How can a livelihood strategy play a role in addressing climate change?
Lessons in improving social capital from an agricultural cooperative in Ukraine

Abstract

Increasing support to small-holder farmers plays an important part in meeting the adaptation-mitigation challenge of agriculture: realising global food security under increasing climate variability, while also reducing greenhouse gas emissions. Cooperatives offer a well-established livelihood strategy and means to support small-holders. This cased study examined a Ukrainian cooperative using the Sustainable Livelihoods Framework to understand the role cooperatives play addressing climate change, and the process by which capacity is used to adapt and/or mitigate climate change. Climate change does not prompt cooperative formation and climate change mitigation might not be a planned outcome in a livelihood strategy. However, modifying the SLF to include climate change outcomes provides a means of understanding the process by which building capacity results in mitigation and adaptation outcomes. Cooperative members and stakeholders outside of the cooperative participated in semi-structure interviews. Social capital and trust emerged as a theme with interviewees from all backgrounds. Initially closed networks and distrust prevented members from joining the cooperative. As the cooperative built new networks, the benefit of joining became apparent to members. Information gained through networks improved access to other capitals, improved livelihood outcomes and addressed climate change. Social capital fulfils key roles in the process of capacity building and implementation of sustainable measures; thus improving social capital could arguably be the chief benefit of cooperatives.

Key words: Adaptation, Mitigation, Agriculture, Capacity Building, post-Soviet

1. Introduction

Agriculture must meet a dual challenge: production needs to improve despite increasing climate variability from climate change (adaptation), and environmental impacts such as greenhouse gas emissions and land degradation must be reduced (mitigation). Training and supporting smallholders has increasingly been viewed as a way to achieve climate change adaptation, mitigation and sustainable agriculture (Bage, 2008; IFAD, 2013; Wolfenson, 2013), while cooperatives have been promoted as one of the most effective ways of supporting smallholders (FAO, 2012). Cooperatives strengthen smallholders through collective action, thereby addressing many of the challenges they face including: poor market access, low purchasing power for inputs and reduced access to financial services (Crowley, 2013; UN News Centre, 2012). Cooperatives can provide many improvements to livelihoods and in this context can be viewed as a 'livelihood strategy' defined as the way people make a living (Chambers & Conway, 1991).

Climate change does not motivate smallholders to form cooperatives. Indeed climate is not the immediate reason for many decisions in agriculture, but many daily decisions affect climate change mitigation and have long term consequences for vulnerability and adaptation. For instance, continual cropping might occur for short-term economic gains, but can degrade soils making them less resistant to drought, while also affecting climate change mitigation by reducing the carbon stored in the soil (Lal, 2010). Similarly, some financially motivated production changes, such as improvements to fuel efficiency, also benefit climate change. Therefore, context and other motivating factors need to be considered along with climate when researching mitigation and adaptation outcomes. Positive outcomes can happen even when climate change is not a motivating factor.

The sustainable livelihood framework (SLF) is particularly advantageous when other social and environmental issues are deemed more pressing than climate change. The SLF allows for an understanding of decision-making in the context of sustainable development, it enables incorporation of climate change into other development goals and it emphasises the improvement of response capacity. The capacity to adapt or mitigate have the same determinants as sustainable development. All three responses depend on the political, social, and cultural context; governance; and access to financial, social, physical, human and natural capital (Brooks & Adger, 2005; Brooks et al., 2005; Swart & Raes, 2007; Yohe, 2001). However, the indicators of capacity only reveal potential, while application of this potential depends on decision-making and other processes (Vincent, 2007). Moser and Ekstrom (2010) proposed that performance at stages could be the key to understanding adaptation and mitigation and that elements of capacity may substitute for each other. Research is needed to understand how to address barriers and how capacity is used to achieve adaptation and mitigation (Klein et al., 2005).

This case study helps to fill that gap by analysing a cooperative in Ukraine. The SLF informed interview questions and coding of responses. Climate change was made explicit by modifying the SLF to include planned adaptation and mitigation in the livelihood outcomes as shown in figure 1. In this case, the aim was to gain a qualitative understanding of the role cooperatives can play in addressing climate change even when it is not a motivation for their creation. The process was broken into four stages: 1) before, 2) commencing, 3) growing and 4) realising. The first stage identifies motivations and barriers to forming a cooperative. The second details how barriers were addressed. The third examines the conditions necessary for the development of the cooperative, while the final stage addresses livelihood outcomes with particular attention to planned adaptation. The entire process needs to be understood since barriers to cooperative creation effectively also hinder addressing climate change. Furthermore, this study moves beyond barriers by revealing how barriers were addressed in a successful case.

