

Appendix 1

List of sample studies selected for in-depth analysis.

A1.1: Strand i: Natural resource governance

Authors	Research interest	Conceptualization			Operationalization				Key findings
		Conceptual framing	Network variable	Network narrative	Network approach	Network definition	Network analysis		
							Network level	Network characteristics	
Apgar et al. 2015	Understand underlying social dynamics at play in social-ecological systems in indigenous territories of Panama.	<i>Explicit reference to resilience:</i> Social networks as dynamic and informal web of interactions which foster adaptation and transformation, and hence resilience of social-ecological systems.	Independent: Influence of networks on adaptive capacity of social-ecological systems.	Social capital: Social networks as part of social capital helping to understand the value of bridging links across different groups, communities, and scales.	Descriptive: Reflection-groups made up of leaders and scholars engaged in iterative discussion cycles in an indigenous territory.	Social relation: formal / informal information exchange. Actors: community members and leaders involved in natural resource governance. Scale: regional / indigenous territory + linkages to external actors.	Subgroup: local governance groups Individual: brokers between subgroups.	Tie: bridging ties connecting brokers between groups, and to outside actors.	Changing roles of leaders prevent the network from becoming vulnerable to the loss of hubs and bridging links. Cultural practices facilitating leadership development and social networking are critical for enabling both adaptation and transformation.
Bodin and Crona 2008	Assess community social capital and identify potentially influential actors in a Kenyan coastal village. Assess if lack of community social capital and leadership may explain the lack of collective action.	<i>Implicit reference to resilience:</i> Social networks as a factor fostering or hindering collective action towards sustainable resource management.	Independent: Influence of social networks on collective action.	Social capital: Characteristics of social networks as a factor of social capital.	Structurally explicit: Complete village / household survey and key informant interviews in a coastal village. SNA: total network.	Social relation: personal support, knowledge exchange, gear lending. Actors: fishermen (household heads) in the village. Scale: local / village.	Subgroup: occupational and relational groups. Individual: brokers between subgroups.	Actor: tribe, occupation, perception of resource status. Tie: ratio of bonding / bridging ties. Structure: density, centrality.	Unwillingness to report rule-breaking due to strong social capital. Homogeneity among key individuals leading to poor recognition. Brokers can block information flows and act as social barriers to transformation. Resilience depends on the impact of central actors on decision making processes.
Cárcamo et al. 2014 †	Investigate the structure and properties of inter-organizational social networks involved in the use and management of natural resources in a	<i>Implicit reference to resilience:</i> Structural properties of social networks influence co-management ar-	Independent: Influence of networks on management outcome.	Form of coordination: Social networks as a formal form of inter-organizational communication / collabo-	Structurally explicit: Document analysis, stakeholder analysis, and questionnaire with organizational representatives	Social relation: information, collaboration. Actors: representatives of organizations / institutions.	Network: governance network. Individual: cross-scale brokers.	Actor: organizational type, administrative level, perception, homophily. Tie: importance, frequency, bridging	Missing cross-scale interaction in co-management networks potentially hampers adaptive capacity and resilience of social-ecological systems. Centrally positioned actors could act as

	coastal marine ecosystem in Chile.	rangements which foster adaptive capacity and resilience of social-ecological systems.		ration.	involved in the management of the marine protected area. SNA: total network.	Scale: local - national governance system.		ties (between scales) Structure: density, diameter, average path length, centrality.	bridging stakeholders.
Cohen et al. 2012	Understand the potential of social networks to facilitate coordination and learning among management actors involved in the marine resource management in Solomon Islands.	<i>Implicit reference to resilience:</i> Social networks as factor of adaptive co-management facilitating coordination and learning among management actors.	Independent: Influence of networks on natural resource governance outcome.	Form of coordination: Social networks as purposeful formed relations between different actors fostering collective action.	Structurally explicit: Qualitative interviews, and questionnaire with representatives of organizations involved in the governance of marine resources. SNA: total network.	Social relation: formal / informal knowledge exchange, collaboration. Actors: agencies and organizations. Scale: local - international governance system.	Network: governance network. Individual: bridging organizations or institutions.	Actor: organization type, scale of operation, preference for learning. Tie: intensity (strong / weak), bridging ties (between scales). Structure: density, centrality.	Cross-scale communication transcending formal governance systems facilitates coordination and learning. A trade-off exists between facilitating flows of knowledge between various levels and promoting learning on local level.
Crona and Bodin 2006	Investigate if a lack of collective action to remedy unsustainable use of fishery resources may be attributed to the structures of the social networks in a Kenyan coastal village.	<i>Implicit reference to resilience:</i> Social networks as factor determining successful implementation of community based co-management.	Independent: Influence of networks on collective action towards the co-management of common-pool resources.	Form of coordination: Networks of stakeholder communication as means of mobilizing and maintaining co-management.	Structurally explicit: Complete village household survey, and semi-structured interviews with household heads in a coastal village. SNA: total network.	Social relation: information and knowledge exchange. Actors: resource users in the village. Scale: local / village.	Network: community management network. Subgroup: occupational and relational groups.	Actor: occupation, tribe. Tie: density of inner / in-between group ties. Structure: centrality, fragmentation (in subgroups).	Communication is mainly defined by occupational groups. Restricted communication between groups in social networks and missing incentives for brokers to act impede the successful implementation of community based management.
Crona and Bodin 2010	Investigate if the examination of power relations and knowledge sharing networks in a Kenyan coastal village can explain why a community has not initiated collective action.	<i>Implicit reference to resilience:</i> Power relations within social networks as factors that can facilitate or prevent societies from transforming governance of natural resources towards resilience.	Independent / Dependent: Influence of network structure on collective action. Influence of power relations on social network structure.	Form of coordination: Social networks of knowledge exchange and power relations as factors impacting consensus building in resource management.	Structurally explicit: Complete village / household survey, and semi-structured interviews with household heads in a coastal village. SNA: total network.	Social relation: knowledge exchange, gear lending. Actors: resource users in the village. Scale: local / village.	Network: knowledge, and gear lending network. Subgroups: occupational and relational groups. Individual: opinion leaders.	Actor: gender age, tribe, occupation, perception of key individuals. Structure: degree centrality.	Opinion leaders, characterized by centrality in knowledge and gear lending networks, show little recognition and willingness to change resource use, because of capital invested in gear equipment. Opinion leaders can act as barrier to change.
de Villiers et al. 2014	Determine whether particular decision making frameworks promote adaptive capacity. Explore social capital amongst land managers in South Africa applying methods of SNA.	<i>Explicit reference to resilience:</i> Social networks facilitating social learning and innovation as a key to enhancing adaptive capacity and resilience of rangeland management.	Independent: Impact of social networks on social learning and innovation.	Social capital: Social networks as structural component of social capital alongside cognitive social capital (norms and trust).	Structurally explicit: Interviews with households involved in land management in Eastern Cape Province. SNA: total network (constructed from ego-networks).	Social relation: seeking advice and calling in times of problems. Actors: households in the region. Scale: regional / provincial governance system.	Subgroups: groups of adopters / non-adopters.	Actor: adopting behavior. Tie: type of ties (friendship, kinship). Structure: size, density.	Social learning networks in form of study groups support both the structural components (i.e. networks facilitating information sharing and decision-making) and cognitive components of social capital (i.e. trust and shared values). Building social networks as a foundation for strong social capital is essential for strengthening adaptive capacity of local communities.

