



Farmers' perception of effective drought policy implementation: A case study of 2009–2010 drought in Yunnan province, China



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ABSTRACT

Using a qualitative social research method at the local administrative level, this paper provides insight into the policy process in China and farmers' perceptions of the effectiveness of policies implemented to deal with drought. Two villages in rural South-West Yunnan were purposefully selected for the study. The research started with the general assumption that China has a strong top-down hierarchical approach to policy processes and that funding dispersal is prioritised by the central government. However, the study found that funding proposals are prioritised for selection in a bottom-up, participatory manner from the local level. The study also found that farmers' perceptions of the effectiveness of policy implementation were directly related to their past experience. Among the nine indicators used to measure the effectiveness of policy implementation at the local level, the farmers in the study area perceived access to roads as highly effective; water use efficiency projects, market demand, human mobility for jobs, and government funds as moderately effective; drought knowledge, community participation in planning, and governance structures as least effective; and the role of leadership as not effective. The study found that farmers' adaptation at the local level is oriented towards short-term market rewards and income diversification. Farmers' local-level adaptation is guided by government priorities and driven by their perception of tangible benefits. To ensure the effectiveness of policy implementation, long-term adaptation strategies, such as awareness raising, capacity building, watershed management, and source conservation need to be strengthened at the local level.

1. Introduction

The decade 2001–2010 experienced extreme droughts in most of the parts of the world: in Australia from 2002 to 2010 (Grafton et al., 2014); in East Africa from 2004 to 2005 (Sivakumar, 2013); and in the Amazon Basin in 2010 (Sivakumar, 2013). Since the founding of the People's Republic of China, a three-year-long drought during 1999–2001 ranked the highest with an area of impact, duration, and induced losses rarely seen in its history. Again, in 2009–2010, a large-scale drought disaster affected five provinces in China, threatening more than 70 million people with drinking water shortages and barren farmlands. Over 20 million people and 30 million livestock suffered from temporary water shortages during the drought's peak period (Zou and Yuan, 2010).

The International Panel on Climate Change (IPCC) 2012 defines drought as “a period of abnormally dry weather long enough to cause a

serious hydrological imbalance”. It goes on to say that “A period with an abnormal precipitation deficit is defined as a meteorological drought” and “A mega drought is a very lengthy and pervasive drought, lasting much longer than normal, usually a decade or more” (IPCC, 2012). Droughts can differ from one another in terms of intensity, duration, and spatial coverage (Wilhite, 2000). Although precipitation is the main driver of drought severity, in the context of global warming, the influence of atmospheric evaporative demand cannot be overlooked (Vicente-Serrano et al., 2012).

Drought can have a major social impact, especially on farmers and their agricultural land; however, most of the research is focused on economic impact, with very few studies on the social impact of drought (Keshavarz et al., 2013). Most drought impact studies have been done at the national and regional level, with fewer at the community and household level. The insufficient information and low recognition of drought impact at the local level make it challenging to obtain adequate

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knowledge about how to cope with and adapt to these changes, making it difficult to advise decision makers on appropriate policy implementation (Wilhite et al., 2007). In the case of the 2009–2010 drought in Yunnan, several studies have been conducted on the cause of the drought (Yang et al., 2012), but few deal with the social aspects and policy implementation (Sawhney and Perkins, 2015).

China has formulated a number of policies for drought relief, mitigation and adaptation, and to enhance adaptive capacity (Li et al., 2013, 2012). These policies can be classified into three categories: (1) policies for water resources conservation and management, (2) policies for economic and social development, and (3) policies for drought relief and salvation. New policies are emerging to address climate change and adaptation. As most of the local level policies are in response to directives from higher levels of government, there is an opportunity to integrate these into sectoral policies and action plans at the local level (Su et al., 2012).

In China, policies are implemented through the government's five-tier hierarchical structure. The central government in Beijing is responsible for making policies and programmes, whereas the four tiers of local government (provincial, city, county and township) implement programmes and have the power to hire and fire departmental employees (Teng and Gu, 2007). The system for the promotion and evaluation of government employees provides a strong incentive for local development; thus, policy implementation is focused on economic growth and local development, often at the expense of environmental sustainability. Discussions are ongoing as to how empirical research focusing on governance and policymaking can inform adaptation, as well as what happens when the best laid plans meet the real world, which can crucially affect policy outcomes (Eakin and Lemos, 2006). As part of this discussion, this study looked at the following questions: What is the policy implementation process at the local level in China? How do local farmers perceive the effectiveness of drought policy implementation at the local level?

To answer these questions, this research analysed farmers' perceptions of the effectiveness of policy implementation. Based on a literature review and field survey, nine indicators were selected to measure the effectiveness of policy implementation at the local level (see methodology). With focus groups as the unit of analysis, the research was conducted using data from secondary literature and policy documents, as well as primary information. Qualitative data analysis was conducted following the five stages of the framework approach (Ritchie and Spencer, 1994).

2. The case study context

China has experienced frequent and serious drought disasters throughout its history. Recently, three intensive meteorological droughts occurred in China between 2009 and 2010. These droughts impacted on crops, people and livestock, with implications for people's socioeconomic status (Ye et al., 2012). Between 1961 and 2004 in Yunnan, the linear trend analyses revealed that the annual temperature increased at a rate of 0.3 °C per decade, while a warming trend of 0.33 °C per decade and 0.26 °C per decade was observed for winter and summer temperatures, respectively (Fan et al., 2011). Between 1960 and 2012, precipitation showed large regional differences reflecting non-uniform changes.

