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Mobility endowment and entitlements mediate resilience in rural livelihood systems

Abstract:

In economically marginal rural locations, choice in livelihood strategy such as decisions to move location mediates levels of individual and household resilience under conditions of environmental change. It is also well established that endowments associated with mobility and the entitlement to mobility are unevenly distributed across populations. This paper integrates these insights and conceptualises location choice as a set of mobility endowments and mobility entitlements. Through these endowments and entitlements, the paper explores how choice affects the ability to be mobile and its role in mediating levels of resilience to livelihood shocks associated with changing environmental conditions. The research design involves measuring the impact of different climatic perturbations in rural locations in Anhui Province, China. Mixed methods of rural appraisal, life history interviews, and a household survey generate objective and perceived elements of individual and household responses to risks. These data are augmented by biophysical observations on the nature of the climatic perturbations. The results show that within the two rural communities, mobility endowments and mobility entitlements are important in determining the impact of mobility on resilience. The life history interview data highlight significant individual agency within the structures that impact on individual choices. Further, individuals and households who possess the ability to decide and to subsequently enact decisions about mobility are shown to be more resilient compared to other individuals and households that lack that ability. Moreover, households practicing short-term, circular mobility are more resilient than those households that practice long-term mobility. The study confirms that, in these instances, choice and the ability to enact those choices mediates resilience and highlights the implications of location decisions but also the conditions in which those decisions are made.

Keywords:

Mobility, choice, resilience, adaptation, China

1. Introduction

Responding to environmental change and other livelihood shocks and stresses is fundamentally about adjusting to risks in response to or in anticipation of changing circumstances (Adger et al. 2013). Migration is such a strategy and is widely used to spread risk and diversify livelihoods (Ellis 1998; Agrawal & Perrin. 2009). Migration is further highlighted as a possible adaptive response to social, political, cultural and environmental change and an important means to reduce vulnerability (Tacoli 2009; Foresight 2011). By contrast, in policy discourses, migration is often described as a failure to adapt, and a problem to be addressed through practices that encourage people to stay in their locations of residence (Geiger & Pécoud 2013). Recent research and empirical evidence captures this apparent contradiction: migration is shown to be heterogeneous and influenced by a range of drivers that work across spatial and temporal scales (Black et al. 2011). Exposure to environmental risks and long-term change have diverse impacts on residential location: for some populations, higher exposure to environmental risks reduces mobility, while for others migration is an option of last resort once all other options have failed (Mcleman 2010). Migration has also been shown to be in anticipation of risk: as a precautionary adaptation due to increased perceptions of the future state of environments (Bardsley & Hugo 2010).

Choice is an important element underpinning the courses of action people and populations consider feasible. Specific responses to livelihood shocks and stresses ultimately come down to choices (or the lack thereof) between different options (Mcleman & Smit 2006: 46). Research on migration and environmental change has tended to conceptualise choice through a continuum of migration outcomes from forced migration at one extreme to voluntary migration at the other (Hugo 1996). More recently these mobility outcomes have been expanded to include those who are unable to migrate or trapped populations (Foresight 2011). That the decision to migrate is influenced by a range of factors operating at different levels from the macro to the micro is well established (Massey et al. 1998; Samers 2010), yet the processes through which the ability to choose are realised and the impact that this has on resilience are rarely studied. In this paper, we seek to address the issues of choice and ask, firstly, what does choice in relation to mobility look like and mean and how is the ability to enact it realised (as conceptualised through endowments and entitlements)? Secondly, are those with greater ability to choose more resilient to environmental shocks? The paper is structured as follows: in the next two sections, we review literature on resilience and choice in relation to environmental change and detail the sampling approach, methods used and the analytical strategy. The subsequent two sections present the results and discussion, specifically drawing out the crucial role that choice plays in mediating resilience. The final section concludes by arguing that the use of mobility can be considered an adaptive response with a positive impact on household resilience.

2. Literature review

2.1. Resilience

Although the close links between resilience and adaptation as captured in adaptive capacity are widely acknowledged (Folke 2006; Miller et al. 2010), they differ conceptually and practically. Adaptation describes the processes through which a system is able to use knowledge and experience and adjust behaviour and modes of operating in response to external or internal processes to continue to exist within a current stability domain. Adaptation is a key attribute of resilience but not the only attribute. Resilience includes other characteristics in addition to adaptive capacity that are more or less visible depending on the nature of the system at a specific point in time, and include the ability to learn, the perception of agency, the real or imagined limits that structure choice, behaviour and responses and the intentional (or unintentional) ability to completely transform a system into a new state (Carpenter et al. 2001; Walker et al. 2004; Jones & Tanner 2017).

Many studies that use adaptive capacity or adaptation to explore resilience empirically, rely on assessment or quantification of the five capitals that underpin sustainable livelihoods. The underlying logic is simple: resilience at various scales is partially constituted by adaptive capacity that can be measured through the presence and availability of different types of capital at an individual, household or a larger unit of analysis (see Deshingkar (2012); and Nawrotzki et al. (2012); Ayeb-Karlsson et al. (2016); Loebach (2016); Banerjee et al. (2017)). Exclusive focus on capital assets as a proxy for resilience, however, downplays characteristics that are critical to generate a more holistic understanding of a resilient system, such as the ability to use knowledge and experience to adjust behaviour, sense of place, constraints associated with marginalisation and disempowerment, and the self-perceived limits of what is considered possible (Jones & Tanner 2017). Both resilience and adaptive capacity remain contested in terms of measurement and operationalisation. But further, there is a major challenge to integrate measurement of resilience with existing migration theories and the problems associated with working across spatial and temporal scales (Walker et al. 2004; Turner 2014; Davies et al. 2015; Adams 2016).

Expansion of the key attributes of system resilience has led directly to consideration of perceived resilience and its implications for action: so-called subjective resilience (Brown 2014). Subjective resilience incorporates social, cultural and psychological elements that contribute to resilience (Béné et al. 2016; Jones & Tanner 2017). That is, the measure of resilience is not externally imposed but self-generated reflecting individual circumstances and lived experiences. This issue has received considerably less attention in the literature to date. Furthermore, self-generated measures of resilience also offer greater potential to better reflect the perceived opportunities and constraints that structure behaviour and reveal the processes through which individuals and households are or are not able to gain the ability (endowments and entitlements) to make choices about mobility.

2.2. Choice

The presence or lack of choice is a key element that influences not only the way in which mobility is enacted but also the outcome of that mobility decision. Choice has been extensively addressed in research that explores migration ranging from the neoclassical approaches (that model the choices individuals make as rationale beings seeking to maximise returns on investment) through to more psychological and behavioural approaches (that focus on the cognitive processes through which people elect to move or not) as demonstrated in Table 1. In the specific arena of the role of environmental risk in migration, constraints on choice have been posited as mediating factors in the impact of environmental change on decisions to migrate, predominantly from areas at risk of, or experiencing, environmental shocks or stresses (Adger et al. 2015).

