

Article

Using Government Resettlement Projects as a Sustainable Adaptation Strategy for Climate Change

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Abstract: Given that increasing migration has been addressed as a major consequence of climate change, a growing number of scholars suggest that the planned relocation of people or Government Resettlement Projects (GRPs) should be included in climate change adaptation. This paper reviews the status of climate change and environmentally induced migration in China, and then presents an empirical case study in Shangnan County in northwest China, where a specific GRP called the ‘Massive Southern Shaanxi Migration Program’ (MSSMP) has been initiated in response to climate change-related impacts. The results showed that the MSSMP helped local residents to adapt better climate change by reducing exposures to risk, enabling mobility, providing financial incentives, raising living standards, and improving emotional status. Furthermore, the MSSMP added additional benefits for migrants compared with traditional GRPs by respecting voluntary participation, preparing for future risks, and reducing social isolation via a short relocation distance. However, GRPs could also be seen as a maladaptation to climate change because they disproportionately increase the burden on the most vulnerable community members, such as those who are financially disadvantaged, new migrants, and people who are left behind. The paper further suggests that the GRPs should be designed by involving multiple adaptation strategies as supplements for GRPs, and broadening the political schemes to consider the special needs of vulnerable groups. This study contributes to an understanding of the roles of GRPs in sustainable climate change adaptation, thereby facilitating the design, organization, and implication of future similar programs.

Keywords: climate change; government resettlement projects; sustainable; adaptation; maladaptation

1. Introduction

Today, the world is experiencing profound changes in climate, with subsequent changes in the environment [1]. The Intergovernmental Panel on Climate Change [2] has reported that observed patterns of climate change, including warming of the atmosphere and oceans, rising sea levels, and melting ice, had reached unprecedented levels over the past few decades, and could continue for millennia. As early as 1990, it was pointed out that the greatest single impact of climate change could be on human migration [3]. As climate change increases, the migration pressures related to these changes may also grow [4]. Climate-change-related migration has therefore become a major concern for policy-makers. In some regions, e.g., small islands in Papua New Guinea, the Mekong River delta of Vietnam, and in the Zambezi River basin of Mozambique, planned resettlement and reintegration

of the affected population have become effective policy instruments for emergency responses and disaster relief in response to climate change [5–7].

China has a long history of using migration as a major tool to achieve multiple goals, such as population control, development projects, environmental sustainability, and poverty alleviation [8–10]. It is estimated that more than 70 million people have been resettled involuntarily in China in the past 56 years as a result of large-scale economic growth [11]. Taking into account the additional effects of schemes such as the designation of national parks, water resource protection, disaster risk reduction, or climate change, and associated adaptation projects, the figure is likely even higher [12]. The government narrative about resettlement projects (GRPs) emphasises positive outcomes, such as improved living conditions, better access to markets, hospitals and schools, and expanded job opportunities [13]. However, many empirical studies reported long-term economic, social, and cultural challenges, including social disarticulation, secondary impoverishment, government-community conflicts, and increasing return migration [14,15].

In the context of climate change, the number of people displaced due to increased disasters, intense water scarcity, or reduced agricultural production is estimated to continue growing, leading to the question of whether GRPs are a sustainable adaptation strategy in response to climate change. This paper presents the empirical results of a case study of rural communities in Shaanxi province in western China, where a GRP has been implemented to cope with increasing flood- and drought-related disasters. Looking beyond the standard explanation of GRPs as a government-orientated compulsory act, this paper further discusses how to design GRPs to ensure migration in the context of climate change is adaptive rather than maladaptive.

2. Theoretical Debate: Migration as Adaptation

Migration in the context of climate change was once considered to be negative. Both academic and political discourse prefer to use the term “refugee” or “forced migrant” to describe the status of climate-change-related migrants [16]. Previous research on forced migration/resettlement demonstrated the negative consequences that burden migrants, including landlessness, joblessness, homelessness, marginalization, food insecurity, increased mobility, loss of access to common property resources, and social disarticulation [17]. Altman and Low [18] claim that, for people affected by disaster, subsequent displacement and resettlement often constitute a second disaster in their lives. However, this viewpoint neglects the multiple causes of migration. Migration is a complex decision influenced by a host of factors, and climate change impacts are usually one of many factors involved in a decision to move [19]. Further, this viewpoint assumed that people move because they could not adapt to the impacts of climate change. Migration is the “last resort”. Therefore, climate change-related migration represents a failure of adaptation.

Many researchers today, by contrast, argue that migration should be seen as a strategic and sustainable adaptation to climate change [16,19–21]. Some researchers [22,23] pointed out that environmental migration can either be a reactive displacement when environmental deterioration becomes so extreme that people are forced to leave or an anticipatory adapting strategy. In the latter case, migration is a precautionary adaptation to climate change based on increased perceptions of risk, which may be increasingly important in the foreseeable future and needs to be recognised and supported [24,25].

