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Transforming local natural resource conflicts to cooperation in a changing climate: Lessons from Bangladesh and Nepal¹

Parvin Sultana², Paul Michael Thompson¹, Naya Sharma Paudel³, Madan Pariyar⁴, Mujibur Rahman⁵

ABSTRACT

Since the 1990s climate change impact discourse has highlighted potential for largescale violent conflicts. However, the role of climate stresses on local conflicts over natural resources, role of policies and adaptation in these conflicts, and opportunities to enhance cooperation have been neglected. These gaps are addressed in this paper using evidence from participatory action research on 79 cases of local collective action over natural resources that experience conflicts in Bangladesh and Nepal. Climate trends and stresses contributed to just under half of these conflict cases. Nine factors that enable greater cooperation and transformation of conflict are identified. Participatory dialogue and negotiation processes, while not sufficient, changed understanding, attitudes and positions of actors. Many of the communities innovated physical measures to overcome natural resource constraints, underlying conflict, and/or institutional reforms. These changes were informed by improving understanding of resource limitations and indigenous knowledge. Learning networks among community organisations encouraged collective action by sharing successes and creating peer pressure. Incentives for cooperation were important. For example, when community organisations formally permitted excluded traditional resource users to access resources, those actors complied with rules and paid towards management costs. However, elites were able to use policy gaps to capture resources with changed characteristics due to climate change. In most of the cases where conflict persisted, power, policy and institutional barriers prevented community-based organisations from taking up potential adaptations and innovations. Policy frameworks recognizing collective action and supporting flexible innovation in governance and adaptation would enable wider transformation of natural resource conflicts into cooperation.

Key policy insights:

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² Flood Hazard Research Centre, Middlesex University, Hendon, London, UK. parvin@agni.com

³ ForestAction Nepal, Krishnamohand Smriti Road, Lalitpur, Kathmandu, Nepal

⁴ iDE Nepal, P.O.Box 2674, Bakhundole, Lalitpur, Kathmandu, Nepal

⁵ Nice Foundation, 244, Keshoblal Road, South Pabla, Daulatpur, Khulna, Bangladesh

- Climate stresses, policy gaps and interventions can all worsen local natural resource conflicts.
- Sectoral knowledge and technical approaches to adaptation are open to elite capture and can foster conflicts.
- Many local natural resource conflicts can be resolved but this requires an enabling environment for participatory dialogue, external facilitation, flexible responses to context, and recognition of disadvantaged stakeholder interests.
- Transforming conflict to greater cooperation mostly involves social and institutional changes, so adaptation policies should focus less on physical works and more on enabling factors such as negotiation, local institutions, knowledge, and incentives.

Key words: climate change, collective action, conflict, cooperation

1 Introduction

Potential for violent conflicts and security concerns have been a focus of popular and scientific climate change impact discourse since the 1990s. Recent literature, such as Gleditsch & Nordas (2014), has focused on violent conflict and the complex potential links with climate change. However, any causal links are complex and supporting evidence has often been revealed as flimsy (Scheffran et al., 2012). For example, large-scale migration has been both conceptualized and challenged as a mechanism that brings those vulnerable to climate change into violent conflict with recipient societies (Brzoska & Fröhlich, 2016; Burrows & Kinney, 2016). A common framework argues that climate change adversely affects natural resource productivity and livelihoods, leading to conflicts when people respond to these changes in the social-ecological system, while state actors fund interventions to manage resources better (Barnett & Adger, 2007). However, multi-scalar forces are at play which make local natural resource management complex and nested, and adaptation and mitigation initiatives themselves can add new sources of competition and potential conflict over commons (Ojha et al., 2016).

Research focusing on violent conflict and its links with climate change, such as Gleditsch & Nordas (2014), has filtered out wider interpretations of conflict. Multiple studies have also used a macro viewpoint of conflict and climate change based on secondary data on violent conflict (Nordas & Gleditsch, 2007; Wischnath & Buhaug, 2014), possibly because data sets exist on such conflicts. This paper takes an alternative approach, in focusing on widespread

local competition and conflicts that have received limited attention in the literature linking conflict and climate change. It aligns with the interpretation and institutional analysis framework of Ratner et al. (2013, 2017) and the challenge of transforming natural resource competition to strengthen social-ecological resilience and mitigate conflict. Ratner et al. (2017) use diverse cases from the literature to argue for strengthening collective action as a way of preventing conflict based on understanding stakeholder narratives, institutions that strengthen the rights of weaker actors, and dialogue. We interpret conflict as local contestation and confrontation over natural resources. In many of the cases presented, this is not violent and arises when actors perceive injustice, usually over access rights.

With the potential for climate change to tip the balance in natural resource management towards conflict, climate change policies and their application, including adaptation, need to be conflict sensitive. The novel contribution of this paper is evidence based on 79 cases of local collective action over natural resources in Bangladesh and Nepal that have experienced conflicts, and analysing not only the role of climate related stresses, but also those factors that have enabled a change to greater cooperation. Like Ratner et al. (2017) the roles of unsupportive policies and interpretations of policies regarding community rights are revealed, but in some cases local conflict played a positive role in transformation to more just natural resource access. Some cases show how community-based adaptation and collective action can go hand-in-hand, but in other cases adaptation investments such as infrastructure were found to have contributed to conflicts. These lessons are relevant to programme and policy design and application at national and sub-national levels for governments and funding agencies.