This research found that at every stage the most apparent changes related to social capital improvements. Social capital has two components: cognitive aspects including trust, norms and beliefs and structural aspects such as networks and groups (Uphoff, 2000). Moreover, the types of connections can be divided further into the connections between people within the same group or community; connections to people in a similar situation but outside of the group; and connecting to people with greater power termed: bonding, bridging and linking social capital respectively (World Bank, 2000). Social capital has been deemed crucial in sustaining successful development interventions, disseminating information, building human capital, reducing vulnerability and addressing climate change (Adger, 2003; Brooks & Adger, 2005; Coleman, 2000; Klein et al., 2005). Nonetheless, social capital can produce negative outcomes. For instance, social networks maintain corrupt systems. In the case of climate change, specifically heat waves, bonding social capital was found to not reduce and potentially even worsen the vulnerability of the elderly in the UK, since inaccurate information can also be spread through networks (Wolf et al., 2010). Meanwhile, Jones et al. (2014) observed that a greater trust in institutions translated into a greater willingness to accept these institutions suggested climate change solutions. By keeping both the cognitive and structural types of social capital distinct the analysis reveals the dynamic nature of social capital rather than treating it as a static entity that can be measured. (INSERT footnote sc measure debate)

The importance of social capital has been covered extensively in sustainability literature, how to foster and improve social capital and how it can function to address climate change is not well understood. While this study contributes specifically to sustainability issues in post-Soviet states, it also has wider application to understanding how social capital, one element of capacity, develops and functions. As explained in the next section, the formation of a cooperative in Ukraine provides a particularly valuable case for understanding how social capital affects climate change adaptation and mitigation.

2. Reasons for cooperative focus in Ukraine's south

Two billion smallholders produce seventy per cent of the world's food (Bage, 2008; Fairtrade Foundation, 2013). Paradoxically, smallholders often live in poverty, encounter food insecurity and political, economic and social factors make them particularly vulnerable to climate change (Morton, 2007). While the importance of smallholders in global food production, their marginalization and the potential of cooperatives to provide much needed support has received increasing recognition, this deliberation has mostly focused on developing nations in Africa and Asia. Yet eastern European countries depend predominantly on smallholder production. Ukrainian smallholders produce over 60 percent of the agricultural output of the country (Thuroczy, 2009). In addition, the country has a poverty rate of 20 percent with the majority of those in poverty living in rural areas (Round et al., 2010).

Ukraine has traditionally and continues to be an agriculturally important country. While Ukraine could have significantly higher yields and better agricultural production, it ranks among the top 15 wheat producing countries and is an important producer of grains and technical crops (Karacsonyi, 2010; World Bank, 2005). Moreover, climate change mitigation in Ukrainian agriculture has received little research attention despite vast amounts of arable land (Smith, 2007). Finally, compared to other regions in Ukraine, the south is drought-prone and likely to have the greatest climatic impacts due to droughts (Falloon & Betts, 2010).

Cooperatives can be open organisations for smallholder collaboration, so it appears to be a simple solution to the challenges of sustainable development; however, post-Soviet history complicates their implementation in Ukraine. Collectivization was violently forced on Ukrainians; the purpose of the collective farm was to benefit the state and the memory of this period still serves as a barrier for cooperative formation (Turner et al., 2013). Smallholders prefer to work individually due to this historical memory, while cooperatives require trust and collaboration. Nonetheless cooperatives have been successfully established in Ukraine (personal communication: Larissa Artmenko, Agricultural Extension Services). This research analyses the adoption and

evolution of a livelihood strategy to understand how cooperatives can function to address climate change in Ukraine even when addressing climate change is not an explicit objective.

3. Methods

This exploratory case study required a successful cooperative in order to understand the conditions necessary for an effective livelihood strategy. A rural development worker in Kyiv provided the contact information for a key informant in Khersons'ka, who in turn facilitated access to the milk service cooperative.

Interviews were carried out at three different scales: national (national experts n=18), regional (regional experts n=13, farmers in region n=5) and cooperative (cooperative staff n=2, cooperative members n=8). A purposive sampling strategy was used to gain a variety of perspectives from various stakeholders and farmers. Interviewees varied in expertise and knowledge; therefore, open-ended questions were administered in a semi-structured format. Typically interviews were conducted in Ukrainian with simultaneous translation; however, some of the national interviews were conducted in English. All interviews were recorded after verbal permission was granted by interviewees. Interview length varied depending on type. Stakeholder interviews took between 30 minutes to 1 hour, farm level interviews typically lasted longer, while some of the smallholder interviews were conducted during milk truck pickups and were much shorter.