Name	Description	Citations
Neoclassical approaches	Focus on the individual as making rational and self-interested decisions	Lewis (1954); (Ranis & Fei 1961); Todaro (1969); Harris and Todaro (1970). See also Lilleör and Van Den Broeck (2011).
New economics of labour migration approaches	Set individual migration decisions within other decision-making units, such as the family or household	Stark and Levhari (1982); Stark and Bloom (1985); Stark and Lucas (1988); Taylor et al. (2003); Amare and Hohfeld (2016). See also Žičkutė and Kumpikaitė-Valiūnienė (2015).
Psychological and behavioural approaches	Focuses on decision-making processes and perceived value or utility of a place.	Wolpert (1965); Speare et al. (1974); De Jong and Fawcett (1981); Kniveton et al. (2011); Tabor and Milfont (2011); Martin et al. (2014). See also Adams (2016); Klabunde and Willekens (2016).
Environmental and climate change studies	Refocused attention on the links between changing environmental conditions and migration outcomes	Mcleman and Smit (2006); Hugo (2008); Afifi and Jäger (2010); Black et al. (2011); Warner and Afifi (2013). See also Piguet et al. (2011); Hastrup and Olwig (2012); Mcleman et al. (2016).
Forced migration and trapped populations	Emerging field exploring the processes through which people are forced to move or trapped in place	Cohen et al. (2013); Adams (2016); Foresight (2011). See also Morrissey (2009); Ottonelli and Torresi (2013).

Table 1: Theoretical approaches that incorporate choice and agency within studies of migration

Within the theoretical traditions in Table 1, and despite an either implicit or explicit focus on choice, the process through which this ability to choose is realised are under-researched. For example, neoclassical approaches suggest that people seek to gain the maximum utility in different places or that migration can be conceptualised as a risk-spreading technique (new economics approaches). However, whilst the outcome of the choice is clear, the means through which an individual or household is able to convert their resources into mobility, and the barriers and enablers that mediate that process, remain obscured.

That environmental change leads to differentiated outcomes via social structures operating on individuals is widely accepted in thought and practice. The same event can have multiple outcomes depending on the characteristics of the individual and the social context they find themselves in. An individual's ability to manage stresses is not given, for example it is produced by unequal access to resources, poverty and lack of representation (Langridge et al. 2006; Ribot 2010). In relation to mobility, some populations are mobile through choice, whilst, at the other end of the spectrum, some are mobile because they have no other option (the same applies to immobility). Yet, despite this knowledge, the processes, barriers and enablers that structure how and if that choice is realised and its outcomes in relation to resilience are poorly understood.

Within China, much literature suggests that migrants move for economic reasons although sub-regional patterns are more complex and multi-faceted (Murphy 2002; Zhu 2003; Gaetano & Jacka 2004; Zhu 2007; Zhang 2008; Whyte 2010; Zhu & Chen 2010). Despite ongoing reforms and greater freedoms (for some), migration, as with many other aspects of people's lives, remains, to a certain extent, under the influence of socialist era instruments of state control such as the *Hukou* system (Cai 2003; Fan 2004; Deshingkar 2005; Zhang 2008; Chan 2010; Chan 2011). Fan (2004) contends that the study of migration in China must include institutions owing to the legacy of the socialist era control instruments such as the *Hukou*[1] system that controlled the movement of populations between rural and urban areas. Despite the gradual relaxation of controls the influence of the *Hukou* system on mobility remains powerful especially when linked to other state institutions such as welfare support and education access. Beyond these formal state-level institutions are those that operate informally. For example, gender and intra-household structures are also highly salient. The roles that are ascribed to individuals within the household, the norms and expectations of people to live up to and fulfil those roles, are very important in influencing who is and is not mobile. These institutional arrangements are likely to influence the choice of individuals to deploy mobility and by extension resilience.

In this paper, we address the issue of choice and the ability to enact it, and the consequences for resilience to environmental shocks. To achieve this, we employ a novel conceptual framework to understand the processes through which people exercise their mobility rights. Building on Leach *et al* (1999), we develop the twin concepts of *mobility endowments* and *mobility entitlements* to explore the ways in which people are or are not able to exert a legitimate, effective command to convert rights and resources to be mobile into mobility itself. Mobility endowments are defined as the rights and resources that people have to be able to be mobile and mobility entitlements are considered to be the legitimate, effective command to convert your rights and resources to be mobile (mobility endowments) into mobility. Institutions are crucial within the framework and influence who is mobile and which resources can be converted into mobility endowments and thence to mobility entitlements. By breaking down the process through which resources are mapped on to mobility endowment and thence on to mobility entitlements, we empirically explore the

[1] *Hukou* classification is divided into two types. The first classification is the *Hukou suozaidi* (the place of *hukou* registration), based on a person's presumed regular residence and is either rural or urban. The second classification, *Hukou leibie*, is based on status or type of *Hukou* and is either agricultural (*nongye*) or non-agricultural (*feinongye* or *chengzhen*) (Chan & Zhang 1999).

nature and extent to which individuals and households have choice, how they use that choice and what it means in terms of mobility outcomes. Moreover, the framework provides a means to express resilience through an understanding of endowments and entitlements and draws on recent work that has sought to integrate the concept with more actor-orientated approaches (Langridge et al. 2006; Nelson et al. 2007; Miller et al. 2010; Béné et al. 2011; Armitage et al. 2012; Coulthard 2012).

3. Methods

3.1. Case study locations, sampling and research tools

Anhui is the second largest (only Sichuan is larger) exporter of migrants of China's provinces, recording a net out-migration of 11,108,000 people over a 20-year period (1990 – 2010) for the population aged five and above (Chan 2012). Over the four five-year periods (1990 – 2010), Anhui has always ranked in the top three for net exporting provinces indicating stability in trends between exporting provinces. Within Anhui, two rural villages, Wanzhuang and Dongdian, located within Lixin County, one of four counties that constitute Bozhou prefecture, are chosen as appropriate sites for the research. In 2011, Bozhou reported above average levels of temporary migration (defined as leaving for six months or more but not changing registration), with 35 per cent of the population taking this decision (the average the Anhui is 31 per cent). Of these, 82 per cent relocated to other provinces with the majority going to Jiangsu (20 per cent), Zhejiang (35 per cent) and Shanghai (33 per cent) (China Statistical Press 2012: 3-21 & 3-22).

The economy of both villages is agricultural; wheat, corn and soya are the dominant crops often practiced alongside animal husbandry. The majority of the population in the case study sites has a local and agricultural *Hukou* and there are no significant livelihood options outside of agriculture - underemployment is acute. Dongdian (26m asl) and Wanzhuang (26m asl) are located in the low-lying plains of the Fei River, a tributary of the Huai River. Significant improvements to the villages' infrastructure have occurred within the last 20 years. Both villages now have near universal access to potable water, are electrified and witnessed improvements to the local road network although travel to major urban centres remains time-consuming. The Fei River constituted a major flood risk until a levee was built along its the banks. Low-lying farmland (located towards the Fei) is particularly vulnerable to surface water flooding or ponding. In both villages, the main roads also act as levees protecting parts of the settlements from surface water or fluvial flooding.