2 Context

The Ganges-Brahmaputra basin hosts over 500 million people who are highly vulnerable to climatic changes. At two extremes of this vulnerability are the inhabitants of floodplains in Bangladesh and hills in Nepal. Both countries have high levels of poverty and high vulnerability to climate change impacts on livelihoods. With a population density of over 1,000 persons per km² in Bangladesh, there is intense pressure on common pool resources notably wetlands. In Nepal, degradation of forests is a persistent problem with associated loss of ecosystem services. Human pressure on resources has been compounded by weak governance. With the aim of improving governance, community management of common pool NR has spread in both countries.

2.1 Climate change stresses and adaptation

Bangladesh and Nepal are both preparing National Adaptation Plans which are expected to mainstream adaptation into longer term national, sectoral and local plans. However, in the study period climate adaptation was guided by National Adaptation Programmes of Action (NAPA) which have not considered natural resource conflict.⁶

The Bangladesh NAPA (Ministry of Environment and Forest 2009) highlighted the problems of coastal inundation, intrusion of saline surface water in the dry season, drought and more unreliable rains, river and flash floods, and intensified cyclonic storm surges. In a strongly centralised state, more funds have been allocated towards short term adaptation including continued investment in large scale water infrastructure. In international forums, public and civil society actors portray the country as a climate change victim to attract adaptation funding.

The Nepal NAPA (Ministry of Environment 2010) highlighted the problems of changing patterns of monsoon rains, glacier melting, landslides, floods, decreased winter rain, drying up of water sources, and increased incidences of pests and diseases. Negative impacts are most likely along the Himalayan foothills due to their sloping and fragile topography. However, unlike most other countries, Nepal's main implementation strategy has been through decentralised Local Adaptation Plans of Action (LAPA) developed by communities under the lowest tier of government (Ojha et al., 2016). This has directed 80% of funds to local challenges but is in flux, with a change in 2017 to a federal system and larger but more autonomous local government units. Mitigation policies mainly focus on forests, and the trend is to reverse decentralised community forestry with more centralised management decisions and restrictions on forest use.

2.2 Community-based natural resource management and networking

In Bangladesh, community-based co-management started in fisheries and local water management in the mid-1990s, increasing to over 500 floodplain community-based organisations (CBOs) (Sultana & Thompson, 2010). CBOs of mainly poor natural resource

⁶ Under the UN Framework Convention on Climate Change (UNFCCC) in 2001 it was decided to support least developed countries to prepare their respective National Adaptation Plans of Action. These were to prioritize their immediate and urgent adaptation needs. Bangladesh was one of the first countries to complete a NAPA. The UNFCCC established a National Adaptation Plan process in 2010 covering all countries to enhance medium-long term mainstreaming of climate change adaptation into national development.

users were formed to address weak natural resource governance. User participation in decisions was expected to improve compliance with rules, improve resource productivity, and provide more equitable access to those resources. These CBOs represent users from one to several adjacent villages with responsibility for spatially defined natural resources. Collective action among fishers offers higher catches from restoring habitat and conserving fish, and local conflicts between elites and fishers over access are reduced where there are well established CBOs with defined secure use rights (Bennett et al., 2001). Policies since 2000 have also devolved responsibility for managing water control structures (sluices) for agriculture to CBOs, partly in response to past conflicts (Mandal, 1994). Since 2007, a network of CBOs has developed for structured adaptive learning between CBOs, and CBOs have enhanced resilience to climate stresses by focusing on community ecosystem benefits (Sultana & Thompson, 2012). Despite these initiatives to devolve natural resource management, in the water sector, investment is mainly on embankments to encircle areas as “polders”, with little space for water user groups and associations to act independently or influence planning. Moreover, government policies have not recognised long term use rights for CBOs in wetlands, and multiple agencies impact on wetland landscapes with little coordination. CBOs have tried to raise these issues, but the space for community engagement in policy dialogue is very limited.

In Nepal, community-based natural resource management started in the early 1980s in response to environmental degradation and increasing costs of top down natural resource protection (McDougal et al., 2008). This expanded to over 18,000 community forestry user groups (CFUGs) across the country. Members of most CFUGs come from several small settlements (hamlets) within one village. These grassroots institutions wanted to consolidate and articulate their interests in wider national policies. This led to CFUGs networking and the emergence of Federation of Community Forest Users Nepal (FECOFUN) a membership body of all CFUGs. FECOFUN aims to amplify CFUG voices, ensure forest policy decisions do not compromise the interests of forest dependent people, and mobilise citizens on environmental issues (Paudel et al., 2012). There have been frequent conflicts between FECOFUN and the government over forest governance, resulting in impasse and consequent adverse impacts on forest conservation and the wellbeing of local communities (Satyal et al., 2018).

In the context of similar extensive community-based natural resource management, but differences between the two countries in adaptation and policy dialogue, this paper aims to improve understanding of how collective action can be enabled to reduce natural resource conflicts associated with climate change stresses and related responses.