Initial questions related to access to capital, adaptation, mitigation and vulnerability context as shown in Appendix A, but interviews were semi-structured and included follow-up and probing questions. The interviews of national experts, regional stakeholders and farmers helped to understand barriers and challenges in Ukraine and Khersons'ka respectfully. Cooperative members and leaders were questioned about joining and forming the cooperative. Interviewees who were not full members, but still sold milk through the cooperative were asked about the motivations for joining the cooperative and about any unexpected benefits received after joining. Interviews were conducted in the spring and summer of 2012. In addition, speeches made during an event celebrating the cooperative were treated the same as interviews and coded during analysis. In order to understand the progress of the cooperative, follow-up interviews along with tours of the office, pasture and milk collecting facility happened in the summer of 2013. Each interviewee type contributed to understanding different stages and required different types of questions as shown in Table 1.

Once interviews were transcribed coding was completed using Max QDA software. The coding process was involved a mix of in-vivo coding informed by grounded theory and coding informed by the SLF. Codes included the vulnerability context, access to capitals, changes in processes, and livelihood outcomes. Memos were written shortly after each interview using a contact summary template (see Miles and Huberman,1994). In these memos, themes that emerged from each interview were noted. Social capital and trust was a theme from interviews at each scale and thus became the focus.

4. Results

The first section of the results draws from interviews at all scales and interviewees from all backgrounds to examine the 'before' stage to demonstrate how the vulnerability context including climate, market access and historical memory motivated and hindered the adoption of livelihood strategies[1]. The second section addresses the surmounting stage by arguing that bonding social capital initially prevented members from joining the cooperative, but by building reputation over time the cooperative eventually overcame this barrier. The third section explores how the cooperative grew by creating bridging and linking social capital and the relationship between social and human capital. The final section relates improvements in capital access to livelihood outcomes. Particular attention focussed on planned adaptation for droughts.

4.1.Before: Vulnerability Context Motivates and Hinders Livelihood Strategies

All interviewees in Khersons'ka mentioned that droughts naturally happen every fourth or fifth year and thus it had always been difficult to farm in the region. Many farmers said that since they had always experienced droughts, they had learned how to adapt. Moreover, all farmers found accessing markets and getting a fair price for products difficult and more problematic than climate. Interviewees were split about whether they saw any significant changes in climate with some stating that shifts in seasonal patterns had become onerous, while others said it was part of a natural cycle.

[1] One criticism of the SLF is that it does not look at how the motivations behind the adoption of livelihood strategies.

Diversification is the most common livelihood strategy in the region particularly for smallholders. Smallholders in the region have jobs outside of agriculture, own a small plot of land in which they grow crops and have one or two cows or other livestock. Livestock are viewed as insurance in years with failed crops; however, farmers remarked that obtaining enough feed for cattle can be difficult during droughts.

According to interviews, cooperatives have been promoted as a livelihood strategy in Ukraine because combining outputs helps to access better markets and negotiate better prices, sharing inputs and equipment helps to improve production, and members can provide a social safety net to each other. This case study's cooperative deals solely with milk production. Smallholders produce more than 80 percent of the milk in Ukraine and are thus too important to supply for buyers to ignore (Danone, 2013). Therefore, buyers are motivated to work with cooperatives, so they can educate producers to improve milk quality and ensure a healthy supply of milk to customers. Before joining the cooperative, members sold milk at small local markets where sales and price are not guaranteed. They could spend all day at market and not sell their milk. Compared to the cooperative, they can get a higher price at local markets on good days, but good days do not happen consistently. Thus, members benefited and were motivated to join the cooperative because of the time saved by having milk picked up by the truck, and a more stable price with guaranteed sales.

Problems with accessing markets clearly demonstrate that climate is not the only determinant of vulnerability. In addition, historical context increases vulnerability and serves as a barrier to adopting some livelihood strategies. The 'Soviet Mentality' was one of the most common problems mentioned by interviewees from all backgrounds and formed a category during the data coding process. This response was followed by a number of issues related to cognitive human and social capital such as strong individualism, dependency, trust and fear. The absence of civil society in the Soviet system created a dependency on others, but orchestrated by the government, affecting both human and social capital (Powell, 1992; Rose, 2008). People have a desire for independence, but a want to be cared for by the government. This dichotomy was expressed in the following quote from a rural development expert:

"On one hand people are tired of being bunched up, they want to think for themselves and be independent, and care only about their own families. On the other hand they have this tradition of forced cooperation and mutual dependency that lasted for generations and it is very difficult to shake it off." (Rural Development Expert 1)

Trust and fear was mentioned consistently by various stakeholders as a barrier to cooperative formation and training farmers. Again this was related to Soviet history as explained by the head of an agricultural support group:

"Another problem is lack of trust and social capital. People are not able to organise and work together. From the Soviet period people have a lack of trust for working together." (Agricultural NGO Leader1)

As a result of this history, farmers do not want to work together causing a barrier to cooperative formation. Moreover, the norm of reciprocity does not apply in this case because many believe that people have ulterior motives when they give to others. Issues related to 'Soviet mentality' and the variety of respondents citing this problem are detailed in Table 2.