Gelcich et al. 2010 †	Explore social, political, and ecological aspects of the transformation in Chile's coastal marine resource governance, from 1980 to today.	<i>Explicit reference to resilience:</i> Social networks as a vehicle to promote transformation and resilience building in natural resource governance.	Independent: Influence of social networks on natural resource management.	Form of coordination: Social networks as purposefully created governance networks.	Metaphorical: Review and synthesis of secondary sources on the transformation of a marine management system in Chile.	Social relation: communication Actors: resource users, scientists, organizations / institutions involved in the management of marine resources. Scale: local - national governance system. Temporal scale: 1980 until today.	Network: national governance network.	Tie: tie strength (strong / weak), bridging ties (between different scales). Context: facilitating policies.	The ability to network knowledge from local to national level through preexisting strong social networks provided critical elements for the transformation of the governance system towards resilience.
Ireland and Thomalla 2011	Explore the role of collective action in building adaptive capacity in Nepal and Thailand, with particular attention to the role of social networks.	<i>Explicit reference to resilience:</i> Social networks as factor facilitating community collective action for resilience building.	Independent: Influence of networks on collective action for adaptation to environmental risks.	Social capital: Social networks as a component of social capital facilitating collective action.	Metaphorical: Two case studies from Nepal and Thailand. Semi-structured interviews, vulnerability analysis, and participatory multi-stakeholder assessment.	Social relation: communication, information and knowledge exchange. Actors: community activists and collectives involved in reducing vulnerability to social and environmental risks. Scale: (not specified)	Individual: motivated leaders.	Actor: leadership. Tie: tie strength. Context: local government influence.	Collective action is robust if it builds on existing social network, and if strong and motivated individuals with good social networks take leadership. Local government can impede collective action.
Mannetti et al. 2015	Examine the issues of social capital, leadership, and traditional knowledge in South Africa and Botswana and explore how they contribute to collective action at the community level.	<i>Implicit reference to resilience:</i> Adaptive co-management systems as formed of social networks of actors involved in implementing rules and regulations on resource use.	Independent: Influence of social networks on adaptive management.	Form of coordination: Networks facilitate access to information required for promoting adaptive co-management systems.	Structurally explicit: Semi-structured interviews with bushmen involved in natural plant use from six farms belonging to the community. SNA: total network.	Social relation: seeking advice and discussing knowledge. Actors: bushmen in the community. Scale: local / community.	Network: knowledge network, collaboration network, dependency network. Subgroups: relational groups.	Actors: demographic factors (gender, age, length of residence), self-perceived level of knowledge. Structure: density, degree, dyads / triads, fragmentation, group cohesion.	Gender and the length of time an individual has been part of the community are barriers to knowledge acquisition (knowledge transfer occurs primarily between men). Homogeneity among key players is likely to reduce communities' ability to synthesize new knowledge. Low levels of ties among members of the network, higher fragmentation and overall low network cohesion hamper the opportunities for collective action.
Marín and Berkes 2010 †	Assess the Chilean shellfish co-management system from an organizational network perspective including networks of actors, the functions of these actors, and fishers' perceptions about Chile's co-management arrangement.	<i>Implicit reference to resilience:</i> Co-management as alternative form of governance that is comprised of multiple and complex social networks.	Independent: Influence of networks on management outcome.	Form of coordination: Social networks as formal arrangements between complex sets of actors.	Structurally explicit: Focus groups, in-depth interviews, and questionnaire with representatives of fishery associations in two administrative regions. SNA: total network (two-mode).	Social relation: facilitation, hindrance of co-management. Actos: small-scale fisher associations, public or private counterparts. Scale: local - national governance system.	Subgroup: functional groups in hindering and facilitating networks.	Tie: positive and negative ties (hindering / facilitating). Structure: centrality.	Studies of co-management should not focus only on collaborative (or facilitating), but also on hindering relationships. Highly centralized governance systems hamper participation of grassroots organizations. More autonomy and ability to use existing linking social capital between local organizations and actors at other scales would provide an opportunity to experiment and learn.

Marin et al. 2012 †	Assess the multifunctional relationships of small-scale artisanal fisher associations and explore the role of bridging and linking social capital for co-management of coastal benthic resource systems in Chile.	<i>Implicit reference to resilience:</i> Social networks linking actors at different levels promote performance of natural resource management and well-being.	Independent: Influence of social networks on economic performance of fisher associations.	Social capital: Investment in social relations pay-back in form of enhanced opportunities and capacities.	Structurally explicit: Semi-structured interviews with representatives of fisher associations in two administrative regions. SNA: ego-network.	Social relation: facilitation and hindrance of co-management. Actors: small-scale fisher associations, public or private counterparts. Scale: local – national governance system-	Subgroups: social capital groups.	Actor: co-management performance Tie: bridging ties (between groups at the same level), linking ties (between groups at different levels). Structure: centrality	Best performing fisher associations are those with higher levels of linking and bridging social capital. Policy regulations and instruments should promote vertical and horizontal relationships.
Marin et al. 2015 †	Investigate if and how social capital – in combination with the levels of damage and geographic isolation – determines fishing organizations' ability to recover and innovate in response to a tsunami disaster.	<i>Explicit reference to resilience:</i> Social networks are an internal factor of social-ecological systems. Social networks promote capacity to respond to risks and adapt to change and hence – in combination with external factors – determine community resilience.	Independent: Impact of social capital / linking ties on the recovery trajectories of fishing communities	Form of coordination / Social capital: Social networks as purposeful developed networks for co-management of natural resources. Social capital as resources embedded in social structure / as linking ties providing resources and support from other places.	Structurally explicit: Panel study including semi-structured interviews with representatives, fisher associations, and regional officials in a coastal region before and after a tsunami. SNA: ego-network.	Social relation: facilitating relationships for the development of collaborative management. Actors: fishery authorities, researchers and consultants, buyers and traders. Scale: local - national governance system Temporal: 2008 and 2013.	Subgroups: groups of fisher organizations with different social capital, external factors, and trajectories.	Ties: linking ties (cross-scale ties to external actors). Structure: centrality	Higher levels of linking social capital are correlated with more positive post-tsunami trajectories. Social networks developed for co-management can facilitate disaster recovery. However, social capital changes over time and post disaster trajectories are also influenced by external factors (amount of damage and geographical isolation). This fact implies that relying only on social relations is a limited strategy for community recovery.
Moeliono et al. 2014	Analyze patterns of information exchange related to REDD+ policy networks in Indonesia. Help to identify potential barriers to the transformational change needed to implement REDD+.	<i>Implicit reference to resilience:</i> Adaptive management of social-ecological systems requires networks fostering the combination of local knowledge, cross-scale coordination, and social learning.	Independent: Influence of network structure on information exchange and governance outcome.	Form of coordination: Governance networks as purposefully created networks of inter-organizational linkages.	Structurally explicit: Semi-structured interviews with representatives of organizations involved in REDD+ Indonesia. SNA: total network.	Social relation: regular exchange of information. Actors: organizations from academic, private, and public sector. Scale: national - international governance system.	Network: governance network. Subgroups: relational groups. Individual: brokers.	Actor: number of employees, head-quarter locations, membership in organizations. Structure: centrality, subgroup fragmentation.	Homophily and power generate a network that lacks the integration between diverse groups. Power asymmetries can hinder effective and inclusive governance. Brokers able to connect different clusters of information seeking will be crucial for effective and inclusive management.
Nuno et al. 2014	Analyze the multiple roles played by different institutions in the management system of the Serengeti and describe the interactions between different actor types.	<i>Explicit reference to resilience:</i> Social networks as a means to characterize collaborations and social relationships facilitating conservation and promoting resilience of governance.	Independent: Influence of social networks on management outcome.	Form of coordination: Management systems as networks of organizations involved in resource management.	Structurally explicit: Scenario building, institutional analysis, and semi-structured interviews with representatives of organizations responsible for the regulation of resource use in the Serengeti. SNA: total network.	Social relation: advice and support aiming to influence policy or implementation interventions. Actors: resource management organizations. Scale: local - regional governance system.	Network: governance network (including policy and implementation network). Individual: brokers / bridging actors.	Tie: frequency Structure: edge connectivity, density, mean geodesic distance, centrality.	Management networks center on very few individuals. These individuals are important in bridging across conservation arenas and therefore are able to potentially affect the resilience of governance structures. Understanding the complexity of behavior of key actors within management institutions is important for implementation of sustainable management.