3 Study Design and Method

3.1 Site selection

Consultations with CBOs, government and NGOs in both countries identified firstly natural resource issues where conflicts were considered to be important, and secondly climate stressed environments. Three geographic-environment-climate stress regions intersecting with four main issues were identified in Bangladesh (Table 1) and two main regions intersecting with four main issues were identified in Nepal (Table 2). Members of the research team had worked collaboratively with many of the existing CBOs in the two countries since the mid-1990s, and using this knowledge, purposively selected 45 sites in Bangladesh and 21 in Nepal to represent these natural resource conflict issues and environments. Three sites/CBOs were typically selected to represent each environment-issue combination.

In Bangladesh, most of the conflicts studied are over access to, or allocation of, water or other aspects of water security. There is a contrast between local collective action in sharing water or growing crops with lower water demands, and public infrastructure including sluices and silted waterways that often do not meet local needs and instead make seasonal flooding and drainage worse for some communities. The other main source of conflicts is inequitable rights to public lands and waters, including elite capture and encroachment of floodplains to the exclusion of poor women and men who depend on wild aquatic resources for their livelihoods.

In Nepal, most of the conflicts studied centre on access disputes over community forest resources between designated user communities and other traditional users, or lack of access to scarce water for poor women and men. This reflects hilly terrain, decentralised governance, and local adaptation plans and projects supporting small scale actions.

3.2 Action research and adaptive learning

Participatory research can be defined as “systematic inquiry, with the collaboration of those affected by the issue being studied, for purposes of education and taking action or effecting change.” Green et al. (2003, p419). This study took the view that participatory action research is embedded in a process expected to empower the disadvantaged and to facilitate change, by documenting the local socio-ecological system and how it has changed,

understanding these processes and the role (if any) of climate factors and policies, identifying options and opportunities, and facilitating testing new arrangements whether institutional or technical.

The action research approach is more fully elaborated and assessed in Paudel et al. (this issue). In each site over about three years (2014-16), a common set of steps was followed. The research team profiled the natural resource base, actors, access, institutions, CBOs and governance arrangements. Separate sessions with each category of actor were used to understand their interests and interactions, past conflict triggers, underlying factors and outcomes. The research team continued to facilitate a flexible participatory action research process with the CBO and other relevant actors with the aim of encouraging natural resource management that would be considered more just by disadvantaged actors, and understanding how this did or did not develop. A key element of the approach was adaptive learning - a structured processes of "learning by doing". This concept was extended from a more technical focus on adaptive management of natural resources and adaptive co-management involving a hierarchy of institutions and learning among stakeholders (Armitage et al., 2008).

Action research with individual CBOs incorporated an adaptive learning cycle where the CBO reviewed how its actions affected access to natural resources and benefit distribution, and then adjusted its actions. However, the scope for adaptive learning for a CBO is limited to its own experience. Adaptive learning networks have been tested between villages but focused on technical aspects of resource management (Arthur & Garaway, 2005). The concept was extended in this study to learning between CBOs regarding conflicts, adaptation and climate change. This involved the existing CBO networks noted in Section 2.2. The process involved regular workshops between CBOs active within a region or district (see Figure 1). Here the leaders of each CBO shared experiences, identified constraints, gaps, challenges and conflicts faced. They coordinated testing new actions or changing practices to address resource management issues, and agreed how they would monitor and assess actions, which were reported back in the next workshop.

4 Results

Summary findings on causes of conflict and how greater cooperation was enabled are drawn from all 79 cases, making comparisons between countries, and complemented by examples.

4.1 *Natural resource conflicts and their basis*

In total 79 cases of natural resource conflict in 72 sites were investigated, and through participatory action research attempts to reduce or transform them all were made by the CBOs with facilitation from the research team. Several of the cases revealed more than one natural resource related conflict. In Bangladesh, communities using four floodplain waterbodies faced conflicts over access rights and pollution from external sources, which has been made worse by declining dry season water flows possibly associated with climate trends. These conflicts were also affected by weak enforcement of water quality standards and environmental impact assessment policies.

The case studies revealed that the type of natural resource issue expected in the initial selection of the cases was not the actual main conflict issue in several cases. Cases identified originally as forest or water related were generally found to have conflicts focused on these resources. However, in Bangladesh, 16 sites originally characterised as aquaculture expansion or fishery management conflicts were found to have wider conflicts over water management. In Nepal, water and forest related conflicts emerged in the sites where local adaptation plans had been developed. The cases represent issues repeated in many locations, and larger landscape-level conflicts. For example, community forestry policy in the lowlands of Nepal allocated use rights to migrants who live close to the forest and not to traditional users who live further to the south. Similarly, polder management strategies in southwest Bangladesh now involve coordinating the opening of polders to allow silt deposition and to flush out rivers (known as “tidal river management”). Hence, conflict drivers are complex and multi-scalar, and are difficult to clearly disentangle.