Wanzhuang experienced a flood in 2007 and Dongdian experienced drought-like conditions from 2010 to 2011. These climatic phenomena are selected as they offer an interesting contrast in terms of speed of onset (a drought event is typically categorised as a slow onset event whilst flooding is considerably more rapid) and are likely to engender different human responses (Dun & Gemenne 2008; Renaud et al. 2011). The data were collected through multiple trips to the research sites over a period of two years from 2011 to 2013. We employed a combination of social research methods: rapid rural appraisal (RRA), household questionnaire surveys and semi-structured and life history interviews. The mixed methods approach employed has been utilised in previous research (specifically the EACH-FOR and Rainfalls projects) on the migration-climate change nexus (Warner et al. 2009; Piguet 2010; Warner 2011; Warner et al. 2012) and interdisciplinary research more generally (Nuijten 2011). One of the key strengths of this sort of approach are the different perspectives, layers of understanding and rigour that are generated through the data collection and analysis.

RRA was undertaken to understand the local context and to help build rapport with local communities. Seven different types of rural appraisal exercises were used in both sites with different community members. The purpose of the activities was to gain an understanding of the socially-differentiated nature of the communities, the impacts of the environmental perturbations as well as the prevalence and nature of migration.

A survey was administered in the form of a face-to-face questionnaire to the household head (or acting household head) or the spouse of the household head in the dwelling of the respondent. The sample frame for the survey was the entire resident household population of each study site elicited though the RRA exercises. There were 106 households in Wanzhuang of which 44 no longer held a *de facto* residence in the village. 47 households were surveyed in Wanzhuang representing 38 per cent of the total number of *de jure* households or 76 per cent of the *de facto* resident households. In Dongdian, there were 124 households of which 43 no longer held *de facto* residence. 44 households were surveyed, representing 40 per cent of the total number of *de jure* households or 62 per cent of the *de facto* households. The questionnaire survey was split into three parts. The first part covered issues associated with environmental change and the impact of the weather event under study; the second part focused on migration and the third part sought information on the household and its members.

Within the questionnaire a distinction was made between longer-term and shorter-term migration. Longer-term migration was defined as a move of three months or more, or an intention to stay away for three months or more if the move was more recent. This cut-off period accords with the definition in the Foresight Report and is often used for distinguishing migration from shorter-term moves (Foresight 2011: 34; Bell et al. 2014). Shorter-term moves were defined as a period of more than one week but less than three months or an intention to stay away for less than three months if the move was recent. This period was selected to capture the more cyclical nature of moves present in the villages and revealed through the RRA activities.

Life history interviews (carried out through an interpreter) were held with migrants in Shanghai who originated from the source communities and with a subset of questionnaire respondents in the source communities to investigate emerging issues from the preliminary analysis. In total, six interviews with migrants in Shanghai were undertaken in phase two of the research and 12 life history interviews with households in the rural sites (capturing a sample of the different household mobility typologies). The life history approach was used to generate detailed insights into participants lives, the choices that they make, the reasons for these choices and their perceived outcomes. In this context, the life histories provide a means to "advance understanding about the complex interactions between individuals' lives and the institutional and societal contexts in which they are lived" (Cole 2001: 126). Life history interviews are skilful in revealing the individual experiences set within broader structures and the perceptions, values and motivations that underpin behaviour (Bruner 1991; Murray 2002; Locke & Lloyd-Sherlock 2011). The insights from the life history interviews are used to augment the more quantitative analysis and link data about mobility outcomes with an understanding about the role of choice and the nature and form of the institutional structures that mediate it. The life history interviews focus on significant events in the productive lives (adulthood) of the respondents and not on the climatic perturbations and their use of mobility. The underlying rationale was to understand from the perspective of the respondents the significant points in their lives and the role that mobility played in these points. Crucially, however, all of the respondents experienced the climatic perturbations within their adult life meaning that these events were part of their lived experiences. The interview data were transcribed and analysed using Nvivo; pseudonyms are used throughout the text to protect identity of the participants.

3.2. Resilience measures

We examined the resilience of households through the application of an innovative combination of self-perceived and externally-derived measures (see Table 2 and Supplementary Information for the methodology used in constructing each of the indices). Through the household survey we collected information on the respondents' perceptions of change (incorporating the period of climatically-induced environmental change) in yield, their financial situation, and wellbeing. These attributes constitute elements that have all been shown to contribute to resilience (Plummer & Armitage 2007; Smith 2014; Afifi et al. 2015). The measures draw on the five capitals that are undoubtedly important in influencing a households' level of resilience. In addition, the measures also capture perceived change over time and enable the incorporation of the subjective, lived experiences and circumstances of individual households, thus generating a more holistic view of how resilient households perceive themselves to be (Cutter et al. 2008; Brown & Westaway 2011; Armitage et al. 2012; Biggs et al. 2013).

Variable	Self-perceived or externally derived	How measured	Measurement / variables	Descriptive statistics
Yield	Self-perceived	Questionnaire: comparing the current situation with five years ago	Increased, decreased, stayed the same	n=61; Range: 0 – 1; Mean: 0.83; S.D.: 0.10; Variance: 0.1

Financial situation	Self-perceived	Questionnaire: comparing the current situation with five years ago	Got better, got worse, stayed the same	n=61; Range: 0 – 1; Mean: 0.77; S.D.: 0.07; Variance: 0.01
Wellbeing	Self-perceived	Questionnaire: comparing the current situation with five years ago	Got better, got worse, stayed the same	n=61; Range: 0 – 1; Mean: 0.87; S.D.: 0.08; Variance: 0.01
Dependency on agriculture	Self-perceived	Questionnaire: describing reliance on agriculture for livelihood	Completely dependent, dependent, not that dependent, not dependent at all	n=61; Range: 0 – 1; Mean: 0.73; S.D.: 0.07; Variance: 0.01
Wellbeing ranking	Externally derived	RRA activity: Each household was discussed and ranked by a group of community members	Upper group, middle group, lower group	n=61; Range: 0 – 1; Mean: 0.60; S.D.: 0.08; Variance: 0.01
Asset index	Externally derived	Questionnaire: Derived from 8 variables representing household characteristics and socio-demographic conditions	Number of ceiling fans, refrigerators, washing machines, bicycles; size of farmland, number of adults in household and the dependency ratio	n=97; Range: 0 – 1; Mean: 0.50; S.D.: 0.07; Variance: 0.01

Table 2: Description, mean and variation in variables used to measure resilience

Three other measures were also used to complement those described above. First, a self-perceived measure of dependency on agriculture was included. The majority of households were reliant on rain-fed agriculture, indicating that they were vulnerable to changes in the weather particularly in relation to precipitation and drought conditions (Marshall et al. 2007; Zhou et al. 2010). Second, a community-derived measure of wellbeing was generated through an RRA activity. This measure provided a counterpoint to the self-perceived reported change over time in wellbeing, and gave an overall indication of how well households were perceived to be doing by their peers. Thirdly, an asset index was developed to provide a proxy measure of the households' socio-economic position to generate insights into their financial stock (permanent income) rather than their financial flow (current income) (Balen et al. 2010).