Pietri et al. 2015	Examine the major patterns of information exchange among individuals of the Coral Triangle Initiative and evaluate impacts on information sharing. Consider implications for strengthening network sustainability, capacity building, and learning.	<i>Explicit reference to resilience:</i> Learning networks are building on social capital which can help fostering resilience and achieving social and environmental goals.	Independent: Influence of social networks on capacity building and learning.	Form of coordination / Social capital: Governance networks as purposefully designed networks for promoting social capital through social learning and capacity building.	Structurally explicit: Qualitative key informant interviews and standardized (electronic) survey with representatives of organizations involved in the Coral Triangle Initiative. SNA: total network.	Social relation: seeking information with regard to coral reef management issues. Actors: organizations and partner countries participating in marine protected area management. Scale: national - international governance system.	Network: governance network. Individual: coordinators.	Actor: organizational affiliation, nationality, brokerage types. Ties: scores, ratio of internal / external links. Structure: density, centralization, fragmentation.	A decentralized network structure with redundancy of ties indicates potential resilience to changes in leadership and membership. Conservation learning networks have the ability to bridge cultural divides and promote social learning. A strong coordinator and continuing efforts to support information sharing and learning are crucial to the network's strength and sustainability.
Ramirez-Sanchez and Pinkerton 2009 †	Examine the effect of resource scarcity on the bonding, bridging, and linking social-capital patterns of fishers' information-sharing networks in coastal communities in Chile.	<i>Explicit reference to resilience:</i> Social capital patterned by social networks of trust can enable or constrain collaborative arrangements and collective action and therefore impact the resilience of social-ecological systems governance.	Dependent: Influence of resource scarcity on social networks and the production and distribution of social capital	Social capital: Social relations as means of supporting fishers' adaptive responses to resource fluctuations, external shocks, and other uncertainties.	Structurally explicit: Survey questionnaire and key informant interviews in six communities in the municipality. SNA: total network.	Social relation: trustworthy information on the state and location of fish. Actors: fishers in the community, fishers in other communities. Scale: local / community + linkages between communities.	Subgroup: social capital groups.	Tie: bonding ties (within a group) bridging ties (between groups in the same community), linking ties (between communities). Structure: fragmentation, subgroups. Context: resource scarcity.	Social networks are activated and deactivated during transitions in fish abundance. Presence of linking ties as indicator of the extent to which fishers adopt geographic mobility as a coping strategy to deal with resource scarcity. Although fishers have adaptive capacity for dealing with fish fluctuations, they have little or no proactive resilience to address the decline of resources.
Rico Garcia-Amado et al. 2012	Understand social capital, decision-making, and collective action in forest-based common pool resource management in Chiapas, Mexico.	<i>Explicit reference to resilience</i> Social networks of trust, reciprocal exchanges, norms, and sanctions are positively related to collective action required for resilient common pool governance.	Independent / Dependent: Impact of social networks on productive activities and conservation of forest resources. Impact of market requirements on social network structure.	Social capital / Form of coordination Norms and social networks as factors of social capital and collective action for resource management.	Structurally explicit: Observations and semi-structured household interviews with all household heads in the local administrative unit. SNA: total network.	Social relation: work-related demand of assistance. Actors: households and public or private actors. Scale: local / administrative unit + external linkages.	Network: management networks (i.e. palm / coffee). Subgroups: crop / producer groups.	Actor: tenure, cash income, group affiliation. Structure: centrality, cluster and subgroups, hierarchy. Context: market changes and requirements.	Market requirements shape networks Organic coffee commercialization is the main source of bridging ties that have resulted in more connectivity and resilience. Despite power asymmetries and internal conflicts, the local network facilitates an effective management of common pool resources. Institution-building is required, because highly centralized networks may not be appropriate for governing social-ecological systems in the long term.
Sanginga et al. 2007	Examine the role, strengths, and limits of social capital in managing conflicts over the use and management of natural resources in Uganda.	<i>Implicit reference to resilience:</i> Social networks facilitate coordination and cooperation for mutually beneficial collective action and help to manage	Independent: Influence of social networks on resource management and conflict resolution.	Social capital: Social networks as assets upon which people rely to manage natural resources and resolve conflicts.	Metaphorical: Interviews with farmers in 16 villages in one district.	Social relation: linkages, membership in formal / informal associations (<i>not specified</i>). Actors: farmers in the village, farmers from other villages.	(not specified)	Tie: bonding ties (between members of the same group), bridging ties (between different groups), and linking ties (connecting actors of different status).	Farmers use several social capital mechanisms for managing conflicts. A combination of social, economic, and political factors has undermined the ability of local bonding mechanisms to manage conflicts. Bridging capital has a relatively higher

		natural resources and to resolve conflicts.				Scale: local / community + linkages between communities.		Context: social, economic, and political factors.	capacity to resolve conflicts.
Stein et al. 2011	Empirical mapping of collaborative social networks between actors that either directly or indirectly influence water flows in the Mkindo catchment in Tanzania.	<i>Implicit reference to resilience:</i> Social networks matter for the adaptive co-management of natural resources.	Independent: Influence of social networks on governance outcome.	Form of coordination: Governance networks consisting of formal and informal relations between political, social, and economic organizations and institutions.	Structurally explicit: Questionnaire and semi-structured interviews with stakeholders in the catchment area (including leaders in four villages). SNA: total network.	Social relation: funding, information and knowledge exchange, collaboration. Actors: organizations and institutions involved in water management. Scale: local - regional governance system.	Network: governance network. Individual: influential actors.	Structure: density, centralization, group analysis.	Village leaders play a crucial role in linking otherwise disconnected actors but are not integrated in the management system. Instead of imposing top-down institutional arrangements, it is more promising to build on existing social structures.
Sundstrom et al. 2012	Examine how ranch privatization and settlement of individual Maasai households have affected traditional livestock herding and social capital mechanisms of Maasai livestock herders in Kenya.	<i>Implicit reference to resilience:</i> In the context of insecure tenure rights over land and natural resources, trusted long-term social networks can enforce property rights and sustain natural resources.	Independent / Dependent: Social networks as a mechanism to ensure access to natural resources. Impact of rangeland privatization on social networks.	Social capital: Social ties among networks members generating collective well-being.	Metaphorical: Narrative interview, group discussions in the area of a former ranch.	Social relations: customary relations, reciprocal use of land and resource. Actors: Masaai community members. Scale: local / village + external linkages.	Individual: particular herders.	Ties: bonding ties (among kin and friends), bridging ties (to actors outside the community). Context: rangeland privatization.	Land subdivision has altered customary social networks and resource governance. Individuals can generate new social capital mechanisms based on a combination of bonding and bridging ties. Bridging ties reaching outside the community can help to shape the transition to commercial livestock practices and take advantage of development opportunities.
Tompkins et al. 2002	Investigate the role of institutional networks for integrated and inclusive coastal-zone management in Trinidad and Tobago.	<i>Implicit reference to resilience:</i> Social networks and the ability of its social actors to combine information and resources outside the local sphere of institutions are important means by which integrated and inclusive management are maintained.	Independent / Dependent: Influence of social networks on inclusive resource management. Influence of legislation and regulation on social networks.	Form of coordination: Governance as facilitated by networks of institutions at various scales:	Metaphorical: Semi-structured interviews and participatory workshops with representatives of coastal resource management institutions.	Social relation: institutional relations relied on for the realization of essential interests. Actors: institutions involved in the management of coastal resources. Scale: local - international governance system.	Network: spaces of dependency (between localized organizations), spaces of engagement (between local stakeholders and external interests).	Context: institutional setup / legislation and regulations.	Cross-scale networks may permit an institutional shift towards more integrated and inclusive approaches. There are winners and losers in any strengthening of networks for the co-management of resources. Thus there is a need to understand the institutional form of networks facilitating inclusive decision making at various scales.

† We included studies from Chile, despite its high-income status, in order to take account of representative studies.