In summary, the vulnerability context includes more than just climatic factors. In the Kherson region, a drought prone climate leads to a strategy of diversification. Market and price challenges mean that cooperatives are a beneficial strategy, but the historical context amplifies vulnerability and functions as a barrier to cooperative formation. The next section explains how the cooperative addressed this barrier.

4.2.Commencing: Overcoming Mistrust and Bonding Social Capital

Larger farmers in the region tended to belong to a few groups, but in general smallholders do not join associations because of trust issues. The cooperative was the only group in which smallholders belonged. The leader of the cooperative explained how she dealt with fear and trust when starting the cooperative:

"People were afraid of joining the cooperative, so we started to get milk from other villages. Because people communicate, they saw that it is fine, so people started to join."

Social networks were present but these networks were used to perpetuate fear, so gossip initially prevented people from joining the cooperative. In this case, the bonding social capital in the village prevented progress. This sentiment was confirmed during interviews with some of the cooperative members. A few interviewees mentioned an earlier opportunity to buy pasture land and share the land through the cooperative, but villagers said that the cooperative leader would only take the land from them. The interviewees said it was a mistake not to trust and with hindsight they regretted the decision. However once the cooperative became successful and a good reputation was built, gossip became positive and smallholders were then motivated to join. Surprisingly small actions led to trust being built fairly quickly. Many members at the celebration mentioned that they enjoyed working with people in the cooperative because they had pleasant conversation and they brought sweets on Women's Day and other holidays. It was these small actions that convinced them over time that the cooperative was trustworthy.

The leader of the cooperative believed fear would continue to function as a barrier in the early stages of the next phase of the cooperative. This next phase involves developing the family farm model. Eventually they plan to have smaller cooperatives working within the cooperative, but first they plan to issue brochures explaining how it will work and to have two or three people try it. The leader explained that people are afraid to be the first to try the family farm model because they will have to demonstrate their work to others including journalists. According to her, *"Village people are modest and do not like to show off farms, so they are a bit afraid to do it"*.

In addition to building reputation for those they wanted inside as members, they also had to build an outside reputation. A staff member at extension services said the following:
"She (cooperative leader) got more support from Heifer and Danone because she works so hard and does not take money for herself. She gets more and more support over time." The cooperative leader mentioned the same matter the following year. She said that people recognised the cooperative and they got more support because nothing was stolen by the organisation, also adding that for nothing to be stolen is unfortunately rare in Ukraine.

4.3. Developing: Improving Social and Human Capital by Building Bridges and Acquiring Information

The first connection between human and social capital was the leadership capability of the head of the cooperative. She built her reputation along with the cooperative and this was paramount to building social capital. The idea of starting the cooperative came from the leader's engagement with other groups as explained here:
"A huge market opened in L'viv and we were invited. Representatives from Europe gave a presentation about how cooperatives work in Europe and how it is possible to work in Ukraine. From there came the idea, the region has lots of cows and problems with market so we thought to do it with milk. We have a problem with price but the number of cattle are good."

Her abilities were credited with bringing the people together by many inside and outside the cooperative. As noted by one smallholder,
"She has iron nerves because it is difficult to deal with people, but she is always friendly." *(Cooperative Member 2)*

The second connection between social and human capital comes from the leader gathering information through new social networks and then disseminating that information to members. As the cooperative's reputation became known, groups approached the cooperative, and in this manner, bridging and linking social capital were created. Shortly after the cooperative was formed, Heifer International offered assistance and Danone signed a business agreement with the cooperative. Members did not necessarily have to trust new groups, since the cooperative presented the information to members and was beginning to build trust. In interviews, cooperative members stated they were too busy to get information on their own, but through the cooperative they have increased access to information.

Likewise in 2012 interviews, the head of the cooperative said she got all of her information from her contact at extension services. A year later she said she was being contacted by groups and getting ideas from a larger network. As one example of bridging social capital, cooperative staff went to a cooperative in Dnipropetrovsk oblast to learn about building modern milking barns.

The cooperative was also able to create linking social capital by getting support and assistance from regional administrators which is very rare for smallholders in Ukraine. Indeed, interviewees at the national level remarked about the lack of support from national government and the inadequacy of regional administrations. It is very difficult to open a new business in Ukraine, as explained by the cooperative head:
"You have to do everything according to the law. All of the laws are written in such a way that they have to be broken by the officials who wrote them to do something."
When the cooperative needed lighting for their building where they accept milk, regional administrators helped to obtain connection to power lines.