The in-depth study by Ye et al. (2012) provided an insight into two major observed impacts of the 2009–2010 drought. First, a water shortage resulted in drinking water security problems, vegetation failure, reduced electricity generation, and livestock losses. The second was an increase in insects and disease resulting in vegetation failure. Among the different impacts, this study deals with the direct impact of drought on water shortages and related policy effectiveness in Qujing city, Yunnan.

In order to address drought, an opinion was promulgated by the Yunnan Provincial Government in 2011 to guide water efficiency

development, encompassing large-scale water efficiency projects and micro-water efficiency projects for development on farmland. This order encouraged the private sector to invest and established market-based water price systems. The government also cooperated with tobacco companies on policy support for irrigation development, farmland improvement, and water-saving technologies, as tobacco production is one of the pillar industries in Yunnan. To promote water saving and increase water use efficiency, Yunnan People's Congress published the Ordinance of Water-Saving in 2012. As a result, all levels of government in Yunnan were legally bound to incorporate water saving in their social-economic development plans; professional technology standards were identified in industry to save water; rewards were given to individuals and organisations that make great contributions to water-saving technology research or that make a model in saving water; and subsidies and loans were provided for farmers to construct water efficiency projects and use water-saving technology.

3. Methodology

3.1. Study area

Situated in the southwest frontier, Yunnan province covers almost 4.1% of the total area of China and is the eighth largest province. In Yunnan, over 70% of water resources are located in remote mountain areas, which are difficult to access. The mainly karst topography means that water retention is low, resulting in precipitation runoff on the ground and frequent drought disasters. This creates a huge gap between water supply and demand, resulting in water shortages.

Qujing, which is located in eastern Yunnan (Fig. 1) and one of the most populated cities, was one of the most drought-impacted areas in 2009–2010 (Wang and Meng, 2013). It was reported that almost 135 million people and 97 million livestock experienced serious water shortages. About 36.93 million hectares of cropland were affected with 0.69 million USD in direct economic loss in agriculture. Qujing has a mild, subtropical highland climate, with short, mild, dry winters and warm, rainy summers. Luliang County was purposively selected for this research due to its history of drought (the great famine during Mao's period and other extreme events, such as the 2009–2010 drought) (Xinhua, 2010). Two administrative village groups, Fa-e-sha and Ayoupu, in the county were selected based on drought severity, economical status, geological conditions, and the number of projects implemented by the government after the 2009–2010 drought (Table 1). During the key informant interviews and the focus group discussions, it was confirmed that Fa-e-sha and Ayoupu are the most drought prone areas in Luliang.

In Luliang, the farmers have changed their water management practice due to drought. According to the former governor, these changes were highly influenced by government policy. Earlier natural water tanks were sufficient in most villages, but now, locals have to pump water and depend on government facilities such as pipes, water tanks and wells for drinking water. For agriculture, the government and tobacco companies have introduced new technologies to save water, such as plastic covers, drip irrigation, sprinklers and dry nurseries. The government has also introduced crops that use less water, like maize and corn.

3.2. Sample selection

Four levels of key informant interviews provided an understanding of the policy implementation process at the lowest administrative level and the involvement of communities in decision making for project implementation (Table 2). Focus group discussions (with participants of mixed ethnicity, age, and household responsibilities) were conducted with 11 women's groups (total of 91 participants) and 11 men's groups (total of 95 participants) separately (Table 3). The key informants were not included in the focus group discussions to avoid duplication. A

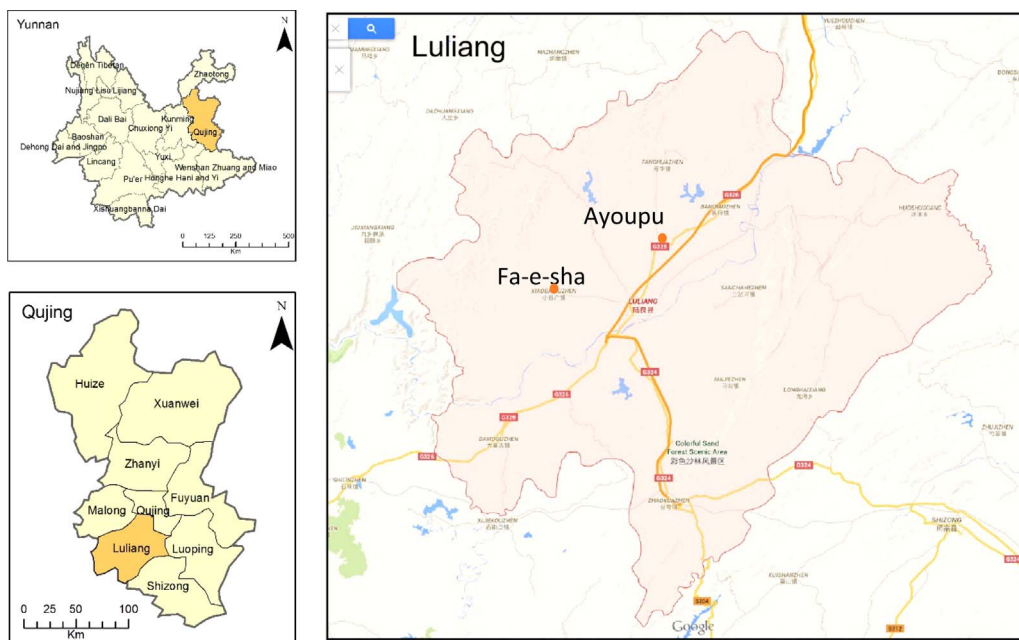


Fig. 1. Location of research sites within Yunnan Province, China.