Although all three measures were snapshots from the point the data were collected, they are indicative of the long-run condition of the household. Agricultural dependency is strongly associated with the size of the agricultural land holding each household possesses and these land holdings have remained relatively static since the 1990s (when the last major land reallocation took place). The externally-derived measure of wellbeing and the asset index were both generated to reflect the long-run status of the household; one through a discussion-based exploration of each household, and the other through a focus on physical assets that are unlikely to vary substantially on a monthly or yearly basis.

Resilience encompasses the ability to learn and exert agency and it reflects households' perceived ability to shape the world around them. Cumulatively, the measures provide an insight into how well households see themselves to be doing and an indication of their perceived level of resilience. The externally-derived measures provide an interesting counterpoint to the self-perceived measures and show, for example, the community perception of the wellbeing of individual households in relation to each other (explored through a snapshot measure of wellbeing) or the long-run socio-economic status of the household as expressed through the asset index.

4. Results

4.1. Impact of the climatic perturbations on mobility patterns

The climatic perturbations (see Table 3 for summary of impacts) in both sites resulted in a variety of mobility responses. The survey recorded changes to households' mobility patterns as a result of the climatic perturbations for the following classes of movement: frequency or duration of short-term mobility into or out of the village, changes to longer-term mobility (into or out of the villages), unplanned return mobility and temporary relocation. Overall, the most commonly deployed mobility response was the temporary relocation of the inhabitants of Wanzhuang in response to the flooding (85 per cent of survey respondents in Wanzhuang). For both sites, a minority of survey respondents (less than 20 per cent) reported changes (increases and decreases) to all classes of mobility out. For mobility into the villages, across all classes of movement a minority of households reported changes in Dongdian but not for Wanzhuang. The cases of no change were reported for a decrease in the number and frequency of people using mobility to return to the village (Table 3).

Variable	Wanzhuang (flood)	Dongdian (drought)
Agriculture	Significant and uniform impacts on soya and corn crop with losses also reported for harvested wheat	Range of impacts from very little to almost complete loss on major crops (wheat, soya, corn)
Physical assets	Impacts reported on a number of physical assets including homes (59%), items in the home (47%) and farming equipment (15%)	Majority of respondents (89%) reported no impact on physical assets
Food availability	80% of respondents reported that the availability of food decreased by either 'a little' or 'a lot'	Just over half (53%) reported decreasing availability of food
Health	More than half (53%) of respondents reported an impact on health	Only 37% respondents reported impacts on health
Financial assets	Majority of households across both sites reported impact on finances but the length of time taken to recover ranged from less than 3 months to more than 2 years	
Impact across mobility types	Variety of mobility responses (frequency, duration and distance) employed by a minority of different households with no one type dominant. Majority of households report no change in mobility behaviours in response to the perturbation.	
Short duration, short distance mobility	More short duration, short distance coping mobility	Negligible short duration, short distance coping mobility
Longer duration mobility	Peak in longer duration mobility during and just after the flood event (but not statistically significant)	Peak in longer duration mobility during drought event (but not statistically significant)
Return migration	Some return migration, but not substantial	
Number of dependents	Comparably more households reducing number of dependants	Few households reducing number of dependants

Table 3: Summary of impacts of climatic perturbations on study sites (n=97; period of analysis=2007 to 2012)

Excluding the government-initiated evacuation of Wanzhuang, the evidence suggests that, for a majority of households the impact of the perturbation on mobility was negligible. However, for a minority of households the perturbation did contribute to a change in mobility behaviour in a variety of ways. In effect, the perturbation disrupted existing patterns of behaviour as households sought to cope with and adapt to the new circumstances brought about by the climatic perturbation. This inconsistency between households suggests that the impact of the perturbation on mobility behaviour was strongly socially differentiated, with households drawing on a specific portfolio of responses depending on their existing resources, mobility endowments and mobility entitlements.

4.2. Households practising short-term mobility appear more resilient to livelihood shocks in the context of weather-related variability

The analysis of the household survey, rural appraisal activities and interviews shows that mobility has, in some cases, enabled individuals and households to increase their resilience to climatic perturbations. Figures 1 and 2 show groups of households exhibiting different types of mobility behaviour (in direct response to the climatic perturbation and more generally) disaggregated by mobility type and their scores on a range of self-perceived and externally-derived measures. These measures provide an indication of how well a household perceives themselves and is perceived to be doing, through which we infer levels of resilience.

Figure 1 shows household use of mobility in response to the impact of the climatic perturbation. Four types of mobility are included in the plot: households that report using some form of mobility (including relocation due to the flooding in Wanzhuang), households that report using no mobility whatsoever, households that report using some form of mobility but not to relocate, and households that report using mobility only for the purpose of relocating from Wanzhuang. Looking at the self-perceived measures, the households that score themselves higher are those that did not use mobility to relocate but may have used mobility in other forms. For the externally-derived measures, the differences between households exhibiting different types of mobility behaviour are smaller but often reversed, with those households not using mobility to relocate appearing to do worse.