Tacoli [26] suggests that migration, in conjunction with income diversification, is an important strategy to reduce vulnerability to environmental and non-environmental risks—including economic shocks and social marginalization. It is found that, in many cases, migration not only increases resilience but also enables individuals and households to accumulate assets through migrant remittances [6,27]. Migrant remittances have many positive effects, such as smoothing consumption of basic needs such as food across seasons, sustaining access to basic needs in times of livelihood shocks (e.g., drought), financing the acquisition of human, social, physical, and natural capital, and increasing demand that stimulates local production [28,29]. Families with labour migrants who

remittances fare better during livelihood crises than those that do not [30]. In the circumstance of sea-level rise, which may entail permanent loss of livelihoods and homes, the more active form of migration—resettlement—will be encouraged [31].

3. Climate Change and Environmental Resettlement in China

All countries face challenges stemming from climate change, including China. The Chinese Academy of Sciences (CAS) indicated that China's challenges in adapting to climate change were of particular importance [32]. Both the Climate Vulnerability Index (CVI) [33] and the Climate–Demography Vulnerability Index (CDVI) [34] identified China as one of the global hotspots for potential migration in the context of climate change.

According to the second National Assessment Report on Climate Change, the climatic changes observed in China are similar to those in the global scenario [35]. The country-averaged annual mean surface air temperature increased by 0.5–0.8 °C from 1910 to 2010 compared to the global value of 0.6 °C \pm 0.2 °C for the same period [36], with northern areas likely to experience a greater future increase than those in the south [36]. The country-averaged annual precipitation has not so far revealed any significant trend on a national scale [35]. However, decadal variability on a regional scale is evident. Northwestern China, the middle and lower reaches of the Yangtze River, and southeastern China have all experienced an obvious increase in precipitation, whereas North China and the southern part of Northeast China have experienced increasingly severe drought conditions [37]. Some analyses show that the frequency and intensity of extreme climate events such as floods and flood-induced landslides have also increased in the past 50 years [35,36,38].

Across its vast territory, China is currently experiencing many consequences of climate change that have the potential to encourage human migration [13,39]. These consequences include a scarcity of fresh water, an increase in the frequency of severe events like droughts and floods, increased coastal erosion and saltwater inundation, and increased glacial melt in the Himalayas [40]. Environmental resettlement now involves the second largest group of resettlers in China, after resettlement programs associated with large hydro-electric projects such as the Three Gorges Dam [41]. Official statistics show that between 1983 and 2005, approximately 2.6 million people were relocated for environmental reasons, including 1.95 million poor people who lived in western China [42]. Shi & Zhou [41] further projected that around 10 million people would require resettlement because of deteriorating environment by 2050, especially in western China.

GRPs have been adopted throughout China to drive population movement related to environmental or climate-change-related issues. Tan and Guo [10] identified three types of conditions under which GRPs have been implemented by the Chinese government in the face of environmental (including climate change) threats: (1) where the surrounding environment is inhospitable for living, such as in mountainous regions, high altitudes with low temperatures and scarce water, or severely arid areas where it is very difficult to find reliable sources of water; (2) where the surrounding environment has been degraded, such as grasslands that have suffered serious desertification, mountainous areas vulnerable to hazards such as landslides and debris flow from flooding, and areas that suffer from severe soil erosion; and (3) where 'protected areas' (e.g., nature reserves, national parks) have been established, resulting in the need to relocate people from the core area to outside the protected regions in order to better conserve the landscape and biodiversity [43].

Earlier environmental resettlement projects in China were largely involuntary and organised by the government [41]. More recent resettlement programs have begun to transition from 'mandatory displacement' to 'mobility incentives', in which the rights of people to make their own decisions are respected [44]. An example of this type of GRP is the 'Massive Southern Shaanxi Migration Program' (MSSMP), which is a 10-year (2011–2020) resettlement project initiated by the Shaanxi Provincial Government that aims to relocate 2.4 million people (600,000 households) from disaster-prone and poverty-stricken mountainous regions in Southern Shaanxi [45]. Six categories of local villagers are eligible to participate in the MSSMP according to the relevant regulations, including: (1) people who

live in disaster-prone areas; (2) people who live in remote villages without basic infrastructure like water and electricity; (3) people who live in undeveloped small-scale villages; (4) people who live in isolated areas where transportation is limited; (5) people who live in ecologically sensitive areas or conservation areas; and (6) people who live near water sources or reservoirs [46]. It can be seen that the scheme of MSSMP is much broader than a single disaster-prevention GRP, but also combines the performances of Poverty Alleviation Projects (PAP) and Environmental Resettlements, which explains the massive number of migrants involved and the long execution period. The following section presents a case study in one pilot site of the MSSMP, explaining how this GRP could be introduced to local communities as one strategy of adaptation to climate-change-related impacts.

4. A Case Study of the MSSMP in Shangnan County, Shaanxi Province

4.1. Site Selection and Research Methods

Located in the southeast corner of Shaanxi Province, northwest China (Figure 1), Shangnan County is a typical hilly area in the Qin-ba mountain region that has been identified as an ‘Environmental Fragile Zone’ in China [10]. The Danjiang River crosses Shangnan County from west to east, with many villages located on the river banks. Nearly 89% of Shangnan’s population lives in rural areas, and more than 50% of the population depends on agriculture for its income [47]. The poverty rate of Shangnan County is 27%, which is far higher than the provincial level of 13% and the national level of 9% [48].