Some members responded that they had no other option, but to join the cooperative. They had no ideas of how to improve their livelihoods. When asked about long term plans one cooperative member responded:
"Not worried about planning, not working at planning, this year we have enough food for the cattle."(Cooperative Member 3)
Similarly, when the cooperative leader was asked in 2012 about getting adequate feed for cattle during droughts she replied that she prayed. A year later she was taking a much more proactive approach. In the following quote, she explains how she uses her social networks to address any new issues that arise.
"There is a proverb that for the person who knows, the door is open. When we have some problems then we talk to regional government and try to refer to any doors we have for a way out. We try not to put problems aside, we try to solve them."

The head of the cooperative's ability to plan, to engage with new ideas and to seek solutions through social networks is fundamental to moving from just coping to being sustainable. The most apparent problem for the cooperative involves the interaction of two issues related to the vulnerability context. Drought conditions affect the price paid for milk and therefore the cooperative needs to address this issue to keep members content. The next section explains how price concerns led to planned adaptation and how access to social capital improves access to other capitals.

4.4. Realising: Increasing Access to Capitals and Improving Livelihood Outcomes

While producers are motivated to join the cooperative to get a better price for milk, the price paid to cooperative members varies according to milk quality specifically milk fat content. The cooperative supplies producers with information about price and milk fat content. Cooperative members said that they valued this information and they had noticed a decrease in fat content in the summer when the cattle use the pasture for feed. This information gives them quicker feedback and more incentive to improve pasture quality, so the cooperative is now working on planned adaptation instead of waiting to address the feed issue when they no longer have enough. The cooperative has a few strategies: i) they are looking to use electric fences to keep the cattle only on certain sections of the land at any one time; ii) they hope to have storage barns built to keep feed and iii) they are looking at sources of feed from outside of the region. Better pasture management has the potential to increase carbon in soils thereby also mitigating climate change (Conant & Paustian, 2002). However, the third strategy causes a trade-off between adaptation and mitigation because of additional emissions from transporting feed. The first two strategies were learned from visiting other cooperatives and thus provide another example of bridging social capital.

This example demonstrates that building linking and bridging social capital improved information and ultimately the human capital of members. While better income is the motivation for improving pastureland, this strategy also addresses climate change. Electric fences have an additional benefit of freeing up time, since members currently tend the cattle in pasture all day.

In addition, membership in the cooperative and better social networks improves access to other types of capital and in turn improves livelihood outcomes. Table 3 provides a summary of the benefits from joining the cooperative as described by interviewees and how these outcomes related to types of capital.

5. Summary and Conclusions

While social capital has been deemed an important element of capacity, the role social capital plays and the concept of it as a form of capital has been highly debated (Bebbington et al., 2004). In this case study social capital was both a barrier to cooperative creation and necessary for the success of the cooperative. While focusing on a single cooperative limits the generalisability of the results, existing literature in the area of social capital supports each of the key findings including: distinguishing the types and quality of social capital, the importance of leadership in building and using social capital, and the presence of feedbacks creating virtuous cycles. In addition, this case demonstrates how social capital functions to increase access to other forms of capital and how a cooperative as a strategy can help overcome trust issues, build social networks and ultimately results in planned adaptation instead of just coping and reacting.

Cooperatives have been promoted in Ukraine to achieve immediate practical outcomes such as pooling of resources and improving market access. However, improvements to social capital could be the more critical transformation, since social capital plays a key role in improving livelihood outcomes including planned adaptation. Social capital improves with use and cooperatives provide a means to exercise social capital. Fukuyama (1995) argued that the destruction of civil society by the Soviet system perhaps had the worst and longest lasting consequences. Any activity that improves social capital in post-Soviet states has greater consequences and should be considered an achievement in itself.

Moreover, it is not simply a shortage of social capital in post-Soviet states, but rather the quality and type of social capital. Rose (2008) argued that Soviet rule led to the creation of informal networks in order to undermine government controls and resulted in "more social capital than society". Social capital does not always lead to a desired outcome and one of the clearest examples of this is in post-Soviet states. For instance, in this case, bonding social capital initially prevented those within the same village from joining the cooperative because social networks were used to perpetuate distrust leading to a collective decision not to join. In addition, pasture land would have been beneficial to obtaining feed in years of drought, but distrust prevented members from supporting the collective purchase of land. This cooperative was able to overcome the barrier by building reputation quickly and using the network to spread a more positive message. Not only did bonding social capital initially form a barrier, but during the growing phase the cooperative persisted because of the creation of bridging and linking social capital. Even the idea for the cooperative came from outside the village network.

