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Resource conflict, collective action, and resilience: an analytical framework

Blake D. Ratner
WorldFish Center & International Food Policy Research Institute (IFPRI), USA
b.ratner@cgiar.org

Ruth Meinzen-Dick
International Food Policy Research Institute (IFPRI), USA
r.meinzen-dick@cgiar.org

Candace May
Colorado State University, USA
ckmay@rams.colostate.edu

Eric Haglund
International Food Policy Research Institute (IFPRI), USA
e.haglund@cgiar.org

Abstract: Where access to renewable natural resources essential to rural livelihoods is highly contested, improving cooperation in resource management is an important element in strategies for peacebuilding and conflict prevention. While researchers have made advances in assessing the role of environmental resources as a causal factor in civil conflict, analysis of the positive potential of collective natural resource management efforts to reduce broader conflict is less developed. Addressing this need, we present a framework on collective action, conflict prevention, and social-ecological resilience, linking local stakeholder dynamics to the broader institutional and governance context. Accounting for both formal and informal relationships of power and influence, as well as values and stakeholder perceptions alongside material interests, the framework aims to provide insight into the problem of (re)building legitimacy of common-pool resource management institutions in conflict-sensitive environments. We outline its application in stakeholder-based problem assessment and planning, participatory monitoring and evaluation, and multi-case comparative analysis.

Keywords: Collective action, common pool resources, conflict, conflict management, governance, institutional analysis and development, natural resource management, policy, resource conflict, social-ecological resilience

1. Introduction

In developing countries where access to and use of renewable, common-pool resources essential to rural livelihoods are highly contested, improving cooperation in their management is increasingly seen as an important element in strategies for peacebuilding, conflict prevention, and longer-term social-ecological resilience. Alongside the more traditional recognition of the importance of common-pool resources in reducing poverty and building rural people's assets is an emerging awareness of the positive potential that cooperation around natural resource challenges can offer in reducing the risk of broader social conflict and violence. While this rationale is not altogether new among advocates of public policy support for and investment in natural resources management (Tyler 1999), it is gaining traction in international development circles (e.g. DFID 2007), as well as in the environmental conservation and peacebuilding communities (Feil et al. 2009; UNEP 2009).

Research on the causal links between competition over natural resources and violent conflict (Carius and Lietzmann 1999; Homer-Dixon 1999; Le Billon 2001; Le Billon and Springer 2007; Rustad et al. 2008; Welsch 2008; Rustad and Lujala 2012) has focused largely on high-value extractive resources such as oil, gems, other minerals, and timber. By contrast, conflict over the renewable natural resources that underpin rural livelihoods in agricultural landscapes – the subsistence use of land, water, fisheries, and forests – has received far less attention from the environmental security community, though this trend is now shifting (Kok et al. 2009; UNEP 2009; UNDP 2010; Kapur et al. 2012; Young and Goldman 2013). There is an important distinction here. Conflict over non-renewable resources is in many respects a zero-sum game – while the benefits from gem mining, for example, can certainly be more equitably shared, the underlying resource is finite. By contrast, renewable resources offer more direct opportunities for collective gains through cooperation and collective action, as stewardship of the resource base can increase productivity, thereby "expanding the pie" for multiple actors.

Several trends are contributing to a sharpened focus on the challenges of managing conflict over renewable resources. The recent surge in international "land grabs" as countries and corporations aim to secure ownership or long-term use rights for agricultural land and primary resource extraction has increased attention to poor people's resource rights and livelihoods in policy debates over food security and poverty reduction (Anseeuw et al. 2012). Climate change, with its associated shifts in resource productivity and migration patterns, the emergence of new markets for carbon offsets for forest and land management, and investment in biofuel production have highlighted additional sources of competition and

potential conflict in renewable resource management (Barnett and Adger 2007; RRI 2010). Lastly, increased recognition of the particular challenges of rebuilding livelihoods in the wake of civil war and other violent conflicts has prompted analysis of the role of renewable resource management in peacebuilding (Young and Goldman 2013).

What explains patterns of conflict and cooperation in response to natural resource competition? As summarized in Figure 1, different research traditions addressing the commons have focused on distinct parts of this problem. Political economy analysis of resource conflict is principally concerned with the top arrow in the diagram – from competition to conflict (e.g. Homer-Dixon 1999; Le Billon 2001, 2005; Collier and Hoeffler 2005; Humphreys 2005); the same is true for the political ecology literature, which emphasizes the positive potential of conflict to spawn social movements or institutional changes that lead to more socially equitable forms of resource use (e.g. Peet and Watts 1996; Peluso and Watts 2001; Bohle and Fünfgeld 2007; Cronkleton et al. 2008). Most of the work on the emergence of institutions for collective action and self-governance is concerned with the bottom arrow – from competition to cooperation (e.g. Ostrom 1990; Lubell et al. 2002; Giordano et al. 2005). The applied literature on conflict resolution and on intervention strategies for post-conflict reconstruction is concerned principally with the arrow on the right side of the diagram – from conflict to cooperation (e.g.

