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Drought and cooperation in a conflict prone area: Bedouin herders and Jewish farmers in Israel's northern Negev, 1957–1963

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ABSTRACT

Climate change is increasingly considered a security problem by academics and politicians alike. Although research is challenging such neo-Malthusian views, it focuses on conflict, or lack thereof, paying limited attention, if any, to cooperation. This study examines the effect of a severe drought on a spectrum of both conflict and cooperation in a highly incendiary setting, between Muslim Bedouin herders and Jewish agricultural settlements in Israel's semi-arid northern Negev region. This region, lying between the Mediterranean zone and the Negev Desert, has historically been a battle ground between farmers and pastoralists.

Using archival data, both conflictive and cooperative interactions between the two groups during the 1957–63 drought, the worst in the 20th century, were examined. The results indicate that although the entire range of responses occurred, violence was limited and occurred only when some of the Bedouins migrated to the more northern Mediterranean zone. In the semi-arid northern Negev the Bedouins and two settlements engaged in substantive cooperation and assistance. Grazing on damaged crops in return for payment was also practiced during the drought.

A number of factors that affected both conflict and cooperation are identified. The severity of conflicts increased when farmers and herders lacked previous familiarity, while the need to reduce the drought's impacts and settlements' left-wing political affiliation formed main incentives for cooperation. Measures taken by state institutions to directly reduce frictions and to provide relief assistance were central to the overall limited level of conflict, but also reinforced the power disparities between the groups.

Introduction

Climate change is increasingly considered a security threat. Indeed, evidence of correlation between changes in climatic conditions and conflicts is increasing (Gemenne, Barnett, Adger, & Dabelko, 2014). Furthermore, the combination of climate change and conflict has been argued to have led to past societal collapse (Diamond, 2005; Ellenblum, 2012).

The notion that climate change may pose a security threat stems from the (neo)-Malthusian perspective of resource scarcity as a possible source of conflict. Accordingly, the semi-arid regions between the arid deserts and settled lands are at the center of the research linking climate change with conflict. In these resource-poor regions, where agriculture and pastoralism compete, droughts can strain nomadic herders and sedentary farmers and increase the friction between them, thereby potentially leading to outbreaks of violence. The Sahel, an agro-pastoral region frequently affected by droughts, is one of the most common examples used by studies investigating the climate-violence nexus (Benjaminsen, Alinon, Buhaug, & Buseth, 2012).

However, recent studies of resources and conflict, even in highly conflictive settings, failed to identify a clear causal relationship between scarcity and violence (e.g. Benjaminsen & Ba, 2009; Moritz, 2010). Other studies indicate that adverse circumstances may lead people to cooperate (Adano, Dietz, Witsenburg, & Zaal, 2012). Similarly, Breusers, Nederlof, and van Rheenen (1998) suggest that conflict and cooperation can coexist. Yet most research examines only conflict, disregarding possible cooperative responses to climate change. This is an important lacuna, because cooperation can increase the capacity to adapt to environmental changes. Moreover, most studies focus exclusively on climate change and resources. Yet, as political ecologists and environmental security scholars have long argued, environmental changes induce conflict only when compounded by other stressors such as unequal resource allocation and a limited capacity of states to manage disputes (Bassett, 1988; Homer-Dixon, 1999). However, the full range of possible reactions, from conflict to cooperation, has not been analyzed in conjunction with such additional variables.

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Although quantitative studies are now beginning to fill this gap (e.g. Böhmelt et al., 2013; Funder, Mweemba, Nyambe, van Koppen, & Ravnborg, 2010), their results are largely constrained to correlations yielded by statistical models. Thus, their ability to reveal the causality linking between climatic perturbations and the emanating societal responses is limited. Examining this causality was recognized by Gemenne et al. (2014) as a research priority.

This paper seeks to address this gap by examining the effects of the most severe drought that afflicted Israel in the last 150 years on both conflict and cooperation between Bedouin herders and Jewish farmers in the semi-arid northern Negev region. This region, lying between the Mediterranean zone to the north and the Negev Desert to the south, has historically been a battle ground between farmers and herders. Adding to the conflictive settings, during the studied 1957–63 drought only the Jewish farmers had access to a central water system which delivered water from the north, while the Bedouin population was not connected to this pipeline.

Extensive archival work, based largely on the examination of official documents issued by the main agency responsible for tackling the drought, was undertaken in order to understand the drought's effect on conflict and cooperation. Using clear definitions of conflict and cooperation, the findings obtained in this study are summarized and discussed with respect to the climate-violence theory.

