


Farmland Transitions in China: An Advocacy Coalition Approach

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Abstract: In recent decades, global social and economic development has resulted in substantial land-use transitions. This was first observed with respect to losses of forested land, attracting worldwide concern. Forest transitions have an important impact on global ecology, whilst farmland transitions are key in terms of global food security. However, research into farmland transitions is lacking, particularly with respect to mechanistic analysis. Using data on China's farmland areas between 1950 and 2017, we investigated the transitional characteristics, and triggers, of farmland change through linear regression analysis. Furthermore, based on the Advocacy Coalition Framework, we reveal the internal mechanism of these transitions. Our main findings are as follows: (1) between 1950 and 2017, China's farmland area exhibited significant growth, and there were two transitions, namely in 1984 and 2004; (2) macroscopic economic and social changes determine the overall evolution of the farmland area; (3) there were two advocacy coalitions in the farmland transition policy subsystem—the farmland supplement and farmland consumption coalitions; (4) under the influence of macroscopic economic and social development, external events play a catalytic role in the transitions, and relatively stable parameters have an indirect but lasting effect in terms of transition outcomes.



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1. Introduction

Land change science (LCS) is an interdisciplinary research approach that integrates social science, environmental and geographical information, and remote sensing science [1]. Recently, LCS has become an important part of global environmental change and sustainable development sciences [2]. Recently, scholars have started to focus on trends in land-use changes [3], that is, on land-use transformations. Land-use transitions have become complex processes involving multiple land-use types [4–6]. Among them, forest land transformations have attracted worldwide concern [7]. However, studies on farmland transitions are scarce, although farmland is the basis of food production. With rapid global industrialization and urbanization, large amounts of farmland have been permanently converted into non-agricultural areas [8,9], and the world's per capita farmland area declined from 0.41 ha. in 1960 to 0.21 ha. in 2019 [10]. For the vast number of developing countries that face the pressure of food security and the need for economic development, there is a sharp conflict between the protection and loss of farmland [11,12]. In this sense, farmland transitions in developing countries should become a research hotspot.

Numerous studies have explored the concept of land-use transition. In 1987, Walker [7] first proposed the term “land-use transition” when studying deforestation in developing countries; however, at that time, the focus was on describing the process of discarded logging land being reclaimed as agricultural land. In the early 1990s, Mather [13] studied

the dynamics of forest areas in developed countries and proposed a forest transition hypothesis. Further, he predicted the spatiotemporal dynamics of forest land by invoking the forest transition curve [14]. Based on the theory of forest land transitions, Grainger [15] explained land-use transitions from the perspective of national land-use morphology. After long-term exploration by the academic community, a land-use transition was defined as a change in the land-use system from one state to another [3]. Since then, others have improved this concept, believing that land-use transitions refer to long-term land-use trends in a certain area in the context of socio-economic development [16], accounting for farmland, forest land, urban land, and homesteads [17]. Research on land-use transformations approaches the topic from one of two perspectives: trends in single-type land-use patterns and overall land-use patterns in a region [18,19].

In the study of land-use transitions, forest land and farmland are the two most typical land-use types, and their primary transitional characteristics have been widely discussed. Regarding forest land transitions, Rudel's [20] analysis of cross-country data from five consecutive world forest resource surveys concluded that in many countries, forest cover has undergone a trend reversal from deforestation during economic poverty to reforestation during economic development. Studies on forest land transitions in Vietnam [21] and Germany [22] have verified this conclusion. Similarly, Culas [23] states that forest land transitions exhibit different trends in different countries and regions; the author used the Environmental Kuznets Curve (EKC) to analyze panel data spanning 43 countries from 1970 to 1994. Generally, the EKC is applied to express the relationship between environmental quality and per capita income. In this article, the horizontal axis is "per capita income", and the vertical axis is "deforestation". The results showed that the inverted U-type EKC is suitable for Latin America and Africa, whereas a U-shaped function is suitable for Asia. In comparison to forest land transitions, most scholars researching farmland transitions have neglected to focus on changes in trends and the reasons underlying those changes [24].

Changes in farmland areas in different countries have been explored, for example, using case-studies in northern Ghana where they have steadily expanded for 31 years [25], while farmlands in the plateau region of northern Argentina have decreased despite increases in other farmland areas in other regions [26]. Ge et al. [27] constructed a theoretical model to explain the temporal transition of farmlands in China by using per capita farmland as the measurement index and analyzing the transition between 1990 and 2010. Using the year 2000 as the turning point, the results showed that 71% of China's farmland areas have experienced a steady transition from gradual decline in farmland per capita to gradual growth. However, the short time-span of this sample does not cover important Chinese policies such as "The Great Leap Forward" (1958) or the economic reform and opening-up (1978); therefore, they cannot fully reflect the overall position of China's farmland transitions.

The driving forces and mechanisms behind land-use transitions reveal important foci which should be emphasized to, and by, policy-makers and other decision-makers. For example, factors such as the natural environment [28], population changes [29], economic development [30], and energy changes [31] are important driving forces behind land-use transitions. Regarding farmland transitions, it has been stated that natural factors account for the basic elements of the transition itself, and the influences of elevation and slope are particularly significant [27]. Socio-economic factors are also the focus of research on driving forces and include population, GDP, fixed asset investment, and per capita disposable income [32]. According to one study, immigration plays an important role in land-use transitions because it leads to urban expansion and farmland occupation. For example, in the United States, urban expansion not only directly converted farmland to urban use, but also left it idle due to the spillover effects of urbanization [33]. At the same time, political and policy factors in the process of land use transitions play an important role and can therefore not be ignored. After Spain joined the European Economic Community in 1986, the agricultural land area in that country decreased from 45 to 38% [34]. The driving forces mentioned above, especially regarding policies, need to be taken into account when

analyzing the farmland transition in China; policy factors play a crucial role in the transition under the strict planning and management characteristics of land-use in China.

In the 1980s, American political scientist Paul Sabatier proposed the Advocacy Coalition Framework (ACF). This is a systematic analytical tool that covers numerous aspects such as natural resources, socio-economic structures, political environment, emergencies, actors, and values. The ACF uses the policy belief system as the standard with which to integrate different policy actors and to analyze how the coalitions of these actors affect policy outputs [35]. Scholars have leveraged this framework in different country contexts and have applied different policy issues to test it. For example, forest certification is a process that uses market mechanisms to ensure that timber harvesting sources are legal, thereby promoting sustainable forest management. When analyzing forest certification issues in Indonesia, Canada, and Switzerland, Elliott and Schlaepfer [36] asserted that the ACF is an effective analytical tool that allows an understanding of multiple participants and involves a policy-learning process. Leifeld [37] traced the change from a single hegemonic advocacy coalition to a stable coalition by analyzing changes in the alliance belief system in the German pension security policy subsystem and corrected the deficiencies of the policy innovation change concept in the ACF. These studies have helped to verify the rationality and science-based approach of the ACF and have also led to revision and refinement of the framework itself to render it more sophisticated and applicable.