A1.2: Strand ii: Agricultural innovation

Authors	Research interest	Conceptualization			Operationalization				Key findings
		Conceptual framing	Network variable	Network narrative	Network approach	Network definition	Network analysis		
							Network level	Network characteristics	
Arora 2012	Study farmers' participation in knowledge circulation in the context of a participatory project on agro-ecological methods in rural India.	<p><i>Implicit reference to resilience:</i></p> <p>Agricultural innovation as a way out of indebtedness and resource depletion necessitates dyadic user-producer interactions which are embedded in wider knowledge networks between heterogeneous actors.</p>	<p>Independent / Dependent:</p> <p>Impact of social networks on adoption of agro-ecological methods.</p> <p>Influence of institutions on network structure.</p>	<p>Pipe:</p> <p>Knowledge networks constituted by circuits of knowledge exchange.</p>	<p>Structurally explicit:</p> <p>Complete village survey in a rural community.</p> <p>SNA: total network.</p>	<p>Social relation: problem solving knowledge in the face of agricultural pest attacks.</p> <p>Actors: farmers and external actors (experts, NGOs, input supplier).</p> <p>Scale local / village + external linkages.</p>	<p>Subgroup: learning circles.</p>	<p>Actor: caste, occupational group (farmer, NGO, private sector), experience of pest attack, adoption of sustainable practices.</p> <p>Tie: number of links.</p> <p>Structure: centrality, analysis of closed circles.</p> <p>Context: institutions / political influence.</p>	<p>Resource persons at the local level act as brokers between the development agency and its beneficiaries.</p> <p>Few farmers involved in knowledge circuits are "elite" farmers in the village who derive their influence from a number of relational and experiential factors that are hinged on formal and informal institutions.</p> <p>Knowledge is produced and interpreted within a set of unequal power relations.</p>
Bandiera and Rasul 2006	Explore the role of family and friendship networks on the adoption of a new crop in Mozambique.	<p><i>Implicit reference to resilience:</i></p> <p>Adoption of new agricultural technologies as an important route out of poverty. Farmers learn how to cultivate a new crop from the choices of others tied together in strong social networks.</p>	<p>Independent:</p> <p>Influence of social networks on adoption behavior.</p>	<p>Pipe:</p> <p>Social networks as conduit for the diffusion of information about new crops.</p>	<p>Descriptive:</p> <p>Household survey, key informant interviews in nine villages.</p> <p>Econometric modeling / analysis.</p>	<p>Social relation: information seeking on sunflower cultivation.</p> <p>Actors: farmers in the village, friends, and kin in other villages.</p> <p>Scale: local / village + linkages between villages.</p>	<p>Individual: farmers.</p>	<p>Actor: adopting status, relational group (kin, family neighbor), labor and agricultural tools, exposure to risk (food insecurity), cashew cultivation, participation in NGO activities, demographic data, migration status.</p> <p>Structure: network size.</p>	<p>The probability that a farmer adopts a new technology is increasing with the number of adopters in his network when there are few, and decreasing when there are many informed farmers.</p> <p>Adoption decisions are more correlated within family and friends than religion-based networks, and uncorrelated among individuals of different religions.</p>
Butt 2015	Examine the political, economic, ecological, and socio-spatial contexts and the relevance of mobile phone use among pastoralists in Kenya.	<p><i>Implicit reference to resilience:</i></p> <p>Technology as main driver of a social group's ability to adapt to rapidly changing social, political, economic, and environmental conditions.</p>	<p>Dependent:</p> <p>Impact of mobile phone use on communication networks related to herding.</p>	<p>Pipe:</p> <p>Social networks as conduit for the exchange of information.</p>	<p>Metaphorical:</p> <p>Qualitative ethnographic research in the study site.</p>	<p>Social relation: enquiring information about herding related issues.</p> <p>Actors: herders.</p> <p>Scale: local / study site</p>	<p>Individual: herders.</p>	<p>Tie: kinship, clan membership.</p>	<p>Information sharing among pastoralists using mobile phones transcends social groups.</p> <p>It is not a question of kinship or clan membership but of how well herders know each other. Instead, exchange is more likely to be mediated by daily practices of herding in response to social, political and environmental conditions.</p>

Conley and Udry 2001	Explore agricultural technology adoption in Ghana with a focus on communication networks.	<i>Implicit reference to resilience:</i> Learning about technologies in social networks as a central feature of the transformation of farming systems in the context of economic development.	Independent: Impact of social networks on the adoption of agricultural practices.	Pipe: Social networks as conduit for the exchange of information on agricultural techniques.	Descriptive: Household survey in four clusters of villages. Econometric modeling.	Social relation: advice about farming, communication about input / output levels. Actors: farmers in the village and farmers in other villages. Scale: local / villages + linkages between villages.	Individual: farmers.	Actor: plot level data on input and output, knowledge on input / output level of other farms. Structure: density.	Information is not freely available to all farmers but channeled through sparse networks and is often imperfect. Farmers orient their behavior to the behavior of other farmers they communicate with. Communication links are not based solely on geographic proximity but expand beyond the village level. Farmers do not engage in optimal learning behavior. Instead, they use simple rules of thumb to guide their behavior when innovating.
Hoang et al. 2006	Explore how social networks function as assets for individuals and households and how they influence access to information and benefits from research and development in rural areas of North Vietnam.	<i>Implicit reference to resilience:</i> Village communities as heterogeneous entities constituted by complex networks of social relationships. Social networks as a means of accessing information from research and development.	Independent: Influence of social networks information access.	Social capital: Social networks as important intangible component of individuals' or households' asset-portfolios.	Descriptive: Semi-structured interviews with household representatives in one rural village. SNA: total network (but no explicit analysis of network structure).	Social relation: discussing, advice seeking regarding agricultural issues and practices. Actors: households in the community, external actors (other households, extension, research). Scale: local / village + linkages to external actors.	Network: discussion / advice network, kinship network.	Actor: relational category, gender, socio-economic status. Tie: kinship, neighborhood / friendship ties. Context: political influence.	Differences in socio-economic status and social connections through kinship, friendship, and neighborhood networks act as significant determinants of access to information. Close relatives are most trusted and hence followed. Most discussion regarding agricultural matters takes place at home / at the village level. Network analysis can avoid reinforcing existing unequal power relations and can enable research and development interventions to reach the individuals and households in greatest need.
Isaac et al. 2007	Investigate the structural arrangements of informal communication networks by examining advice seeking in the cocoa agroforestry of Ghana.	<i>Implicit reference to resilience:</i> Access to knowledge is essential for community based adaptive management. Farmers who lack the means to acquire farming knowledge from formal sources rely on information within their informal social networks.	Independent: Influence of social structure on the adoption of agroforestry management practices.	Pipe: Social networks as informal conduits for the transfer of knowledge on agricultural practices.	Structurally explicit: Household interviews in four communities in Ghana. SNA: total network.	Social relation: informal advice on farming practices. Actors: farmers in four communities, external actors (farmers, extension, and institutions). Scale: local /community + linkages to external actors.	Network: community advice network. Individual: central / bridging farmers.	Actor: socio-demographic data, origin (in / outside the community), level of involvement, and level of imitation. Structure: density, centrality	Social proximity does not control the formation of informal advice structures. Advice networks are sparse networks with a core-periphery structure. Few central actors acting as bridging between formal and informal networks. Central farmers are active in community activities. Hence promotion of community involvement may strengthen informal networks.
Isaac 2012	Investigate information network structures within the agrarian environment in order to understand the barriers to, and development of	<i>Implicit reference to resilience:</i> The structure of social networks connecting a variety of agrarian actors is fundamental	Independent: Impact of social structure on effectiveness of farm management.	Pipe: Social networks as conduit for the exchange of agrarian knowledge and	Structurally explicit: Semi-structured interviews with farmers and members of organizations in two geographically sepa-	Social relation: advice on the management of agrodiversity on cocoa farms. Actors: farmers, external actors (ex-	Network: farmers' personal innovation networks. Individual: farmers.	Actor: adoption rate of agroforestry practices. Tie: number of ties, farmer-to-farmer ties, organizational ties.	The increase of organizational ties is related to a decrease of network density in personal producer networks as they replace producer-to-producer ties. Producers with ties to organizations are likely to be positioned in more sparse and