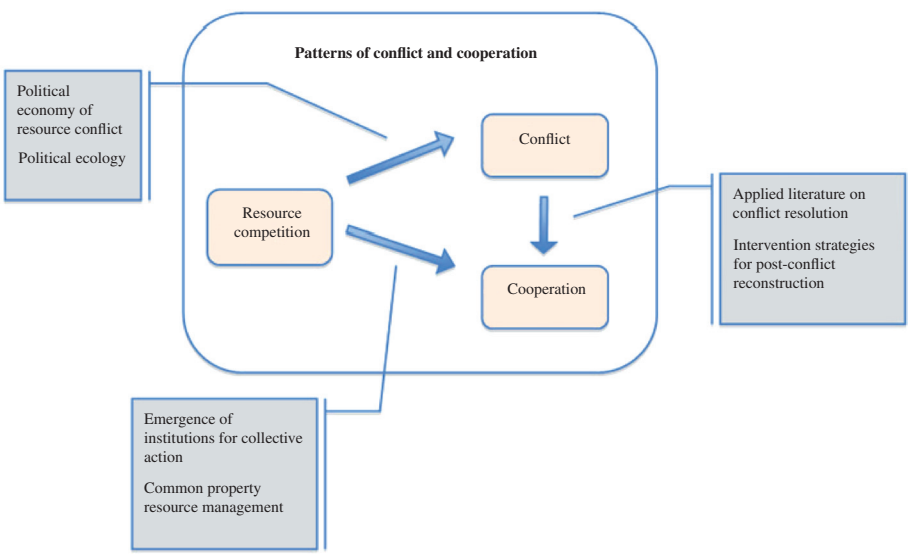

Figure 1. Differing points of analysis in research traditions examining patterns of conflict and cooperation in response to resource competition.
Source: Authors.

World Bank 2005; Maas and Carius 2008; Conca and Wallace 2009; Ruckstuhl 2009; UNEP 2009).

This paper introduces an analytical framework that draws on insights from each of these research traditions. Our aim is to provide a shared conceptual language to guide research on the role of collective action in cooperative management of renewable natural resources, conflict, and social-ecological resilience. "Conflict" as used in this paper covers multiple levels of intensity from non-violent disputes to sustained, violent conflict. The term "broader social conflict" is used to denote escalation in intensity, extension in scale beyond the local level, or extension in scope (e.g. when resource-related conflicts become linked to other divides related to ethnicity, religion, nationality, or social class). While some degree of competition and conflict over environmental resources can be considered inevitable, the focus of our attention is finding ways to divert the progression from competition over common-pool resources essential to rural livelihoods into broader social conflict, including but not limited to violent conflict. The commons literature, while centrally concerned with the dynamics of cooperation and competition, often does not make these linkages explicit; our intent in this review is to fill that gap.

Building on the institutional analysis and development (IAD) model (Ostrom 2005), and incorporating principles from the sustainable livelihoods approach and resilience theory, the framework is applicable across multiple scales of analysis, linking local stakeholder dynamics to the broader institutional and governance context. Accounting for both formal and informal relationships of power and influence, as well as values and stakeholder perceptions alongside material interests, the framework aims to provide insight into the problem of (re)building legitimacy of resource management institutions in conflict-sensitive environments. By offering criteria to evaluate the outcomes of patterns of conflict and cooperation, moreover, we hope to embed the specific analysis of such patterns of interaction within the broader assessment of progress towards social-ecological resilience.

The paper is organized as follows. Section 2 presents an overview of the framework. This is followed by more detailed treatment of its main elements – the context (section 3), the action arena (section 4), patterns of interaction (section 5), and outcomes (section 6). Section 7 provides a discussion of the distinctive features of the framework and the way this draws on distinct research traditions on the commons. We conclude by outlining the framework's application in three domains: stakeholder-based problem assessment and planning, participatory monitoring and evaluation, and multi-case comparative analysis.

2. The framework in overview

The framework elaborated below builds on the institutional analysis and development (IAD) model (Oakerson 1992; Ostrom 2005; Poteete et al. 2010). We selected the IAD model as the foundation because it is highly adaptable, having been applied to a wide range of institutional analyses across different resource systems, and because it also enables analysis of divergent outcomes,

even if historically it has primarily been applied to understand the sources of cooperation. The framework has four main elements: the initial *context* influences an *action arena*, in which *patterns of interaction* are established, leading to certain *outcomes*. As such, it enables the analyst to incorporate key contextual factors without losing sight of the more immediate incentives that influence actors' choices. As a dynamic framework, outcomes, in turn, feed back into and influence the context and action arena in future rounds (see Figure 2).

The context incorporates three broad sets of factors: 1) attributes of the resources, which describe biophysical conditions and trends; 2) attributes of the resource users, which encompasses both local communities and extra-local users; and 3) "rules", which covers broad governance arrangements down to specific rules regulating use of a given fishery, forest, or pastureland, for example (Ostrom et al. 1994; Ostrom 2005). Each of these factors of context can be broken down into much more detailed elements depending on the particular situation examined (Poteete et al. 2010). For each factor, we assess how particular characteristics shape the incentives for collective action to manage contested renewable resources cooperatively – or, alternatively, how they increase the incentives for broader social conflict and violence.