Several practices suggest that the ACF is suitable for analyzing governance issues with serious value differences. Land is a scarce resource, and when coupled with its status as a comprehensive space carrier, the use process is full of competition over interests and value uncertainties. In this context, some scholars have introduced the ACF into land-use research. For example, Heinmiller and Pirak [38] studied the urban changes of the Greater Golden Horseshoe region in Canada based on the ACF. The research showed that three coalitions (the agricultural, environmentalist, and developer coalitions) formed a policy subsystem around their basic and unique core beliefs of the policy. Similar to urban changes, the transition of farmland areas is also a complex land-use problem. From a global perspective, regardless of whether a country's land areas are publicly or privately owned, changes in farmland areas are, to varying degrees, affected by policies. As a country that is typically characterized by public land ownership, the spatiotemporal dynamics of China's farmlands reflect stronger policy measures. Farmland transitions can be seen as a product of land-use policy changes, and the ACF explains the processes of these changes from the perspective of the learning and interactions of policy advocates' coalitions. In this sense, the ACF may be an effective framework to study the mechanism underlying farmland transitions.

Overall, although forest land transitions have been widely studied, available research and exploration of farmland, as a hybrid artificial-natural land system, is insufficient. In particular, research on farmland use has not adequately considered trends in farmland transitions, and long-term studies on farmland transitional characteristics are lacking. In addition, regarding the underlying mechanisms, natural resources, social economic structure, and the political environment, and other factors, also need to be considered.

Against this background, to fill these knowledge gaps, the objectives of this study are as follows: (1) to reveal the inflection point of the farmland transitions and the change in trend characteristics at different stages over a long-term scale by analyzing farmland data for China from 1950 to 2017; (2) to analyze the policy actors, coalition composition, and belief systems present in farmland transition contexts based on the perspective of the ACF and build a theoretical framework that systematically explains the mechanisms of the transitions; (3) to analyze the impacts of coalition changes and external events at different transition stages on farmland transitions and reveal the mechanism underlying farmland transitions in China.

2. Materials and Methods

2.1. Overview

This article analyzes farmland transitions from the perspective of quantity changes. Because a “farmland transition” refers to long-term changes in farmland area, a linear regression method was used to visualize changes in farmland area in China from 1950 to 2017. Changes in land-use patterns tend to exhibit substantive volatility, and transition means that trend changes have occurred. We determined these points from images of farmland area change.

2.2. Advocacy Coalitions Affecting Farmland Transitions

The ACF identifies policy actors in a policy subsystem that share a particular set of beliefs and take action based on their shared beliefs [35]. The framework can be demarcated into three components: relatively stable parameters, external events, and policy subsystems (Figure 1). Among them, relatively stable parameters, such as natural resources and social structures, do not change considerably over a certain period and are therefore not considered herein. This study primarily aims to analyze the operational mechanism of the policy subsystem and the role of external events in farmland transitions in China. In the policy subsystem, the participants involved were first identified, and subsequently, the coalitions that these participants formed were determined. The policy belief structures of the coalitions were then analyzed, and the policy outputs formed by the interactions among these coalitions were identified. Finally, these policy outputs formed the farmland transitions.

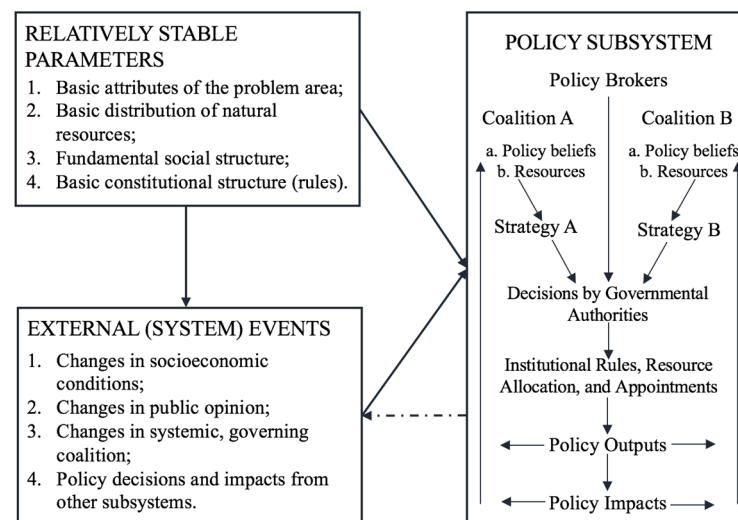


Figure 1. The Advocacy Coalition Framework, revised according to Weible et al. [39].

According to the ACF, members of the same coalition have no disputes over long-term coordinated actions [35]. Therefore, when identifying members, a coalition is often divided according to the different attitudes held by members towards a certain coordinated action. In developed countries, due to the high availability of recorded texts concerning the processes of policy agendas, formal minutes are a favored source of data, e.g., from parliaments, hearings, and legislative committees. Within these records, one can recognize which social groups are involved in the policy agenda and their policy claims. Therefore, by identifying these policy claims, members with similar claims can be classified as being in the same advocacy coalition [40,41].

However, in China, due to the difficulty in obtaining texts on the processes of policy agendas, it was necessary to make certain adjustments to the method of identifying alliance members. First, as farmland transitions reflect trend changes, it was possible to list the activities that led to increases (Table 1: A1–A4) and decreases in farmland area (Table 1: B1–B4) from the land activity codebook in Table 1. Second, the text data of various plans

that had direct and significant impacts on farmlands were collected and analyzed according to the codebook (Table 1). Subsequently, information on the various land activities involved in the text was extracted. The organizations responsible for managing such land activities may be the standard from which the organizations' interests were affected; therefore, these participants were identified in the policy subsystem of the transition. Finally, according to their different policy opinions on different land-use activities, policy participants were divided into different advocacy coalitions.

Table 1. Land activity codebook.