During the past three decades, southern Shaanxi has witnessed an increase in average temperature and precipitation, likewise in the frequency of severe drought and flood disasters [38,49], with many adverse impacts on the life and property security of residents, economic development, agricultural production, and the environment [38,49,50]. Since 1998, Shangnan government has launched a series of GRPs for multiple aims including post-disaster resettlement, poverty alleviation, the construction of a Conservation Reserve and dam, and improvement of living conditions [51]. Shangnan County was selected as a pilot area for the MSSMP from 2011 onwards. The total number of households and people involved in GRPs in Shangnan County has shown a significant increase following the implementation of the MSSMP (Figure 2).

The case study was carried out in 16 villages in Shangnan County, employing participant observation, semi-structured interviews, and focus group discussion (FGDs) as the main data collection methods. Participant observation enabled the authors to gain an overall understanding of village conditions. For further insights into residents’ preferences with regards to migration, perspectives on climate change impacts, and other views, the study conducted 97 semi-structured interviews with different groups of informants, including experts, government officials, and local villagers. Ten FGDs were conducted in resettlement communities and mountainous regions, engaging with both migrants and non-migrants and specific informant groups such as the elderly, left-behind-women, and migrant workers. Secondary data were collected to gather information on government policies and reports that were related to the research topics, used to assess the validity and reliability of the findings as it complemented the findings of other data collection methods. This research applied and obtained human ethics approval from the Charles Sturt University Human Ethics Committee.

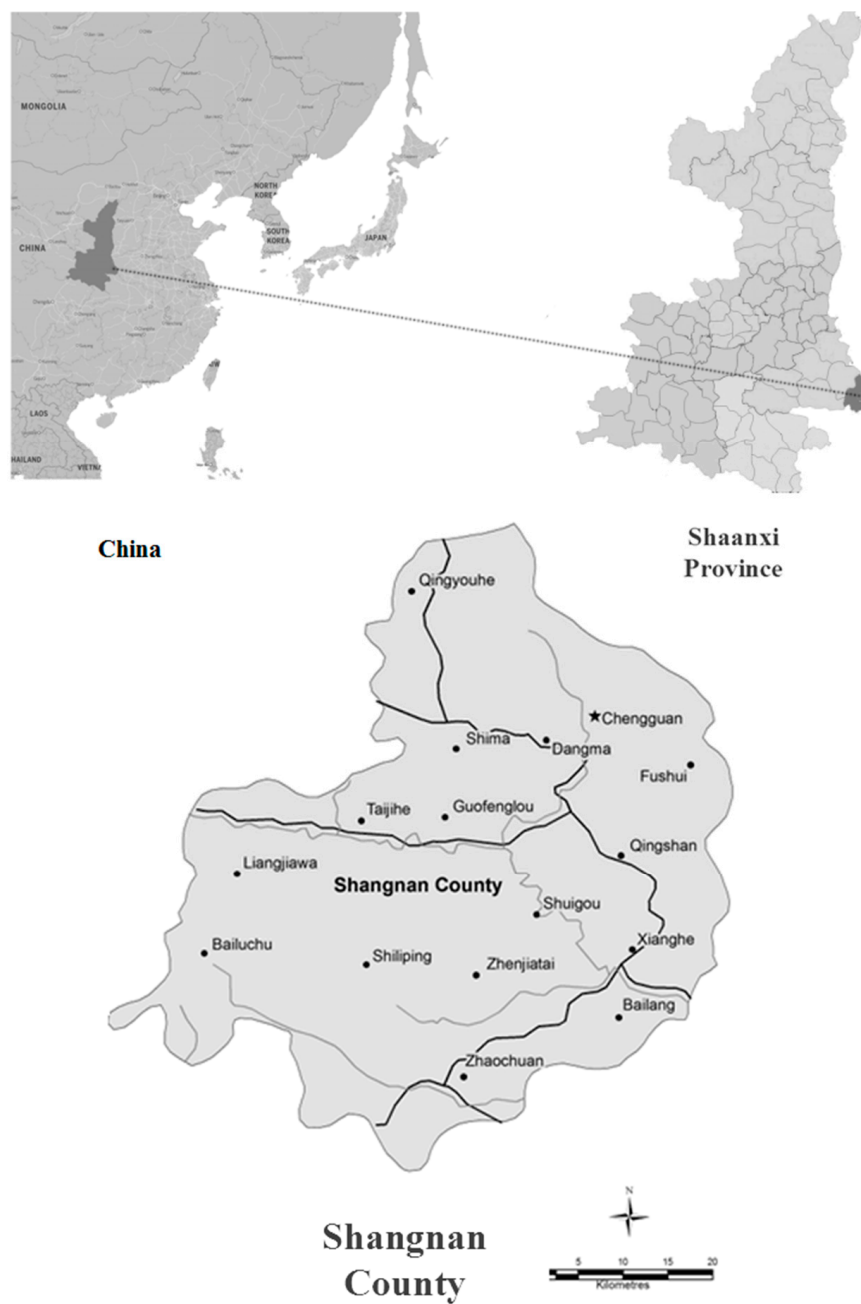


Figure 1. Case study location.

