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How far and how long the fallowing policy can go?

Groundwater over-exploitation in the North China Plain has seriously constrained agriculture production and sustainable development. Decision-makers attach great importance to policies that can reduce groundwater use without hampering food production. Seasonal fallowing is one such key policy.

Winter wheat is the main culprit causing groundwater over-exploitation in the North China Plain (Liyan Wang et al, Policy Brief 1). Since 2014, the Hebei province started to test the impact of fallowing winter wheat on reducing groundwater extraction at small scale. With the experience gained, in 2016, the Chinese central government initiated the fallowing pilot program in the Hebei province through the No. 1 governmental document[1]. Fallowing means to change the system of two crops in one year to one crop in one year, namely to change the winter wheat and summer maize to one crop of maize or cotton. One season of winter wheat fallowing or one season of rain-fed cotton will largely reduce the planting area of winter wheat that depends on groundwater irrigation. Farmers who attended the pilot program received the governmental subsidy of 500 CNY per mu (1 Mu is about 667 square meters) of fallowed area per year. Farmers are encouraged to practice crop rotation and foresting in their fallowed farm land. By combining these measures, the government intends to explore the land rotation and fallowing system for up-scaling. The present policy brief presents the findings of winter wheat fallowing policy implementation, followed by policy recommendations for the future.

Key facts:

Participation	33 counties[2] in 4 cities 2014 56 counties in 6 cities in 2016 47 counties in 6 cities in 2021
Fallowing area	50,666 ha in 2014 to 133,333 ha in 2016, and maintain the scale up to 2021
% of fallowing area of total cultivation area in 2018	1.3% for Hebei province 4.4% for cities attending the pilot program
% of fallowing area of total winter wheat sowing area in 2018	5.7% for Hebei province 8.2% for cities attending the pilot program

National policies and actions in supporting the implementation of seasonal fallow policy:

>>> The No.1 governmental document of 2014 advocated for the transformation of the agricultural development mode to tackle the groundwater depletion.

>>> For comprehensive groundwater governance, since 2014 groundwater exploration areas are defined as restricted and prohibited areas according to the severity of groundwater overdraft.

>>> In 2016, following the No. 1 Chinese central governmental document of promoting fallowing policy, a pilot program for exploring the arable land rotation & fallow system was institutionalized and standardized for further implementation.

>>> Revised Water Law was enacted in 2016, requesting the county-level authorities in areas of groundwater over-exploration to take measures to control strictly the groundwater over-pumping.

Total fallowing area has increased and remained at certain scale though it forms a small percentage of the winter wheat sowing area for the province.

Winter wheat fallowing has reduced groundwater withdrawals

A survey conducted by the China Center for Agricultural Policy (CCAP) of Peking University indicated that all villages participating in the winter wheat fallowing pilot were located in regions where the average depth was 256 meters for deep groundwater and 75 meters for shallow groundwater. Almost 96% of arable land in the pilot area depends on groundwater

[1] No. 1 Chinese central government document, issued always at the beginning of the year, states the most important issues and policies regarding the agricultural production, rural area development and the livelihood of farmers.

[2] China has 29 provinces. Municipal governments are under the administration of provincial governments. Under municipalities are county-level government, who directly administer the villages.

irrigation, with 76% relying exclusively on groundwater. Chinese farmers averagely cultivate 3-5 mu of land per household in the North China Plain. Therefore the whole village must be invovled in the fallowing program in order to connect the fallowed farmland to a minimum of 3 hectares to achieve water-saving scale effect.

Economic analysis demonstrated that 1 mu of fallowed land would reduce groundwater withdrawal by 126 m^3 per year, subject to no change in other factors (Guan, 2021). This result is lower than what was expected (140-160 m^3). The extent to which this reduction in groundwater abstraction resulting from fallowing would contribute to the recovery of the aquifer is unclear and needs further study.

Policy Recommendations

Long-term participation of the whole village is the key for policy effectiveness

In the 13 villages studied, only two villages had 100% arable area enrollment into the fallowing pilot program (Deng, et al., 2021; Deng, 2021), while in most villages only about half the arable area was enrolled. The number of participating counties had reached 56 in 2016, then decreased to 47 in 2021, showing that during the fallowing pilot period from 2016 to 2021, some participating counties exited in between, while othes joined in. Total fallowing area remained at certain scale though the number of participating farmers were up and down. Farmers' joining and exiting has increased the management cost of the pilot program, and is not beneficial for overall water saving at scale.

Non-farm employment would impact the sustainability of the fallowing policy

The survey showed that 89% of the farmers didn't change their labour time after participating in the pilot program (Deng, et al., 2021; Guan, 2021). Only 10.1% of the farmers increased their non-farm work time. Providing non-farm job information and training would promote non-farm employment and broaden farmers' income channels.

Equity of subsidy mechanism is crucial

A reasonable governmental subsidy would take into account factors such as regional conditions, market price fluctuation of winter wheat etc. 40% of surveyed farmers attending the fallowing program felt that their farming income have reduced, indicating that the subsidized 500 CNY per mu per year might be lower than their opportunity cost. Survey further confirmed if the subsidy decreased from 500 CNY to 100 CNY per mu per year, farmers' willingness to attend the fallowing program would decrease from 77% to 1% (Deng, et al., 2021; Deng, 2021).

National policies and actions in supporting the implementation of seasonal fallowing policy:

>>> In year 2019, the Action Plan for Managing Groundwater Over-pumping in the North China Plain was issued with two major lines of measures: One "Reduction Line" focusing on water conservation and agricultural restructuring to reduce water withdrawals, and another "Increasing line" to increase regional water resources through multi-channel water resources diversions.

>>> In year 2021, the Chinese central government issued the Groundwater Management Regulation, attaching equal significance to groundwater conservation and pollution prevention.

Planting green manure crops to realize the national strategy of "Storing Food in Soil"

Fallowed land is bare without any plant cover, causing soil erosion and nutrients and carbon loss in the dry and windy weather in the North China Plain. Local governments should consider providing technical guidance and fiscal support to encourage famers to plant green manure crops during the fallowing season to increase soil fertility, which is in line with China's national strategy of "Storing Food in Soil".

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References

Deng, Hongbo., Guan, Baozhu; Wang, Jinxia, Zuo, Alec, Wang, Zhuanlin and Sun, Tianhe, 2021. Seasonal land fallowing policy in response to groundwater overdraft in the North China Plain. Water Alternatives-An Interdisciplinary Journal on Water Policies and Development 14(2): 371-394.

Deng, Hongbo, 2021. Decision-making Behavior of Farmers ' Participating in and Compensation Scheme of Seasonal Land Fallowing Policy in Haihe River Basin, Chinese Academy of Sciences (Phd Thesis).

Guan, Baozhu, 2021. Impacts of Seasonal Land Fallowing Policy on Agricultural Production Decision and Groundwater Irrigation in Haihe River Basin, Peking University (Phd Thesis)

Liyan Wang, Yanjun Shen, Jianmei Luo, Policy Brief 1: an overview of policies in managing groundwater over-pumping in the North China Plain

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