Table 1
Characteristics of research sites.

Sources: <http://www.luliang.gov.cn/> (unofficial translation); Field study 2013–2015 (Luliang).

Administrative villages	Ayoupu	Fa-e-sha
Elevation (m)	1,906.5	1876
No. of households	1906 (2011)	958 (2011)
No. of villager groups	4	8
Population	6450 (3266 M: 3184 F)	3560 (1827 M: 1733 F)
Land area (km ²)	24.47	30.78
Average temperature °C	14.7	14.7
Average annual rainfall (mm)	675	580
Temperature trend	Increasing	Increasing
Major stress as perceived by the community	Water shortage due to less rainfall	Water shortage due to drying of ponds
Agriculture base	Corn, tobacco, rice and other crops	Corn, rice, tobacco and other crops
Physical infrastructure and facilities	Nearest station (terminal) 0.5 km, from the nearest bazaar 2 km; asphalt road with concrete pavement	Nearest station (terminal) 7 km, 7 km from the nearest bazaar; gravel road

detailed checklist was prepared for the semi-structured questionnaire survey with key informants, covering village information, drought management, the policy process, and policy instruments and implementation at the local level.

Table 2
Information on key informants.

Source: Field study, 2013–2015.

Occupation	Gender	Years of service	Occupation	Gender	Years of service
G1 Former governor Luliang	M	2	F1 Villager group leader	M	8
P1 Township water manager	M	> 10	F2 Villager group leader	M	2
P2 Township water manager	M	2	F3 Villager group leader	M	2
P3 Administrative village leader	M	8	F4 Villager group leader	M	1.5
P4 Administrative village leader	F	2	F5 Villager group leader	M	6
A1 Villager group leader	M	12	F6 Villager group leader	M	6
A2 Villager group leader	M	30	F7 Villager group leader	M	5
A3 Villager group leader	M	4	F8 Villager group leader	M	5
A4 Villager group leader	M	13			

Table 3
Information of the focus group discussion participants.

Source: Field study, 2013–2015.

Group	Women's group		Men's group	
	No. of participants	Average age	No. of participants	Average age
A1 & 4	10	49.5	23	59.9
A2	7	40.1	7	50.4
A3	8	47	8	46.8
F1	8	55.6	6	51
F2	8	46.9	8	44.7
F3	13	52.2	8	46.5
F4	8	38	7	35.3
F5	7	38.2	8	46
F6	8	48	8	34.6
F7	6	50	5	58.4
F8	8	35.8	7	42.9

3.3. Research design

Given the exploratory nature of the research and perception study, a qualitative method was adopted for the study (Castellan, 2010; Gillham, 2005). Nine key indicators were identified based on the literature review and field scoping to analyse the effectiveness of policy implementation (Table 4). The five stages of data analysis in the ‘framework approach’ for qualitative analysis were applied to provide insights, explanations and theories on social behaviour/perceptions

Table 4
Indicators for measuring effectiveness of policy implementation for drought management at the local level .
Source: Literature review and field study, 2012–2013.