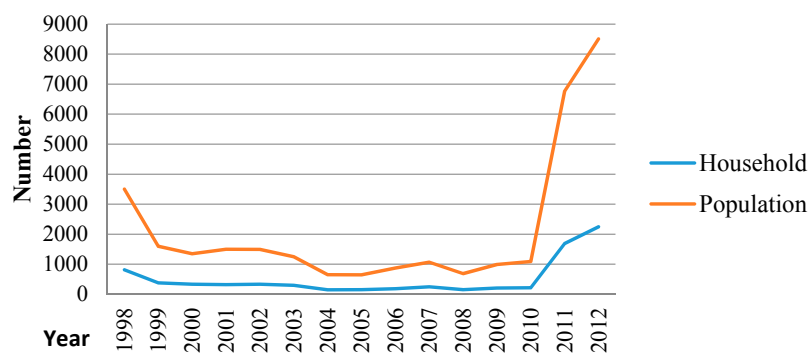


Figure 2. The total number of people and households involved in GRPs in Shangnan County (1998–2012).

4.2. The Implementation of MSSMP in Shangnan County

Based on the plans and regulations of the MSSMP, Shangnan County set its own resettlement target to move 24,604 households (93,400 people) within 10 years [46]. In only its first year, this program resettled over 2100 households (7991 people) [51]. The implementation process of the MSSMP in Shangnan County is presented in Figure 3, based on information obtained from interviews with officials in the Shaanxi Provincial Government and the Shangnan County Government. Figure 3 also demonstrates the key participants in each stage of the MSSMP implementation. It can be seen that governments at all levels (i.e., provincial, municipal, and local), play different roles in the process of MSSMP implementation.

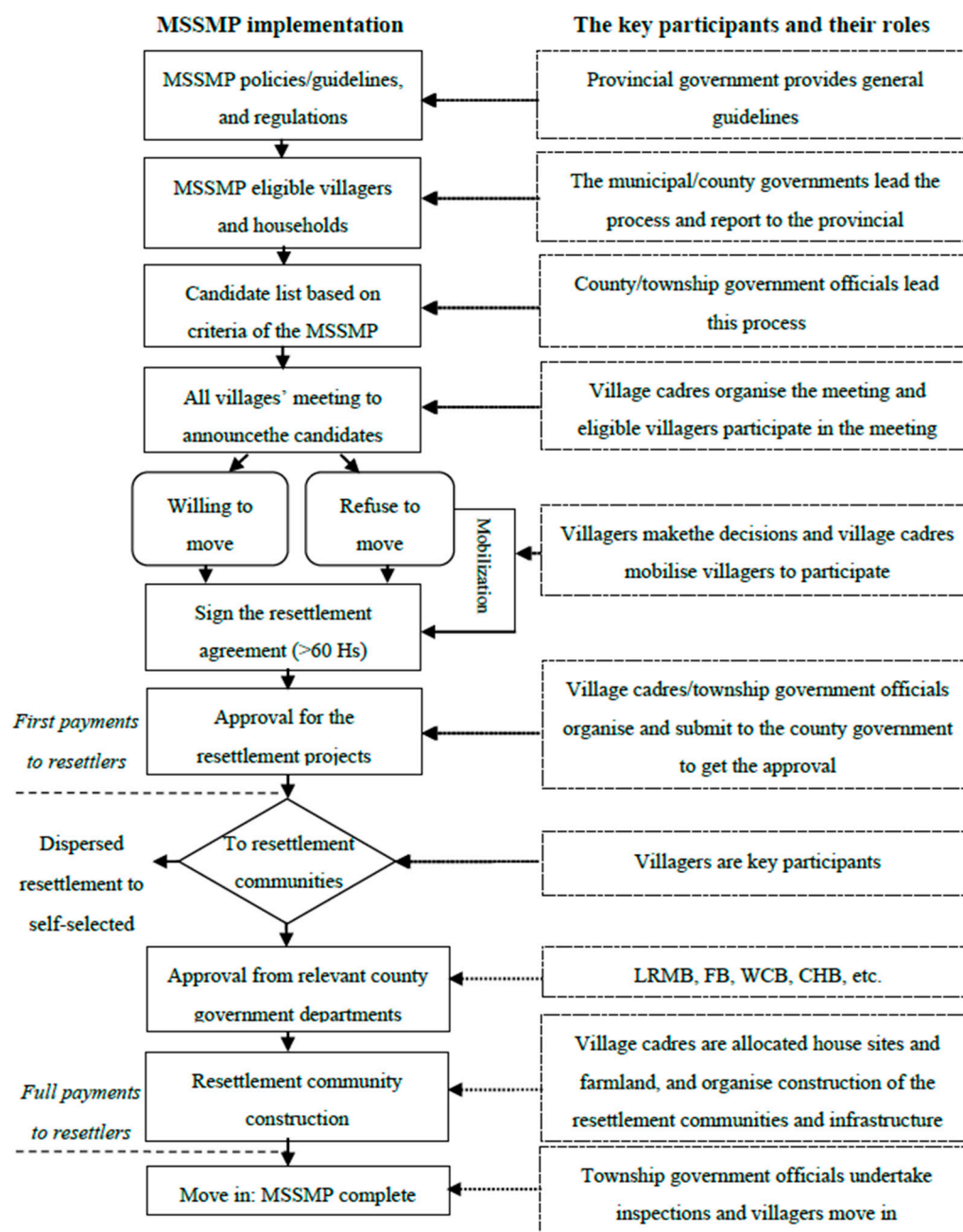


Figure 3. The major processes involved in the implementation of the MSSMP and key participants in each stage. Based on interviews with government officials in Shaanxi Provincial Government and Shangnan County Government; see also the similar process proposed by Xue et al., 2013 [44].