Similarly, Wolz et al. (2010) found that bonding social capital did not improve income and possibly hinders development among smallholders in Ukraine; moreover, they found that income improved if networks with people from different backgrounds were built. While Wolz et al. (2010) determined a quantitative relationship between type of social capital and income, this work explains how bonding social capital functions to cause negative outcomes and the benefit of bridging social capital. Cook et al. (2004) argued that closed networks limit access to information and new opportunities. Since climate change presents new situations, bridging and linking capital help to gather new information needed to adapt.

Along with building new networks this case study found effective leadership to be crucial to success. The cooperative's leader's ability to build reputation attracted assistance and led to the creation of bridging and linking social capital. The cooperative already had a considerable amount of human capital with her leadership. As the cooperative acquired new information through networks, the information was used to build human capital. In this way human capital also improved with the creation of more networks. This supports Purdue's (2001) argument that leadership is important for building a level of trust needed to effectively use and establish communal and collaborative social capital.

This work demonstrated how the different types of social capital feedback to increase social capital over time. As more outside groups become involved in the network, the benefits of being in the cooperative became more obvious, more members joined and positive outcomes created greater trust. Likewise, López-Gunn (2012) described the development of a virtuous cycle with continual feedbacks between a gradual increase in citizen participation, an increase in trust, strengthening capacity and developing organised culture. In contrast to the assumption that social capital is difficult to build, Durlauf (2002) argued that models indicate that a small change can be amplified through feedbacks to create a large change in the level of trustworthiness and development of social capital. This case demonstrated that even small actions increased trust and social capital was built relatively quickly. The change does not end at the cooperative, since social capital built in one cooperative can become a model for other cooperatives within the network. In this manner, cooperatives and other types of small development projects enable substantial improvements in social capital (Newman, 2007).

Social capital improves access to other forms of capital and ultimately improves livelihood outcomes including climate change adaptation. Specifically, the new information that the cooperative gained through networks has led to awareness for the need to address the quality of pasture and feed which ultimately led to strategies for planned adaptation. Planned adaptation is needed to move from just coping to long-term sustainability. Planning involves building preparedness and reduces impact more effectively than just reacting at time of a crisis. However, individuals tend to be reactive whereas planned adaptation requires cooperative action (Brooks and Adger, 2005). Bridging and linking capital are needed for ideas, but ultimately bonding capital puts these ideas in action and the right combination of these different types of social capital addresses climate change, while also improving rural livelihoods. Cooperatives can provide a strategy in which the right combination of social capital can be created and maintained to address climate change.

References

Adger, W. N. (2003). Social Capital, Collective Action, and Adaptation to Climate Change. *Economic Geography, 79*(4), 387-404. doi: 10.1007/978-3-531-92258-4_19

Bage, L. (2008). Supporting smallholders is crucial to food security. *Financial Times*. http://www.ft.com/cms/s/0/0ee4e4d6-4bc2-11dd-a490-000077b07658.html#axzz2qUVrTRZ6

Bebbington, A., Guggenheim, S., Olson, E., & Woolcock, M. (2004). Exploring Social Capital Debates at the World Bank. *The Journal of Development Studies, 40*(5), 33-64. doi: 10.1080/0022038042000218134

Brooks, N., & Adger, W. N. (2005). Assessing and Enhancing Adaptive Capacity. In B. Lim, E. Spanger-Siegfried, I. Burton, E.L. Malone & S. Huq (Eds.), *Adaptation Policy Frameworks for Climate Change* (pp. 165-182). New York: Cambridge University Press.

Brooks, N., Adger, W. N., & Mick Kelly, P. (2005). The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation. *Global Environmental Change, 15*(2), 151-163. doi: http://dx.doi.org/10.1016/j.gloenvcha.2004.12.006

Chambers, R., & Conway, G. R. (1991). Sustainable rural livelihoods: practical concepts for the 21st century. *IDS Discussion Paper 296*, 29. http://opendocs.ids.ac.uk/opendocs/handle/123456789/775#.Uo9zg8TQDeI

Coleman, J. S. (2000). Social capital in the creation of human capital. In P. Dasgupta & I. Serageldin (Eds.), *Social Capital A Multifaceted Perspective* (pp. 13-39). Washington, DC: The International Bank for Reconstruction and Development/World Bank.

Conant, R. T., & Paustian, K. (2002). Potential soil carbon sequestration in overgrazed grassland ecosystems. *Global Biogeochemical Cycles, 16*(4), 90-91--90-99. doi: 10.1029/2001GB001661

Cook, K. S., Rice, E. R. W., & Gerbasi, A. (2004). Creating social trust in post-socialist transition. In J. Kornai, B. Rothstein & S. Rose-Ackerman (Eds.), *Creating Social Trust in Post-Socialist Transition* (pp. 231). Hampshire, England: Palgrave Macmillan.