	effective farm management, specifically the management of agrodiversity in Ghana.	to the adoption of innovations and influences the advancement or weakening of sustainable farm management.		information	rate rural areas. SNA: ego-networks.	tension, NGOs). Scale: local / community + linkages to external actors.		Structure: size, density, triad analysis.	efficient information networks as identified by a low level of redundant ties correlated to higher reported on-farm agrodiversity. Unlike common-pool resource management which requires dense networks, exchange of complex information requires diffuse but efficient social networks.
Isaac et al. 2014	Investigate the role of migrant farmers in agricultural information networks and explore implications on the adoption of pro-environmental management practices in Ghana.	<i>Explicit reference to resilience:</i> Environmentally induced migration as a livelihood strategy shaping agricultural information networks and therefore the sustainable management of agroecosystems and the resilience of the region of destination.	Dependent: Influence of migration on social networks and their ability to promote the adoption of environmental management practices.	Pipe: Networks as conduit for the exchange of knowledge on agricultural practices.	Structurally explicit: Farmer interviews in three rural communities. SNA: total network (constructed from ego-networks).	Social relation: exchanging and seeking information on agricultural practices. Actors: farmers in the community and farmers in other communities. Scale: local / community + linkages between communities.	Network: agricultural communication network. Individual: farmers (brokers).	Actor: settlement categories, origin and location, demographic data, land tenure, adaptive practice, brokerage roles. Tie: tie-frequency between communities. Structure: size, centrality, cohesion. Context: migration.	Cohesion of the communication network is dependent on a few strategic bridging ties initiated by migrant farmers. Migrant farmers have larger networks, act as brokers between socially and spatially distant groups, and tend to apply pro-environmental agricultural methods. This can be conceptualized as social-ecological memory. Migrant farmers are potential agents of innovation and adaptive management.
Matouš et al. 2013	Explore the roles of social networks and extension networks for the adoption of resource conserving practices among Ethiopian farmers.	<i>Implicit reference to resilience:</i> Farmers' decisions are influenced by other farmers and the nature of social relationships. Informal networks can play a larger role in the protection of natural resources than formal institutions.	Independent: Influence of social networks on the adoption of agricultural techniques.	Pipe: Networks as conduit for the exchange of information.	Descriptive: Household survey and semi-structured interviews with local extension staff in three villages in three agro-ecological zones. Econometric analysis.	Social relation: information exchange on resource conserving agricultural techniques. Actors: households in the village and external actors (extension staff). Scale: local / village + linkages to external actors.	Individual: farmers. Network: community information network.	Actor: wealth, ethno-religious group, knowledge about resource conserving practices, geographic location. Tie: internal / external ties. Structure: size, density.	Farmers living close to the village center, with big land, bigger overall networks, and same ethnicity are more likely to be included in the extension system. Same religion and ethnicity between farmers and extension staff increases likelihood of learning from extension. Farmers with larger networks are more likely to know an extension agent but those who are receptive to extension are those who are less socially connected.
Matuschke and Qaim 2009	Examine the impact of social networks on the adoption of modern seed technologies among smallholder farmers in rural India.	<i>Implicit reference to resilience:</i> Social networks impact the adoption of agricultural innovations and contribute to increased agricultural productivity and reduced poverty.	Independent: Influence of social networks on social learning and technology adoption.	Pipe: Networks as a conduit enabling interaction and knowledge exchange between farmers.	Descriptive: Household interviews in seven villages in four rural districts. Econometric modeling / analysis.	Social relation: regularly talking about agricultural decisions. Actors: farmers in the village and external actors (farmers, extension staff). Scale: local / village, linkages between villages + linkages to external actors.	Individual: farmers.	Actor: education, experience, farm size, caste, adoption behavior. Tie: ties of kinship and friendship. Context: village adoption rate, distance to input dealer / market.	Social networks do not necessarily coincide with village boundaries. Hence, relying on village level adoption rates underestimates social network effects. Communication takes place along homophilous rather than along heterogeneous lines. The behavior of members in the individual network has bigger impact as their characteristics.

Mazzucato and Niemeijer 2000	Explore the role of social institutions in guiding decisions regarding the use of technologies drawing on a case study from Eastern Burkina Faso.	<i>Implicit reference to resilience:</i> In order to understand farmers' decision making regarding soil and water conservation technologies, it is fundamental to understand local institutions. These institutions require investments in form of gift-giving and exchanges to build relationships.	Independent / Dependent: Influence of social networks on soil and water conservation. Influence of socio-economic changes on traditional social networks.	Pipe: Social networks as conduit for the exchange of technologies, information, resources, and gifts.	Metaphorical: Interviews and observations in two villages over a three-year period.	Social relation: reciprocal exchange of labor, varieties, technology, and land. Actors: farmers in the village, farmers in other villages. Scale: local / village + linkages between villages.	(not specified)	Context: socio-economic changes (increasing market integration).	Mixing of market and social aspects has led to changing use and composition of networks. Networks extending beyond the village level are used to access a repertoire of resources and technologies. This has increased the ability to adapt to changes. Technologies are more attractive if they help maintain existing networks (lending qualities of a technology). Intervention should not only focus on technologies but on how farmers' abilities to network can be increased.
Spielman et al. 2010	Examine how Ethiopian smallholders innovate, how their social networks contribute to innovation processes, and how they are influenced by policies and market factors.	<i>Implicit reference to resilience:</i> The way how smallholders innovate and improve their livelihoods is under constant change. Innovation systems comprise actors linked by networks of knowledge and others exchanges.	Independent: Influence of social networks on innovation adoption.	Pipe: Networks as a conduit for the exchange of information, inputs, and credit within the innovation system.	Structurally explicit: Household interviews, focus group discussions, and semi-structured interviews with key actors in 10 case study locations. SNA: total network.	Social relation: exchange of knowledge, inputs, credit, finance, price and market information. Actors: actors of the innovation system: farmers, extension staff, private and public sector representatives. Scale: local – national innovation system.	Network: national innovation system. Individual: brokering organizations.	Actor: socio-economic / demographic data, adoption behavior, group affiliation (private sector, NGO, extension, etc.). Tie: bridging links. Structure: centrality, coreness, cliques, and structural holes. Context: political influence.	Heterogeneous and integrated networks provide farmers with greater livelihood options. Interconnected public organizations play a central role, while market and civil society actors play only a peripheral role. Public extension and administration exert a strong influence over smallholder networks. By crowding out market-based and civil society actors the public sectors potentially limits beneficial innovation processes.
Tatlonghari et al. 2012	Investigate the structure of information exchange among male and female farmers involved in a project on participatory variety selection in Laos and Indonesia.	<i>Implicit reference to resilience:</i> Social capital in form of social networks among farmers can enhance the adoption of sustainable resource practices and can promote food security and income generation.	Independent: Impact of social networks on the adoption of new seeds.	Social capital: Social networks can serve as a form of social capital, and hence are an important intangible component of individuals' and households' asset portfolios.	Descriptive: Household surveys in two study villages in Laos and Indonesia. Econometric modeling / analysis.	Social relation: exchange of information on seeds. Actors: friends, family members, external actors (formal institutions). Scale: local / village + linkages between communities + linkages to external actors.	Subgroup: groups of kinship / friendship.	Actor: gender of the respondent, age, years in school, household size, area cultivated, number of relatives, membership in organizations, and access to extension services and social institutions. Structure: size of subgroups.	Farmers are strongly influenced by their kin and friends. Having more relatives increases the likelihood of having a big network. Information opportunities of men and women vary in terms of exposure to and control of information. Men tend to have larger networks than women. Gender should be accounted for when investigating the determinants of social networks.
Thuo et al. 2014	Examine the effects of social network factors on information acquisition and adoption of new seed varieties among groundnut farmers in Uganda and Kenya.	<i>Implicit reference to resilience:</i> Social networks play a key role for social learning, and hence the adoption of new agricultural practices.	Independent: Influence of social networks on information acquisition and the adoption of new seeds.	Pipe Networks as a conduit for the exchange of information.	Descriptive: Household interviews in two study sites. Econometric modeling / analysis.	Social relation: discussing groundnut matters, support towards better productivity. Actors: farmers and external actors (extension staff, input	Individual: farmers.	Actor: socioeconomic / demographic data, location, gender. Tie: tie strength, bonding / bridging ties (internal or external sources of infor-	Information flows in social networks are strong among farmers with similar characteristics. Particular weak ties to external support (research, extension etc.) influence information acquisition but not necessarily adoption. As well, gender and geographic location determine information