The MSSMP is initiated and funded by the provincial government. The Shaanxi Provincial Government, not the central government, is responsible for formulating policies and guidelines to guide the implementation of the MSSMP. Following the formulation of the MSSMP guidelines, the Shangluo (municipal-level) and Shangnan (county-level) governments have the responsibility for proposing candidate townships and villages for the MSSMP, and reporting the outcome to the Shaanxi Provincial Government. Then, with feedback from candidate townships and villages, the county and township governments select eligible households and villagers based on the criteria outlined in the MSSMP guidelines. The next step involves public consultation and the signing of a resettlement agreement. Specifically, the village cadres call all villagers to a meeting with government officials from the Shangnan Poverty Alleviation Resettlement Office (SPARO, the department that is in charge of the MSSMP at the county level) to inform them of the resettlement rules and regulations, compensation/subsidy levels, resettlement methods, and the status of proposed resettlement sites. After a period of time for consideration, the eligible villagers sign up for participation voluntarily. People who are willing to participate can sign an agreement of resettlement with SPARO in the village group meeting that is held later.

The number of participants determines whether the village becomes approved as a qualified site of the MSSMP. A resettlement community can be built when the number of participants exceeds 60. Thus, sometimes the village cadres have to persuade and mobilise villagers to participate if there are fewer than 60 participants. For example, village cadres may carry out weekly visits to eligible participants of the MSSMP in their village, explaining the resettlement policies to them and advocating the benefits of moving. Sometimes extra cash is given to the participants confidentially to stimulate their willingness to move.

After signing the resettlement agreement, the eligible participants are asked to provide basic information on their households, including the area of their house, their household size, and personal bank account information. This information, together with the signed agreements, is submitted to the county government for approval. After approval by the county government, the township governments are authorised to transfer the first payment of the resettlement subsidy directly into each participant's bank account.

Township governments also need to get separate approval from relevant county departments before constructing new resettlement communities. For instance, the resettlement projects need approval for land use from the Land Resource Management Bureau (LRMB), approval for forest occupation from the Forestry Bureau (FB), approval for waterway transformation from the Water Conservancy Bureau (WCB), and approval for construction from the Construction and Housing Bureau (CHB).

Then village cadres allocate house sites and farmland, and organise construction of the resettlement communities and infrastructure. Once the standard of construction has been inspected and assessed by the township government, the participants can obtain the full payment of the subsidy and move into the resettlement communities. The process of MSSMP implementation is then complete.

A review of the implementation process shows that the MSSMP is still a government-led migration, since governments still play important roles in planning, organising, and financially supporting the resettlement. Nevertheless, the voluntary nature is also reflected in the implementation process. Firstly, the participants fully acknowledge the project and its implications through the village group meeting. Secondly, the participants are free to agree to participate in the project through a voluntary registration process. These two conditions meet the requirements of the World Bank (WB) to claim a GRP as voluntary [44,52]. The voluntary nature of the MSSMP also contributes to its popularity, because the decisions of participants are based upon personal needs rather than compulsory administrative requirements.

4.3. The Effectiveness of MSSMP as an Adaptation Strategy for Climate Change

According to the IPCC [53], adaptation to climate change refers to the process of adjustment to actual or expected climate and its effects. Various types of adaptation have been distinguished. Bardsley and Hugo [24] distinguished between in situ and ex situ adaptation, with the former referring to an adaptation ‘in place’, and the latter referring to an adaptation that involves the movement of people, systems, and/or assets from a vulnerable place. The interview results suggest even though local governments were spared no effort to promote MSSMP and the majority of participants claimed benefits from the implementation of MSSMP, it was difficult to conclude that all local villagers felt the same way.

4.3.1. The Perspective of Governments

There were three reasons why local governments believed that the MSSMP was an effective adaptation to climate change. Firstly, local governments thought that the MSSMP could largely reduce the loss of life and personal injury during climatic disasters. It was reported by the experts in Shangnan National People’s Congress (SNPC) that mortality was one of the most essential criteria to assess the government’s performance during disaster control. Thus, local governments were encouraged to relocate people out of disaster-prone areas to avoid potential casualties.

Secondly, the MSSMP was considered to be more cost-benefit efficient cost- and benefit-efficient in improving living standards for rural villagers compared with other adaptation strategies. On the contrary, disaster prevention and infrastructure construction were perceived to be ‘costly’ and required ‘repetitive input’.

Thirdly, local governments believed that the MSSMP was a far-sighted adaptation given the inevitable trend of urbanisation. Statistics shows that internal rural to urban migration was the dominant migration pattern in Shangnan County and that this form of migration increased sharply in the past five years [47]. Some government officials also commented that ‘villagers who live in remote mountainous regions will move to urban areas eventually. The MSSMP helps them to achieve their aspirations in advance.’

