementation lacks a holistic approach considering the interconnections among food security, ecology, and rural development. Successful land restoration initiatives need to be accompanied by comprehensive land use planning.

To ensure the harmonious implementation of both policies, several key considerations should be addressed. First, protecting the achievements of the GFG Program is essential, necessitating transparency in local afforestation data to prevent forest destruction for arable land restoration. Second, ensuring the productivity of the existing land and diversifying grain supply strategies are equally vital as expanding arable land. Third, detailed soil assessments and land use planning at the local level can inform priority setting. Last but not least, aligning with farmers' preferences and established practices, as well as offering economic incentives and job opportunities are fundamental to achieve successful arable land restoration.

References

The Central People’s Government of China (2007): 退耕还林政策不会影响国家粮食安全 (In English: The Grain for Green Policy does not affect national food security) https://www.gov.cn/zxft/ft61/content_752047.htm (Accessed: 10 October 2023)

China Agricultural University (2023): 耕地“进出平衡”背后：国家要产更多粮食，农民要利益最大化 (In English: Balancing Inflows and Outflows of Cultivated Land: More grain production for the nation and maximized benefits for the farmers) https://news.cau.edu.cn/mtndnew/ce8c73b15249451e9eeac394d261647c.htm (Accessed: 07 October 2023)

Deng, L., Shangguan, Z., & Li, R. (2012). Effects of the grain-for-green program on soil erosion in China. *International Journal of Sediment Research*, 27(1), 120–127.

Department of Natural Resources of Henan Province (2022): 丰收背后的“耕保经”——河南省周口市扶沟县加强耕地保护纪实. 18. August. 2022. https://dnr.henan.gov.cn/2022/08-18/2562924.html (Accessed: 07 October 2023)

Fan, M., & Xiao, Y. (2020). Impacts of the grain for Green Program on the spatial pattern of land uses and ecosystem services in mountainous settlements in southwest China. *Global Ecology and Conservation*, 21.

The Federal Government (2022): Mehr Flächen für zusätzliches Getreide (In English: More areas for additional grain). Common Agricultural Policy. 22. December 2022. https://www.bundesregierung.de/breg-de/aktuelles/ausnahmen-gap-2023-2080660 (Accessed: 07 October 2023)

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (2007): National Strategy on Biological Diversity. https://www.bmuv.de/fileadmin/Daten_BMU/Pools/Broschueren/nationale_strategie_biologische_vielfalt_2015_bf.pdf

Federal Ministry of Food and Agriculture (2023): Massive Schäden - Einsatz für die Wälder (In English: Massive Damage - Efforts for the Forests) https://www.bmel.de/DE/themen/wald/wald-in-deutschland/wald-trockenheit-klimawandel.html

Feng, Z., Yang, Y., Zhang, Y., Zhang, P., & Li, Y. (2005): Grain-for-green policy and its impacts on grain supply in West China. *Land Use Policy*, 22(4), 301–312.

Hua, F., Wang, X., Zheng, X., Fisher, B., Wang, L., Zhu, J., Tang, Y., Yu, D. W., & Wilcove, D. S. (2016): Opportunities for biodiversity gains under the world’s largest reforestation programme. *Nature Communications*, 7(1), 12717.

Kong, X. (2020): The “non-grain conversion” of arable land: Issues, Causes, and Countermeasures. *China Land*, 11:17-19.

Lyu, C., & Xu, Z. (2020): Crop production changes and the impact of Grain for Green program in the Loess Plateau of China. *Journal of Arid Land*, 12, 18-28.