						supplier, and researchers) Scale: local / village + linkages to external actors.		mation).	acquisition.
Van den Broeck and Dercon 2011	Explore the role of social networks as facilitators of information flows and social externalities of banana production in a Tanzanian village.	<i>Implicit reference to resilience:</i> Social networks facilitating information flows and "learning from others" between farmers.	Independent: Influence of social networks on information flows and social externalities of banana production.	Pipe: Networks as a conduit for the exchange of information flows.	Descriptive: Full village / household census in one village. Econometric analysis.	Social relation: advice seeking and information exchange related to banana production. Actors: farmers in the village. Scale: local / village.	Individual: farmers.	Actor: social roles (kinship, neighborhood and membership in self-reported insurance groups). Tie: tie strength (internal / external ties).	Social learning is imperfect and requires strong networks such as kinship networks. Being part of a larger kinship network or living closer to other farmers suppresses the likelihood of having outside information sources. In order to obtain biggest social externalities those farmers should be addressed belonging to different kinship groups.
van Rijn et al. 2012	Explore the relation between different forms of social capital and agricultural innovations for a sample of African countries.	<i>Implicit reference to resilience:</i> Agricultural innovation is an important factor for economic growth and development. Structural social capital of the poor can foster the adoption of new agricultural technologies.	Independent: Influence of social networks on agricultural innovation.	Social capital: Social networks as structural capital (bonding-, and bridging social capital).	Descriptive: Household survey and village survey in seven African countries. Assessment of an adaptation index and social capital indicators. Econometric modeling / analysis.	Social relation: connections between households at village national level (<i>not specified</i>). Actors: households in the village and external actors (<i>not specified</i>). Scale: local / village + linkages to external actors.	Subgroups: social capital groups.	Actors: level of education, experience of the household in farming, household wealth. Tie: bonding ties (between kin), bridging ties (linkages across groups). Context: presence of mobile phone networks, schooling facilities and water resources.	Participation in wider networks that extend beyond the local village correlates with more innovation. This could be due to enhanced information or better access to resources. Participation in horizontal (intra-community) networks does not appear to be significantly correlated with innovations.
Wossen et al. 2013	Examine how the structure and size of networks affect social learning and farmers' decision to adopt sustainable resource management practices.	<i>Implicit reference to resilience:</i> Social networks as a central determinant of the adoption of new technologies. Networks reduce exposure to risks and are essential in enhancing agricultural productivity and food security.	Independent: Impact of structure and size of social networks on adoption decisions.	Pipe: Networks as a conduit for the exchange of information from different sources.	Descriptive: Analysis of existing survey material from villages in 140 districts. Econometric modeling / analysis.	Social relation: exchange of information, learning about new technologies. Actors: farmers, external actors (extension, public / private institutions). Scale: local / village + linkages to external actors.	Individual: farmers.	Actor: social roles (kin, friends, neighbors) educational level, age, plot location, distance from the peer, distance of network members relative to each other. Tie: kinship- / friendship ties, neighborhood ties. Network: number of ties (size).	Social network size and type of ties (e.g. kinship) play a significant role in enhancing the adoption of natural resource management practices. Adoption of new natural resource management practices is more frequent among farmers whose plot is located next to adopters ("learning by watching"). Distance between network members has a positive effect on the adoption of new technologies. External sources of information such as extension play a crucial role in enhancing the adoption of resource management practices.

Table A1.3: Strand iii: Social support

Authors	Research interest	Conceptualization			Operationalization				Key findings
		Conceptual framing	Network variable	Network narrative	Network approach	Network definition	Network analysis		
							Network level	Network characteristics	
Abizaid et al. 2015	Employ an analytic approach for the study of labor sharing networks among peasant households in the Peruvian Amazon.	<i>Implicit reference to resilience:</i> Social relations shape peasant resource use and livelihood security in rural areas. Labor exchange as a strategy to cope with seasonal labor shortage and cash limitations.	Independent: Influence of kinship networks and household structure on the availability of labor exchange.	Pipe: Social networks as source of labor support in times of labor shortage.	Structurally explicit: Observation, focus groups discussions with key informants, and complete household / village census in a mountain village. SNA: total network.	Social relation: exchange of labor. Actors: households in the village. Scale: local / village.	Network: village labor sharing network. Subgroup: kinship / gender groups.	Actor: household affiliation, gender, income, assets, and land use. Tie: ties between women / men, kinship ties, tie intensity.	Structure and flows of labor within the network are shaped by how households are connected through relational networks at personal and group level. Participation in and access to cooperative labor is markedly unequal. Women's personal networks play an important role in the mobilization of cooperative labor. Cooperative labor is not always reciprocal in the short term.
Baird and Gray 2014	Investigate the influence of livelihood diversification on traditional support networks in terms of bonding and bridging ties in Maasai communities in northern Tanzania.	<i>Explicit reference to resilience:</i> Traditional social networks of exchange and reciprocity are critical components of household security, disaster relief, and household resilience in rural areas. Social networks are evolving in response to household diversification.	Dependent: Influence of income diversification on networks of traditional inter-household exchanges.	Social capital: Social networks as important component of social capital. Different networks confer different types of social capital on their members.	Descriptive: Semi-structured group interviews and household survey in six communities. Livelihood diversification index. Regression analysis.	Social relation: exchanges of resources between households (loans, restocking, and gifts). Actors: households in the community. Scale: local / community.	Individual: households.	Actors: socio-economic / demographic data, church participation, perception of household exchanges. Ties: number and content of exchanges, bonding and bridging ties.	The transition of risk management holds several implications for the growth, development, and resilience of households and communities. Reducing household exchanges might reduce the ability to act collectively. Diversified households may be able to better manage high incidence / low severity shocks but may be less well prepared to manage low incidence / high severity shocks. Declining inter-household exchanges (bonding ties) releases resources that could be invested in household diversification (bridging ties).
Bosher et al. 2007	Explore key factors determining who has assets, who can access public facilities, who has political connections, and who has supportive social networks for coping with environmental risk in coastal communities in Andhra Pradesh, India.	<i>Explicit reference to resilience:</i> Social networks provide social capital that can bolster the resilience of the poor and vulnerable to environmental risks.	Independent / Dependent: Influence of social networks on the resilience of poor households. Caste influence on access to social networks.	Social capital: Social networks as component of social capital providing access to resources that can substitute other capitals and enhance resilience.	Descriptive: Key informant interviews, household interviews, and sociograms in eight coastal villages. Vulnerability index. Descriptive statistics.	Social relation: connections to NGOs, CBOs and family members. Actors: households, CBOs, external actors (NGOs, politicians). Scale: local / village + linkages to external actors.	Individual: households.	Actor: caste, vulnerability index. Tie: tie type, tie strength (internal / external).	Caste is a decisive factor determining the access to particular supportive networks. The poor and powerless castes (those with poor access to political social networks) are dependent on their informal social networks. These networks are typically accessed via the involvement with NGOs.

Cassidy and Barnes 2012	Explore the relationship between household connectivity and household resilience to shocks such as illness, crop damage, and livestock diseases in a rural community in Botswana.	<i>Explicit reference to resilience:</i> Social networks as a strategy of vulnerable rural households to deal with external and internal stresses and shocks and to increase their resilience.	Independent: Influence of network structure on household resilience to environmental risks / economic stress.	Pipe / Social capital: Social networks as a conduit for the exchange of resources. Social networks as one aspect of social capital.	Structurally explicit: Focus group and complete household survey in a rural village. Household resilience index. SNA: total network.	Social relation: exchange of information, labor, food, or money in times of stress. Actors: households in the village. Scale: local / village.	Network: village support network. Individual: households.	Actor: socio-economic and demographic data, resilience index (including wealth, livelihood diversity, household capitals). Structure: centrality.	Households that are better connected have higher resilience, because of higher redundancy and reach of ties into different subsets of the community. Unequal distribution of capitals is correlated with unequal distribution of connectivity. Already marginalized households are less connected.
da Costa et al. 2012	Understanding household food security and, inter alia, the role of food exchange in Timor-Leste.	<i>Explicit reference to resilience:</i> Social networks as a coping strategy for rural households and as a contribution to resilience of agricultural systems to climatic risks.	Independent: Influence on social networks on household food security.	Pipe: Social networks as conduit for the reciprocal exchange of food.	Metaphorical: Review based on national household survey / consumption study.	Social relation: reciprocal gifting of food. Actors: households. Scale: (not specified)	(not specified)	Tie: reciprocity of food exchanges.	The gifting of food between neighbors and members of extended families functions as 'delayed reciprocity' whereby the gift is returned at a later date when the household that has received the gift has a surplus or when other households experience shortage.
Downey 2010	Examine the influence of labor exchange networks on the socio-ecological resilience of rural Mayan communities in Belize and identify relevant network properties.	<i>Explicit reference to resilience:</i> Labor exchange networks contribute to village cohesion and adaptive management, and therefore to community resilience in the context of socio-economic and environmental changes.	Independent: Influence of social networks on the resilience of rural communities / social-ecological systems.	Pipe / Form of coordination: Social networks as conduit for the exchange of labor and information. Networks as a form of managing resource use.	Structurally explicit: Analysis of historical land uses and complete household census in five study villages. SNA: total network.	Social relation: exchange of labor for clearing and planting fields. Actors: households in the village. Scale: local / village.	Network: village labor exchange network.	Actor: field size, crops planted, and productivity. Tie: ratio of reciprocated / unreciprocated ties. Structure: group size, hierarchy.	Labor networks not only increase a farmer's ability to coordinate large labor groups, they also enhance learning and adaptation. Increasing reciprocity rates can increase production, whereas decreasing reciprocity can help protecting shared resources from overuse. Resilience is not increased by developing fragile institutional hierarchies to protect common resources, but by the connective properties of networks.
Ekblom 2012	Assess vulnerability and resilience in rural communities in South Mozambique from a historical perspective, including the role of social networks.	<i>Explicit reference to resilience:</i> Resilience as the capacity of a society to respond to and recover from adverse conditions. Social networks as a livelihood strategy affecting the capacity to cope with vulnerabilities.	Independent: Influence of social networks on resilience / vulnerability of rural communities.	Pipe: Social networks as conduit for the exchange of resources.	Metaphorical: Semi-structured interviews with key informants and household interviews in a rural commune. Geological data and pollen analysis.	Social relation: kinship ties, labor exchange, information sharing, remittances. Actors: households in the commune, external actors (not specified). Scale: local / commune + national / international linkages. Temporal scale: 700 AD until today.	Individual: households.	Ties: internal / external linkages. Context: commercialization of natural resources use, trade, and migration.	Household exchange as an important strategy for buffering risks. Livelihood strategies are institutionalized in society and are examples of the capacity to build resilience. In particular social networks spanning places have long historical continuities. Strategies for reducing vulnerability in the short term can inhibit the capacity to build resilience in the long term.