The conflict cases studied involve imbalances in, and disputes over, access to natural resources. However, where the resource base changed and past cooperation was undermined by either climate related stresses or policies and their application, these have been highlighted as factors in Table 3. This confirms a strong link between local conflicts over water security and changes associated with climate stresses and trends. It also confirms the significance of gaps in policies and their application in issues over fisheries, land and other natural resources in Bangladesh. In Nepal “other” comprises mostly gaps in local institutions (such as the interaction between communities, community forestry and protected area management).

Table 3 simplifies the complexity of the cases. Attributing conflicts to one root or trigger factor would obscure the multiple factors involved. In most cases a combination of factors

explained how CBOs and local institutions had been undermined or become less effective, and conflicts with other actors or within CBOs emerged. Thirteen causal factors were identified (Figure 2), and while the most common was access disputes, typically 3-4 of these factors were involved in each case, with no difference in the average number of factors between countries.

Where natural resource productivity became more uncertain, or declined, or changed its spatial distribution due to climate changes, this directly exacerbated conflicts over natural resource use, and with no change in human pressure resulted in overexploitation. Local people observed that dry seasons were longer and/or drier, reducing the dilution of effluent in four sites in Bangladesh thereby worsening water quality. In some floodplain *beels* (waterbodies) more unreliable and erratic rainfall outside of the main monsoon meant that there was less surface water remaining for fish to survive in sanctuaries, and with fish concentrated in smaller areas of shallower water this provided an opportunity for poaching and conflicts over fishing. Similar trends affecting streams in three hill sites in Nepal and two sites in Bangladesh resulted in declining water flows, and upstream communities prevented downstream communities from diverting or collecting water. In three sites in the mountains of Nepal potential conflicts have been exacerbated and triggered by climate trends which have shrunk traditional pastures so that yak herders have fewer alternative locations for winter grazing, therefore increasing their pressure on community forests.

In several cases, conflict arose from land use changes in Bangladesh associated with expansion of fish and prawn farming and waterlogging in coastal polders. This may be exacerbated by climate factors, such as the trend for saline surface water to intrude further upstream in the dry season. In the words of a poor woman dependent on collecting aquatic plants and fish in Bangladesh: “The area of flooded fields in the beel has fallen, and all these resources decreased drastically in recent years, along with my income.” Elite capture of resources was a factor in 20 Bangladesh cases, such as local or external investors grabbing public lands for fish farms. Erosion of livelihoods from aquatic commons is a widespread impact on the poor, but when the impacts are more extreme (such as when fish farms block water flows and flood homes) this resulted in conflicts. In one site local elites with access to the local administration obtained the lease to a public waterway, and then blocked it for aquaculture (which is illegal) thereby negatively impacting water flows and the livelihoods of the wider community. Such use of informal powers to grab public lands or water, despite policies to the contrary, is a more general phenomenon (Beban et al. 2017), but in these cases changes in water flows and siltation physically made this capture easier.

Public sector responses were also shown to worsen conflicts. In Nepal expansion of protected areas and unsympathetic application of stricter rules governing use of natural resources in buffer areas (to secure key habitats vulnerable to climate change) increased conflicts between local communities and protected area authorities. Moreover, in nine out of 14 community forest cases in Nepal conflicts with traditional forest users who were excluded from CFUGs can be attributed to weaknesses in application of community forestry policy and failures in local institutions. Policy impacts can have a more direct link with climate stresses. For example, after a cyclone, the Government of Bangladesh announced that those affected were exempt from repaying loans in an attempt to minimise hardship. This undermined one CBO that operated a revolving fund: its members defaulted and the CBO lost the ability to offer services resulting in internal conflict. In Bangladesh, stricter conservation of the Sundarbans mangrove forest helps protect villages from cyclonic storm surges, but brought the poor into conflict with authorities in four cases. As one woman explained: “We are destitute, to survive we collect firewood from the forest and sell it. ... we go in a group as there are so many dangers such as tigers, snakes and forest guards. When you steal you have to deal with much more.”

4.2 Outcomes of participatory action research

Based on process documentation over three years of action research, the research team summarised the outcomes and identified where there was a reduction in conflict and increase in cooperation, and the characteristics of this change. Among the 31 cases where climate stresses contributed to local conflicts, 80% changed to greater cooperation through the action research process. This contrasts with reducing conflict in 40% of 23 cases where policy gaps were important causal factors (Figure 3). The remaining 25 cases involved disputes over natural resource access without influence of policy gaps or climate factors, and conflict reduced in almost 60% of those cases. As will be shown these changes involved, for example, negotiation and a revised access arrangement, or innovations that released resource constraints and bypassed the conflict.

The four cases in Bangladesh where waterbody users were in conflict with external polluters reveal that negotiation and collective pressure led to three private organizations internalising the problem and paying for treatment and effluent retention. However, where municipal waste discharge was involved the town council took no action despite use of the courts by the fishing community.

4.3 Factors causing conflict to persist

In 12 cases in Bangladesh and four cases in Nepal, conflict persisted despite action research for over three years. In most of these cases power, policy and institutional barriers prevented CBOs taking up potential adaptations and innovations. For example, in Bangladesh, local elites used political connections to grab part of a public waterbody for aquaculture excluding traditional fishers.