	Land Activity	Definition
Farmland Area Increase Activity	A1. Land development	Activities that bring unused land into a cultivable status through engineering, biological, or multi-disciplinary measures
	A2. Land arrangement	Adjusting the layout of land-use through the integration of farmland and centralized merging of settlements
	A3. Land reclamation	Taking remediation measures vis-a-vis land destroyed by mines to make it available. Some reclaimed land is used as farmland
	A4. Positive agricultural restructuring	Changing the agricultural production structure according to changes in the market demand for agricultural products, resulting in an increase in farmland areas
Farmland Area Decrease Activity	B1. Construction	Non-agricultural construction spanning industry, mining, transportation, and real estate occupy farmland, resulting in a decrease in farmland areas
	B2. Damaged by disaster	Farmland that has been washed away, burned, or buried due to various disasters and that cannot be restored in the short term
	B3. Withdrawing from farmland for ecological reasons	Due to ecological needs, the state plans a stepwise conversion of farmland to forests, grasslands, and lakes
	B4. Negative agricultural restructuring	Changing the agricultural production structure according to changes in the market demand structure for agricultural products, resulting in a decrease in farmland areas

In the ACF, the beliefs of the policy actors drive their actions, and they want these beliefs to be reflected in policy outputs. In a coalition, if the coalition members have no disputes over long-term coordinated actions, they must have the same belief system, which acts as the bond and core driving force behind the formation of the policy actors. This belief system plays a linking role and can be divided into three levels: deep core, policy core, and secondary beliefs (Figure 2). The deep core beliefs at the innermost core are abstract and include long-term judgments on axiomatic issues and attitudes towards nature, and they remain virtually unchanged [35]. The core policy beliefs are located in the middle layer and apply the deep core beliefs to specific policy subsystems, creating the basis for uniting different policy actors to form an advocacy coalition [35]. The outermost secondary beliefs are instrumental decisions formed by different coalitions based on experiences and necessary information searches to realize the core policy beliefs of the coalitions [35,42]. If a coalition wants to occupy an advantageous position in a policy agenda, it needs to continuously expand the influence of its belief system. In the farmland transition policy subsystem, by identifying the differences in the belief systems of the different coalitions, the coalition's influence on land policy outputs and farmland transitions can be further analyzed.

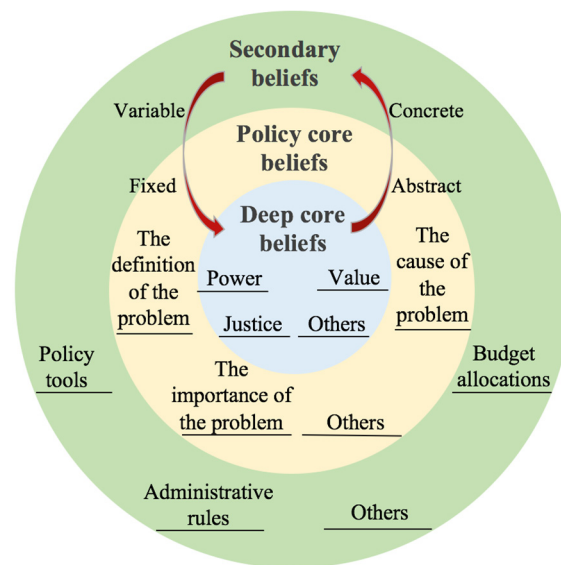


Figure 2. Structure of policy belief systems, adapted from Sabatier [35].

Generally, major policy changes are affected by external events in the policy's subsystem. Such events include changes in the socio-economic environment, changes in public opinion, changes in the ruling coalition's system, policy decisions, and influences from other subsystems. Policy changes will affect the spatiotemporal dynamics of farmland areas, thus affecting farmland transitions. Therefore, when studying this transition, it is crucial to also pay attention to various external events that can affect policy changes.

2.3. Data Sources

Due to the lack of accurate farmland survey data in the People's Republic of China (PRC) during the 1950s–1990s, farmland data from 1950 to 1995 were based on the work of Feng et al. [43]. Those authors analyzed, inverted, and reconstructed China's farmland data in stages. Using the farmland survey data obtained in 1953 as the basis for determining agricultural tax as a reference point, the verification results suggest that the data from 1949 to 1952 have a good connection. China's statistical work was conducted from 1953 to 1960, and the statistical results were appropriately consistent with the net reduction in farmland areas. Overall, the data from 1949 to 1960 can directly reflect the amount of farmland in China. The relevant data sources from 1986 to 1995 are diverse and vary greatly; they include data on the spatiotemporal dynamics of farmland published by the Ministry of Land and Resources (MLR), which is the most reliable source. Therefore, based on the results of the detailed national land survey in 1996, Feng et al. inverted the MLR data from 1986 to 1995, on a yearly basis. The statistical data from 1960 to 1985 were inconsistent with the actual changes in farmland trends; therefore, farmland areas were fit and reconstructed based on grain output data. The premise for adopting this method is that China's grain data are authentic at this stage, and it has been verified that farmland area and grain output were strongly correlated during this period. Considering that the "household contract responsibility system", initiated in 1978, was a watershed moment in China's agricultural development, Feng et al. simulated the grain-farmland area relationship between 1961 and 1978 and between 1978 and 1985, using data from 1949 to 1960 and 1986 to 1995, respectively. The farmland area data after reconstruction from 1950 to 1995 were well connected between the different periods and comparison with other reference data also showed good consistency. Therefore, the results of Feng et al. were used as the basis of the data analysis in this article. Farmland data between 1996 and 2008 were obtained from the "China Statistical Yearbook" [44]. It should be noted that a national land survey was conducted in China from 2007 to 2009, and the results of this survey were adopted in the farmland area of 2009. Changes in survey techniques and methods led to a significant

“jump” in the amount of farmland between 2008 and 2009 (Figure 3), and therefore, statistics after 2009 cannot reliably reflect the changing trend in farmland area between 2008 and 2009 because the presence of one or more substantive artefacts cannot be ruled out. To improve the practicability of the data, 2009–2017 farmland data refer to the results of farmland data reconstruction by Wang et al. [45]. Based on original statistical data, the authors used the ARIMA model (Autoregressive Integrated Moving Average model)¹ to predict and extrapolate the amount of farmland before and after 2009 and to correct the data.

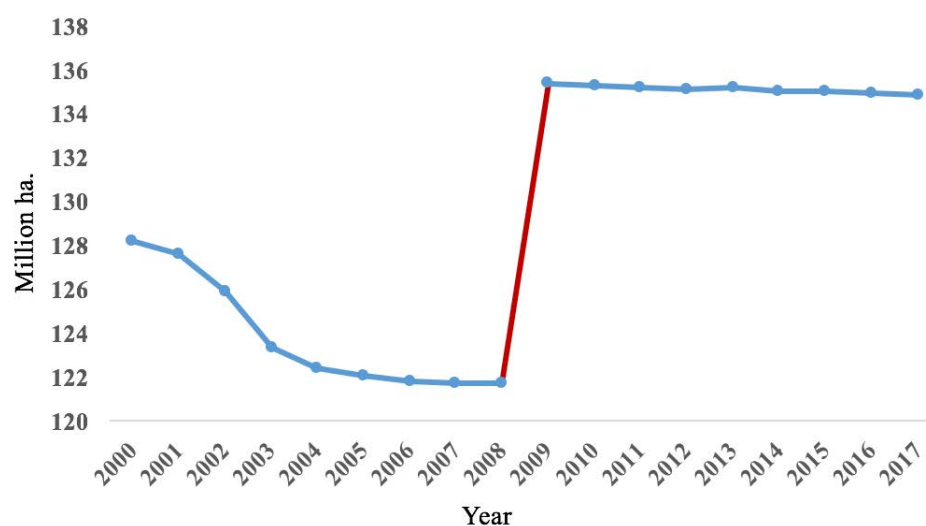


Figure 3. Changes in China’s farmland area between 1996 and 2017, including the adjustments that resulted from the 2007–2009 national land survey.