Crowley, E. (2013, 26/08). New ideas put agriculture co-operatives at the heart of rural development. *The Guardian*. Retrieved from http://www.theguardian.com/global-development-professionals-network/2013/aug/26/agriculture-co-operatives-markets-credit

Danone. (2013). Ukraine cooperative demo farm. *2014*(17/01). http://ecosysteme.danone.com/project/ukraine-demonstration-farm/

DFID. (1999). Sustainable Livelihoods Guidance Sheet http://www.eldis.org/vfile/upload/1/document/0901/section1.pdf

Durlauf, S. N. (2002). Bowling Alone: a review essay. *Journal of Economic Behavior & Organization, 47*(3), 259-273. doi: 10.1016/S0167-2681(01)00210-4

Fairtrade Foundation. (2013). Powering up smallholder farmers to make food fair (pp. 47). London: Fairtrade Foundation.

Falloon, P., & Betts, R. (2010). Climate impacts on European agriculture and water management in the context of adaptation and mitigation—The importance of an integrated approach. *Science of the Total Environment, 408*(23), 5667-5687.

FAO. (2012). Agricultural cooperatives: key to feeding the world (pp. 8). Rome, Italy: Food and Agriculture Organization of the United Nations.

Fukuyama, F. (1995). *Trust*. London, England: Penguin Books.

IFAD. (2013). Smallholders, food security and the environment (pp. 52). Rome, Italy: International Fund for Agricultural Development.

Jones, N., Koukoulas, S., Clark, J. R. A., Evangelinos, K. I., Dimitrakopoulos, P. G., Eftihidou, M. O., . . . Tsaliki, P. (2014). Social capital and citizen perceptions of coastal management for tackling climate change impacts in Greece. *Regional Environmental Change, 14*(3), 1083-1093. doi: 10.1007/s10113-013-0540-5

Karacsonyi, D. (2010). The Ukrainian agrarian sector and the global economic crisis *Economic Crisis and Political Turmoil in Ukraine* (pp. 91-138). Budapest: World Economy Research Institute.

Klein, R. J. T., Shipper, E. L. F., & Dessai, S. (2005). Integrating mitigation and adaptation into climate and development policy: three research questions. *Environmental Science & Policy, 8*, 579-588. doi: 10.1016/j.envsci.2005.06.010

Lal, R. (2010). Managing Soils and Ecosystems for Mitigating Anthropogenic Carbon Emissions and Advancing Global Food Security. *Bioscience, 60*(9), 708-721.

López-Gunn, E. (2012). Groundwater governance and social capital. *Geoforum, 43*(6), 1140-1151. doi: 10.1016/j.geoforum.2012.06.013

Miles, M. B., & Huberman, A. M. (1994). *An Expanded Sourcebook Qualitative Data Analysis*. London: Sage Pulications.

Morton, J. F. (2007). The impact of climate change on smallholder and subsistence agriculture. *Proceedings of the National Academy of Sciences of the United States of America, 104*(50), 19680-19685. doi: 10.2307/25450775

Moser, S. C., & Ekstrom, J. A. (2010). A framework to diagnose barriers to climate change adaptation. *Proceedings of the National Academy of Sciences*. doi: 10.1073/pnas.1007887107

Newman, L. (2007). The virtuous cycle: incremental changes and a process-based sustainable development. *Sustainable Development, 15*(4), 267-274. doi: 10.1002/sd.317

Powell, D. E. (1992). Perestroika in the (former) USSR: Psychological, political, and economic dimensions. *Studies in Comparative Communism, 25*(2), 193-207.

Purdue, D. (2001). Neighbourhood governance: Leadership, trust and social capital. *Urban Studies, 38*(12), 2211-2224. doi: 10.1080/00420980120087135

Rose, R. (2008). *Understanding Post-Communist Transformation: A Bottom Up Approach* (First ed.). New York: Routledge.

Round, J., Williams, C., & Rodgers, P. (2010). The role of domestic food production in everyday life in post-Soviet Ukraine. *Annals of the Association of American Geographers, 100*(5), 1197-1211. doi: 10.1080/00045608.2010.520214

Smith, P. (2007). Regional environmental change: special issue on "Modelling future changes in Cropland Soil Carbon in European Russia and the Ukraine". *Regional Environmental Change, 7*(2), 49-49. doi: 10.1007/s10113-007-0030-8

Swart, R. O. B., & Raes, F. (2007). Making integration of adaptation and mitigation work: mainstreaming into sustainable development policies? *Climate Policy, 7*(4), 288-303. doi: 10.1080/14693062.2007.9685657

Thuroczy, A. (2009). The Agricultural Sector and Trade in Ukraine: European Commission, Directorate-General for Agriculture and Rural Development.