4.3.2. The Perspective of Local Villagers

Pro: The MSSMP Is a Sustainable Adaptation for Climate Change

Local villagers identified several advantages that they had obtained from the MSSMP, which were similar to the advantages conferred by other previous types of GRPs. One of the most essential benefits was the guarantee of personal safety. Since Shangnan County is located in a hilly area, the original houses of local villagers typically bordered rivers and/or faced the mountains, making them prone to floods and landslides. However, the new residences in resettlement communities were normally built on flat, high terrain with strengthened concrete structures, which reduced the risk of collapse in the event of a large flood. In addition, the new resettlement communities were well equipped with electricity, tap water, sewage pipes, public toilets, and biogas pools for heating. Many informants predicted that their living standards would be improved after migration.

The second important factor that made the MSSMP an effective adaptation was ‘removal of institutional obstacles’ to facilitate the mobility of the local village. The household registration system (*hukou*) and land tenure system were the two major restrictions on population movement in Shangnan County (also in large areas of rural China). In the MSSMP, the local governments were responsible for processing the household registration transfer and allocating land/homesteads for the migrants, thereby reducing the administrative formalities and costs.

The majority of migrants were also attracted by the monetary subsidy. The households that choose dispersed resettlement receive a subsidy of 30,000 Yuan (US\$4873), while the households that choose centralised resettlement can obtain subsidies ranging from 10,000 Yuan to 40,000 Yuan (US\$1264–US\$5056) [51]. Migrant focus groups revealed that, although ‘the subsidy is not enough for

a new house', it could, nonetheless, help to ease their economic pressures. In this case, they identified the subsidy as 'a privilege of policy' and 'an opportunity they should grab'.

The information provided by local people also revealed some additional benefits of the MSSMP compared with other GRPs. First, informants reported that the 'voluntary nature' increased the acceptance of the MSSMP to a large extent. People showed more willingness to participate, thereby smoothing the process of relocation and reducing conflicts between migrants and governments. For example, several informants mentioned that in involuntary GRPs village cadres needed to persuade people to participate with an agreement to provide monetary rewards. In contrast, all of the MSSMP places in many townships were quickly booked.

The reason behind the popularity of the MSSMP was its function as a proactive adaptation strategy in response to the increasing frequency of climate change-related disasters compared with other in situ adaptations. The research data have shown that the majority of informants had observed climate change impacts, such as an increased frequency and intensity of floods, landslides, droughts, and water insecurity (see Table 1); also, the majority of them were convinced that these changes would be more likely to happen with more severe consequences in the future. In such cases, MSSMP became a preferred risk reduction option for them.

Table 1. The reported and observed climate change-related impacts.

Climate Change Impacts	Numbers Provided by Local Weather Bureau	Perceptions Reported by Local Villagers
Increasing average and extreme temperatures	During the thirty-two-year period from 1981 to 2012, the mean annual temperature in Shangnan County increased slightly by 0.15 °C per decade. The mean maximum temperature for Shangnan County increased during the last three decades while the mean minimum temperature decreased; hence, the gap between the two extremes has increased.	Local villagers (21/97) sensed that ' <i>the average temperature had been increasing in recent years</i> ' or that ' <i>it felt warmer now</i> '. In addition several informants mentioned that the maximum temperature had increased and that it was becoming warmer earlier than in the past.
Disturbance of rainfall pattern	Rainfall in winter (between December and February) decreased, whereas rainfall in summer (between July and September) increased. Also, annual one-day maximum rainfall increased steadily over the past three decades, indicating that extreme rainfall events became more frequent over the duration of this period.	One-third of the interviewees (32/97) reported that rainfall in the spring had reduced in both quantity (amount per rainfall) and quality (ability of the rains to sustain the crops until crop maturity) when compared with the past.
An increasing occurrence of flood-drought disasters	Five droughts and seven floods and flood-induced landslides occurred during the 16-year period between 1997 and 2012, which was twice the rate of occurrence of these types of disasters in the previous 16 years between 1981 and 1996.	Fifty-one of the 97 interviewees stated that floods and flood-induced landslides occurred more frequently and with more severe consequences during the past 10 years compared with the period before. With regard to drought and the occurrence of dry spells, nearly half of the interviewees (42 of 97) reported that these had occurred more frequently and more intensively over that past 10 years.

Source: Shangnan Weather Bureau and in-depth interviews.

Another advantage of the MSSMP mentioned by informants was the short distance involved compared with other ex situ adaptations. Informants reported that the majority of the participants in the MSSMP were relocated to new communities within the boundaries of existing townships, which meant they could remain within their original communities and avoid social isolation. In addition, some farmers mentioned that they could continue their agricultural activities in their original places for a period of time thanks to the short distance involved in commuting. This gave them time to adjust and redevelop the basis for sustaining their livelihoods.