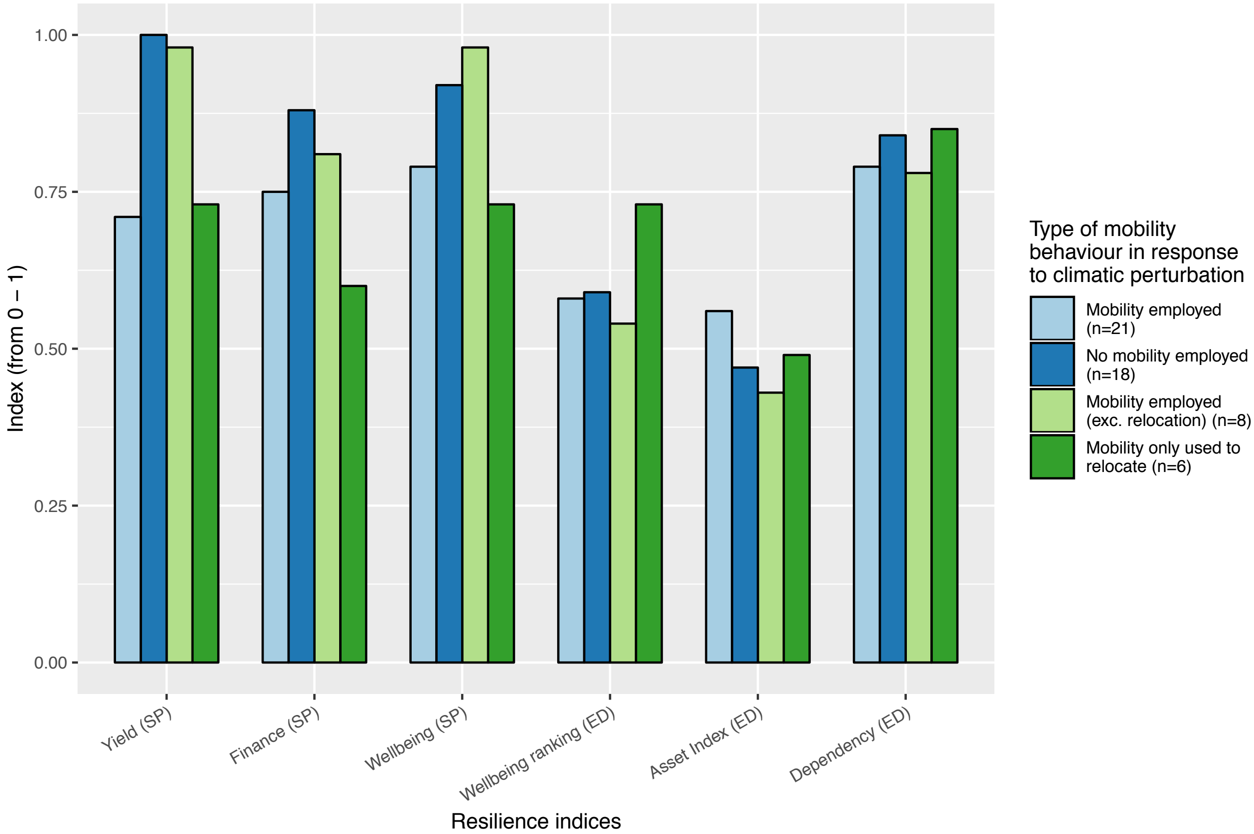

Figure 1: Indices of resilience for households exhibiting different types of mobility in response to the climatic perturbation (n=53; Wanzhuang=flood; Dongdian=drought; SP=self-perceived; ED=externally-derived)

Figure 2, shows households use of mobility over a longer time-period that includes the climatic perturbation but is not necessarily in response to it. Over the period that incorporated the climatic perturbations, households that practiced mobility but retained *de facto* residence within the village (through circular or seasonal mobility) reported larger improvements in yield and a lower dependency on agriculture compared to those households that only utilized longer-term migration or practiced a combination of different types of mobility. Furthermore, the households using only short-term migration scored highest in the wellbeing ranking (community-perceived measure) and the asset index (an externally-derived measure). For households with longer-term members absent through migration the picture is much more mixed, these households show greater dependency on agriculture, levels of wellbeing and lower scores on the asset index. The self-perceived measures of change for the immobile households tend to compare favourably in relation to the more mobile households whilst the reverse is true of the externally-derived measure.

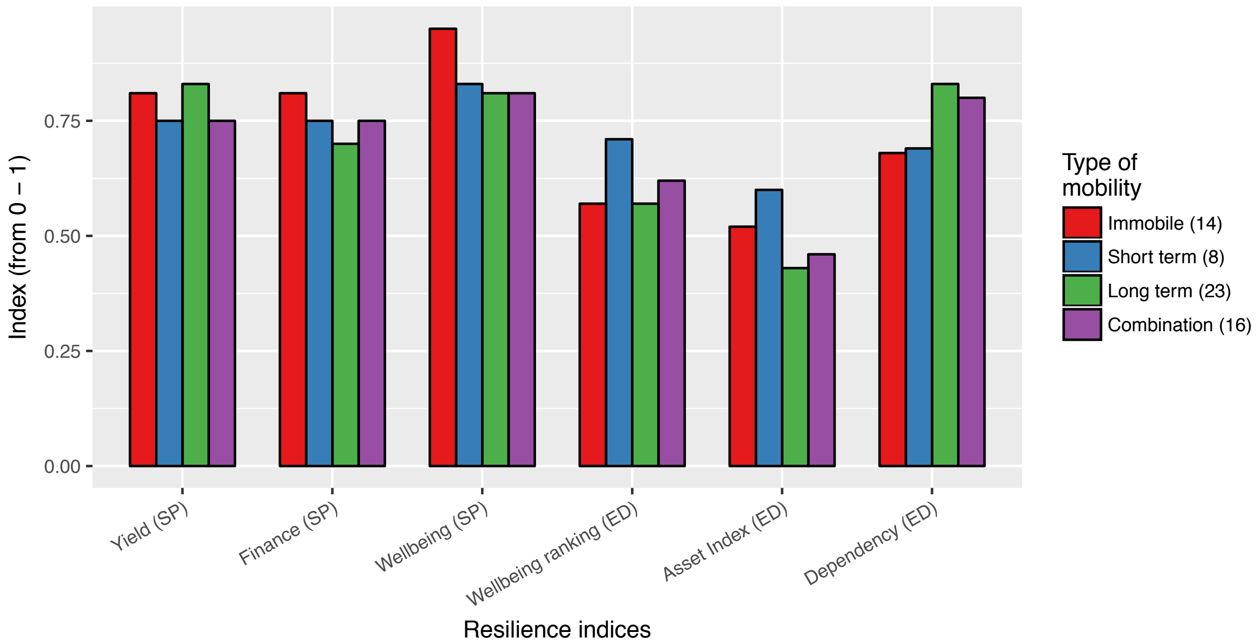

Figure 2: Indicators of resilience for households exhibiting different types of mobility over the period of analysis including the period of the climatic perturbations (n=61; period of analysis=2007 to 2012; SP=self-perceived; ED=externally-derived)

Although the differences for individual measures between mobility types were not significant, the overall results suggest that the group of households employing short-term mobility were doing moderately better in comparison to other groups on a range of self-perceived, community-perceived and externally-derived measures especially when compared to the other groups that utilize mobility. These data suggest that the group of households employing short-term mobility are more resilient to the sort of livelihood shocks that are experienced during periods of climatically-induced environmental change.

One of the most notable features of figures 1 and 2 is the difference between the self-perceived measures and the externally-derived measures for households exhibiting certain types of mobility. In figure 1, the group that only used mobility to relocate scored themselves amongst the lowest on the self-perceived measures and were the highest in two of the three externally derived measures. In figures 1 and 2, the immobile households scored themselves very positively for the self-perceived measures of change. Whereas the externally-derived measures of wellbeing or the asset index is often one of the lowest. This suggests that these households perceive themselves to be well, whilst the external measures imply this may not be the case.