SN	Indicator	Explanation and reference (literature review)	Explanation used in the research
1	Local government funds	<ul style="list-style-type: none"> Limited investment by the government in social (health, education) and economic (energy, employment, access to market) sectors is a factor preventing the communities from building adaptive capacities (ICIMOD, 2009, p 22). 	<ul style="list-style-type: none"> Funds (projects) provided by the county, township and village government to address drought
2	Water efficiency projects	<ul style="list-style-type: none"> Efforts could be made to adjust planting structure to give priority to the development of water-saving agriculture, promote the collection and use of rainwater, and build water-efficient irrigation facilities to raise water-use efficiency (Yang et al., 2016). 	<ul style="list-style-type: none"> Water efficiency projects like pumps, channels, tanks, water harvesting, etc.
3	Drought knowledge and technology	<ul style="list-style-type: none"> The ability to adapt is affected by technology, and population mobility (Burton et al., 2001). Improved education and information is needed for enhanced adaptive capacity (Burton et al., 2001). Lack of information among farmers about information and technologies for resistance to drought is the main restriction on their adaptation to a drought scenario (Yang et al., 2016). 	<ul style="list-style-type: none"> Information about drought and the technologies used to address it
4	Income diversification and improvement	<ul style="list-style-type: none"> Diversification of income sources (and therefore risk-spreading) must be encouraged, particularly for poorer sectors of society (Burton et al., 2001). 	<ul style="list-style-type: none"> Human mobility for income enhancement
5	Social capital and networks, governance structures	<ul style="list-style-type: none"> The ability to adapt is affected by institutional capacity, wealth, organizational and legal framework. (Burton et al., 2001). The determinants to enhance adaptive capacity include the social capital of societies, and the flexibility of and innovation in, the institutions of government and the private sector to enable them to grasp opportunities. (Adger et al., 2003). Improved institutional capacity and efficiency (Burton et al., 2001). To improve adaptive capacity requires deeper attention to institutions on multiple scales and careful planning to ensure that institutions can work to help poorer groups. (The World Bank, 2010, p 176). 	<ul style="list-style-type: none"> Formal and informal networks at local level for water management
6	Access to resources	<ul style="list-style-type: none"> The ability to adapt clearly depends on the state of development (Burton et al., 2001). Improved access to resources/markets (Burton et al., 2001). Adaptive capacity is supported further by all-weather roads, electricity, and drains (The World Bank, 2010). If governments want to build resilience in vulnerable regions, their policies not only need to be personally relevant but also supported by enabling infrastructure and mechanisms (Pearce et al., 2010). 	<ul style="list-style-type: none"> Access roads linking villager groups with the main market and agricultural fields
7	Community participation	<ul style="list-style-type: none"> Active participation by concerned parties, especially to ensure that actions match local needs and resources (Burton et al., 2001). If citizens are expected to participate in the process of implementing adaptation policies, then it is vital to involve them in the process of designing the policies from the very beginning (Patt and Schröter, 2008; p 466). 	<ul style="list-style-type: none"> Involvement of local communities in planning and decision-making process
8	Market demand	<ul style="list-style-type: none"> Non-state actors such as markets and NGOs, to some extent bridge the ‘knowledge gap’ to some extent, which could enhance the adaptive capacity of the people to respond to floods, droughts, and other water-related hazards (ICIMOD, 2009, p 33). Markets and government policy have a greater impact on enhancing the adaptive capacity of communities than climate change awareness (Pradhan et al., 2012). 	<ul style="list-style-type: none"> Market demand, especially in Luliang where tobacco companies are willing to provide irrigation facilities to deal with drought
9	Leadership	<ul style="list-style-type: none"> A substantial part of adaptive capacity relates to the ability of local communities to make demands on local governments and, wherever possible, to work in partnership with them (The World Bank, 2010). State capacity has been defined as “the ability of state leaders to use the agencies of the state to get people in society to do what they want them to do” (Eakin and Lemos, 2006). 	<ul style="list-style-type: none"> Leadership capacity of administrative village leaders and villager group leaders to lobby township, county and provincial governments to bring projects to their areas

(Pope et al., 2000; Ritchie and Spencer, 1994). The raw data was used to identify key ideas and recurrent themes, using transcripts of the key informant interviews and focus group discussions, notes from field observations, recordings and social maps (Schutt, 1996).

After the identification of themes in line with the key indicators, a detailed indexing was done and rearranged to summarise the perceptions and experiences of farmers and key informants. Based on the research objectives, the associations between themes were mapped and

explanations provided for the findings. The indicators were ranked with respect to the respondents’ perception of the effectiveness of policy implementation. Based on the field observations, discussions with key informants, and the researchers’ judgement, the ranking was further categorised as 9–7: Highly effective; 5–6: Moderately effective; 3–4: Least effective; and 1–2: Not effective.

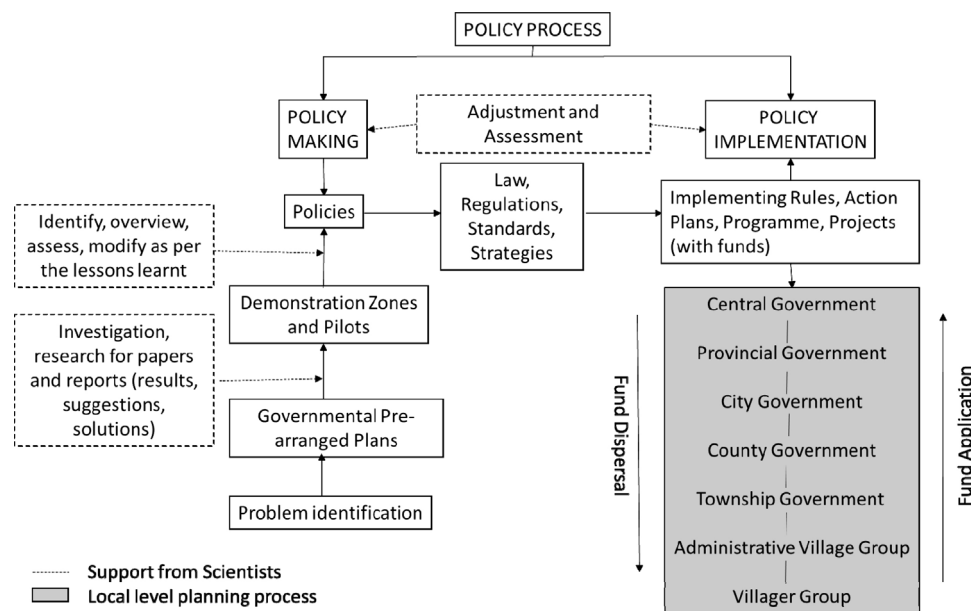


Fig. 2. Planning process in China. Source: Key informant interviews with experts and field study.