When analyzing the policy subsystem of the farmland transitions, the text data included the “Outline of the National Land Use Master Plan” [46,47] (1997–2010 and 2006–2020: two periods in total), the “National Economic and Social Development Master Plan” [48] (1953–1957 and 1958–1962: once every 5 years after 1966, comprising a total of 13 periods), the “National Land Improvement Plan” [49] (2011–2015 and 2016–2020: two periods in total), and other important planning texts that had a direct impact on land-use.

3. Results and Discussion

3.1. China’s Farmland Transitions

Regression analysis of China’s farmland area (Figure 4) from 1950 to 2017 reveals alternating trends between increases and decreases. However, overall, after nearly 70 years of development, China’s farmland areas have generally increased.

Throughout the study period, there were two inflection points on the curve of farmland area change, i.e., in 1984 and 2004. From 1950 onward, the farmland area curve showed a moderate and stable upward trend, but the total amount was far below the average value in the sample. This trend was interrupted after 1957, and from 1958 to 1960, the farmland area in China experienced a short but drastic period of decline, with large farmland losses. Of the entire study period, 1960 was the year with the lowest farmland area in China. However, from 1961 to 1984, farmland area increased rapidly, reaching a peak in 1984 before starting to decline once again. After 2005, when the farmland area gradually approached the “arable land minimum”², the downward trend weakened, and the farmland area remained reasonably stable.

¹ A method for converting non-stationary time series to stationary time series by differential processing.

² “Arable land minimum” refers to the minimum area of the arable land that should be protected. China sets this value at 120 million hectares.

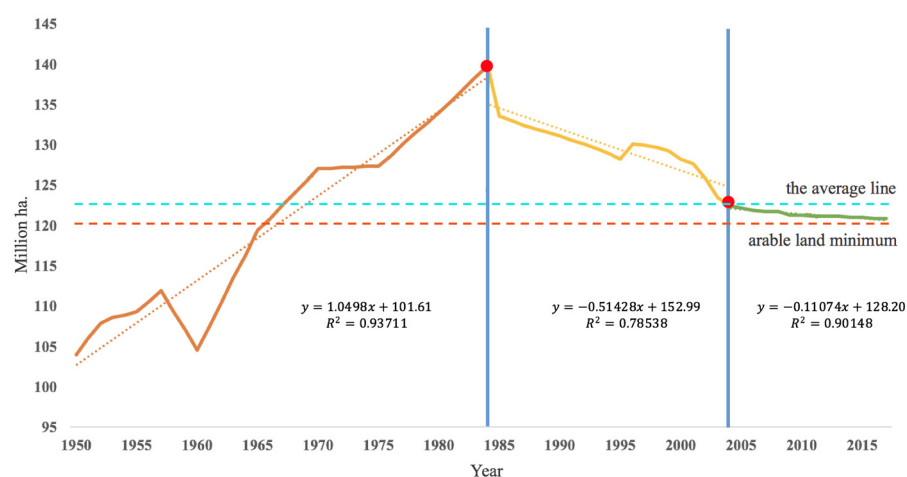


Figure 4. Regression analysis of farmland area changes in China between 1950 and 2017.

Evidently, farmland area experienced two transitions in terms of quantity. The first is from a fast growth period to a rapid descent period in 1957, and the second is the transition to a stable period in 2004.

3.2. Advocacy Coalitions Affecting Farmland Transitions

There are two advocacy coalitions in the process of policy changes that affect farmland transitions: the farmland supplement coalition and the farmland consumption coalition (Table 2). The farmland supplement coalition supports land activities related to the expansion of farmland areas, such as land development, arrangement, and reclamation. The primary policy actors include the Ministry of Land and Resources of the PRC, the Ministry of Agriculture of the PRC, the State Administration of Grain, and think tanks that study farmland protection. The first three of these policy actors are responsible for the protection of farmland and food security throughout the country and represent the backbone of the farmland supplement coalition. Land planning experts and policy researchers are collectively referred to as think tanks. They use their expertise to provide policy advice and suggestions on farmland protection, farmland reclamation, and the improvement of farmland quality. The farmland consumption coalition primarily involves policy actors involved in land development, land reclamation, and farmland occupation. The farmland occupation activities primarily include transportation, water conservancy, urban construction activities, real estate development, rural housing construction activities, and energy extraction activities.

Additionally, there are two other important policy actors in the farmland transition policy subsystem. Their positions and attitudes are relatively contradictory in the policy actions related to farmland, and they do not belong to any coalition but are defined as “policy brokers”. The National Development and Reform Commission department guides overall reform of the economic system and provides macro-control. Furthermore, it is responsible for managing the State Administration of Grain in the farmland supplement coalition and the National Energy Administration in the farmland consumption coalition. To meet economic and agricultural production goals, it is necessary to take a macro-perspective which, in turn, means impacting on various land-use arrangements. Under China’s administrative system, local governments are simultaneously responsible for various domains such as economic development, farmland protection, or withdrawing from farmland for ecological reasons; they act as brokers for all parties in the policy subsystem of farmland transitions.

Table 2. Advocacy coalitions in the farmland transition policy subsystem.

	Increase in Farmland Activity			Decrease in Farmland Activity			Negative Agricultural Restructuring
	Land Development	Land Arrangement	Land Reclamation	Positive Agricultural Restructuring	Construction	Damaged by Disaster	
	Farmland supplement coalition						
Ministry of Land and Resources	Y	Y	Y				
Ministry of Agriculture	Y	Y	Y	Y			N
State Administration of Grain	Y	Y	Y	Y			N
Think tanks	Y	Y	Y			N	Y
	Farmland consumption coalition						
Rural collective economic organizations				N	Y		Y
National Energy Administration	N		N		Y		
Ministry of Transport	N		N		Y		
Ministry of Housing and Rural Development	N		N		Y		
State Forestry Administration				N			Y
Ministry of Water Resources	N		N		Y		Y
Industrial and mining enterprises	N		N		Y		
Real estate development enterprises	N		N		Y		
	Policy brokers						
National Development and Reform Commission	Y	Y	Y		Y		Y
Local government	Y	Y	Y		Y		Y

Note: Y = yes (supports this type of land activity); N = no (does not support this type of land activity).