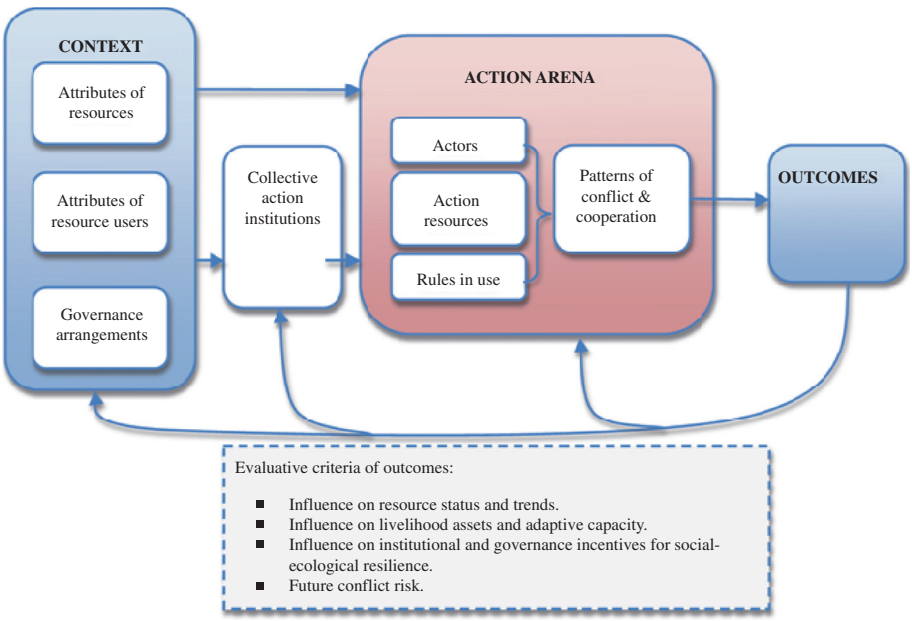

Figure 2. Conceptual framework on resource conflict, collective action, and social-ecological resilience.
Source: Adapted from Ostrom (2005) and di Gregorio et al. (2008).

An action arena can be a village, a court, even a single meeting – any stage for social bargaining on which different actors may choose to cooperate or not (di Gregorio et al. 2008). Ostrom (2005) characterizes action arenas as composed of an action situation and participants. Di Gregorio et al. (2008) further break this down into *actors action resources* and, *rules in use*. We find this latter characterization useful for considering the dynamics of interactions that lead to either conflict or cooperation. The action arena concept invites stakeholders to reflect on what can be done, and how to shift the action resources available so that disadvantaged groups can indeed influence decision-making more effectively in pursuit of equitable outcomes.

Patterns of interaction refer to the bargaining processes among actors in which they exchange resources, devise new rules, and demand action from other stakeholders (di Gregorio et al. 2008). Given the focus of analysis for this framework, we have labeled these "patterns of conflict and cooperation." The outcomes of such interactions over time influence the broader institutional context. Of specific concern for our purposes, these patterns of conflict and cooperation influence the institutional and ecosystem characteristics that either contribute to social-ecological resilience or increase livelihood vulnerability and conflict risk.

Figure 2 presents this modified IAD framework, using Ostrom's (2005) system for grouping contextual factors, but following the approach of di Gregorio et al. (2008) in the action arena.

3. Key contextual factors

In our modified IAD framework, context encompasses three types of factors: attributes of the resources, attributes of the resource users, and governance arrangements. In applying this framework to understanding the links between natural resource management and conflict or cooperation, we assess how each set of factors shape the incentives for collective action to cooperatively manage contested natural resources – or, alternatively, how they increase the incentives for broader social conflict and violence.

3.1. Attributes of the resources

Scarcity (supply relative to demand) of any resource – renewable or not – creates pressure on a resource. Dispersed resources are more difficult to exclude others from using as compared to those that are highly concentrated. Even for a very high-value resource like diamonds, dispersed secondary diamonds from alluvial deposits are much harder to control, compared to primary diamonds found in underground diamond-bearing kimberlite pipes. This is one reason that the alluvial diamonds in Sierra Leone are more associated with looting and illicit trade that funded conflict, compared to diamonds from mines in Botswana, which are much easier to regulate (Lujala 2005). For renewable common-pool resources, however, the spatial and temporal distribution of the resource also matters. Many studies

indicate that the more predictable the resource, the easier it is to build institutional arrangements for its management (Agrawal 2001; di Gregorio et al. 2008). At the same time, in many dryland areas with fluctuating rainfall, the erratic physical environment has created pressure for people to develop higher-level institutional arrangements such as reciprocal land and water access in pastoral areas (e.g. Ngaido and Kirk 2001). Similarly, water shortages in Bali prompted efforts to get the traditional *subaks* (irrigation groups) to federate and negotiate with each other for water allocation along a shared river (Sutawan 2000). With climate change, hydrologic flows are likely to become even less reliable in many areas, creating additional pressures on sharing arrangements. Thus, both long-term trends of ecosystem change and short-term shocks are relevant.

Observability of resource use is another factor that contributes to conflict mitigation by increasing transparency and reducing suspicion. Monitoring of others is one of Ostrom's (1990) design principles for successful management of shared resources, and is much easier to do when there is observability. Activities such as night patrols of irrigation systems or fishing grounds are done to improve monitoring and build trust that rules governing the resource are observed. Small size of resource units and well-defined boundaries of the resource – factors identified by Agrawal (2001), Ostrom (1990), and Wade (1988) as facilitating collective action – similarly increase observability and reduce the costs of monitoring resource use, so are likely to reduce conflicts.

In addition to scarcity, spatial and temporal distribution, and observability, there is a long list of biophysical conditions hypothesized to facilitate coordination in resource management (see Baland and Platteau 1996; Agrawal 2001; Poteete et al. 2010). The relevant categories of resource traits will vary depending on the resource, region, and other contextual factors.

3.2. Attributes of the resource users

Among attributes of resource users, socioeconomic characteristics such as ethnicity, education, and wealth are particularly relevant for analysis as potential cleavage lines along which conflicts may form. This is particularly the case where these different attributes are highly correlated, as, for example, when ethnicity is associated with different (and competing) uses of a resource, such as between pastoralists and farming communities. Stewart et al. (2008) apply a detailed cross-country comparative case analysis to conclude that the risk of violent conflict is increased in situations where multiple horizontal inequalities align, such as where ethnicity aligns with type of resource use or historical claims for resources. Where multiple types of property rights institutions or claims overlap, there are increased opportunities for disjuncture among various social groups, especially where each group appeals to a different type of customary or religious law as the basis for their claims.