Policy application biases remained an issue. In Bangladesh seven fisher CBOs were in conflict with government over public waterbody policy which, on paper, should secure use rights for fishers, but in practice is used to lease use to cooperatives backed by elites on a competitive short-term basis. Dialogue with the relevant ministry over proposed reforms, informed by this research and articulated by CBOs and researchers, stalled due to lack of political will to reform the existing system that actually benefits local investors and administrators. The CBOs took legal action to prevent government leasing out use rights to others, resulting in protracted cases, despite initial court rulings in support of CBOs. In this context legal processes did not help the disadvantaged secure their rights. However, after withdrawing their legal case, two-thirds of the CBOs had the skills and recognition to negotiate access with the local administration.

In four Nepal cases, negotiation failed as the actors currently controlling forests did not agree to share benefits and no win-win options or alternatives were identified that would enhance natural resource availability for the disadvantaged communities.

4.4 Factors enabling transformation from local conflict to greater cooperation

Outcomes and reasons for change were documented in 63 cases where conflict was resolved or transformed into cooperation, and where partial resolution was achieved during three years of action research. In consultation with the communities, the research team considered changes to be sustainable or transformative based on documented increased cooperation, changes in local institutions that are more inclusive and/or accepted by the involved actors to be fairer or more just, and in particular where there were changes in tenure over natural resources (36 cases benefiting previously disadvantaged poorer people). In 12 cases, actions partially resolved or reduced conflict without fundamentally transforming the situation. The evidence revealed nine main factors enabling these changes, which are discussed here. The percentages of cases where these factors contributed to change are shown in Figure 4. There was no single "solution"; on average a combination of 4-5 enabling

actions and approaches reduced conflict and enhanced cooperation. Cluster analysis identified five associations of enabling factors and their contexts. Three were mainly in Bangladesh: a set of water and associated commons cases where learning networks plus policy application and the contribution of “other facilitators” (facilitation from sources in addition to the research team, for example local councils) enabled conflict to be overcome; water related cases where incentives, knowledge, as well as other facilitators were the main enablers of change; and non-water related cases where governance innovations and incentives were the main enabling factors. Two were mainly in Nepal: water cases where technical innovation, other facilitators and incentives enabled change; and diverse cases where innovations (technical and governance), learning networks, and incentives were the main factors. The role and examples of each factor are discussed below.

Dialogue and negotiation were followed in most cases and changed understanding, attitudes and positions of actors. Dialogue is an integral part of participatory action research, but negotiation was added for this study. Dialogue can be considered necessary to address conflict, but not all negotiations resulted in transformation. In one Bangladesh site early attempts to negotiate between CBOs to share water failed because the CBO with more than enough water feared that climate stresses in future would reduce its water supply. Other factors (local knowledge and a technical innovation – see below – complemented by new institutional arrangements) subsequently enabled the disadvantaged community to collectively restore lost springs, thereby compensating for increasingly unreliable rain in the dry season.

Incentives played an important transformational role in a majority of cases in both countries. The incentives involved took different forms. In nine community forest cases in Nepal, CBOs recognized limited access rights for previously excluded groups who were sources of rule breaking and conflict, thus converting illegal activities into CBO regulated activities. In five cases (both countries), disadvantaged communities started to pay to secure use and decision-making rights. For example, in Nepal, a local club mobilised payment from a disadvantaged lower community towards its activities and helped persuade the richer upstream community to share water and permit a multiple use water system to be constructed, benefiting women from the low caste community. Similarly, in Bangladesh, in a dispute between two CBOs, the CBO adversely affected by a distant sluice gate agreed, after negotiation, to contribute towards maintenance costs on condition that it secured a right to be represented in operating decisions. This cooperation leveraged support from the government. The repaired gate could then be operated effectively for crop cultivation in the lower area without adversely affecting farmers closer to the sluice. In the words of the

secretary of the adversely affected CBO: “Now we have a say over sluice operation. ... All farmers are happy with two crops ...more fish are recruited from the river, 90% of women also benefit as they are catching fish for household consumption.” Lastly, in almost all cases, conflict resolution benefited CBO leaders socially through local recognition of their role. For example, leaders from socially disadvantaged groups were appreciated in local events, and some CBO leaders subsequently were elected to local government councils.

Enhanced **knowledge** played an important role in about half of the cases. In Nepal, this involved external expertise from the research team or from the Forest Department helping CBOs estimate sustainable yields and demand and supply for forest products, so that they could understand how much fuelwood could be harvested by users who had been excluded by community forestry policies. Local indigenous knowledge also played a role. For example, in Bangladesh, elders in one community identified where former springs had silted up. By digging out silt, the CBO restored the springs and enhanced water flow, thus averting conflict over water and encouraging collective action to maintain springs.

Technical measures and innovations helped overcome natural resource constraints underlying conflict, including water stresses associated with climate factors. Multiple use water systems were introduced in three Nepal sites to store and transfer water efficiently from upstream communities to lower communities where women saved time and effort collecting water for domestic purposes and now grow high value vegetables. In Bangladesh, six CBOs mobilised resources to repair sluice gates to improve their operation, which helped overcome conflicts that had arisen due to problems operating them.