Con: The MSSMP Is a Maladaptation to Climate Change

The results also showed that some informants saw the MSSMP as maladaptive as it increased the vulnerability of specific groups. A common finding in migration literature is that the poor are less able to move than those with more economic resources [54]. The implementation of the MSSMP in Shangnan County further demonstrated that it was not always the poorest populations who benefited from such schemes. Reported by a government official in the research area, there are underlying criteria in addition to the six criteria listed in the official regulations. One was that the financial status of the household should support the costs of removal and housing. Consequently, the poorest families were often excluded from the selection process. Based on participant observations and in-depth interviews, it was found that poor people were often the most vulnerable in the context of climate change since their incomes were the most dependent on agriculture, and they lacked options for employing adaptation technologies because of their lack of money. In this case, MSSMP had not always been an available adaptation strategy for the poorer members of the population.

The MSSMP also increased the potential risk to those villagers left behind. The core principle of the MSSMP was respect for the voluntary nature of participation, but villagers choosing to remain felt constant pressure to move. They identified the challenges triggered by the trend for increasing outward migration as: (1) less neighbourhood support when they encountered disasters; (2) less agricultural production due to more frequent and severe wild animal foraging activity that followed the outward relocation of the population; and (3) fewer social services due to the withdrawal of public investment. They claimed that they were *'the forgotten group'*.

Similarly, some new migrants risked becoming increasingly vulnerable during the post-resettlement period. They faced an increased financial burden, difficulties in restoring their livelihoods, and a loss of social networks, as had been identified in other GRPs [55,56]. However, participants of the MSSMP reported an additional risk that was associated with short-distance relocation. Some of them worried about the security of the new resettlement communities given the perception of increasing climate change risks in the future. They were afraid of encountering a second relocation if the resettlement communities became disaster-prone given the increasing impacts of climate change.

5. Discussion

Given that migration has been considered an adaptive response to climate change, a growing number of scholars suggest that planned relocation or GRPs should be included in the consideration of climate change adaptation [57–61]. Despite the general acceptance of this opinion, the effectiveness of GRPs as an adaptation strategy remains unclear and debatable. The results of the case study indicated that GRPs helped local people to better adapt to climate change, but increased the vulnerability of certain groups at the same time. So, should GRPs be initiated in response to climate change? When should governments conduct these GRPs? Who has the right to decide whether an individual/group is eligible to participate in the GRPs? Should participation in the GRPs be voluntary or involuntary? Which groups of people are vulnerable to the process of implementing GRPs and how can governments help them? These are crucial questions requiring further discussion when designing GRPs in the context of climate change.

5.1. Should GRPs Be Initiated as a Climate Change Adaptation Strategy?

It has been argued that if climate change does result in certain regions becoming uninhabitable, governments have the responsibility to investigate the possibility of supporting the movement of people and to start planning [62]. The Asian Development Bank (ADB) endorses GRPs by stating 'reducing the barriers to migration on a regional scale and facilitating regional mobility could greatly benefit the migrants [and] the origin and destination countries in the context of climate change' [63]. Beyond the current study, GRPs have been shown to be an efficient instrument to assist those affected

by the various impacts of climate change in a number of global empirical cases, including when temporary protected status was provided to Haitians in the United States after the 2010 earthquake [57]; when internal migrations were promoted in the Maldives to reduce population pressures on islands threatened by sea-level rises [7]; and when agricultural communities in the Mekong River delta of Vietnam were resettled in response to recurring floods [39,64,65].

Some scholars have argued for the need to exercise caution when using GRPs for the welfare of migrants; for example, Barnett and Webber [66] argued that GRPs should be treated as a last resort in response to climate change; and de Sherbinin et al. [57] and Ferris [67,68] claimed that the practice of development-forced displacement and resettlement highlighted the important lesson of ‘avoiding resettlement if possible’. Their reservations came partly from the negative indirect effects of GRPs, such as loss of land, employment, shelter, and access to common resources; economic marginalisation; increased morbidity and mortality; food insecurity; and negative cultural and psychological impacts [56]. This suggests that the GRPs should be carefully designed to consider the broader policies of sustainable development, poverty alleviation, and capacity building to ensure that they ultimately improve the livelihoods of migrants.

In addition, the design of GRPs should also consider the national and regional major function of regionalization and population planning that serves medium- to long-term needs, to minimise the likelihood of the migrants having to undertake a second relocation due to the adjustment of related population policies and plans in the future.

Finally, there is concern related to the locations used for resettlement. The efficiency of relocating people affected by climate-change-related impacts over short distances remains debatable. The research findings revealed that short-distance relocation could increase the willingness to move by reducing the risk of social isolation. Nevertheless, some informants claimed that short-distance relocation was actually their reason for refusing to participate in GRPs, because they were worried about the future risk that resettlement communities might face in the context of climate change. Thus, the preliminary investigation of resettlement locations becomes crucial. The selection of a resettlement location should consider the general conditions of the relocation site, including climate, geology, hydrology, and vegetation, to prepare for the future risk of climate change. Table 2 concludes the merit and demerit of GRPs as adaptation strategy, and highlights the policy main-points when design the GRPs in the context of climate change.

Table 2. The merit & demerit of GRPs as climate change adaptation strategy and the policy main-points.