Table 3 shows that the farmland supplement and farmland consumption coalitions have opposite belief systems. In terms of deep core beliefs, the key to the conflict between the two coalitions is whether, under the existing external environment, they should continue to pay attention to protecting the right to survival or give priority to the right to development. The farmland supplement coalition believes that “food for the program” is still a prudent mantra and farmland areas should be increased to maintain the fundamental bottom line of national food security, while the farmland consumption coalition is more in agreement with “taking economic construction as the center” and believes that sufficient land support should be provided for economic and social construction. The core policy beliefs are a representation of the deep core beliefs, and the contradiction between the two coalitions’ beliefs revolves around the question of the type of land that should be focused on for protection. The farmland supplement coalition focuses on farmland protection and farmland area supplementation, making this coalition’s line-up stable for a long period of time. However, the actors in the farmland consumption coalition are involved in all aspects of construction (including energy, transportation, and real estate), and they will only join the coalition when they determine that it is beneficial for them to do so. Against this background, changes in the coalition’s membership occur relatively frequently. Such changes result in the two coalitions having a disparate number of policy participants, yet they are virtually equal in their overall strength and thus maintain the possibility of having a balanced competition of interests. From the perspective of their basic policy mechanisms, the mandatory planning force of the farmland supplement coalition is stronger than the market-based means of the farmland consumption coalition, and therefore, changes in farmland area exhibit an overall upward trend. Secondary beliefs are instrumental decisions that are made to achieve the core policy beliefs and necessary information searches under special circumstances. In terms of instrumental decisions, the two coalitions have further refined their basic policy mechanisms and selected different policy tools. Regarding information searches, in recent years, China has paid increased attention to “eco-civilization” [50]. In this context, the two coalitions have formed different perceptions of the ecological function of farmland. Since the 1990s, the theory and practice of good governance has flourished [51], emphasizing the diversification of management methods. In this context, the two coalitions hold different positions regarding the direction of system reform.

Table 3. The advocacy coalitions’ belief systems on farmland transitions.

Levels and Types of Beliefs	Farmland Supplement Coalition	Farmland Consumption Coalition
Value priority Basic standards of distributive justice	Deep core beliefs Right to survival. Food for the program ³ .	Right to development. Taking economic construction as the center ⁴ .
The definition of the problem	Policy core beliefs Farmland is the basic resource on which mankind depends and is the fundamental guarantee of national food security.	Development and construction are the most important ways to improve national economic strength. It is possible to reduce farmland by developing agricultural technology, thereby increasing the output per unit area.
The importance of the problem	China’s population continues to grow and the demand for grain is large, but the area for farmland is decreasing. Therefore, farmland protection is urgent.	The rapid development of China’s economy requires adequate land security for urban construction, infrastructure construction, industrial and mining construction, among others.
The cause of the problem	Construction encroachment and withdrawing from farmland for ecological reasons lead to farmland area reduction.	Some scattered farmland areas have impeded urban and industrial development.

Table 3. Cont.

Levels and Types of Beliefs	Farmland Supplement Coalition	Farmland Consumption Coalition
Basic policy mechanism	Defining “arable land minimum” and adopting mandatory planning and legislative means to effectively protect and supplement farmland. Secondary beliefs	Market methods should be used to coordinate various land-use relations, and the use and protection of farmland should be incorporated into the market mechanism.
Policy tools	Approval system for the conversion of farmland, a farmland acquisition–compensation balance system, and so on.	Farmland occupation tax, development rights transfer mechanism, farmland index transaction, among others.
Adequacy of ecological protection	Farmland has ecological service functions, and the farmland ecosystem meets the needs of environmental protection.	The farmland ecosystem is unstable, and withdrawing from farmland cultivation for ecological reasons meets environmental protection requirements.
The direction of system reform	Farmland protection needs to be gradually legislated and institutionalized. To adapt to the new situation, it is necessary to constantly improve the farmland protection system.	At present, farmland protection in China is too dependent on compulsory institutional measures and should be appropriately adjusted to reduce the control of areas by improving the availability of space for economic development.

3.3. The Farmland Transition Mechanism Based on the ACF

Farmland transitions reflect coalitions’ interactions with farmland use and protection against the background of national macroeconomic and social development. Economic and social transitions at the national macro-level determine the overall direction of farmland area changes. Both the farmland supplement coalition and the farmland consumption coalition launched their competitive interests over the policy agenda related to land use. Under the combined influences of external events and relatively stable parameters, a series of policy outputs were formed. These policy outputs determine changes in farmland area to a certain extent. Combined with the change of macroeconomic policy environment, this paper analyzes the reasons underlying the farmland transition, based on the ACF, and explores the important policy outputs concerning farmland use in China over the last 70 years (Figure 5 and Appendix A).

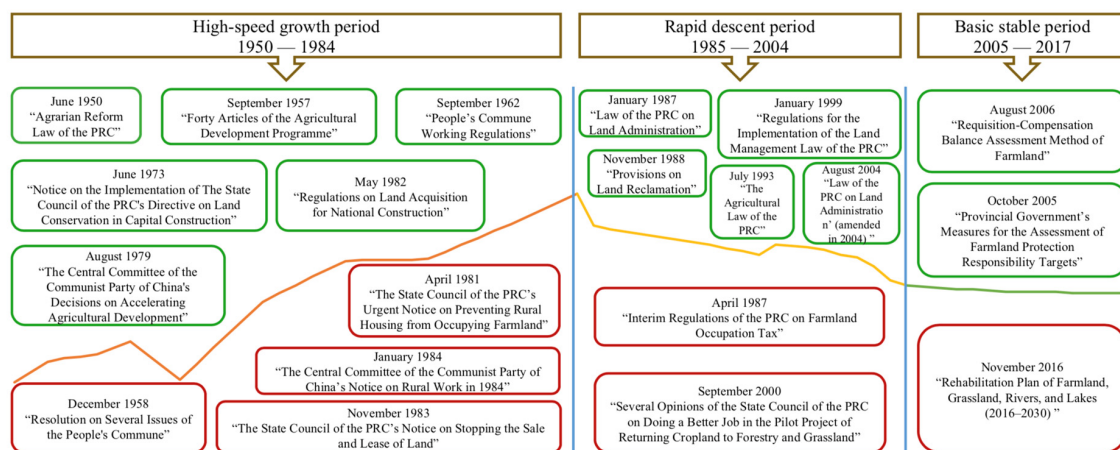


Figure 5. Changes in China’s farmland use policies; further details can be found in the Appendix A.

³ This was a slogan put forward by Chinese government in the 1950s to address the issue of insufficient grain supply; it called for concentrated efforts to develop grain cultivation and ensure food production.