Research on factors affecting management of shared resources (e.g. Wade 1988; Ostrom 1990; Baland and Platteau 1996; Agrawal 2001) posits that bounded

groups with a shared identity and history of cooperation are more likely to engage in effective resource management. Yet we must pay attention as well to the way that individual "communities" are differentiated, often comprising multiple identities and conflicting values and claims over the natural environment (Leach et al. 1999). Although social capital is often assumed to increase cooperation, it is not always straightforward. Bonding social capital (social cohesion within groups based on ethnicity, location, religion, shared values, reinforced by working together) may reduce conflicts at the most local level, but may contribute to conflict with other groups. Bridging social capital (structural relationships or networks that cross social groupings, involving coordination or collaboration, social support, or information sharing) can reduce conflict between communities. Linking social capital (ability to engage with external agencies, especially between poor groups and those in authority, to draw resources or influence policy) may be important to mitigate broader social conflicts (Pretty 2003).

Another key attribute of resource users is their assets. The sustainable livelihoods approach stresses the importance of a range of tangible and intangible assets: natural, physical, human, financial, and social, which we categorize as attributes of the resource users (Ellis 2000). Natural resource assets may, at first, seem part of the biophysical context, but we consider it part of the characteristics of the users, because property rights are inherently social relationships. To be an asset, there must be some form of property rights that connect that resource to a person or group. Property rights therefore "map" the natural resources into assets. Secure property rights are often a crucial element in creating clear expectations and thereby reducing conflict. But the distribution of property rights also matters. Highly unequal property rights that deprive many people of even the basic means of subsistence can also lead to conflict, whether through large-scale revolutions (as in China or Nepal) or sabotage and localized use of "weapons of the weak" (Scott 1985; Peluso 1992) as in the Naxalite movement in India. Other types of assets are also relevant for conflict and cooperation. Human capital includes education and health, as well as bodily strength. Physical capital such as roads can connect people or bring them into contact and hence conflict. Weapons are themselves a type of physical capital. The sustainable livelihoods approach links these assets to the implementation of livelihood coping strategies to manage risks and shocks. It also draws attention to the importance of livelihood vulnerability, which comprises the elements of exposure to risk, severity of risk, and capacity to adapt (Adger 2006; Deligiannis 2012).

3.3. Governance arrangements

The final set of contextual factors in the framework relates to the patterns of decision-making on issues of public importance, including natural resource allocation, management, and use. In this modified framework, governance arrangements include mechanisms of representation of diverse groups in decision-making, distribution of power and mechanisms of accountability (Agrawal and

Ribot 1999; Lemos and Agrawal 2006). These are mediated by formal (statutory) legal and political structures as well as customary and informal institutions. Whereas much attention in the natural resources management literature has focused on governance arrangements specific to the resource sector at hand, we argue that considering broad governance characteristics such as state capacity and legitimacy, rule of law, freedoms of expression and political organization, and protections on human rights is essential in conflict-sensitive environments.

Rules that specify which actions are required, permitted or prohibited are generally nested. That is, it is typical for one set of rules to define how other sets of rules can be changed. Ostrom (1990) distinguishes three types of rules: (a) operational rules govern day-to-day decisions, such as who has use rights for an area of grazing land or forest; (b) collective choice rules affect how operational rules are to be changed, and who can change them; and (c) constitutional choice rules are used in crafting collective rules that in turn regulate the operational rules. In this way, the broader governance arrangements influence the character of collective action institutions that emerge, as well as the attributes of different user groups in terms of natural resource access but also voice in decision-making.

Each of these types of rules can be a source of cooperation, or they can be a source of conflict. Widespread and violent conflict (such as civil war) can rupture the institutional structures for constitutional choice, causing lower order rules to also become less effective. The institutions of collective action for resource access and use, such as water user groups, forest management committees, community fishery organizations, and farmer cooperatives, to name a few, embody collective choice rules, and help to set operational rules for resource use. In some instances where local sources of legitimacy for these institutions remain strong, they can endure and remain functional even amidst a more generalized breakdown in governance (Adhikari and Adhikari 2010). While in some highly aggregated frameworks (e.g. Ostrom 2009) these are grouped as a component of the governance system, we have flagged them separately in the modified framework to draw attention to the particular role of such collective action institutions (see Figure 2). Quantitative analysis across multiple country cases confirms the importance of resource governance for reducing the likelihood and intensity of conflict and as an investment in peace maintenance (Franke et al. 2007), but yields few practical implications for how to do this. Our premise is that institutional innovations that enable diverse stakeholders to assess and manage resource competition equitably can help build resilience, including the capacity to adapt not only to current sources of conflict but also to future risks. The challenge is to identify how development interventions in the natural resource sectors can link with complementary efforts to strengthen the underlying role of equitable governance and secure rights as a foundation for resilient livelihoods (Ratner 2013).

By probing the interactions between generalized governance arrangements, ecosystem integrity, and the livelihoods and rights of resource users, progress can be made in deriving lessons for both conflict prevention and recovery. Many security studies focus on the national and international levels, while many natural

resources management studies focus on the farm, community, or local ecosystem. Joining the sustainability and security domains focuses action on the meso-level, seeking out institutional linkages that can help foster collaboration across scales and sectors (Folke et al. 2005; Lebel et al. 2006; Armitage et al. 2009). Focusing attention exclusively on one level can yield inappropriate analysis, and by extension, inappropriate institutional interventions (Young 2006).

Important dimensions of resource conflict stem from institutional gaps. When authoritative hierarchies to enforce rules governing relations of state and remote agricultural communities are missing or inadequate, new institutions are required to bridge these gaps (Keohane and Ostrom 1995). In some cases this entails a re-assertion of prior institutions. In post-conflict East Timor, for example, when the newly independent government lacked the capacity to enforce its own environmental laws, communities revived a customary system of land management known as *Tara Bandu* that had been superseded by the forestry code during the Indonesian occupation (Miyazawa 2010). More often it requires institutional innovation – the creation of new institutions to address emergent challenges, or the adaptation of existing institutions to function in new ways through polycentric forms of governance that include at least some limited authority for resource users in rule-setting (Ostrom 1999).