Merit of GRPs	Demerit of GRPs	Policy Main-Points of GRPs
(1) Reducing the barriers to migration; (2) Temporary protecting for people affected by climate change events; (3) Reducing population pressures on islands threatened by sea-level rises; (4) Adapting to the reduction of agricultural incomes caused by recurring floods	(1) loss of land, employment, shelter, and access to common resource; (2) economic marginalization; (3) increased morbidity and mortality; (4) food insecurity; (5) negative cultural and psychological impacts	(1) GRPs should incorporate broader policies of sustainable development, poverty alleviation and capacity building; (2) GRPs should consider the national and regional major function of regionalization and population planning; (3) GRPs should carefully select the resettlement locations after an complete investigation

5.2. When Should GRPs Be Initiated in the Context of Climate Change?

Migration was the adaptation strategy preferred by local residents due to their perceptions of climate change posing a high risk in the future. Migration may be inescapable when the threshold of moving is exceeded. This raises the question: when should GRPs be initiated in situations where migration is deemed to be the best adaptation strategy?

Previous research has suggested that resettlement should only be considered in cases where in situ adaptation is impossible [1,57,69]. However, this research shows that GRPs can be used as proactive adaptive instruments for facilitating migration by people who have always had willingness to move. Thus, GRPs should not be the ‘last resort’ after the failure of in situ adaptations. Instead, in regions that are expected to experience unfavourable effects from climate change, governments should plan to implement voluntary GRPs in advance, together with verified in situ adaptation strategies. This would allow local people to choose suitable adaptive methods depending on the impacts they face.

5.3. *Who Is Eligible for Climate Change-Related GRPs?*

Previous research has identified several groups of people that might need to be moved in response to the effects of climate change; however, in the case of GRPs, planners organising the resettlement determine who should move. Wilmsen and Webber [12] found that the eligibility for GRPs was normally determined by politics, and in particular the agendas of powerful stakeholders. In this research, the Shaanxi Provincial Government issued the regulations for the MSSMP, which included people impacted by sudden-onset disasters and slow-onset degradation and poverty as eligible for the GRPs. Nevertheless, the regulation also contained a hidden standard, which required that the participants have enough household savings for relocation, and, consequently, deemed poorer people to be ineligible. The research result indicates that the design and planning of GRPs is not sufficiently democratic. As Wilmsen and Webber [12] stated, ‘the politics of inclusion and exclusion is a murky business’. Therefore, the current research calls for more participant-centred and anti-exclusion practices embedded in the policy, planning, and implementation of the GRPs.

5.4. *Which Are the Vulnerable Groups in Climate Change-Related GRPs?*

According to Adger [70], IOM, and UNU [71], climate change has a disproportionately greater impact on poor people, who are, coincidentally, those that have the fewest resources to be able to leave their homes. This research found that poor people were also marginalised in GRPs, because they were more likely to be ineligible as a consequence of limited financial support. Furthermore, new migrants were found to be another vulnerable group. Similar to the people affected by forced resettlements, migrants in climate change-related GRPs also faced a series of economic, social, and psychological challenges, such as livelihood transformation, high expenditure requirements, funeral issues, social isolation, and increasing emotional stress. In addition, people who were left behind in GRPs were vulnerable due to the increasing challenges of climate change, as well as the lack of social support caused by low population density and less government input. This group of people was described as a ‘trapped population’ by Warner et al. [72].

Beyond these three groups, previous research has shown that farmers, children, women, elderly people, indigenous people, and ethnic minorities tend to be more affected by climate change impacts [73–75]. Thus, this research suggests that priority should be given to the needs of the most vulnerable populations. Climate change vulnerability assessments that can identify these populations and the underlying causes of their vulnerability should be conducted before the initiation of GRPs. Furthermore, GRPs should encourage the full and effective participation of identified vulnerable groups in all stages so that their needs can be addressed.

6. Conclusions

Climate change-related migration is increasing, whether it is for escaping from emergent climatic disasters such as floods, landslides, and tsunamis; or adapting to the long-term impacts of climate change process, such as droughts and sea-level rises. It is possible that GRPs will continue to be employed as climate change adaptation strategies around the world, especially in China. The empirical case study of the MSSMP in Shangnan County suggests that the resettlement program functions as a strategy of adaptation to climate-change-related impacts by reducing exposure to hazards, enabling mobility, providing financial incentives, advancing living standards, and improving

psychological well-being. Furthermore, the MSSMP added additional benefits for migrants compared with traditional GRPs by respecting voluntary participation, preparing for future risks, and reducing social isolation through a short relocation distance. Conversely, the results also indicate that the MSSMP disproportionately burdens the most vulnerable groups—the poor, the people left behind, and some new migrants. For this group of participants, the MSSMP is maladaptive rather than adaptive.

Therefore, the design of GRPs is critical. Drawing on the experience of existing GRPs, future GRPs should embed more participant-centred and anti-exclusion practices in the policy, planning, and implementation process, taking advantage of the voluntary nature to facilitate the spontaneous transformation of migrants. In consideration of the specific needs of climate change adaptation, it is necessary to analyse the climate change scenario of resettlement locations to avoid further risks. It also suggests that we should conduct vulnerability assessments to identify the vulnerable populations and the underlying causes of their vulnerability. No matter the stage of design or implementation, the full and effective participation of identified vulnerable groups should be encouraged to reduce the disproportionate effects of GRPs.

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