Systematic Review Protocol

Title
What are the Impacts of China's Key Forest Management Policies on Forest Cover and Rural Incomes?

Citation:

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Keywords

Background
To effectively curb climate change, the world needs healthy forests. Forest ecosystems represent the world's largest terrestrial carbon sink, absorbing large amounts of carbon emissions annually (Pan et al., 2011). This function, however, can be compromised by poor forest management practices. Deforestation and forest degradation have been widespread in the developing world, and emissions from land-use change (primarily deforestation) and other forestry sources made up about 11% of total carbon emissions worldwide between 2010 and 2019 (Nabuurs et al., 2022). If deforestation and forest degradation trends can be reversed, not only will carbon emissions from these forests be reduced, but many forests will also turn into net carbon sinks. China has been a leading player in forest recovery and expansion in the developing world. Four major ongoing afforestation programs and policies have been aimed at increasing China's forest cover in recent decades: the Natural Forest Protection Program (NFPP), the Sloping Land Conversion Program (SLCP), the Three-North Shelterbelt Program (TNSP), and Collective Forest Tenure Reform (CFTR). In order for these large-scale, long-running programs to be sustainable, they must simultaneously support afforestation and benefit the livelihoods of enrolled rural residents. While a small number of earlier systematic reviews have focused on China's reforestation policies (Chen et al., 2015; Gutierrez Rodriguez et al., 2016), no previous review has assessed the effects of the country's three major reforestation and afforestation programs (the NFPP, SCLP, and TNSP) on forest cover and income, nor has any previous review assessed how these outcomes were affected by China's collective forest tenure reform. Understanding the effects of each of these programs on forest cover and rural income is of interest to researchers and policymakers designing forest management systems in developing countries worldwide.

Theory of change or causal model
Section exceeds word limit. See attached document "6.1_Theory_of_Change_or_Causal_Model"

Stakeholder engagement
This is a project of the Stanford Center on China's Economy and Institutions (SCCEI). SCCEI researchers are responsible for the formulation of the question and this protocol, as well as the rest of the review process. While we have not consulted any specific target audiences about this project,

we hope to produce a set of results that will be useful to policymakers in low and middle-income countries around the world. Specifically, we expect to be able to summarize the results from the study and generate a list of policy initiatives that are successful at achieving afforestation. We also want to identify the policies that lead to afforestation which also help rural families, as well as those policies that hurt them.

Objectives and review question
Primary question: What effects have China's four major nation-wide afforestation policies had on forest cover and rural income in China? Secondary questions: 1. To what extent were the NFPP, SCLP, TNSP, and/or collective forest tenure reform responsible for increases in forest cover in China? 2. To what extent did these policies positively or negatively affect the livelihoods of rural farmers? 3. To what extent did these effects vary by policy, time period, and region?

Definitions of the question components
Population: Chinese forests and associated rural communities. Intervention: The study must evaluate the effects of at least one of the following four policy interventions: the Sloping Land Conversion Program; the National Forest Protection Program; Collective Forest Tenure Reform; or the Three-North Shelterbelt Program. Comparator: The results of the study must be compared against a non-enrolled comparison group (e.g., a non-enrolled area or landholder during the intervention, or an area or landholder prior to the intervention period). Outcome: The study must contain at least one numerical outcome measure of either forest cover or income of affected populations. Study design: The study must be an empirical primary-data study.

Search strategy
Section exceeds word limit. See attached document "8_Search_strategy"

Bibliographic databases
Seven English databases through Stanford Institutional subscription (all queried in English using title-abstract-keyword search): Academic Search Premier; Agricola; Agricultural and Environmental Science Collection ; EconLit; GreenFILE; Scopus; Web of Science; Three Chinese databases (all queried in Chinese using title-abstract-keyword search): CNKI; Wanfang; CQVIP;

Web-based search engines
Google Scholar was selected as an English-language secondary search tool to be used after the primary search of publication databases and gray literature repositories is complete. The first 300 results on Google Scholar will be screened for relevant results that may have been missed during the primary search.

Organisational websites
Six English organizational websites used for grey literature search: Archive overte; Biefield Academic Search Engine; Open Access Theses and Dissertations; ProQuest Dissertations and Theses; OAIster; Global ETD Search; Search strategy for organizational websites: use full search string if Boolean search is allowed; otherwise, run 3 consecutive searches using these strings: China Land Conversion; China Grain for Green; China reforestation;

Comprehensiveness of the search
An independently assembled list of target papers (see attached document "Target_Papers.docx") was used to assess the comprehensiveness of results returned by the search strings. Search strings were only considered finalized when at least 80% of target papers were returned across all databases.