4. The action arena

The action arena is the stage for social bargaining on which different actors may choose to cooperate or not (di Gregorio et al. 2008). We are particularly interested in action arenas dealing with resource competition and potential conflict. Within these, it is especially important to consider the characteristics of the *actors* involved, the *action resources* they each have to influence others and pursue their objectives, as well as the constraints and opportunities provided by the *rules in use*, which provide the institutional context that limits the choices they have available. Action arenas may be defined at many different levels, from the household to international levels. However, these do not happen in isolation. Just as ecosystem interactions are linked processes across scales (Alcamo et al. 2003), so too are the processes of social bargaining over environmental resource use and access.

4.1. Actors

Actors may be individuals or collective entities, such as organizations, e.g. government departments, other state entities, private companies, or NGOs. Internal actors are those who are expected to follow the specific rule system that emerges from institutional bargaining, whereas external actors can influence the bargaining processes of institutions that define rule systems for other actors, but are not necessarily bound by the outcome (e.g. non-resident government or NGO officials). External actors may act as benevolent agents or as opportunistic rent-seekers. Particularly where participatory stakeholder dialogue is concerned, conveners and analysts exercise influence as actors not separate from but embedded

within the action arena, which requires a reflective sensitivity to power dynamics (Ramirez 1999).

The attributes of different actors are, in part, a function of the social networks they belong to and multiple roles they play. An actor's role within social networks is characterized by his or her relative interconnectedness (measured by the density of relationships), relative position (measured by their centrality within a network) and relative influence (Ramirez 1999; Bodin and Crona 2009). Each actor will have specific action resources, and possible choices about strategic behavior, that might take into account possible strategies of other actors. Change agents are those actors that can influence other actors towards a specific path of institutional change. This influence can take many forms, including top-down policy reform processes and bottom-up social movements. Change agents can have positive and negative influences, and these influences may be intentional or unintentional. Identifying change agents, then understanding and influencing their choices, therefore becomes an especially critical challenge for development interventions aimed at improving resource management and reducing conflict risks.

4.2. Action resources

Action resources are those intangible and tangible assets that give actors the capability for agency. Agency includes the ability to exercise livelihood choices, to participate in collective action at various levels, to influence other actors, or get involved in political processes. All the different types of assets can be considered action resources. In addition, di Gregorio et al. (2008) discuss the potential role of a number of intangible action resources, including: information and the ability to process it; cognitive schemata, which define the borders of what is imaginable to an actor; knowledge that is used to justify their actions; social prestige; and, time.

Forming coalitions also increases the action resources available to the actors involved. Action resources can be mobilized by insiders or outsiders to further their objectives. For example, in their analysis of how communities in eastern Zambia formed bylaws to manage conflicts over land use, Ajayi et al. (2012) note the importance of the decision to engage with the traditional chiefs, who command a great deal of respect and lent legitimacy to the formulation of the bylaws.

Action resources are not distributed evenly or equitably. Wealth or status differences between households or between communities are relatively easy to identify, but even within a household or community, gender differences in action resources are quite important. Men and women have different roles and interests, different action resources available to them, different socially sanctioned norms of behavior, and different approaches to conflict or its resolution (Pandolfelli et al. 2007).

4.3. Rules governing the use of action resources

Action resources do not have a fixed value: they depend on the rules that apply in each action arena. Examining these "rules in use" helps identify the key action resources, and how this is likely to favor some actors and outcomes over others. In

some cases, social prestige is very important in others, current information or time is more important, etc. This offers two major strategies by which certain groups or their allies can try to get outcomes in their favor: either help strengthen their assets, or change the rules to favor the assets that they do have. If land ownership is required in order to have a "seat at the table" (e.g. for land use planning), then helping the landless could involve either obtaining land ownership for them or changing the rules such that participation in decision-making is not tied to land ownership.

Collective action can help in this, allowing groups to work together with other internal actors or with external allies to expand their claims (thereby converting social capital into other assets or changes in the rules). For example, recent research on land management in Cambodia demonstrates the importance of recognizing and supporting the rights of indigenous populations to increase their chances of negotiating with intensifying external claims on their traditionally-managed forests (Ironside 2010). This case involves both bonding social capital within indigenous communities and linking social capital, working with external agencies such as IUCN. The indigenous people's movement provides a further use of bridging social capital to link indigenous communities worldwide to claim stronger property and territorial governance rights (stronger assets) as well as establishing the principles of free, prior, and informed consent for external uses of resources in indigenous areas – a rule change in their favor for negotiating with governments and private sector interests in natural resources in their areas.

Typically, no one single or consistent set of rules governs an action arena. Rather, there is legal pluralism – the coexistence of multiple different types of rules: international, national, customary and religious law, project regulations, local norms, and even voluntary guidelines or corporate social responsibility standards – each backed by a different institutional framework (Meinzen-Dick and Pradhan 2002). Different actors appeal to different sets of rules, depending on which they know of, which institutions they have access to, and which they think will favor their interests to justify their actions. For example, Pradhan and Pradhan (2002) describe how different villages disputing over water in Nepal variously appeal to government project rules, customary water sharing arrangements, and norms giving priority for drinking water to justify their claims to the resource.