The paper proceeds as follows. The next section reviews the climatic and non-climatic factors affecting the interactions between farmers and herders. It is followed by a section presenting the physical and socio-political settings of the northern Negev during the study period. After elaborating the research method, the results are presented and the factors affecting conflict and cooperation during the drought are discussed. Some of the most influential factors include the state's response to the drought, political attitudes, and the prevalence of prior relations between farmers and herders. The paper concludes with a discussion of these elements and by raising several policy implications regarding the prevention of climate-induced conflicts.

Factors affecting conflict and cooperation between farmers and herders

Reflecting a seemingly straightforward struggle over resources at its most basic form and often highly visible, farmer–herder conflicts are commonly presented by neo-Malthusians as the archetypal examples of sub-national resource conflicts. Given the opportunity, herds may graze on crops. Farmers may seek to expand their farmland, often at the expense of grazing areas. Consequently, conflicts between farmers and herders are common throughout the world and reflect the dependency of humans on basic commodities such as milk, meat and grain. However, farmers and herders may share mutually dependent and symbiotic relations. Moreover, the relations between farming and herding groups are not a mere outcome of place-specific resource availability as they are also affected by a rather complex interplay of social, economic and political factors operating on different levels and scales (Turner, 2004).

The factors affecting farmer–herder relations are shown in Fig. 1 and are elaborated in the two following sub-sections. A

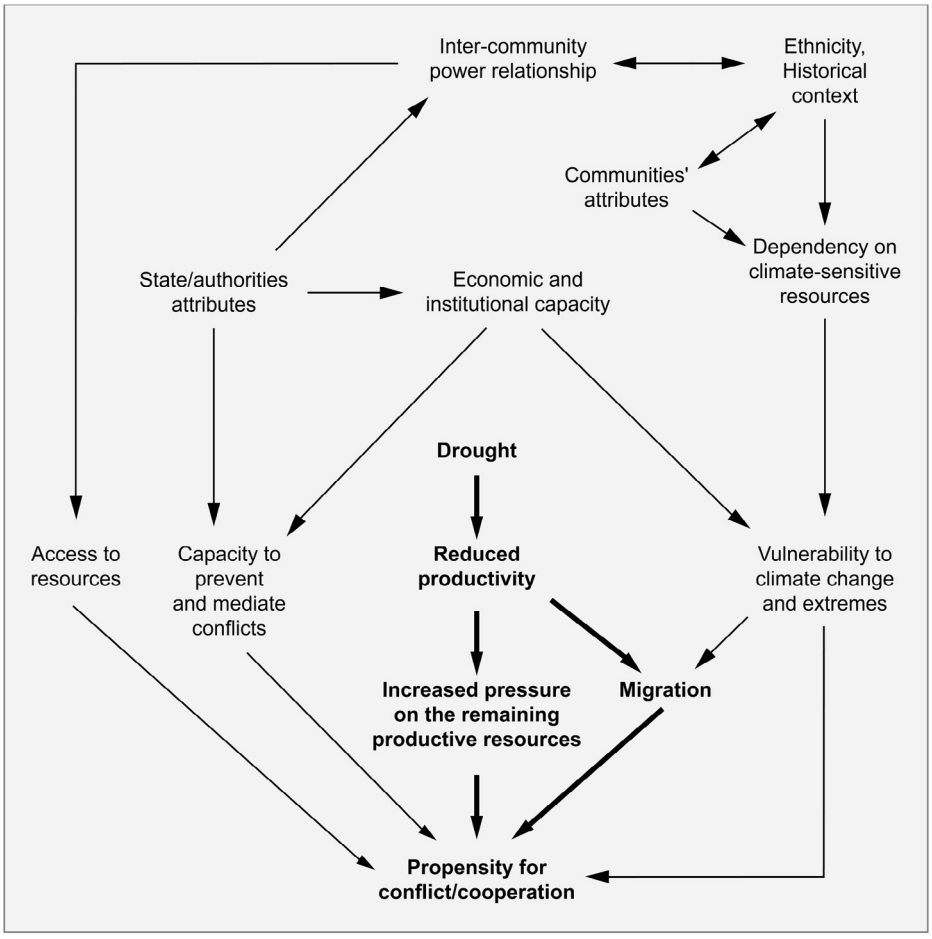

Fig. 1. A generic model of the factors affecting farmer–herder interactions. Factors illustrating the possible effects of droughts are bolded.

substantial portion of the reviewed literature focuses on West Africa, as sources on farmer–herder relations in the Middle East are sparser.