Gallego and Mendola 2013	Investigate how labor migration in poor developing settings impacts social support networks and cooperative arrangements in migrant-sending communities in South Mozambique.	<i>Implicit reference to resilience:</i> Social networks and migration are crucial household strategies for mobilizing a range of economic resources. Mobility provides both the households and the local network with potential access to uncorrelated income sources.	Dependent: Influence of migration (remittances) on social networks in the origin of migration.	Social capital: Social networks as a key source of information and resources, ultimately influencing economic performance.	Descriptive: Household survey in 42 communities in four rural districts. Econometric modeling / analysis.	Social relation: informal mutual support, advice seeking from relevant persons, formal group membership. Actors: households in the community, migrating household members. Scale: local / community + linkages to migrants.	Individual: households.	Actor: socioeconomic / demographic data, migration, remittances, perception of / reason for community participation. Context: migration, community level characteristics.	Households with successful migrants (i.e. those receiving remittances or return migration) engage more in community-based social networks. Income risks and participation constraints may limit both access to and effectiveness of social networks. Thus higher income stability through remittances or strong family migration ties may decrease participation costs and increase household commitment at the community level.
Goulden et al. 2013	Examine the role of social capital and livelihood diversification strategies for adaptation to climate variability in dynamic lakeshore social-ecological systems in Uganda	<i>Explicit reference to resilience:</i> Social networks as livelihood strategy supporting adaptation to climate variability and promoting resilience throughout the adaptive cycle of the coupled social-ecological system.	Independent: Influence of social networks on the resilience of social-ecological systems	Social capital: Social networks as relations between people that facilitate productive activities.	Descriptive: Household survey, focus group discussions, and key informant interviews in two villages. Regression analysis.	Social relation: advice seeking regarding climate events, group participation. Actors: households in the village and external actors (organizations and institutions). Scale: local / village + linkages to external actors. Temporal scale: 1950s to mid-2000s.	Individual: households.	Tie: type and strength of ties (bonding, bridging, linking).	Households adapt to climate variability by concurrent, spatial and temporal diversification of livelihoods, and by drawing on social capital. However, these sources of resilience are not sufficient in all circumstances. The availability of adaptation options varies according to the different stages in the adaptive cycle of the social-ecological system. Bridging and linking social capital are important for collective action and state responses. Policies should promote strong social capital within and between social groups.
Islam and Walkerden 2014	Investigate the role of bonding and bridging relationships for community resilience to climate events in coastal villages in Bangladesh.	<i>Explicit reference to resilience:</i> Social networks of bonding and bridging ties play a central role in household resilience and disaster recovery.	Independent: Influence of social networks on household resilience to climatic risks.	Social capital: Social networks (bonding and bridging ties) as element of social capital facilitating coordination and cooperation for mutual benefit.	Descriptive: Focus groups, meetings with NGOs and key informants, and household surveys in two coastal villages. Descriptive statistics.	Social relation: support (emotional, food, shelter, cash, labor, etc.). Actors: households in the community, external actors (NGOs). Scale: local / community + linkages to external actors. Temporal scale: Weeks / months after the event.	Individual: households.	Actor: socio-economic / demographic data, household assets. Tie: bonding ties (household members + in-law households), bridging ties (neighbors and close friends).	Affected households draw heavily on their bonding and bridging relationships to face the immediate crisis. Bridging ties (neighbors and friends) break down after some time due to conflict and resource constraints. For longer-term recovery support through linking social networks is needed. Distribution of support is not equal: NGOs favor their borrowers and local governments favor members of their political party.

Islam and Walkerden 2015	Examine how social capital promotes household disaster recovery in coastal villages in Bangladesh, in particular linking social networks with NGOs.	<i>Explicit reference to resilience:</i> Linking social networks – the links between households and external organizations – form an important part of disaster resilience and recovery.	Independent: Influence of social networks on household resilience to climatic risks.	Social capital: Social networks as an aspect of social capital, facilitating coordination and cooperation for mutual benefit.	Descriptive: Focus groups, meetings with NGOs and key informants, and household surveys in two coastal villages. Descriptive statistics.	Social relation: links to formal organizations, advice seeking, material and financial relief, livelihood assistance. Actors: households in the community, external actors (NGOs). Scale: local / community + linkages to external actors.	Individual: households.	Actor: socio-economic / demographic data, household assets. Tie: linking ties to organizations.	Linking ties to NGOs provide support but at the same time catalyze relief dependency, because they focus on relief rather than preparedness.
Kadigi et al. 2007	Assess the spatial dynamics and determinants of livelihood capital, vulnerability, and coping strategies for poor agrarian households in Tanzania, including the role of social networks.	<i>Implicit reference to resilience:</i> Social capital in form of social networks of trust and reciprocity provides opportunities for poor households to cope with water scarcity.	Independent: Influence of social networks on the ability of households to pursue different livelihood activities.	Social capital: Social networks as aspect of social capital: Networks provide an informal framework for information sharing and collective decision-making and have direct impact on other types of capital.	Metaphorical: Household survey in different sample villages in the upper and lower catchment. Descriptive statistics.	Social relation: information sharing and collective decision making, labor sharing. Actors: households. Scale: (not specified)	Individual: households.	Context: climate related shocks, market / income opportunities, access to resources and institutions.	Collective labor arrangements, traditional ceremonies, and informal group membership crosscut social strata and result in higher levels of social capital for poor households. Nevertheless, households critically depend on existing institutional arrangements and mechanisms.
Katikiro et al. 2015	Describe how perceived changes in a fishery system such as declining fish stocks, market failures, and the loss of important species may strengthen or weaken sociocultural patterns in a fishing community in Tanzania.	<i>Implicit reference to resilience:</i> Traditional networks (based on kinship and friendship) provide opportunities for mutual help, solidarity, and social exchange. Hence, social networks constitute a critical safety net for poor households.	Dependent: Impact of ecological changes, market changes, and immigration on patterns of social exchange.	Pipe: Social networks a means to access resources and support.	Metaphorical: Semi-structured interviews, focus group discussions, and life-history interviews in five coastal villages. Descriptive statistics.	Social relation: mutual support. Actors: households in the community. Scale: local / village.	Network: mutual support networks.	Tie: bonding ties (based on kinship / friendship). Context: decline of resources, market integration, immigration.	Informal social relations have become loose and changeable due to perceived ecological changes and the influx of people without a fishing culture background. This has led to an erosion of mutual help, solidarity, and social exchange. However, few primary bonds such as family and clan networks have managed to survive and even flourish within new situations.
Lyle and Smith 2014	Explore the linkages between participation in community collective activities and access to adaptive support networks in a Peruvian highland community.	<i>Implicit reference to resilience:</i> Adaptive support networks play a prominent role in alleviating social and environmental stressors. One reason for collective benefits from social networks is that those who	Dependent: Influence of community participation on access to social support networks.	Social capital : Participation in community activities as an investment in social networks facilitating access to support and resources.	Structurally explicit: Observation, archival data, and household interviews in an Andean village. SNA: total network. Regression analysis.	Social relation: agricultural support (e.g. watching herds, providing advice on animal husbandry). Actors: households in the village. Scale: local / village.	Network: village support network. Individual: households.	Actor: household health and composition, herd size, participation in community activities. Tie: reciprocity. Structure: degree centrality. Context: geographic	Participation in collective action can convey information about qualities of fellow community members that are not easily observable otherwise. Cooperative households have better reputations and have larger support networks (and better household health). As well, mean distance from other households and per capita herd size are significant predictors of network size.