<u>4.3. Choice is an essential element in mediating resilience under conditions of mobility</u>

Interviews were undertaken with a subset of the surveyed households and those who had migrated to explore the circumstances through which household members exercised mobility choices. The clearest example of the role of choice as a mediator of resilience is for households that have retained a *de facto* residence within the village. We present three examples to illustrate the importance of choice and how it can have potentially significant implications on mobility and resilience.

Example 1: an immobile household.

Wang Hong-Li is 82 and lives with his wife, aged 81, in Wanzhuang, he has one daughter who lives in a village nearby. Wang Hong-Li and his wife have two *mu* of land (a *mu* equals 666.66m^2) that they farm for themselves. During the interview Wang Hong-Li stated that he could not farm any more land owing to his physical condition, he is reliant on help from his extended family (nephew) and some hired labour to do some of the more strenuous activity for him. Despite some minimal state support, Wang Hong-Li is reliant on agriculture for his subsistence.

> If I don't farm, I have nothing to eat [and] [I]f we can get good harvest in crops, we have enough to eat, while if not, we don't have enough to eat (20140203 Interview Wang Hong-Li).

In recovering from the flood, Wang Hong-Li was reliant on support from two main sources of support: the state and his daughter. Yet Wang Hong-Li's ability to respond and cope with shocks and stresses is limited in a number of ways. At a cognitive level, his ability to conceive of life beyond the immediate area appears constrained. Such cognitive limits are perhaps related to a combination of life history and the impact of the stricter controls in movement up until the mid to late 1980s. Other than one daughter (who remains close but is considered part of her husband's family) and a nephew, Wang Hong-Li has no other surviving immediate relatives. Wang Hong-Li's social network is very limited and strongly focused within the village. Institutionally, the state structures at a local and national level are working as barriers to mobility. Finally, he is poor (as demonstrated through his receipt of government support) with very limited assets, suffers from ill health and is dependent on subsistence cropping.

Wang Hong-Li appears vulnerable to local (weather-related) shocks or stresses that reduce his yield and the functioning of his social support network. For example, an event that negatively impacts on his ability to farm whilst concurrently affecting his daughter's household (reducing her ability to provide remittances) and disrupts his local support network would further increase the pressure on the minimum guarantees provided by the state. In this instance, Wang Hong-Li has limited resources and low levels of mobility endowments and mobility entitlements brought about by his reliance on the state. The low levels of wealth and resources possessed by Wang Hong-Li are major impediments to his mobility choices and also influence his resilience to shocks and stresses.

Example 2: mobility enacted to return to the village

Wang Zhou is 48 years old, married and has two children (aged in their mid-twenties). Whilst their children were growing up, Wang Zhou and his wife worked and lived in Shanghai and his children remained in Wanzhuang with Wang Zhou's parents. During this time Wang Zhou was able to remit money back to his parents including during times of hardship as was the case with the flood in 2007. In 2013, Wang Zhou's father became ill and Wang Zhou and his wife had to return to Wanzhuang to care for him, giving up their jobs in the process. Wang Zhou has started farming again but the change in jobs has had an impact on the household economy. Wang Zhou stated that his father used to farm and he used to work in Shanghai: stretching the household between two locations, boosting the livelihood options available to the family and increasing their earning potential.

Since Wang Zhou's father became ill, it has become more difficult for the household as they make less money and have greater outgoings. For example, Wang Zhou reported that they had to borrow money to fund the cost of an operation, as the state would only contribute a small amount to the medical costs. Repaying this money was entirely dependent on the income generated through farming.

> We are not sure [when we can repay]. In more than one year, if there is something wrong, we can only go home for getting in the crops, and we can pay it off if we have money left. But if we don't have money left, it will cost another year [through farming] (20140203 Interview Wang Zhou).

Wang Zhou's father's illness has curtailed his ability to work (reducing the amount of labour available to the household) and increased the demands on the other adult members of the household who are obliged to care for him. In addition to his father, Wang Zhou is also responsible for bringing up two grandchildren who live with him in Wanzhuang. Wang Zhou's house was damaged in the flood in 2007 and a village level moratorium on new building and renovations has meant that the house has yet to be repaired. The poor state of repair the house is in has resulted in it being classed as 'dangerous to live'[2]. Wang Zhou stated that should another flood occur the family would be strongly affected and the cost of rebuilding would have to be met through loans and borrowing as they have no money to fund such measures.

The confluence of these factors on Wang Zhou's life make him much more vulnerable to future environmental perturbations (such as a flood), a point that he himself articulated during the interview. The account of Wang Zhou highlights the interaction of household institutions (its organisation), social norms and laws and expectations (*bao* and *xiao*[3]) that placed an obligation on Wang Zhou to return to care for his father and the wider societal changes occurring in China. Cumulatively, these personal circumstances, institutional factors and broader changes in China (increased mobility, growing urban rural wage differences) obliged Wang Zhou to use his mobility endowments and deploy his mobility entitlement to return to his village to care for his father. However, Wang Zhou and his family now appear more immobile and are less resilient to future shocks and stresses.

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[2] Category of building condition.

[3] *Bao* (reciprocity) and *xiao* (filial piety) and emphasises the responsibility of children to care for their parents into old age (see Sung 1998).

Example 3: household resides in village and the household head works away for portions of the year

Wang Chung has lived in the village all his life earning a living through teaching and administration within the local government. Wang Chung is 68 years old, is married and has two children. In addition to his clerical work, Wang Chung maintains 14 *mu* of farmland, which is considerably larger than the average plot size for Wanzhuang (8.35 mu), maintained by his wife when he works away. Wang Chung states that,

> I had been doing the water works for many years before I left my village. I was confused at that time thinking whether I should work outside. On the one hand, I was not sure about the income level of the new job. On the other hand, I was still working on how to become a official [recognised by neighbours and undertaking a specific role] worker in the village. But my sister-in-law told me that they lacked a technologist and I happened to be free at home, I went to the building site and I get to know that they would offered me a better salary. Therefore, I made the decision [to go] … It was right. Now I get a much better income (20140204 Interview Wang Chung).

The excerpt demonstrates the value in stretching livelihoods to exploit additional opportunities to boost income. Wang Chung was able to convert the resources at his disposal: family connections to open up job opportunities, the ability of his wife to manage the farmland, and the regular income from agricultural activities enable him to pursue other livelihood activities by deploying his mobility endowments and mobility entitlements. By using mobility to support the process of diversification Wang Chung has boosted the household income and reduced his reliance on agriculture, therefore reducing the impact of variations in yield due to weather-related shocks and stresses (such as those caused by floods and droughts) in his home village. Furthermore, the networks and contacts he has developed will also help should he decide or need to relocate to other areas. Finally, should his work outside of Wanzhuang end then he can fall back on his farming and networks within the village and surrounding area.