4. Results and discussion

4.1. Policy process

The policy process is an integral part of the policy cycle and involves a series of activities undertaken by the government and its institutions to achieve the goals and objectives articulated in policy statements (Burke et al., 2012). In China, the strong hierarchy provides most of the authority to the central government (Shi, 2012) and funding decisions are made top-down (Li et al., 2013; Ye et al., 2012). Detailed discussions with experts showed that the policy process in China has two main parts – policy making and policy implementation (Fig. 2).

Generally, the policy-making process involves policy makers and scientists: the problem is identified, plans are prepared and piloted, and policies are formulated. The process includes laws, regulations, standards and strategies for policy implementation. Policy implementation includes the preparation of rules, action plans, programmes and projects with funding availability. Once funds are secured, implementation is initiated with fund dispersal from the central government to the provincial, city, county, township, administrative village and villager group level in a hierarchical way.

The policy process in China also includes a feedback loop at the local level, with fund applications being prepared at the villager group level and submitted to the central government following a bottom-up hierarchical order. The research found strong empirical evidence of this feedback loop at the local level, where farmers prioritise their needs in villager groups. In this bottom-up approach to project planning, the villager group leaders submit the project proposal to the administrative village leader, who collects the information from all of the villager groups and passes it on to the relevant township officer (e.g., the township water manager, in case of water-related issues) to make the funding decision. If the township office has already received the funds from the county, it provides the funds to the villager groups on a priority basis. If they have not received funds, they ask the county government and, if required, the city, for the funds. Once the project is approved, it is handed over to the concerned authorities for implementation following the same hierarchy downwards. Not all of the projects requested by village group leaders will succeed in obtaining funding from the government. One villager group leader explained:

The villager group leader will report the problem to the administrative

village leader and then to the township. The relevant township office will conduct a detailed study. Then they will discuss the problem with the villagers before they make a decision. They will also give training to the villagers on how to implement the project. (Respondent A1)

In some cases, the farmers are also consulted before the project starts (Table 5).

From an outside perspective (non-Chinese), the policy process in China is perceived as top-down, because the local-level planning and fund-application process is not immediately evident. However, the findings of this research provide empirical evidence that a bottom-up approach exists at the local level, where fund applications are made using a participatory approach. In the meantime, funding decisions are still top-down, based on the project proposal submitted by the community.

4.2. Effectiveness of policy implementation

The findings on the effectiveness of policy implementation are presented below, using the nine indicators.

4.2.1. Government funds (moderately effective)

In general, government fund support was perceived to be moderately effective by farmers in Ayoupu and Fa-e-sha. Comparing the perceptions between the men’s focus group and the women’s focus group, it was found that men in Fa-e-sha perceived government funds as being more effective in dealing with drought. Women in the F2 and F5 focus groups perceived government funds to be important because they believe that “money can do everything” to solve drought problems. In

Table 5 Key informants’ perceptions of project implementation process. Source: Field survey, 2013–2015 (n = 16).

	Consulted before the project starts		Consulted during the process		Informed only after the decision is made	
	Yes	No	Yes	No	Yes	No
No. of responses	10	6	2	14	1	15
Percentage	62.50%	37.50%	12.50%	87.50%	6.25%	93.75%

Table 6
Policies/projects implemented in research sites.
Source: Key informant interviews, 2013–2015.

Name of project	Year of implementation	Year of completion	Villager groups	Implementing institution/ mechanism
Ayoupu villager groups				
Drinking water	2013	2013	A1, A2, A3	County water management bureau
	2014	Till date	A4	
5 small water projects (water tank, pond, pumping station, water channel and water dam)	2013	2014	All	County water management bureau
Agriculture road and channel project	2012	2012	A1, A2, A4	County agriculture bureau
Drinking water from natural pool	2010	2010	A4	County water management bureau
	2014	2014	A2	County water management bureau
Fa-e-sha villager groups				
Drinking water (tank, well, pipes)	2010	2012	F6	County water management bureau
	2012	2013	F2	
	2013	2014	F5	
	2014	2014	F4, F8	
Road	2015	2015	F2	County agriculture bureau

addition, almost 90% of the key informants (n = 16) perceived that government funds can be used for water efficiency projects, such as pumps, tanks and irrigation channels for drinking water and agriculture fields, and even buy food in case of food insufficiency. However, some were sceptical that the funds provided by the government “might not be used for the right purpose because only a small amount will come to village” (Respondent A3).

Respondents generally agreed that government funds helped farmers to deal with the immediate impacts of the drought and minimised their problem with drinking water and water for agriculture. Because the funds that trickle down to the villager group level are negligible, respondents perceived that structural measures, such as building a water tank or irrigation channel etc., to be more effective than government funds.

4.2.2. Water use efficiency projects (moderately effective)

After the severe drought in Luliang in 2009–2010, several policies/projects were implemented by the government. As informed by the township water managers, there were more projects implemented in Ayoupu than Fa-e-sha to deal with immediate drought (Table 6). As they had experienced the benefits of water use efficiency projects first hand, farmers in Ayoupu perceived water use efficient projects to be more effective than farmers in Fa-e-sha. Most of the farmers in Fa-e-sha perceived water management as the “government’s responsibility” and said that water also should be managed at the household level: “We wish that the government would make pumps or tanks near our agriculture fields so that we can get water easily” (Respondent F6).