Institutional innovation and reform, including changes in CBO membership, rules and their relations with other natural resource users, was important in transforming about half of the cases in both countries. Where previously disadvantaged stakeholders agreed to contribute fees in return for access to resources or a role in decision making, this was part of local institutional change (those stakeholders became represented in the CBO, or forums were established between neighbouring CBOs). Other institutional innovations made use of opportunities within policy frameworks. In southwest Bangladesh, a rich person had leased a waterway from the government and then subleased it to 20 people for fish farming, blocking water flows and flooding a large cultivated area. Here the solution offered by government officers was for the CBO to register as a fisher cooperative so that it could obtain the lease and then manage the waterway in a more environmentally friendly way. In Nepal where there was conflict between CFUGs and yak herders the innovation adopted was to zone community land into blocks for rotational grazing. In the words of a chauri (hybrid yak-cattle)

herder: “Before we used to face many problems due to community forestry. ...Villagers even vandalized the sheds. ... But now it is different. ... We mainly discuss ... where we can take chauri for grazing. ... So we have started practicing grazing on a rotation basis.” In other Nepal cases CFUGs added stakeholders who had been excluded, or reformed their structure with sub-committees for each hamlet. While some institutional innovations are consistent with relevant policies, others depend on local discretion and need to be regularised by policy reform or guidelines.

Adaptive learning networks between CBOs were tested (where CBO leaders meet regularly to share lessons, see Section 3.2 and Figure 1), and contributed to conflict resolution or enhancing cooperation in 30 cases. CBOs were encouraged to take up collective adaptations and innovations shared by CBOs. An important mechanism for conflict resolution was peer pressure on CBOs that were perceived as lagging behind or failing to negotiate or adopt innovations. The networks also mobilized nearby CBOs to help mediate in some cases. In most freshwater floodplain sites in southwest Bangladesh the CBO network engaged in mediation or influenced CBO leaders to adopt good practices.

Gaps in **policies and their application** were already shown to contribute to natural resource conflict, for example by enabling elite capture of waterbodies with changed characteristics, or preventing negotiation with and inclusion of forest users from distant communities. The cases show how policy interpretation can be made more sensitive to conflicts and the needs of the disadvantaged. In over 40% of Bangladesh cases, changes in how policies were implemented or interpreted contributed to reducing conflict. In northwest Bangladesh, landless erosion victims along the Brahmaputra River had been allocated land that emerged on islands in the river, but were unable to take possession of this land due to complex processes. After a facilitated meeting between a CBO and the sub-district land administrator, the administrator agreed to explain and assist in the process and all 35 landless households actually took possession of land.

Voluntary **multi-stakeholder forums** were introduced at the district (and central) levels as a way to engage government officials, opinion leaders, NGOs and academics with the CBO networks and research team. They contributed to local transformation of conflict in nine cases, by mobilising government officers to advise, mediate, or provide resources to CBOs. However, these forums were short lived and one of the least important enabling factors.

Neutral **intermediaries** (government, researchers, and/or other CBOs) have an important enabling role. In all of the action research cases, there was facilitation from the research

team. But facilitation from government actors (termed “other facilitators”) was important in almost half of cases in both countries. This was mobilized by the research team; it seems unlikely that these officials would have facilitated if they were only approached by the disadvantaged groups in local conflicts. Nevertheless, their role was significant as they have formal authority over natural resources, are respected, and can access other government resources. In southwest Bangladesh, a CBO organized a mass movement from 19 villages affected by elite capture of a waterway and sluice which blocked water flows. They petitioned the sub-district administrator who agreed to pursue their request and shared their problem with the district administration and local Member of Parliament. This mobilized three government agencies that collectively re-excavated the canal.

5 Conclusions

Do local natural resource conflicts and factors enabling their transformation matter for climate change related policy? We conclude that attention should focus more on widespread local natural resource conflicts that deepen inequality and constrain the adaptive capacity of the disadvantaged. Climate stresses rarely created conflicts, but in many of the cases studied exacerbated conflict. Policy gaps (sectoral compartmentalisation, rigidity, application manipulated by those with power) were also important. Many of these climate influenced conflicts can be resolved and even transformed, but this requires responsive enabling facilitation and support for collective action.

Conflict is not necessarily negative; in some of the cases, it brought together the disadvantaged who cooperated in movements for their rights. Thus, conflict can be part of a dynamic process of change and transformation that brings benefits, as well as costs. There are transaction costs to these changes, and the action research reported here may be difficult to replicate on a large scale, but ultimately, in a majority of cases, the benefits from cooperation are greater.

The cases reveal the scope for capacity building and reform of local institutions to reduce conflict, but if those institutions could be changed over three years, might changes be reversed and not transformational? Institutions need to adapt as new challenges emerge, and cases were considered to be successes for one or more of several reasons. For example, where changes in membership or access rules were embedded in CBO constitutions or management plans endorsed by government agencies, or where secure changes in tenure favour disadvantaged stakeholders. Improvements in social relations and

trust between actors were demonstrated by cooperation in work or social functions. Lastly, where win-win outcomes can be achieved, formerly conflicting actors have an incentive to continue cooperating.