Conflict may significantly alter the rules governing the use of action resources. External interventions to address conflict or prevent it likewise can fundamentally shift the rules in use that lend value to the action resources available to different actors. Not only is it important to recognize the role of natural resources as potential sources of conflict and opportunities for peacebuilding (UNEP 2009) we must recognize too that such interventions create and influence particular action arenas from local to international levels, reinforcing some decision-making processes and delegitimizing others.

Research on common property institutions demonstrates that the level of trust that stakeholders have in institutions to mediate resource competition relates to

the degree each has internalized shared norms and values. When shared norms and values are not internalized, greater levels of external enforcement are required (Baland and Platteau 1996). When existing resource management institutions are unable to address resource competition, typically one or more factors are at play that reduce or negate their credibility and legitimacy in the eyes of key stakeholders. These factors include broader social transformations that undermine shared values among local actors, new resource claims by external actors that disregard local institutions, ecosystem linkages (such as upstream-downstream relationships) or market integration that extends the range of stakeholders with an interest in resource management decisions, as well as bias against certain groups in policy implementation.

Analysts need to ask how various interventions may contribute to shifts in assets across stakeholder groups, how conflict resolution mechanisms are made accessible to different user groups, and how this framing of action arenas affects actors' choices about pursuing cooperative problem-solving.

5. Patterns of conflict and cooperation

The action arena constitutes the immediate frame within which actors make choices about how to interact. The focus of this section is on the patterns of interaction that result from these choices. In particular, our concern is with the extent and nature of collective action that characterizes these patterns of interaction.

Sanginga et al. (2007) distinguish three broad categories of conflict management mechanisms. These are customary approaches, legal and administrative mechanisms, and alternative conflict management systems. Each has its limitations. Customary approaches are often discriminatory and usually unable to handle conflicts among communities, with government, or across scales. Legal and administrative mechanisms are often inaccessible to marginalized groups and unsuited to reaching cooperative outcomes in resource management. Alternative conflict management systems, which Sanginga and colleagues term the "synergy approach," are often stymied by power differences and sometimes applied without sufficient adaptation to the local context (see Table 1).

Our particular concern is how collective action can address the limitations of each of these mechanisms. In what ways can collective action help to shift customary conflict management approaches so they are more inclusive, or link more effectively to formal administrative and legal processes, or engage actors at other scales beyond the traditional, local purview of customary institutions? In what ways can collective action increase marginalized groups' access to formal channels of administrative decision-making, legal reform processes, or access to justice through the courts? And, moving beyond the ad hoc interventions that typically characterize alternative dispute resolution with external facilitation or mediation, how can such approaches be institutionalized so that they become a feature of the prevailing governance framework?

Table 1: Strengths and limitations of different conflict management mechanisms

Conflict management mechanisms	Strengths	Limitations
Customary mechanisms	Encourages participation by community members and respect of local values and customs Provides familiarity of past experience Can be more accessible because of low cost, use of local language, flexibility in scheduling Decision-making is often based on collaboration, with consensus emerging from wide-ranging discussions, often fostering local reconciliation Contributes to a process of community self reliance and empowerment	Not all people have equal access to customary conflict management practices owing to gender, class, caste, ethnic or other discrimination Courts and administrative law have supplanted authorities that lack legal recognition Communities are becoming more mixed, resulting in weakened authority and social relationships Often cannot accommodate conflicts among different communities, or between communities and government structures, or external organizations
Legal and administrative systems	Officially established with supposedly well-defined procedures Takes national interests, concerns, and issues into consideration Decisions are legally binding	Often inaccessible to the poor, women, marginalized groups and remote communities because of the cost, distance, language barriers, illiteracy and political discrimination Judicial and technical specialists often lack expertise, skills or interest in participatory natural resource management
Alternative conflict management	Promotes conflict management and resolution by building on shared interests and finding points of agreement Processes resemble those already existing in many conflict management systems Low cost and flexible Fosters a sense of ownership in the solution and its process of implementation Emphasizes building capacity within communities so local people become more effective facilitators and handlers of conflict	May encounter difficulties in getting all stakeholders to the bargaining table May not be able to overcome power differences among stakeholders in that some groups remain marginalized Decisions may not always be legally binding Some practitioners may try to use methods developed in other countries without adapting them to the local contexts

Source: Adapted from Sanginga et al. (2007), after Means et al. (2002).

Stakeholders sometimes choose not to engage in such conflict management mechanisms altogether. As Ramirez (1999) reminds us, that choice depends on an actor's calculus of anticipated benefit. In addition to joint decision-making (which may employ any of the customary, administrative, or alternative mechanisms described above) or third party decision-making (which may rely on adjudication or arbitration through customary or formal legal and administrative channels), an actor may choose separate action. This may take the form of retreat (avoiding direct confrontation or downplaying the conflict), struggle (through violent or non-violent means), or tacit coordination without direct agreement. These routes of action are not mutually exclusive – the same actors may shift strategies over time or pursue multiple channels simultaneously, and the outcomes from one approach may in turn influence the effectiveness of other mechanisms.

6. Evaluating outcomes

In evaluating outcomes from patterns of conflict and cooperation, we are particularly concerned with outcomes measured in terms of livelihood security, resource sustainability, and adaptive capacity, as well as more fundamental shifts to the institutional and governance context. These factors influence, in turn, the likelihood that future resource competition will be managed cooperatively, or whether it will spur broader social conflict.

6.1. Livelihood security, resource status, and adaptive capacity

In many practitioner approaches to conflict management or resolution, the focus is on immediate perceptions of results – "success" is measured by the extent to which parties feel a decision or agreement is fair and responds to their expressed needs or interests (Fisher and Ury 1983). Without denying the importance of such process evaluation, our focus is on the way conflict management mechanisms in practice contribute to more enduring outcomes – not only the narrow interests of actors but also the broader social needs, desires, and values affected (Pinzón and Midgley 2000).