Ministry of Agriculture and Rural Affairs (2021): 如何看待“三调”比“二调”少了 1.13 亿亩耕地 (In English: How do we understand the fact that the Third Land Survey' reveals a 113 million mu arable land loss since the Second Land Survey?)

http://www.moa.gov.cn/ztzl/gdzlbhyjs/mtbd_28775/mtbd/202108/t20210827_6375079.htm (Accessed: 07 October 2023)

Ministry of Agriculture and Rural Affairs (2023): 农业农村部关于落实党中央国务院 2023 年全面推进乡村振兴重点工作部署的实施意见 (In English: Implementation Opinions of the Ministry of Agriculture and Rural Affairs on Effectively Advancing Key Tasks in Rural Revitalization in 2023 as Deployed by the State Council). https://www.gov.cn/zhengce/zhengceku/2023-02/22/content_5742671.htm (Accessed: 07 October 2023)

Ministry of Natural Resources (2022): 关于进一步完善政策措施 巩固退耕还林还草成果的通知 (In English: Notice on Further Improving Policy Measures to Consolidate the Achievements of Returning Farmland to Forests and Grasslands). https://www.gov.cn/zhengce/zhengceku/2022-11/11/content_5726119.htm (Accessed: 07 October 2023)

National Development and Reform Commission (2013): 丹江口市退耕农民发展现状调查分析 (In English: Analysis of the Current Development Status of Farmers Engaged in Grain for Green Program in Danjiangkou City). https://www.ndrc.gov.cn/xwdt/gdzt/lyzybhyjs/201310/t20131010_1201156.html （Accessed: 10 October 2023）

National Forestry and Grassland Administration (2020): 中国退耕还林还草二十年 (In English: Twenty years of China's Grain for Green Program) http://www.forestry.gov.cn/html/main/main_195/20200630085813736477881/file/20200630090428999877621.pdf) （Accessed: 10 October 2023）

OECD (2018): Innovation, Agricultural Productivity and Sustainability in China. https://doi.org/10.1787/9789264085299-en

The State Council (2002): 退耕还林条例 (Regulation of Grain for Green), the State Council Decree No. 367 of the People's Republic of China. http://f.mnr.gov.cn/201702/t20170206_1436961.html （Accessed: 10 October 2023）

The State Council (2020a): 国务院办公厅关于坚决制止耕地"非农化"行为的通知 (In English: Circular of the General Office of the State Council on resolutely stopping the "non-agricultural conversion" of arable land) https://www.gov.cn/zhengce/content/2020-09/15/content_5543645.htm （Accessed: 10 October 2023）

The State Council (2020b): 国务院办公厅关于防止耕地"非粮化"稳定粮食生产的意见 (In English: Opinions of the General Office of the State Council on preventing the "non-grain conversion" of arable land and stabilization of grain production) https://www.gov.cn/zhengce/content/2020-11/17/content_5562053.htm （Accessed: 10 October 2023）

The State Council (2014): 《新一轮退耕还林还草总体方案》（发改西部〔2014〕1772 号）（In English: Overall Plan for the New Round of the Grain for Green Program）.

The State Council (2023): 中共中央国务院关于做好 2023 年全面推进乡村振兴重点工作的意见 (In English: Opinions of the Central Committee of the Communist Party of China and the State Council on Effectively Advancing Key Tasks in Rural Revitalization in 2023). http://www.moa.gov.cn/ztzl/2023yhwj/2023nzyyhwj/202302/t20230214_6420529.htm （Accessed: 10 October 2023）

Su, Y., Qian, K., Lin, L., Wang, K., Guan, T., & Gan, M. (2020): Identifying the driving forces of non-grain production expansion in rural China and its implications for policies on cultivated land protection. *Land Use Policy*, 92, 104435.

Xu, Z., Xu, J., Deng, X., Huang, J., Uchida, E., & Rozelle, S. (2006): Grain for Green versus Grain: Conflict between Food Security and Conservation Set-Aside in China. *World Development*, 34(1), 130–148.

Zheng, X., Yao, S. B., & Lu, Y. N. (2020): Impacts of sloping land conversion program on Grain Production. *Bulletin of Soil and Water Conservation*, 40(2), 239-246.

Sino-German Agricultural Centre (DCZ)