Lack of coordination between sectoral policies encouraged conflict, failed to regulate over exploitation of commons, and in Bangladesh, failed to ensure long term use rights to public waterbodies. The cases also reveal the role of biased application and misinterpretation of existing policies in perceived injustices and local natural resource conflicts. Gaps and fuzzy policies, as well as environmental changes associated with climate stresses, created opportunities for local elites to undermine or bypass existing local institutions and capture common natural resources.

Opportunities for grassroots stakeholders to participate in policy debates are needed. Policies are adopted with limited deliberation, and local initiatives in natural resource management and adaptation are not adequately mainstreamed. In Bangladesh, adaptation policies are geared towards sectoral and project-based approaches that favour large scale government interventions, rather than taking a coordinated approach or, as in Nepal, encouraging locally owned flexible adaptation.

This study contributes to understanding of the role of climate change in local natural resources conflict, and is novel for providing evidence of the effectiveness of factors within participatory approaches to reduce conflict, strengthen adaptation and, in many cases, to enable transformative change. This involved combinations of enabling factors and approaches according to local social and environmental context. Innovations adjusting local institutions and natural resource characteristics, developing incentives and mechanisms for actors to share costs and benefits, enhancing local knowledge, and adaptive learning within and between communities all played their parts in change. Scaling up and replication of these achievements requires a flexible, participatory and decentralised approach that recognises all stakeholder interests in designing larger adaptation programmes. Such approaches should build local institutions with a strong mandate and tenure security over local commons based on inclusive governance.

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Table 1 Breakdown of study sites selected in Bangladesh

Conflict issue	Coastal (southwest) N=21	Drought and erosion prone (northwest) N=18	Deeply flooded (haor) (northeast) N=6
Agriculture and water management N=9+6	3 Non-saline 3 Saline (includes planned embankment breaches)	3 Sluice/ embanked areas	(covered in other cases)
Enclosure of floodplain commons/ land use change N=15	3 Shrimp farming (expansion or reduction) 3 Prawn/fish; agriculture and aquaculture	3 Floodplain aquaculture 3 New land in main rivers - chars (new crops, loss of commons)	3 Aquaculture (enclosing fallow land)
Community managed fisheries N=15	3 Coastal/ estuarine 3 Floodplain	3 Closed wetlands 3 Open wetlands	3 waterbodies
Other issues N=6	3 Sundarbans forest resources (access policies)	3 Water pollution	

N= Number of sites selected purposively for action research, 9+6 indicates 9 sites primarily chosen and 6 chosen for other issues

Conflict issues are the natural resource issues expected to arise in the sites

Table 2 Breakdown of study sites selected in Nepal

Conflict issue	Hills and mountain N=9	Lowland (Terai) N=12
Community Forestry (CF) N=12	3 Landscape: CF vs. pastoralists conflicts in high mountain regions 3 Local: Elite capture	3 Landscape: CF vs. distant users 3 Local: CF vs. landless
Local Adaptation Plan of Action (LAPA) N=6	3 LAPA-NR issue	3 LAPA-NR issue
Water and multiple use water systems N=0+6	Water sharing (covered in LAPA cases)	Water sharing (covered in LAPA cases)
Protected areas /buffer zones N=3		3 Park-people (wildlife depredation, denial of traditional uses, distributional justice of park revenue)

N= Number of sites selected purposively for action research, 9+6 indicates 9 sites primarily chosen and 6 chosen for other issues

Conflict issues are the natural resource issues expected to arise in the sites

Table 3 Role of climate stresses and policy limitations behind natural resource conflicts (number of action research cases)

Country	Natural resource focus of conflict	Underlying NR conflict category			Total
		Climate stresses and trends	Policy and its application	Other	
Bangladesh	Water	18	4	4	26
	Fishery	0	6	4	10
	Aquaculture enclosure	3	1	2	6
	Other natural resources	0	4	1	5
	Institutions	0	1	2	3
	Land	0	3	0	3
	<i>Total</i>		<i>21</i>	<i>19</i>	<i>13</i>
Nepal	Forest	3	0	11	14
	Water	7	0	0	7
	Institutions	0	4	0	4
	Land	0	0	1	1
	<i>Total</i>	<i>10</i>	<i>4</i>	<i>12</i>	<i>26</i>

Note: all of the cases involved conflicts over access to natural resources. Bold indicates main underlying category

Fig. 1 Annual cycle of adaptive learning among a network of community based organisations