Unlike Ayoupu, in Fa-e-sha women and men had different perceptions about the effectiveness of policy implementation. Although they agreed that water supply was one of the major problems, men perceived it to be important to pump water from low land to high land, whereas women perceived good irrigation channels and building roads near to agriculture land to be important so that they can carry water easily. Due to water scarcity in the villager groups, the women in the F3 and F5 focus groups perceived water efficiency projects to be less effective. Likewise, men in the F2, F3 and F8 focus groups strongly perceived water use efficiency projects to be not effective in their village, as they said their village “lacked a water source and finding an alternative is more important”. It was also found that the effectiveness of water efficiency projects was directly linked to government funds: “without funds, it is not useful to have water use efficiency projects” (F3 men’s group).

While government support for water use efficiency infrastructure development helped the farmers to deal with immediate drought impacts, it also increased the dependency of farmers. Iran’s experience also shows that the increased dependency of farmers on government

policy and programmes during severe drought has made vulnerable people depend more on government support, leading to mistrust, especially among those who found themselves ineligible or unable to access assistance (Keshavarz et al., 2013).

4.2.3. Drought knowledge and technology (less effective)

Drought knowledge and awareness raising was perceived as less effective for policy implementation in the research sites, perhaps indicating that farmers have a low level of awareness about climate change and that local decision making is highly influenced by government policy. One of the women in the A3 focus group in Ayoupu reported that, “it makes no difference because drought can occur anytime”, whereas one of the men in the A4 focus group said that the “villagers know more than the government how to deal with drought at the local level”. However, the respondent P3 said that a few new technologies had been introduced, including a deep well for irrigation, a nursery for seedlings, crops that use less water, the use of plastic sheeting to retain moisture, and a floating nursery. These interventions were also observed during the field study.

In Fa-e-sha, most of the men and women in the focus groups emphasised that “without the availability and accessibility of water and funds, they would not be able to implement the technologies and knowledge”. On a positive note, men in groups F2 and F8 and women in group F7 showed interest in learning about new technologies so that they can save water and have good agricultural yield. Most of the villager group leaders said that government training on water management and efficient agricultural practices were very useful to them during droughts. However, one of the villager group leaders (Respondent F8) said that the training, like tobacco plantation and goat raising, was “not useful at all” for his villagers, because they already knew how to do these things.

Responding to drought requires an understanding of climate change and drought and how it might place a household and an individual at risk. Hence, local people need to be involved in designing and implementing coping and adaptation strategies (Patt and Schröter, 2008). This supports the argument that if drought (induced by climate change) is to be addressed effectively, then more attention needs to be paid to awareness raising about the changing climate and the impact on people’s lives and livelihoods for long-term adaptation planning (Qi et al., 2008). The low level of awareness about climate change/drought among farmers in the study area increases their dependency on government policy and, thus, influences their perceptions about the effectiveness of policy implementation at the local level.

4.2.4. Income diversification (moderately effective)

Income diversification, specifically human mobility for job in

different cities, was attributed to the severe drought in Luliang, which was considered a push factor. However, income diversification was also driven by the perception of the young generation that migration provides easy money, compared to hard agricultural work on drought-stricken land. Women in groups A1–4 and A3 perceived income diversification, such as human mobility for job, to be “not very useful because their workload increases and mobility decreases due to responsibility for elderly people and children at home”. Whereas, women in the A2 women’s group said that, although human mobility as income diversification brings money, “it is difficult for them to work outside as they cannot read and write properly”. Interestingly, the men and women’s focus group discussion in A3 villager group said that human mobility not only diversified their income, but also “decreased water use in their household”. They realised that the maximum use of water was during January/February when the migrant workers come home for the spring festival.

In Fa-e-sha, almost all of the participants in the focus group discussion emphasised that human mobility was an effective way of dealing with drought because it diversifies income. Remittances sent by migrant workers help in the education of children and to pay for medical care for parents. Human mobility was perceived by farmers as a less tiresome and better adaptation option and is widely practised in rural areas of China. This view was also supported by the respondent P2:

Even though the government gives teenagers a job in the village, they want to get a job outside, because a farmer’s income is much less than that paid by the jobs outside. The villagers think that they can get the same benefit outside the village without working hard.

The main factors driving human mobility from the villages to the cities were observed to be the acquisition of land for construction projects such as reservoirs, the leasing of land to companies for tobacco plantations, and attractive job opportunities outside – all of which were guided by policy directives. Competitive prices for agricultural products can also drive young people to work in the countryside for a while, based on market requirements; however, it is understandable that they would eventually seek opportunities in the cities when the peak period for agricultural production is over.

Due to drought, a lot of people below 40 years of age go to the developed region, mainly to electronic factories, in building construction, and as mechanics etc., but without any technical knowledge or training. (Respondent A3)

Although seasonal human mobility enhances the adaptation of farmers to drought by diversifying income sources (Pradhan et al., 2012), the major challenge is to make migrants more productive through improved skill training. Due to the increasing frequency of drought, it is important for shifts to take place in the agricultural sector, including in crops, livestock, and horticulture, and for appropriate technologies to be used, market links to be strengthened, and the skills and capabilities of farmers enhanced to facilitate income generation in the villages. In government policy, less priority has been given to technical training for employment generation, improved services such as legal aid and workers’ safety, and the retention of young people in the workforce or guided mobility to avoid stagnation and the waste of human resources (Nanshan and Yuan-qing, 2002).