In particular, our concern is with livelihood security, resource status, and actors' adaptive capacity. This combination of factors draws on the insights of resilience theory, which focuses on the capacity of a social-ecological system to absorb disturbances and reorganize while undergoing change to retain essentially the same function, structure, identity, and feedbacks (Walker et al. 2004). While historically the resilience approach has been dominated by empirical observations of ecosystem dynamics interpreted in mathematical models, in recent years there have been advances in understanding social processes (Folke 2006). This includes examination of social learning (García-Barrios et al. 2008), leadership, agents and actor groups (Fabricius et al. 2007), social networks, institutional and organizational inertia and change (Robards and Greenberg 2007), adaptive

capacity, transformability and systems of adaptive governance that allow for management of essential ecosystem services (Gooch and Warburton 2009).

However, there remains a need to further probe the role that conflict and responses to conflict play in contributing to or undermining resilience. By conceptualizing the feedback loops linking outcomes of conflict and cooperation to the broader social, ecological, and institutional context, the framework developed in this paper aims to assist analysis of these links. Outcomes that affect resource status are conceptualized as shifts in the characteristics of the resources under analysis. Outcomes of collective action that affect livelihood security and adaptive capacity are conceptualized as shifts in characteristics of the resource users. Repeated efforts at collaborative management that engage the range of stakeholders across scales can serve not only to promote positive social and ecological outcomes in the near term but can also improve the relationships among stakeholder groups and the capacity for learning and adaptation that is needed to address future stresses and shocks (Daniels and Walker 2001).

Structured processes of social learning involving collective action to address natural resource conflict, we posit, can improve institutional fitness to manage not only future resource conflicts but other forms of social conflict as well. The case of community forest user groups in Nepal (Adhikari and Adhikari 2010) offers an instructive example. Local institutions devised for the purpose of managing competition over shared resources remained effective in the context of a violent political conflict because of their adaptability to changing circumstances and their linkages across scales and levels of organization. Not only did they continue to provide an effective mechanism for forest management despite the failure of broader institutions of governance, but they served as well to moderate the effects of the broader conflict on local communities.

6.2. Shifts in institutional and governance arrangements and conflict risk

In addition to outcomes that affect the characteristics of the resources and resource users, it is important to evaluate how repeated responses to resource conflict affect the prevailing institutional and governance context. Here again, both positive and negative outcomes are possible: institutions and governance factors may promote social-ecological resilience and cooperative management of future conflicts or they may increase the risk of future conflict.

For example, how does the inclusion or exclusion of certain groups in public decision-making processes reinforce norms of participation or, by contrast, institutionalize horizontal inequalities and grievances? Stewart et al. (2008) argue, based on comparative case study analysis, that violence is more likely to occur when severe social-political and socio-economic horizontal inequalities coincide. This provides elites within marginalized groups a strong incentive to mobilize their constituents and greater likelihood of gaining their support. Stewart et al. (2008) show as well, however, that proactive policies of social and political inclusion can reduce the likelihood of violent conflict. Exploring ways natural

resource policy and management can contribute to such inclusion is, by extension, a critical challenge.

How do the patterns of interaction among various formal and informal institutions affect their relative legitimacy in the view of different stakeholders, as well as the capacity of these institutions to negotiate differences or overlaps in jurisdiction, mandate, or decision-making authority? Adger et al. (2005) posit that the persistence and stability of governance arrangements depend on the distribution of benefits and costs from cross-scale linkages, demonstrated by the ability of various institutions to command legitimacy and trust among resource user and governmental stakeholders. Trust in this context is costly; it is built up through repeated interactions and can be quickly eroded when differences in power among stakeholder groups lead to gaps in access to information or decision-making. If government regulators, for example, mobilize information and resources from cross-level interactions to reinforce their authority, often other stakeholders such as resource users are disempowered (Adger et al. 2005). Bridging organizations take on special importance in this regard by providing opportunities for trust building through vertical and horizontal collaboration and collaborative learning processes (Young 2006; Berkes 2009).

How do the responses to resource conflict strengthen or undermine alternate mechanisms of public accountability? Both formal and informal routes of influence should be assessed. For example, positive experiences of collaboration among local communities, corporate resource users, and government agencies may result in an increased willingness to pursue joint decision-making in other domains in the future, or may influence legislation outlining processes for environmental and social impact assessment of investment projects. Separate action to mobilize community grievances over resource conflicts through the media and public protest may broaden political support in a way that influences the emergence of new social safeguards in policy or law, or alternatively, may contribute to a crackdown on media and community-based organizations that becomes institutionalized as an enduring constraint. Frequently these outcomes may diverge from the aims of the actors involved. Woods (2010), for example, describes how the efforts of international NGOs in northern Burma to protect local communities from the encroachment of Chinese companies inadvertently help to formalize the government's authority over ceasefire areas where ethnic minorities have so far exercised a degree of autonomy and local control of resources.

7. Discussion

One of the strengths of the framework outlined here is its applicability at many different levels, from small groups to national or even international levels, depending on the boundaries of the action arena under study. Research on common-pool resource management has long been criticized for paying inadequate attention to extra-local forces of political, social and economic change (Watts 1996; Bryant and Bailey 1997; Agrawal 2001). This is particularly important for

the growing number of conflicts that involve actors beyond the local community, where finding solutions requires bridging ecosystem scales and nested levels of institutions (Sanginga et al. 2007). Unlike many conflict analysis tools that begin at the national scale, our framework builds up analysis from the local perspective. In this, it also draws from the sustainable livelihoods framework, highlighting factors that create vulnerability, the roles of different kinds of assets, and the effect of policies and institutions on people's diverse livelihood strategies (Ellis 2000; Deligiannis 2012).