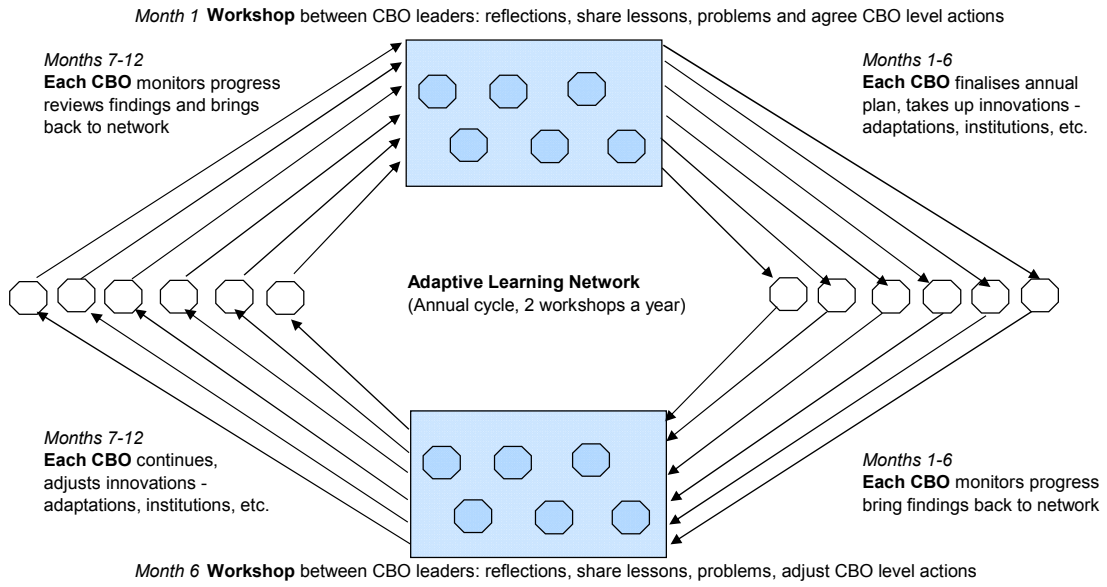


Fig. 2 Factors (underlying and triggers) behind natural resource conflicts studied

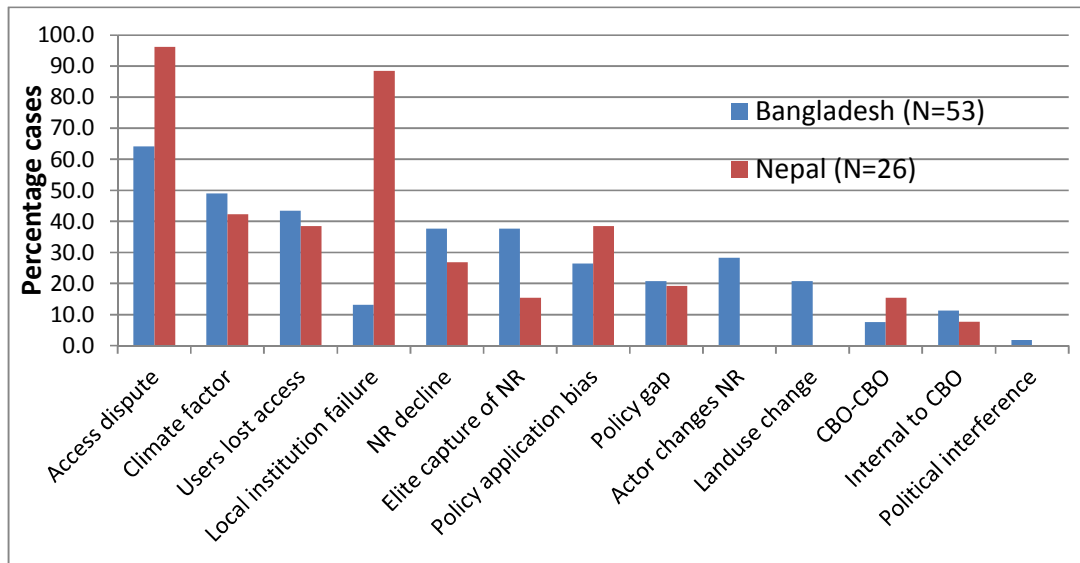


Fig. 3 Outcomes of action research by role of climate and policy factors in natural resource conflict cases

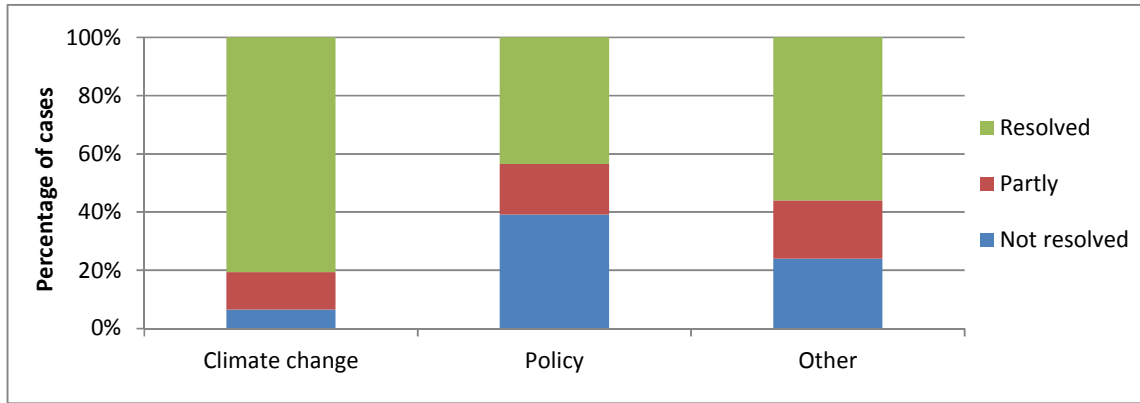


Fig. 4. Approaches used in 63 cases where conflict was transformed into greater cooperation