Local governments in the study areas strongly promote either relocation (*qianyi*), due to development and infrastructure projects, or migration (*yimin*), for ecological and poverty alleviation purposes. Thus, people are often encouraged to move and resettle, which, in some cases, disrupts their livelihood (Wang et al., 2013). Temporary mobility brings back remittances, information and skills, which stimulates new enterprises and livelihood opportunities to deal with drought. But, without proper training and skill development, migrants often end up in poorly-paid jobs, making them more vulnerable.

4.2.5. Governance structures (least effective)

The research found different opinions about the effectiveness of governance structures between women and men’s groups at the villager group level. Out of the four villager groups in Ayoupu, women in A1–4 focus group perceived governance structures, like water user’s groups, to be important for effective policy implementation. However, without prior experience with the functioning of user’s groups, they were not confident of their sustainability and effectiveness.

Men, except for in F1 and F2 focus groups, mentioned that governance structures at the local level are “not required” for policy implementation. They perceived saving water as being done at the household level, not as a community activity. Most of the participants in the focus group discussions pointed out that “different people have different thoughts” so it is difficult to build consensus in a group.

Several policies in China help to mediate between the government and households, including water users’ associations and drought relief teams (Li et al., 2012). In the research sites, there were women’s association, older people’s association, farmers’ associations, fruit associations and tobacco associations. However, these users’ groups were not directly involved in drought or risk management at the local level.

4.2.6. Access to resources (highly effective)

A frequently-discussed issue was road access, which was considered to be a highly effective indicator of drought policy implementation. Although road access does not have direct links to the occurrence of drought, farmers related it to drought management in various ways. Some of the farmers said that the construction of roads blocked their water channels/ground water flow, resulting in water scarcity. Others said that Ayoupu, compared to Fa-e-sha, is closer to the main road and has easy market access, which enables them to sell their goods during times of crisis. Therefore, during the 2009–2010 drought, Ayoupu was less vulnerable than Fa-e-sha. One of the administrative village leaders said “Access to resources is important as the road will help market linkages, which is important to sell goods and enhance livelihoods”.

More than 50% of the participants of the focus group discussion considered road access to be “convenient for carrying water to the home and agriculture fields in case of emergency”. The farmers said that the government had provided bottled water for drinking, water tankers to fill ponds for agriculture, and animal carts and tractors to transport water during times drought. Hence, those villagers who had road access were able to get water to cope with the extreme drought more easily.

However, in Fa-e-sha, women and men had different perceptions of the effectiveness of road access for drought policy implementation. Except for women in F5 group, others strongly perceived road access to be an important factor for effective policy implementation to deal with drought. Women in F3 group strongly perceived that, due to the remoteness of their village and without good road access, they were “neglected by the government”. Without road access, they could not transport water and did not have access to markets to sell their goods. A link to the main road helps farmers to access resources and markets, thereby contributing to enhancing their adaptive capacity (Burton et al., 2001).

4.2.7. Community participation/involvement (least effective)

Because the level of awareness about climate change and drought was low at the local level, the farmers perceived community participation to be least effective for drought policy implementation. Their perception was influenced by their experience that “without funds, projects cannot be implemented, even if it is selected through active community participation”. The farmers showed willingness to contribute to policy implementation in kind, if government funds were available.

Considering that communities were involved in the planning and decision-making process, the local leaders and township water man-

agers emphasised that community participation is very important in order to receive inputs based on local knowledge, which enhances the ownership of farmers: “The top leader can listen to the villagers and get advice from them” (Respondent F6).

A similar research conducted in Mozambique emphasised that for farmers to be responsible in responding to drought, they have to understand how climate change/drought may place them at greater risk and, therefore, farmers should play a larger role in designing the response strategies (Patt and Schröter, 2008). The low level of awareness about climate change/drought increased the dependency of local people on government policy and, thus, influenced their perception of the effectiveness of policy implementation at the local level.

4.2.8. Market demand (moderately effective)

The market demand (for tobacco) as a factor in effective policy implementation was considered more important in Luliang, which is directly related to the fact that Luliang has more investment by tobacco companies, which provided seedlings, irrigation facilities, dry nurseries and floating nurseries, as well as skills development training to improve yield and cope with drought. Most of the villager groups in Fa-e-sha who wanted the tobacco companies to invest in their area perceived that it will “improve their financial status”. These farmers said that leasing their land for tobacco would free young people to migrate, providing double economic benefits to farmers.

Market demand was a higher priority for men than women, and men wanted market information from the government to sell their crops at a “competitive price”. However, women mentioned that harvesting a monocrop (e.g., garlic) created more supply than demand and they could not sell such crops at a good price. A study on tree crops as a possible adaptation measure in China, India and Nepal identified monoculture systems as vulnerable to both economic and climate shocks and shifts (Su et al., 2013). Especially in China, areas with a variety of trees were found to be less vulnerable than areas with monoculture plots, which were devastatingly impacted by the drought of 2009–2010.

With the construction of water infrastructure projects provided by the government and tobacco companies, local farmers in the research sites have become more dependent on government funds and were not aware of the long-term consequences if these water sources dry up. When farmers were asked, “what happens if the water sources dry”, almost all of them said that “it is not the concern of the farmers because the government should provide water to everyone”. In the short term, the intervention of tobacco companies and supporting government policies through infrastructure development has helped farmers in the research sites to deal with immediate drought by addressing market demand.