Turner, K., Ramsing, N., Wright, S., & Antonovskaya, I. (2013). Ukraine Horticulture Development Project: the use of incentives to motivate collective action. *Enterprise Development & Microfinance, 24*(2), 104-117. doi: 10.3362/1755-1986.2013.011

UN News Centre. (2012). On World Food Day, UN focuses on agricultural cooperatives to end global hunger. Retrieved 18/01, 2014, from http://www.un.org/apps/news/story.asp?NewsID=43299&Cr=hunger&Cr1=#.UtprQBBFDcs

Uphoff, N. (2000). Understanding social capital: learning from the analysis and experience of participation. In P. Dasgupta & I. Serageldin (Eds.), *Social Capital A Multifaceted Perspective* (pp. 215-252). Washington, DC: The International Bank for Reconstruction and Development/World Bank.

Vincent, K. (2007). Uncertainty in adaptive capacity and the importance of scale. *Global Environmental Change, 17*(1), 12-24.

Wolf, J., Adger, W. N., Lorenzoni, I., Abrahamson, V., & Raine, R. (2010). Social capital, individual responses to heat waves and climate change adaptation: An empirical study of two UK cities. *Global Environmental Change, 20*(1), 44-52. doi: http://dx.doi.org/10.1016/j.gloenvcha.2009.09.004

Wolfenson, K. D. M. (2013). Coping with the food and agriculture challenge: smallholders' agenda (pp. 47). Rome: Natural Resources Management and Environment Department Food and Agriculture Organization of the United Nations.

Wolz, A., Fritzsch, J., Buchenrieder, G., & Nedoborovskyy, A. (2010). Does cooperation pay? The role of social capital among household plot farmers in Ukraine. *South East European Journal of Economic and Business, 5*(2), 55-64. doi: 10.2478/v10033-010-0015-2

World Bank. (2000). Removing social barriers and building social institutions *World Development Report 2000/2001: Attacking Poverty*.
World Bank. (2005). Ukraine: poverty assessment (pp. 91): Europe and Central Asia Region Human Development Sector Unit.
Yohe, G. (2001). Mitigative capacity – the mirror image of adaptive capacity on the emissions side. *Climatic Change, 49*(3), 247-262. doi: 10.1023/a:1010677916703

Table 1. Stages of cooperative development, interviewees and question type.

Stage	**Interviewees**	**Focus of Question**	**Research Questions**
Commencing	All interviewees	Vulnerability context, Barriers and Motivations	What were the motivations for starting and joining the cooperative? What prevented it from happening sooner?
Surmounting	Cooperative members/staff	Observation at celebration, context/ challenges, follow-up	How were barriers addressed?
Growing	Cooperative staff	Observation at celebration, changes in access to capital	How did the cooperative strengthen and sustain itself?
Realising	Cooperative members/staff	Access to capital, benefits of membership, follow-up	How does it address climate change? How is capital access linked to livelihood outcomes?

Table 2. Summary of responses citing issues involving 'Soviet mentality'.

Theme	Quote	Interviewee
Individualism	"It is hard to get Ukrainians to work together. The mentality is that it is my business and I will take care of myself."	Regional Administrator 1
Dependency	"It is difficult to teach them to be responsible for the equipment because they have been used to not caring about it during Soviet times."	Rural Development Expert 2
Fear	"If you go now to the villages and to the small farmers, they are afraid of everything."	Kyiv Agricultural Expert 1
Fear	"People are afraid of anything new."	Cooperative Leader
Fear/Trust	"They do not know what will happen in a year or two because it could be taken away from highest level."	Rural Development Expert 2
Trust	"People think if someone gives something: Will they take back more?"	Cooperative Member 1
Trust	"It is difficult to be a leader: people believe a person who gives took more than they gave."	Regional Administrator 1
Trust	"People do not belong to groups because they don't trust the associations."	Farmer 1

Table 3. Summary of access to other forms of capital and improved livelihood outcomes.

Capital	**Description**	**Livelihood Outcome**
Financial	Access to low interest loans	More Income
Financial	Guaranteed sales	More Income
Physical	Milk truck – time saved going to market	Increased Well-being
Human-Natural	Information – Manure storage and pasture management	Mitigation
Human-Natural	Information – Long-term planning for feed strategies	Adaptation (Planned)
Natural	Drought tolerant cattle suitable for region Best genetic material for breeding	Adaptation (Planned)
Natural	Feed provided to members during shortage	Adaptation (Reactive)
Not applicable	Yoghurt received from Danone (in lieu of payment)	*Food Security

* Cooperative members were given yoghurt as part of their payment. The yoghurt available in rural stores is often spoiled.