A further advantage of this framework is that it recognizes the interplay of contextual factors that can constrain or enable certain outcomes and the action arena in which people make choices – in other words, the interplay of structure and agency. Whereas most research and policy attention has focused on the role of natural resources as a source of conflict, understanding the dynamics of various responses to resource conflict requires this more nuanced approach. In particular it provides a means to assess various levers of change to empower disadvantaged rural people to increase their potential for positive action, and it encourages reflection on the role of development agencies, governments, NGOs, and even researchers as facilitators of change (McCay 2001). This stands in sharp contrast to the deterministic approach of many quantitative analyses of factors underlying civil conflict across a large number of cases (e.g. Franke et al. 2007; Collier et al. 2008).

Reinforcing this understanding of agency is an emphasis on actors' knowledge, perceptions and values. Institutions that define the "rules" of interaction are considered socially-constructed and subject to change (McCay 2002). Natural resources are often bound to social identities in complex ways. The historical, cultural, or symbolic importance of a particular resource may contribute to conflicts over its management, with competing groups invoking alternative values, narratives, and ways of framing the problem (Long 1992). Sustained conflict over a resource may even become an element of a group's social identity, complicating efforts to reach a settlement (Green 2010).

This emphasis on group values would be naïve, however, if it did not also consider the power relationships among different actors (Edmunds and Wollenberg 2001; Jentoft 2007). Access to livelihood opportunities is governed by social relations, organizations and institutions, in which power is an important explanatory variable (De Haan and Zoomers 2005). Our framework therefore also draws on the political ecology perspective to recognize the role of power and negotiation, and the emergent nature of governance (Wyckoff-Baird 1998). This means that analysis of any situation has to recognize risks of power imbalance and deprivation, and also seek out institutional responses that help frame incentives for cooperation.

While a number of other research approaches focus on explaining a single outcome (the determinants of violent conflict or cooperation), our focus on collective action is designed to capture the contingent nature of group interactions. Collective action comprises any form of concerted group effort to achieve a shared

goal. However, as Oakerson (1992) notes, not all collective action is voluntary – rules may be imposed that require people to participate. Also, collective action is not necessarily positive: collective action may be discriminatory, excluding outside groups, undermining cohesion across communities, and may indeed help to catalyze violent action. Our concern is what works to foster collective action that supports livelihood security and social-ecological resilience, recognizing at the same time the potential for broadening social conflict that increases people's vulnerabilities.

These characteristics of the framework we have outlined above – multi-scale application, a focus on the interplay of contextual factors and group agency, emphasis on stakeholder values and power relationships, and consideration of contingent outcomes – enable one to analyze long-term processes of institutional change. By definition a process, not a state, collective action is facilitated and constrained by institutions. Over time it can also shift the institutional context, i.e. it can help establish or build the legitimacy of new institutions, and it can help strengthen existing institutions, increasing responsiveness, equity, and effectiveness of resource management, conflict resolution, and governance. The challenge is to build enduring institutional incentives so that multiple, complementary, legitimate channels exist to manage resource competition, making violent action less attractive.

8. Conclusion

This framework aims to improve understanding of the role of collective action in resource conflict and its outcomes, as well as the practice of intervention to improve such outcomes at multiple levels. In this concluding section we outline three such applications: (a) stakeholder-based problem assessment and planning for development interventions and policy reforms, (b) participatory action research for monitoring, evaluation, and collective learning in ongoing initiatives, and (c) multi-case comparative analysis and synthesis of lessons.

The framework can be adapted for participatory problem assessments by drawing attention to the links between immediate sources of dispute and the broader contextual factors that increase or decrease conflict risk. An assessment of the contextual factors – characteristics of the resources and of the users, including the risks and assets, the governance arrangements, and collective action institutions – can help to anticipate the scope for conflict or cooperation. Examining the range of actors involved, the resources at their disposal, and the rules at play, provides a structured way to explore solutions. Equally, the framework should aid joint planning building on such assessments to scope collective priorities for policy and institutional reform efforts, or for development interventions at national, sub-national, or regional scales. As such, the process of collective analysis and problem-solving can itself become an instrument of social learning.

Just as the framework can be applied to collaborative analysis and planning, it can enhance efforts at monitoring and evaluation of ongoing initiatives, again by

broadening the consideration of contextual factors and collective action strategies. The resilience approach encourages practitioners to augment stakeholders' evaluation of outcomes in terms of their immediate interests to encompass a more integrated perspective on prospects for the social-ecological system as a whole and the longer-term implications for their own livelihood security. There is important scope as well for process evaluation, assessing the degree to which stakeholder interactions are contributing to social learning, building relationships and trust across social divides, and opening up opportunities for institutional innovation that facilitate positive expressions of collective action in the future.

In its application to multi-case comparative analysis, the framework can yield lessons on the factors that influence collective action in resource conflict so as to refine our understanding of strategies that work in policy reform and development practice across a range of conflict sensitive environments. Although recent research on violent conflicts in developing countries has found that contemporary conflicts more frequently occur within rather than between states, the unit of analysis for many comparative studies remains the nation state. When the question at hand is not simply where conflict risk is high but also what to do in response, a more fine-grained analysis of institutional dynamics is required. Our framework can assist in this task by showing how resource conflicts (and successfully avoided conflicts) result from decisions made by resource users within a particular institutional and environmental context. By doing so, the framework provides a basis for comparison of cases that applies across multiple scales of analysis, rather than seeing conflict as a function of national-level characteristics. Likewise, it encourages analysts to explore both the constraints of the institutional and governance context and the scope for actors to influence and shape that context over time.

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