4.2.9. Leadership (not effective)

Local leadership can be an enabling factor for effective policy implementation. In Luliang, the local leadership plays a crucial role in project prioritisation at the township and county levels. Although the leader was discussed as “someone who can play a lead role and who can influence decision making”, during the focus group discussion in Fa-e-sha, participants ranked leadership as “not effective” compared to other indicators. This might be because Fa-e-sha had fewer projects and the villager group leaders had less experience in influencing project approval than the leaders in Ayoupu. The women’s group in Fa-e-sha perceived that good leadership “without water resources” cannot solve the drought problem in their village.

However, the role of leadership was strongly presented by the villager group leaders during the key informant interview. Fifty percent of the key informants agreed that policies and projects are influenced by the relationships and networks of the villager group leaders. The former governor and both the administrative village leaders also agreed that the “negotiation skill” of a leader is important to secure projects for their village. However, it was explained that the government also

conducts studies before prioritising projects for implementation:

In addition to the request from the leaders, when the government provides projects to the farmers, we study the geological conditions, rainfall, meteorology, and climate change to see if there is enough water for the reservoir. (Respondent P1)

In villager groups where the leaders have served for a long time, the leaders explained that they make decisions on behalf of the villagers:

I am familiar with the situation of the village and know about every difficulty encountered by farmers. I go to seek help from the township government and water management bureau to get the project for the village. If there is a serious problem, I call a meeting with the farmers to discuss it. (Respondent F5)

Administrative village leaders talk about projects to the government. Since I am a local person, I am familiar with the village conditions. I know which villager group lacks water so I request the government and negotiate with them for the provision of water to that villager group. (Respondent P3)

In addition, the villagers request projects like tobacco farming as the tobacco companies provide water tanks, which can be used for other agricultural purposes. The respondents generally perceive that if a leader is influential, he/she can influence the tobacco companies and the government to prioritise their villager group over others for project implementation. However, the tobacco companies also conduct various tests before implementing a project to secure their investment:

The tobacco company first exams the soil type. If this is suitable, then they invest in water tanks. Because these water tanks are built in the field, it is used for agriculture only. (Respondent P1)

A study in Baoshan province in Yunnan also found that better project implementation is directly related to the strong leadership at the local level (ICIMOD, 2009). For example, afforestation activities initiated by a village leader in Baicai to cope with serious landslides and soil erosion later evolved into a long-term adaptation strategy. Some village groups in Taokong had better irrigation infrastructure than others as a result of good leadership. As discussed earlier, this research provides strong evidence that the perception of farmers depends on their long-term experience, which provides a basis for decision making (about the degree of effectiveness).

5. Conclusion: Ensuring effective policy implementation

The present research provides empirical evidence on, and insight into, farmers’ perceptions of the effectiveness of policy implementation in dealing with drought, considering the 2009–2010 drought in Luliang. Two major issues were discussed – the project planning and implementation cycle at the local level and the effectiveness of policy implementation, as perceived by farmers, using nine key indicators.

The research started with the assumption that a strong top-down bureaucratic policy-making and implementation process exists in China. Unlike most other countries, the Chinese government is perceived by outsiders as rigidly maintaining party discipline, with top leaders having command of bureaucracies in the policy process (Lieberthal and Oksenberg, 1988). However, the research indicates that the top-down approach to funding decisions is complemented by a bottom-up feedback loop at the local level. At this interface, farmers prioritise their needs following a bottom-up participatory approach to meet the top-down funding decisions. This need to be appreciated by outsiders to improve our understanding of the policy process in China.

Among the nine indicators of effective policy implementation studied, the farmers perceived access to roads as being a highly effective measure for market linkage and the transportation of water during crises such as drought. Alternative drought management options, such as water use efficiency projects, market demand (for

tobacco), human mobility for jobs, and government funds were considered to be moderately effective. Without a water source in the village, drought knowledge, community participation in planning, and governance structure were perceived to be least effective measures for policy implementation. Lastly, the role of leadership was considered to be not effective in policy implementation, if the leaders lacked the negotiation skills to secure projects for their villages. Although men and women strongly perceived drought as having the same impact on them, differences were found in their perceptions of the effectiveness of policy implementation, primarily based on their work division including women's role in the management and use of land and water at the household level. The indicators and their effectiveness can differ according to different geographical scales and disaster types (Adger et al., 2005). Considering the limitations of the research sites, future research is needed to analyse the nine indicators used in this research to evaluate the effectiveness of drought/disaster management policy implementation in other villages in China and in other countries.

In conclusion, farmers' adaptation at the local level was found to be oriented towards short-term market rewards and income diversification. In addition, farmers' adaptation appeared to be mainly guided by the government's priorities. Farmers' perceptions were largely based on their previous experience and driven by the desire for immediate and tangible benefits. To ensure the effectiveness of policy implementation, adaptation planning is essential in designing and incentivising an effective interface between the top-down and bottom-up approach. On one hand, government support is fundamental to implement policies and plans at the local level; on the other hand, investment is needed to strengthen the capacity of communities as they are at the frontline of drought impact. Hence, local leaders need to increase the participation of farmers (women and men) in the planning process so that their voices are heard. Meanwhile, the government and decision makers need to acknowledge the voices of women and men, so that communities can cope with and adapt to drought and to ensure effective policy implementation.

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