Search update

n/a. Eligibility will be limited to article published before the date of protocol submission.

Screening strategy

Screening of search results will be conducted by a four-person team, with two reviewers working in English and two in Chinese. As these reviewers have not previously authored papers related to forestry policy in China, no conflicts of interest are expected to arise during the screening process. The review team will conduct a pilot screening and validity assessment using 100 papers from a mix of databases before the review is formally conducted. For the formal review, reviewers will first download search results from all relevant databases and repositories in their assigned language. Duplicate results will be removed using Endnote. Reviewers will then individually screen the titles and abstracts of the downloaded papers, excluding papers that are not relevant. Reviewers will individually screen the full text of the remaining papers. If a reviewer is not certain whether a paper should be included, they will have the option to leave a note saying so. Any papers excluded at this stage or later will be added to a list of excluded papers, along with a note explaining the reason for exclusion. This list will be made available upon publication of the final review. Any paper included by one reviewer but excluded by the other reviewer will be independently assessed by a designated supervisor (Yiming Cao for Chinese literature, Tom Kennedy for English literature). The supervisors will make the ultimate decision whether or not to include the paper. Discrepancies will be resolved in this way.

Eligibility criteria

A predetermined set of inclusion criteria will guide reviewers' decisions as to which papers should be included or excluded at each stage of the article screening process. The inclusion criteria are as follows: Population: All studies must be situated and conducted in China, specifically focusing on changes taking place within public or private forest lands during the study period. Intervention: All studies must evaluate the effects of at least one of the following four policy interventions: the Sloping Land Conversion Program; the National Forest Protection Program; Collective Forest Tenure Reform; or the Three-North Shelterbelt Program. Comparator: Farmers and Land in Enrolled and Non-Enrolled Areas of the interventions. Outcome: All studies must contain at least one outcome measure of either forest cover or income of affected populations (including the following income-related outcomes: household income, off-farm employment, income diversification, economic status, welfare (if calculated using income measures). Study design: All studies must be empirical primary-data studies. Eligible dates: January 1, 1980 to March 1, 2023

Consistency checking

During the pilot screening, all pilot papers will be screened by 2 reviewers, and a third reviewer with subject matter expertise will check the adherence of all included pilot papers to the eligibility criteria. The third reviewer will also assess the consistency of the two initial reviewers' inclusion decisions. During the formal screening, 100% of titles, abstracts, and full text articles will be screened by 2 reviewers. A third reviewer with subject matter expertise will check the lists of included papers for consistency. If the first two reviewers made different decisions regarding inclusion for a given paper, the final decision will be made by the third reviewer.

Reporting screening outcomes

The screening process will be reported in a ROSES diagram. A list of eligible articles will be provided in the review. All papers excluded at full text will be listed in a supplementary file appended to the review, along with reasons for exclusion.

Study validity assessment

Critical assessment of bias risk and validity of all included studies will take place after the screening process has been completed. We will assess included studies using a modified version of the CEE

Critical Appraisal Tool prototype (Konno et al., 2021). This version of the tool has been modified and slightly condensed by the review team in order to streamline the validity assessment process in light of the large conceptual and linguistic scope of this review. Review team members working in both languages will individually assess the risk of bias in all included papers according to six specific criteria, as defined in the CEE prototype: Criterion 1: Confounding bias Criterion 2: Selection bias Criterion 3: Classification bias (observational studies only) Criterion 4: Deviation from intended intervention/exposure (experimental studies only) Criterion 5: Detection bias Criterion 6: Outcome reporting bias Team members will indicate whether the risk of bias in each criterion is "high," "low," or "unclear." Papers that receive one or more "high" risk assessments for specific criteria will be marked as having "high" risk of bias overall. If team members assign different bias assessments to the same paper, a subject matter expert advising the review will be asked to provide a final bias risk assessment. Bias assessments for all included papers will be reported in the final review, and bias risk will also be presented and discussed in the narrative synthesis of the included studies.

Consistency checking
A pilot validity assessment will be conducted before the formal review. All included pilot papers will be assessed by 2 reviewers. A third reviewer with subject matter expertise will reviewer these validity assessments for internal consistency. During the formal review, the validity of 100% of included papers will be assessed by two reviewers. If either review marks the risk of bias as "high" for a given paper, the reported risk of bias in the final review will also be given as "high."