As stated in section 3.1, the life history interviews were undertaken to generate data on significant events within the respondents' lives and to understand if and how mobility featured. Interestingly, whilst the climatic perturbations were discussed during the interviews they were not highlighted as a primary motivator of mobility. Instead, the data present a more complex picture of mobility (and immobility) decisions as multi-causal. The spectrum of mobility responses shows the role of the state, the importance of family ties and social networks, individual ambition, and happenstance. Changing environmental conditions are visible within the data but given form in indirect ways through, for example, decreasing agricultural yields and the provision of remittances.

5. Discussion

5.1. Mobility as a means to diversify livelihood options and access locations unaffected by the climatic perturbation

Literature on resilience of resource dependent communities frequently cites diversification as a key means through which households can overcome shocks and stresses (Ellis 1998; Ellis 2000; Goulden et al. 2013; Nguyen & James 2013; Bennett et al. 2014). In this study, households that have diversified through the use of short-term mobility appear to be more resilient when compared to those households with members practicing longer-term mobility (as shown through self-perceived and externally-derived measures). Although derived from small sample sizes, this finding contradicts assertions made in some previous studies on links between farming and migration that infer a negative impact on productivity for shorter-term, more circular migration (see, for example, Li & Tonts 2014). More broadly, the research suggests that the extent to which longer-term mobility and diversification are assumed to result in positive outcomes for households is less clear cut than sometimes portrayed (see, for example, Agrawal and Perrin 2009 and Banerjee et al., 2017). As such, we recommend more research on these issues is warranted to understand the extent to which these findings are replicated elsewhere.

The difference between the households practicing short-term and long-term mobility in this case could arise from the nature of the relations the household members retain with their rural home. A household practicing more circular mobility appears well adapted to cope with livelihood shocks and stresses in the village. The farm-related income provides an income base that serves to meet the subsistence needs of the household. This income source is augmented by other non-farm activities that act as insurance when the income from agriculture is disrupted. The resilience of that household is derived both from the diversity of livelihoods practiced and an increase in the geographic area within which livelihoods are practiced. Whereas, the impact of losing labour, in the form of longer-term out mobility, allied with the reluctance to ask for substantial amounts of support reduces the ability of those households to sustain increases in yield as additional investment is reliant on remittances that may not be sufficient for the household's needs.

Households that are immobile (both in response to the climatic perturbation and more generally) also show evidence of increased resilience when looking at self-perceived measures although the picture is more mixed when compared with the more mobile households when looking at the externally derived-measures. These more immobile households appear to lack the means to invest in and improve their livelihoods owing to the limited income that can be derived from a more exclusive reliance on agriculture. Béné et al. (2014), in a review article examining poverty and resilience, refer to the notion of adaptive preferences whereby people learn to live with poverty by supressing wants and desires. In other words, the households reporting greater increases in yields, finances and wellbeing (indicating greater resilience) may be expressing the personal processes through which they have adjusted their expectations to cope with deteriorating conditions and marginal improvements are considered much more positive than would be the case for other households with greater levels of wellbeing.

5.2. Choice as a mediator of resilience

As shown through the example households, the way in which mobility is or is not used is strongly socially differentiated. Households of similar levels of wealth and exposed to the same livelihood shock can and do respond in very different ways which results in very different outcomes. Building on the work of Lister (2004), Coulthard (2012) and Brown and Westaway (2011), we present in Figure 3 a taxonomy of mobility showing differing levels of mobility endowments and entitlements. The figure is differentiated along two axes: immobile to mobile and obliged to elected, reflecting movement and choice respectively.

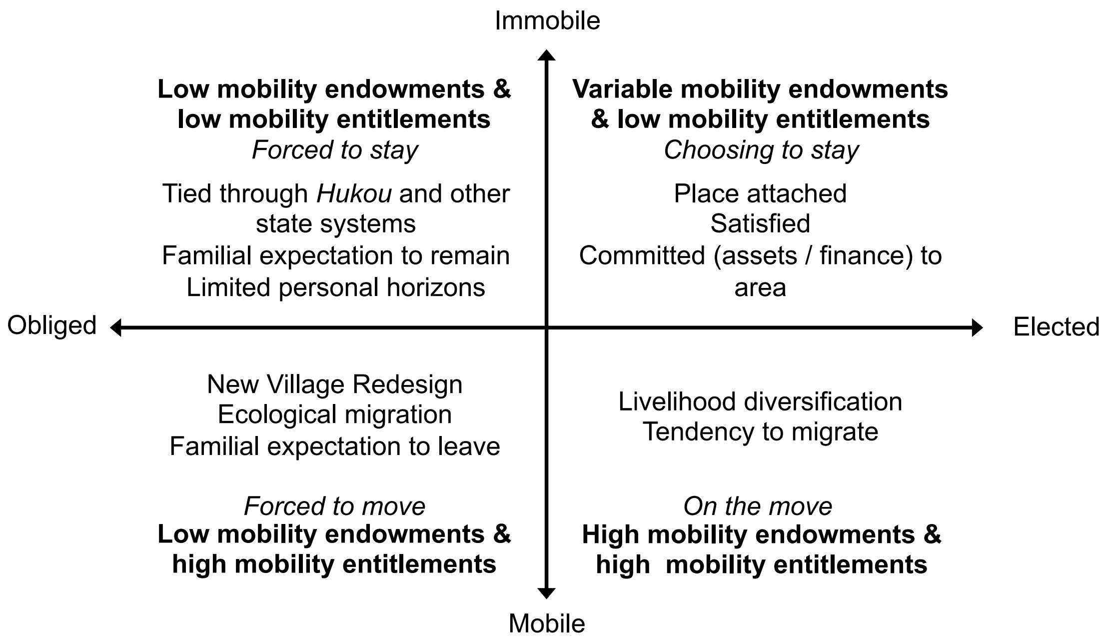

Figure 3: Adapted taxonomy of mobility showing different levels of mobility endowments and mobility entitlements with hypothetical examples based on the case study data

Low mobility endowments relate to the rights to be mobile and include a small asset base limiting one's ability to move, low levels of education hindering opportunities in other locations, issues associated with state structures such as the *Hukou* and tied support, and the obligations placed on members of a family to remain in the rural location to ensure an active claim on the land whilst other members are more mobile. Conversely, *high mobility endowments* are associated with those who have the financial means and good levels of education to support mobility, a supportive family and social network, and the personal ambition to move. Our understanding of *low mobility entitlements* relates strongly to the linked set of mobility endowments. In cases where mobility endowments are low and one's right to move is constrained, then one's ability to deploy mobility is minimal. Conversely, if one's mobility endowments are high then we can infer that there is no wish to deploy their mobility entitlement and that person is more likely to be staying put as they are place attached, satisfied or committed to the area in terms of investments, assets, or more socially. As with low mobility entitlements, our understanding of *high mobility entitlements* is again influenced by the linked set of mobility endowments. Cases where mobility endowments are low but mobility entitlements high are likely to be associated with instances of forced mobility. In China this may be due to instances of village reorganisation[4] (Long et al. 2010) or ecological migration (Mao et al. 2012). Alternatively, in instances where mobility endowments are high we can assume that the person is mobile because they have a desire to be (for example to increase quality of life).