⁴ This was a priority for China to promote economic and social development in the 1980s, calling for a concentrated effort to develop social productive forces and facilitate national industrialization.

3.3.1. Macro-Economic and Social Dynamics Determine Farmland Transitions

First, changes in demographic policy influenced farmland transitions in China to a large degree. From the 1950s to the early 1980s, China's population experienced rapid growth due to the concept of "many children, many blessings". The Chinese government encouraged population growth at this stage. However, the limited natural resources could not sustain the growing population, resulting in poverty and hunger. For this reason, farmland increased rapidly to enhance grain production. However, out of fear of excessive population growth, the Chinese government shifted from encouraging population growth to slowing down population growth in 1982. This change also slowed down farmland expansion.

Second, changes in the household registration system influenced farmland transitions in China. The "Regulations of the People's Republic of China on Household Registration", issued in 1958, contained a strict urban-rural dual household registration system. Until the 1980s, this system severely restricted migration within China, especially rural-to-urban migration. Therefore, the growth of the rural labor force at this stage was positively correlated with the growth of farmland area. After 1984, China began to implement the resident identity card system, gradually relaxing household registration control. The rural labor force was strongly attracted to industries and cities. In the context of relaxing household registration control, a large part of the rural population migrated to cities, which resulted in a decrease in farmland area.

Last, economic restructuring also influences the overall evolution of farmland area. During the research period, China underwent a transition from a planned economy to a market economy. During the period of the former (from the 1950s to 1980s), China's economic and social development depended on the substantial development of agriculture, characterized by the expansion of farmland areas to increase agricultural production. Since the 1980s, China has gradually been establishing a market economy system. The Chinese government has vigorously promoted industrialization and urbanization, which has led to an increase in the demand for construction land. Thus, large areas of farmland were converted into built-up land.

3.3.2. Changes in the Coalition Power Balance Influence Farmland Transitions

There was a period of rapid farmland growth between 1950 and 1984. Based on the policy outputs of this period (Figure 6), it is evident that for a country that was just emerging from the Second Sino-Japanese War (1931–1945) and the Chinese People's War of Liberation (1946–1949) and was in despair, food was the cornerstone of people's livelihoods, alongside national stability. As such, with the support of all salient actors, restorative growth of farmland was possible. However, the contradiction between the limited land resources and the expanding population began to be obvious. The reserve land could not meet the growing needs of farmland and construction land, and the opposition between the two coalitions was formed. After a period of development, the core policy beliefs of the "food for the program" of the farmland supplement coalition (proposed in 1958) were relatively stable. From the perspective of policy outputs, the coalition gradually developed and matured in minor respects, such as in terms of issues surrounding wasteland and lake reclamation. During this period, the farmland consumption coalition initially formed the core policy belief of "taking economic construction as the center" (proposed in 1978). The main actors in the coalition were rural collective economic organizations. The consumption of farmland was reflected in rural housing construction and the development of social enterprises. Nevertheless, these areas only occupied a small part of the farmland area. Overall, the strength of the farmland supplement coalition at this stage was higher than that of the farmland consumption coalition. Thus, the farmland area continued to grow rapidly. Although there was a brief period with a sharp decline in farmland between 1958 and 1960 due to poor judgements by top-level system designers, the overall upward trend again resumed in the 1960s.

From 1985 to 2004, farmland areas experienced a period of long-term steady descent. During this stage, China's economy expanded rapidly, accompanied by increased urbanization and a higher demand for construction land. Under the double promotion of expansion (demand for urban construction and expansion of rural autonomy), all types of illegal farmland occupation were frequent. During this period, although there were several policies related to farmland protection, they showed obvious problem orientations and post-recovery characteristics. With the participation of policy actors spanning industry, mining, and transportation, the power of the farmland supplement coalition greatly increased and occupied a dominant position in the policy agenda.

After 2005, the declining trend in farmland area was curbed, especially with the development of the Ministry of Land and Resources of the PRC, which was established in 1998 and became the backbone of the farmland supplement coalition. In terms of policy output, rationalization and institutionalization of management also occurred and the introduction of a series of systems such as the dynamic equilibrium of the total cultivated areas, acquisition–compensation balance, and a farmland protection-targeted responsibility system, enabled China's farmland protection measures to gradually form a systematic and comprehensive policy network. This led to the narrowing of the power gap between the two major coalitions. In the context of a more modernized and urban economy, the share of the agricultural sector in GDP and the share of the rural income structure are currently both decreasing [52], making it hard to recognize a new transition from declining to increasing farmland area. However, China's farmland area is expected to remain stable for a long time to come, as the power of the coalitions becomes more balanced.

3.3.3. Catalytic Action of External Events

During policy changes, external events act as catalysts to enhance or weaken the power of the alliance and often lead to major policy changes, directly affecting the policy subsystem in a short period of time. On the one hand, the mechanism by which external events play a catalytic role directly affects existing coalitions and changes their right to speak in the policy arena. On the other hand, it influences the strength of coalitions by changing the composition of those coalitions.

During the "Great Leap Forward"⁵ between 1958 and 1960, iron and steel smelting was promoted for building large railways. Capital construction investments expanded rapidly, agricultural production stagnated, a large amount of farmland was wasted, and the power of the farmland supplement coalition was weakened. This led directly to short-term drastic reductions in farmland areas from 1957 to 1960.

Economic reform and opening-up began in 1978 and this had a profound impact on all aspects of Chinese society. At the beginning of this movement, with increasing per capita incomes, China's market for agricultural products expanded. Further, the "household contract responsibility system" enhanced the enthusiasm for production and improved the supply capacity of agricultural products [53]. Under the stimulation of both supply and demand, the cultivated land area continued to grow. However, with the deepening of the reform and opening-up, the rapid rise of the economy kicked various construction projects in China into full swing, and the threat to various types of farmland was high. At the same time, the increase in grain yield and grain imports temporarily suppressed the urgency to protect farmland. As a result, the farmland consumption coalition gradually came to dominate the policy subsystem, leading to another interruption to the upward trend and ushering in the first sudden change in farmland area in 1984.