		contribute more reputational benefits, whereas those who contribute less incur reputational costs.						location.	
Nygren and Myatt-Hirvonen. 2009	Analyze the diverse ways in which peasant households in Honduras struggle to earn their living and cope with distress amid globalization.	<i>Implicit reference to resilience:</i> Social networks play an ambiguous role in shaping the opportunities and constraints of poor households to cope with poverty.	Dependent: Factors influencing the viability and reproduction of social networks.	Social capital: Social networks providing access to resources for coping with distress.	Descriptive: Observation, participation, ethnographic interviews, and semi-structured households interviews in all seven villages of the region.	Social relation: labor exchange, money lending, remittances, market connections. Actors: households, and external actors (intermediaries, politicians, and NGOs). Scale: local / village + linkages to external actors.	Individual: households.	Actor: household assets, household composition, life-history. Context: political-economic processes and institutional mechanisms shaping rural livelihoods.	Social networks are not a "capital" or "asset" that poor always can draw from. Rather networks are based on dynamic and negotiated transactions that cannot be mechanically stored or accumulated. Networks are not necessarily available and free of charge but are based upon complex norms of reciprocity. Cultivation of networks requires time, effort and money which the poor peasants lack. Instead, social networks tend to reinforce the existing differences.
Orchard et al. 2015	Assess the association between aquaculture, livelihoods, and social networks in coastal communities of North Vietnam.	<i>Explicit reference to resilience:</i> Aspects of resilience reside in the social networks of natural resource dependent communities: They facilitate access to livelihood resources in order to respond to change and increase the ability of communities to self-organize.	Independent / Dependent: Influence of aquaculture on social networks. Influence of social networks on the resilience of local communities.	Social capital: The structure and function of social networks is a crucial aspect of social capital enabling people to act together, and to pursue shared benefits.	Structurally explicit: Household survey in three coastal communities. Livelihood diversity index. SNA: total network (constructed from ego-networks).	Social relation: communication about mangrove system related issues. Actors: households, external market actors. Scale: local / village + linkages to external actors.	Network: mangrove communication network. Individual: households.	Actor: income, mangrove dependency, livelihood diversity. Tie: bonding / bridging ties. Structure: centrality, efficiency, effective size, and constraint. Context: market integration.	Economic transition alters mangrove system governance through the increasing influence of market mechanisms on the structure of social networks. Traditional dense social networks (bonding capital) are replaced by larger and less dense networks extending the village level (bridging capital). By reducing redundancy and connectedness market integration negatively impacts the capacity of communities to buffer the loss of ties and to self-organize. This way, market integration impacts community resilience.
Rindfuss et al. 2012	Examine the role of family networks at places of origin and destination on migrants' exchanges with family members in northeast Thailand.	<i>Implicit reference to resilience:</i> Migrant remittances are a crucial source for livelihoods in less developed countries. Migrants are embedded in a complex and changing web of social obligations among close family / kin and obligations in the area of destination.	Independent: Influence of family social networks on migrants' remittance behavior.	Pipe: Networks as a conduit for exchanging and facilitating flows of support.	Descriptive: Complete village / household census in all villages of a rural district. Migrant interviews (in destination areas). Regression analysis.	Social relation: transfer of money, labor and goods. Actors: households in the village and other villages in the district, migrants in destination areas. Scale: regional / district + linkages between villages and destination areas. Temporal scale: from 1984 to 1994.	Individual: households.	Actors; age, gender, education, occupation, migrant destination, household size. Tie: ties to spouses, children, and parents.	Intra-family exchanges are influenced by marital status of the migrant, the presence of children and parents in the household of origin, and by having siblings depart from it. The location of the spouse is of relevance as well.

Rotberg 2010	Investigate if and how social networks and key individuals contribute to rural adaptability to climate related risks in Bangladesh.	<i>Explicit reference to resilience:</i> Key individuals in formal and informal social networks can lead communities to adaptive action and can increase communities' resilience / capacity to cope with the impacts of climate changes.	Independent: Influence of networks and key individuals within them on the ability of households and communities to adapt.	Social capital: Social networks as a source of coping and adaptation to climate related risks.	Descriptive: Focus group, interviews, and semi-structured interviews in a coastal village in Bangladesh.	Social relation: asking for support in times of flood, and general assistance. Actors: households, external actors (organizations, NGOs). Scale of interaction: local + linkages to external actors. Temporal scale: seasonal / annual.	Individual: key individuals in the village (brokers).	Actor: education, gender, age, employment, origin of migration, trust and respect (attributed by the community). Ties: tie strength strong / weak ties and type (internal / external).	Key individuals are important for social network functioning. Key individuals that are trusted and respected serve as mobilizer and brokers and hence promote capacity to cope and to adapt. Formal and informal linkages with NGOs provide opportunities for income generation and the strengthening of networks. Social capital is bolstered when embedded in a network of reciprocal social relations. Combination of strong and weak ties leads to more resilient and adaptable communities.
Scheffran et al. 2012	Investigate opportunities for framing migration as a contribution to climate adaptation by drawing on case studies from the Sahel region.	<i>Explicit reference to resilience:</i> Communities and migrants are active agents who shape their livelihoods under changing conditions. Migration creates social capital that can foster resilience in the communities of origin.	Independent: Influence of social networks on climate change adaptation in areas of destination.	Social capital: Networks promote capabilities of migrants and provide access to resources that enrich capitals available at origin of migration.	Metaphorical: Review of three case studies from Western Sahel region.	Social relation: remittances, innovation and knowledge transfer. Actors: households and migrants in areas of destination. Scale: local - international migration system.	Network: migration network.	(not specified)	Migrant social networks can help building social capital and fostering social resilience in the communities of origin. Migration networks trigger innovations across regions by transferring knowledge, technology, remittances and other resources. Hence migration could increase the flexibility, diversity, and creativity of communities in addressing climate stress and could open new pathways for co-development.
Torkelsson 2007	Analyze the role that gender plays in the distribution and productivity of social network ties in a rural village in Ethiopia.	<i>Implicit reference to resilience:</i> Social networks provide access to bonded and bridged social resources and therefore offer opportunities to confront poverty and vulnerability.	Dependent: Influence of gender on the distribution and productivity of network ties.	Social capital: Social networks provide access to social resources that can be exchanged into other capitals.	Descriptive: Semi-structured household interviews, discussions, and observations in a rural village. Document analysis.	Social relation: participation in formal / informal institutions. Actors: households in the village, external actors (formal organizations). Scale: local / village + linkages to external actors.	Individual: households.	Actor: gender. Tie: bonding ties, bridging ties (access to formal institutions), linking ties (contact to external institutions, e.g. NGOs). Context: social norms, social institutions.	Men and women have different access to social networks. It is shown that the poorest and most vulnerable are those excluded from social networks. Networks of women revolve around bonding ties at local level and lack bridging ties to formal institutions (because of limited mobility and time constraints).
Zimmerer 2014	Examine agrobiodiversity in smallholder cultural landscapes with the goal of offering new insights into management and policy options for the resilience-based in-situ conservation in Bolivia.	<i>Explicit reference to resilience:</i> Migration alters social networks central to in-situ conservation of agro-diversity and hence impacts social ecological resilience.	Dependent: Influence of migration on social networks.	Pipe: Livelihood networks connecting various groups through the exchange of information and influence.	Metaphorical: Survey on land use and livelihood activities (including migration and social networks) in a highland region.	Social relation: kinship, social relations between livelihood groups (not specified). Actors: livelihood groups. Scale: (not specified)	(not specified)	Context: migration.	Social networks of migration related livelihood groups are powerfully shaped through international and national migration, while at the same time supporting agrobiodiversity use and in-situ conservation.