Referring to the examples provided previously, Wang Hong-Li is in the upper left quadrant with low mobility endowments and low mobility entitlements. He is unable to be mobile even if it is desired and this contributes to his low levels of resilience. Wang Zhou is located in the bottom left quadrant of the figure. He was working in Shanghai until his father's illness obliged him to move back to Wanzhuang. To all intents and purposes, this move was unwanted and was something that Wang Zhou felt obliged to do. Now that he has relocated to his ancestral village he is reliant on farming and appears less resilient to climate-related environmental perturbations. Lastly, Wang Chung is in the bottom right quadrant. His mobility appears to be more elected and he has used it to diversify his livelihood with associated increases in levels of resilience.

The typology is, inevitably, a simplified and static representation of people's lives and needs further empirical evidence to test its applicability in other settings and contexts. Over time, households and individuals will move between the different quadrants as is evidenced in the case of Wang Zhou. As a result of his father's illness, he felt obliged to move back to his rural home (the bottom left quadrant), since returning his ability to be mobile appears more constrained and he may now be located somewhere in the upper left quadrant with low mobility endowments and low mobility entitlements. Further, whilst the data presented have been primarily at the level of the household, considerable variation will exist within households. For example, an increase in the mobility endowments and entitlements of some individuals within a household cannot be assumed to be universally experienced by other individuals within the same household (indeed, it may have the opposite effect).

We argue that those households at the elected end of the spectrum are more likely to be resilient (whether by externally-derived or self-perceived measures) to livelihood shocks and stresses than those at the obliged end of the spectrum and this applies regardless of a households' level of actual mobility. Despite the more exploratory nature of the findings suggest the need to draw a theoretical distinction between those who are able to be mobile but choose to remain immobile at one end of the spectrum and those who are unable to be mobile (except *in extremis*) at the other end of the spectrum, highlighting the need to look beyond simple outcomes (in this case mobility). Human actors are never just passive in the face of change (or stability) and will seek to understand and prioritise certain behaviours based on their understanding of

[4] The involuntary moving and grouping of 'old' villages into new purpose-built villages in other locations

the world around them (Mclaughlin & Dietz 2008). In the case of immobile households, the distinction between whether a household is trapped or voluntarily immobile is highly likely to influence their level of resilience to shocks and stresses (Foresight 2011: 35).

Whilst there is a danger that the argument becomes circular in that households are trapped because they are poor and they are poor because they are trapped, this is less likely within the Chinese context. The influence of the state over one's ability to move, remains significant and is enacted through policy instruments such as (but not exclusively) the *Hukou* system. The *Hukou* system links place of residence with access to social welfare support, government employees' place of work is determined by the state, and the state has the power to relocate whole villages if they are deemed unviable (in terms of the population). Whilst the links between the *Hukou* system and welfare support will impact more so on those households living in poverty, the other two examples can apply just as much to households that are considered wealthy as those that are considered poor.

5.3. Methodological innovations and study limitations

China's politics and institutional architecture play a central role in the lives of its citizens.. In relation to migration, Deshingkar (2005) argues that the diversity of movement patterns is historically, socially and culturally specific. In a similar vein, the influence of the *Hukou* system, as an institutional barrier to mobility, is commonly acknowledged as profound in spite of the reforms over the last 30 or so years (Cai 2003; Chan 2011). More generally, the continued importance of other socialist era instruments of state control is a point commonly acknowledged by scholars writing on China including Zhang (2008), Fan (2004) and Chan (2010). These examples demonstrate the need for theoretical and methodological approaches that are able to understand or explain the changes in modern China (Zhang 2008). Our findings bear this out in relation to mobility, choice and resilience and demonstrate the need to design and implement research that is sensitive to the prevailing social, political, cultural and economic context within which the research is taking place.

The mixed methods approach used in this study reveals differences between self-perceived and externally-derived measures of resilience and how they relate to mobility as well as to generate insights concerning the multi-casual nature and complexity of mobility decisions. Mixed methods approaches have only sparsely been used to measure social resilience to date and, in this case, generate useful insights methodologically and empirically. More generally, the mixed methods approach provides a very rich understanding and appears particularly suitable for exploring complex phenomenon such as those under study in this research (Bryman, 2008: 629 - 652; Gray, 2014) and for examining a role for more subjective evaluations of resilience based on self-reporting (Béné et al. 2016; Jones & Tanner 2017). One of the main limitations of the study was the small sample sizes within the analysis of subsets of data of the household survey (especially when the data were disaggregated at a sub-village level) that precluded the use of a range of statistical analysis techniques. In these instances, we have been cautious not to over-generalize across populations in other contexts.

6. Conclusion

In the results presented here mobility has increased the resilience of some individuals and households in general and in regard to specific climatically-linked environmental changes. The results suggest that the use of mobility constitutes an adaptive response to constrained livelihood opportunities in an economically and ecologically marginal location. In this case, mobility has enabled individuals and households to diversify their livelihoods and exploit opportunities for boosting income. In so doing, individuals and households have increased the number of potential locations they can utilise to generate livelihood opportunities, some of which may be outside the area physically affected by the weather driven shock or stress. These findings show that households and their members use multiple locations, often concurrently, as part of their portfolio of livelihoods to manage and cope in times of stress. This suggests that, if these findings hold in other locations then, attempts to understand place-specific risks have insufficiently engaged with the complex reality of this translocal householding and what that means for how households utilise and derive benefits from different locations (Harvey 1989; Deshingkar & Grimm 2005; Bakewell 2007; Collyer & King 2014).

This research shows that resilience and wellbeing are not always mutually reinforcing and suggests a need for further research on their relationship. For example, individuals and households that were living in conditions of poverty were potentially adapting down their preferences or limiting their expectations. These actions suggest that in some cases individuals invest in resilience at the expense of wellbeing (Coulthard 2012). This example therefore highlights the fallacy of assuming that greater resilience is beneficial to wellbeing. Hence our findings align with Béné et al., (2012) and others who argue that increased resilience does not necessarily lead to a reduction in poverty. Caution is needed therefore, when seeking to build resilience to ensure that wellbeing is also enhanced rather than compromised.

In this paper, we show that wellbeing is affected by more than mobility outcomes in the context of environmental change. Mobility through choice appears to be more likely to result in positive outcomes than mobility if it is obliged or forced. Similar findings apply to immobility. Whilst the findings are limited to the case study sites, we see that the motivations for moving or staying, the ability to make that choice and how that choice is realised are crucial in determining the impact of the outcome on lives and livelihoods. Hence this research points to a new frontier of relating wellbeing to individual intentions and their lived realities and what this means in the context of mobility decisions.

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