In the 1990s, economic globalization became an important characteristic of the global economy. International competition and free trade accelerated the flow of factors and the international division of labor, which had far-reaching impacts on the economic systems of all countries in the world [54]. In the tide of globalization, China became the "workshop of

⁵ This was a nationwide social production campaign in China between 1958 and 1960 that set a series of unrealistic economic tasks and targets, such as catching up with and surpassing the UK in the production of major industrial products over 15 years.

the world”, taking full advantage of its cheap labor force. In this context, the development of processing and manufacturing industries accelerated construction on occupied farmland. The large number of farmers pouring into the cities to work also led to the partial abandonment of farmland. These are all important factors that contributed to the steady decline in farmland area in China since 1984. After China’s accession to the WTO (World Trade Organization) in 2001, massive imports of agricultural products had a significant impact on the country’s traditional natural economy [55], making the period of 2001–2004 a small climax of the decline in cultivated land area. However, at this stage, there were also some important external events affecting the farmland supplement coalition. In 1994, Lester R. Brown, director of the World Watch Institute, published a report entitled “Who will feed China? Wake-up call for a small planet” [56], which caused controversy about China’s food security. As a result, China paid more attention to its domestic food security and farmland protection, and the strength of the farmland supplement coalition was enhanced. Under the influence of this event, in 1995, there was a small short-term increase in China’s farmland area, albeit in the context of an overall downward trend. In 1998, a catastrophic flood occurred in the Yangtze River Basin. Upon investigation, it was found that the large amount of reclamation land had reduced the storage capacity of the rivers and lakes, which played an important role in the disaster. This also sounded the alarm for the “land reclamation” method of supplementing farmland areas, and the approach of “withdrawing from farmland for ecological reasons” started to play an important role in the policy subsystem. As a result of these external events, the farmland transition entered a new stage in 2005.

3.3.4. Relatively Stable Parameters Have Indirect but Long-Lasting Effects on Farmland Transitions

Generally, relatively stable parameters do not directly affect the interaction of coalition members, but objectively determine the resource constraints and the probability of policy changes. As shown in Figure 5, the overall trend of farmland change does not always correspond to policy outputs, especially in the period 1985–2004, when the policy outputs of the farmland supplement coalition were considerably higher than those of the farmland consumption coalition, but the farmland area declined for a long time. This was largely due to changes in the relatively stable parameters.

The transition from agricultural rural societies to industrial urban societies is the economic and social development path followed by most countries in the world. During the period from 1950 to 2017 (especially after 1978), China also experienced such structural changes [57], among which the urban and rural structure had the largest impacts on farmland changes. During the study period, China’s urbanization rate increased from 11.18% in 1950 to 59.52% in 2017, with an increase of about 770 million permanent urban residents. Numerous rural people migrated to the cities, which resulted in farmland abandonment. This largely explains the steady decline in farmland since 1984.

In the process of social structure change, people’s understanding of farmland also changed, which means that the basic attributes of the problem domain changed. In a subsistence-based agricultural economy, increasing farmland is seen as the only source of livelihood, especially for farmers, whose most important means of production is farmland. With the advent of industrialization and urbanization, the economic value of land and labor for cultivation was much lower than that of development and construction. As a result, awareness of the importance of farmland has become diversified, and some farmland protection policies have even run counter to the wishes of farmers. This is one of the reasons why the spatiotemporal dynamics of farmland are not consistent with policy outputs.

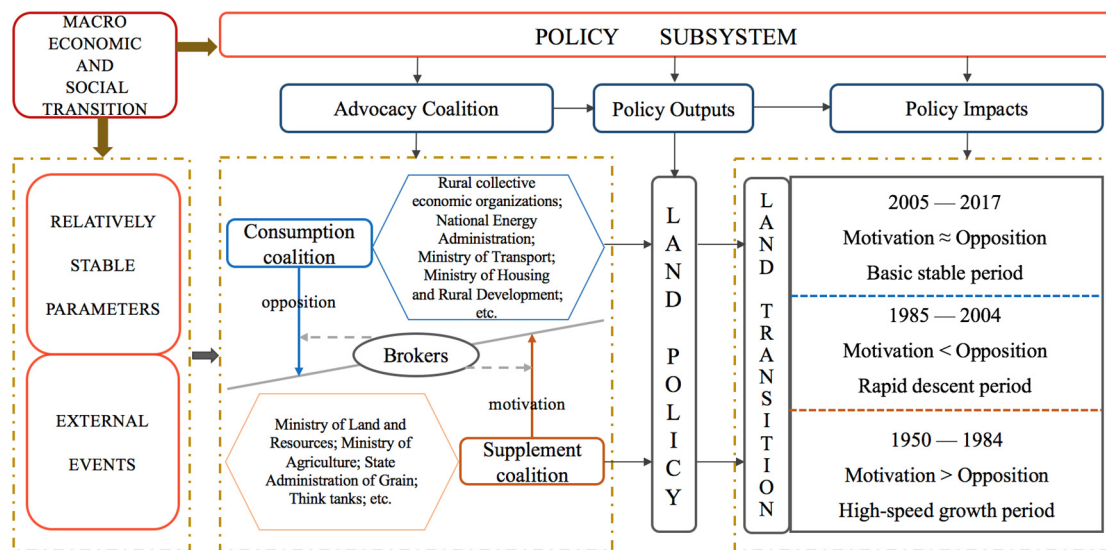


Figure 6. China's farmland transformation mechanism from the perspective of the Advocacy Coalition Framework.

4. Conclusions

Transitions emphasize changes in trends. Therefore, when studying farmland transitions, it is critical to determine inflection points. We used a linear regression method to analyze changes in China's farmland area from 1950 to 2017. We searched for, and sought to understand the reasons for, abrupt transition points. Based on our results, there are two inflection points (1984 and 2004) during the study period which means that there have been two transitions in China's farmland area between 1950 and 2017. From 1950 to 1984, China was in a period of sustained fast growth, with the total farmland area increasing rapidly and continuously. In the period from 1985 to 2004, there was a sharp decline in farmland area. After 2005, the range of change of farmland area became smaller and entered a reasonably stable period.

Farmland, as a type of national land arrangement, is most significantly affected by macro-level economic and social transitions. Since 1950, changes in China's macroeconomic policies have led to demographic transitions in the country, a change in the household registration management system and the reform of the economic system, all of which have ultimately determined the overall manner and direction of farmland area change.

We applied the ACF to study the mechanism of farmland transition. We highlight two advocacy coalitions in China—farmland supplement and farmland consumption—that held opposing belief systems. Of the two, the former was the driving force for the growth of farmland areas, whereas the latter represented the opposition. In this policy subsystem, the policy brokers consisted of local governments and the National Development and Reform Commission, acting simultaneously on the two coalitions and playing a coordinating role. Competition of interests and learning among the coalitions promoted the introduction of various land-use policies. In the policy output process, external events acted as catalysts. The implementation of various land policy outputs had an impact on the spatiotemporal dynamics of farmland areas, which, in turn, affected the transition. In this context, and from the perspective of the framework of advocacy coalitions, the transition of farmland areas reflects, to some extent, policy influence. During farmland transition, external events act as catalysts, whereas relatively stable parameters have indirect but lasting effects once they change.