Data extraction strategy
Studies that meet inclusion and validity criteria will be included in data extraction. Information categories that will be collected is outlined below. If a study presents data from multiple cases or populations, we will extract the data separately as long as they can be clearly distinguished by geographical context (e.g. ecoregions), interventions (e.g. sloping land conversion), outcome groups (e.g. forestry coverage), or institutional contexts (e.g. populations or socioeconomic baselines) of the study. Methods - Geographical coverage; time span; time of investigation; type of study; data collection methods; nature of the data (local perceptions of impacts or impacts elicited from the data on locals); sample size; unit of observation; source of variation; empirical strategy (DID/RD/RCT/etc); econometric model (OLS/probit/etc); comparators Interventions - Intervention name; time and duration of the intervention; intensity of the intervention; Measure of the intervention; parties relevant and/or responsible for the intervention; type of intervention (subsidy/mandatory/ reform/etc) Outcomes - Category of outcome (environment/human); name of outcome; measure of the outcome; unit of the outcome; mean value of the outcome variable; standard deviations of the outcome variable Effects - Direction of the main effects; point estimates of the main effects; standard errors of the main effects; interpretations of magnitude; upper and lower bound of the estimated effects (varying specifications) Biases and uncertainties - Possibility of selection into sample; possibility of selection into treatment; balance between treated and control; adjustment for confounders

Meta-data extraction and coding strategy
We will include record all relevant metadata about selected papers including: Author(s); Bibliography; Language; Possible conflicts of interest in authors' affiliations of funding sources; publication year; Publishing source (Journal, Book, Institution for dissertation, etc), author(s); Title; Year Published;

Consistency checking
Two members of the review team will independently extract data from a subset (10%) of included and valid papers. Their consistency will be checked before data extraction of the full list of included papers is undertaken. Discrepancies will be resolved by an third, independent team member with

subject specific expertise.

Potential effect modifiers/reasons for heterogeneity
To understand potential variations in findings across studies, we will also collect information on variables that may serve as effect modifiers. These may include the location or geography of the intervention, subgroups of the population, details of program implementation, institutional and socioeconomic contexts, incentive structures of involved parties, and survey methods used. In cases where an intervention has differing effects on the same outcome, we will examine how these variables contribute to the heterogeneity of effects.

Type of synthesis
Narrative and quantitative

Narrative synthesis methods
Because of the expected heterogeneity in interventions, outcomes, and methods used in relevant studies, we will use a narrative synthesis to summarize the empirical evidence. Our narrative synthesis will involve summarizing the direction and size of the effect for each combination of intervention and outcome in a table. For each combination, we will determine whether the findings are unanimous positive, unanimous negative, or mixed. We will also assess the quality of evidence for studies in each combination in terms of representativeness and the potential for bias.

Quantitative synthesis methods
To complement the summary table, we will conduct meta-analyses and/or heterogenous analyses when feasible. Meta-analyses, which estimate the overall impact using statistical methods (Schwarzer et al. 2015), will be conducted when there is a sufficient subset of cases addressing a particular combination of intervention and outcome, with sample sizes, point estimates, and standard errors of the effects. Heterogenous analyses will be conducted when there are mixed findings for a particular combination, and will aim to identify how the effects of an intervention on an outcome may vary depending on other factors. We will conduct quantitative meta-analyses for intervention-outcome pairs with at least five studies. While we have not conducted any preliminary analyses using test papers, based on the content of our test papers, the effect of sloping land conversion on income meets this criteria. For papers that study the same intervention and outcome but use different measures, we will standardize the estimates using beta coefficients (i.e., effect size in terms of standard deviations). This will make meta-analyses more plausible.

Qualitative synthesis methods
n/a

Other synthesis methods
n/a

Assessment of risk of publication bias
We will gather and screen papers from six English-language grey literature repositories to ensure that our results are not impacted by publication bias. We will also widen our Chinese search to include theses and dissertations for the same reason. To test for publication bias, we will use two standard approaches: Funnel plots and Egger's tests.

Knowledge gap identification strategy
n/a

Demonstrating procedural independence

We have previously determined that our four main review team members and two supervising members have not previously published articles that would be considered eligible under the criteria laid out for this review. Advisors to this review who have previously published papers that might be eligibile for inclusion in this review will not be involved in the selection or study validity assessment process in any way.

Competing interests

Funding information

Author's contributions

Tom Kennedy and Andrew Rule wrote and compiled this protocol. Congying Yuan and Yiming Cao selected key target papers. Cindy Feng and Andrew Rule created and validated English Search Strings. Congying Yuan and Xiaoying Liao created and validated Chinese Search Strings. Scott Rozelle and Jintao Xu advised on motivation and objectives of the review.

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n/a

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