We predict that, with the change from extensive to intensive land use, the farmland supplement coalition will no longer rely on the increase in farmland area to achieve agricultural development. In addition, the farmland consumption coalition will also tend to increase the efficiency of land use instead of occupying more farmland. This way, the conflict between the two coalitions is expected to decrease. The two alliances may move

from confrontation to collaboration, with the aim to achieve growth of both agriculture and industry, based on new technologies.

Although this paper focuses on the farmland transition in China, this is also a world-wide problem, especially in developing countries. By advocating the framework of coalitions, a more comprehensive analytical tool is established. According to the identification of policy coalitions, the analysis of belief systems, and the analysis of external factors, it is helpful to understand the reasons for transitions and to predict future trends.

However, it should be noted that the research framework developed and applied herein depends on certain assumptions: the existence of a single stable government, public land ownership, and land use which is strictly planned and managed by the government. As such, applications in other country contexts need to ensure that the underlying framework is modified accordingly to ensure that it is fit for purpose.

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Appendix A

Table A1. Farmland use polies in China over time.

Period	Policy Text	Policy Outputs
		Fast growth period (1950–1984)
June 1950	“Agrarian Reform Law of the PRC”	The implementation of farmers’ land ownership, the liberation of rural productivity, and the vigorous development of agricultural production led to a rapid increase in the demand for farmland nationwide.
September 1957	“Forty Articles of the Agricultural Development Program” (revised draft)	This was the program’s document for the agricultural “Great Leap Forward” and raised the requirements of agriculture, forestry, animal husbandry, by-products, and fishery production in a short period of time; it also raised excessively high production requirements, leading to the transformation of lakes into fields during its peak period.
December 1958	“Resolution on Several Issues of the People’s Commune”	This document proposed a “three-three” farming system, which required reducing the planting area of crops by using one-third of the total farmland for crops, one-third for trees and grass, and one-third for leisure.
September 1962	“People’s Commune Working Regulations” (draft amendment)	This document allowed the production team to reclaim wasteland, manage barren hills, and make full use of all possible resources within the scope of the team.
June 1973	“Notice on the Implementation of The State Council of the PRC’s Directive on Land Conservation in Capital Construction”	This required construction land to be used only after strict examination and approval to save land and avoid industrial land occupying farmland.
August 1979	“The Central Committee of the Communist Party of China’s Decisions on Accelerating Agricultural Development”	The document proposed to implement the “food for the program” policy, develop agricultural production, systematically reclaim wasteland, and convert lakes into fields.
April 1981	“The State Council of the PRC’s Urgent Notice on Preventing Rural Housing from Occupying Farmland”	This stated that due to occupied farmland being used for building houses and establishing enterprises in rural areas, extensive publicity and education should be carried out, the layout should be reasonably planned, arable land should not be occupied (as much as possible), building materials should be reformed, and damage to farmland should be reduced.
May 1982	“Regulations on Land Acquisition for National Construction”	The document stipulated that any wasteland that could be used should not occupy farmland and stipulated the land compensation fee and resettlement compensation standard for the requisitioned farmland. During the resettlement process, wasteland should be properly developed to expand the farmland area.
November 1983	“The State Council of the PRC’s Notice on Stopping the Sale and Lease of Land”	The notice required that rural organizations must be firmly prevented from occupying farmland through privately negotiated conditions. They frequently occupied farmland and vegetable fields by renting, buying, and selling houses or by occupying the land by means of “jointly building houses”, “jointly setting up factories”, and “jointly building warehouses”. This required that existing farmland must be protected.
January 1984	“The Central Committee of the Communist Party of China’s Notice on Rural Work in 1984”	This stated that the land contract period should be more than 15 years and should prohibit the conversion of contracted land to non-agricultural land, accelerate the development of mountainous areas, water areas, and grasslands, and develop rural transportation, post and telecommunications, and rural industry.

Table A1. Cont.

Period	Policy Text	Policy Outputs
		Rapid descent period (1985–2004)
January 1987	“Law of the PRC on Land Administration”	This implemented a land-use control system, compiled an overall land-use plan, and stipulated land use as divided into agricultural land, construction land, and unused land. It strictly restricted the conversion of agricultural land into construction land, controlled the total amount of construction land, and implemented special protection for farmland.
April 1987	“Interim Regulations of the PRC on Farmland Occupation Tax”	Units and individuals occupying farmland to build houses or engage in other non-agricultural construction were regarded as tax obligors of the farmland occupation tax.
November 1988	“Provisions on Land Reclamation”	This stated that enterprises and individuals who cause land damage due to production and construction activities would carry out land reclamation in accordance with regulations and pay compensation for loss of farmland. If the reclaimed land was used for agricultural, forestry, animal husbandry, or fishery production, the relevant state regulations would receive agricultural tax relief.
July 1993	“The Agricultural Law of the PRC”	This stipulated that governments both at and above the county level should delineate basic farmland protection areas in accordance with regulations and implement special protection for farmland in the basic farmland protection areas.
January 1999	“Regulations for the Implementation of the Land Management Law of the PRC”	This implemented a dynamic balance system of total farmland and adopted a series of administrative, economic, and legal measures to ensure that the total area of existing farmland in China could only increase, not decrease, within a certain period, with the aim of gradually improving the quality of farmland.
September 2000	“Several Opinions of the State Council of the PRC on Doing a Better Job in the Pilot Project of Returning Cropland to Forests and Grassland”	This implemented a system of withdrawing from farmland for ecological reasons. The Ministry of Finance, the Ministry of Water Resources, the Ministry of Agriculture, and other departments were jointly responsible for returning farmland to forests and grasslands.
August 2004	“Law of the PRC on Land Administration” (amended in 2004)	This implemented an approval system for the conversion of farmland. If the land occupied by construction involved the conversion of farmland, then approval procedures for this conversion should be followed.
		Basic stable period (2005–2017)
October 2005	“Provincial Government’s Measures for the Assessment of Farmland Protection Responsibility Targets”	This implemented a target responsibility system for farmland protection. The Ministry of Land and Resources, the Ministry of Agriculture, and other relevant departments should propose assessment indicators for the amount of farmland and the basic farmland protection area of the provincial government.
August 2006	“Requisition-Compensation Balance Assessment Method of Farmland”	This implemented a system of farmland acquisition-compensation balance. The Ministry of Land and Resources’ management department conducted assessments based on construction land projects and determined the quantity, quality, and capital of the farmland to be added according to the supplemented farmland plan.
November 2016	“Rehabilitation Plan of Farmland, Grassland, Rivers, and Lakes” (2016–2030)	This implemented a rehabilitation system, strictly observed the “arable land minimum”, established reasonable rotation and fallow systems, improved the quality of farmland, and ensured the safety of the soil environment. Land that was not suitable for farming needed to be withdrawn for ecological reasons.

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