Effects of droughts on conflict and cooperation

As the literature indicates, droughts may lead to both conflict and cooperation. On the conflictive course of events, neo-Malthusians view droughts as the first link in the 'typical' climate-scarcity-conflict nexus. When a drought occurs, less land is available for cultivation and grazing, which in turn reduces productivity and increases the pressure on the remaining fertile areas. This may exacerbate land-use competition and give rise to potential conflicts, triggered most commonly by livestock-induced crop damage (Turner, Ayantunde, Patterson, & Patterson, 2012).

Droughts may also force herders to travel greater distances in search of pastures, thereby leading to friction with farmers beyond their traditional migration routes. Paradoxically, the potentially greater availability of resources in the receiving areas may fuel such friction by providing a stronger material basis for conflict (Adano et al., 2012). Coupled with the absence of significant previous familiarity and the associated conflict resolution mechanisms, migration is recognized as a main pathway to conflict (Homer-Dixon, 1994). In the Middle East, population movements induced by droughts have occurred over several millennia. Joseph's biblical story and the journeys of the Israelites to Egypt are examples of traditions regarding ancient long-term migrations triggered by consecutive dry years.

Contrary to neo-Malthusian claims, higher pressure on resources can also increase the mutual interests between farmers and herdsmen. For example, grazing herds on crop residues enriches the fields with manure while also providing fodder for livestock. This practice improves the limited resource base and is economically favorable for both groups (Moritz, 2010). Such practices are in line with well-established theories on the management of common-pool resources, which highlight the contribution of reciprocity and collective action to long-term system productivity (Ostrom, 2000).

Cooperation may also result from migration. Cornucopian views of environmental migration highlight its adaptive advantages which may provide incentives to cooperate. For example, migration involves the sharing of knowledge that may raise agricultural production and improve conservation practices, thereby benefiting both migrants and locals (Barnett & Webber, 2010).

Non-climatic factors affecting conflict and cooperation

Previous studies have identified a number of generic social, economic and political variables that affect farmer–herder relations. Broadly, these can be attributed to one of two main levels—the inter-group level and the state/authorities level.

On the inter-group level, ethnicity and historical contexts are important factors shaping farmer–herder interactions. Linked with such historical trajectories, conflicts between nomads and agriculturalists in the Middle East have historically followed ethnic lines (Reifenberg, 1950). Vulnerability to climatic fluctuations is another important explanatory variable. A heavy dependency of communities on climate-sensitive resources and a limited availability of alternative income sources may aggravate the impacts induced by droughts, thereby increasing the potential for local conflicts and/or migration (Barnett & Adger, 2007). However, because conflict increases vulnerability, communities may choose to reduce its risks by cooperating and sharing their resources.

Farmer–herder relations are also heavily affected by factors that operate on the state/authorities level. Largely determined by their economic and institutional capacities, states' ability to manage the adverse impacts of droughts affects the vulnerability of farmers and herders to such events and hence the propensity for resource-based conflicts.

Perhaps more fundamentally, states shape the structural factors that determine the socio-political environment in which resource-dependent groups interact. The capacity of states to manage conflicts and their control of resource allocation constitute particularly important elements (Homer-Dixon, 1999). 'Weak' states may lack the capacity to mediate between rival groups or repress conflicts. Corrupt and opportunistic institutions may also amplify the potential for violence. The effects of such governance voids are evident especially where informal conflict resolution mechanisms have been undermined by states (Turner et al., 2012). Conversely, if conflict is prevented the probability of cooperation as a means to reduce adverse impacts of environmental changes increases (Adano et al., 2012).

States also shape the access of communities to productive resources. Resource allocation policies often prioritize farmers, thereby creating inequality in access to productive land and lowering the opportunity cost of herders for engagement in violence. This may reflect the prevailing societal power structure and the affinity between landowners or farmers and state institutions. Such an affinity may be particularly pronounced when there are ethnic differences between the farmers/landowners and the herders (Benjaminsen & Ba, 2009).

As the review of the literature shows, the relationship between climatic fluctuations and farmer–herder interactions is complex. Beyond the effects of climatic variables, inter-group relations are shaped by various socio-political factors (O'Loughlin et al., 2012). Such factors determine the propensity for conflict and/or cooperation in the face of resource scarcity. In this sense, climatic shifts or shocks are viewed largely as 'triggers' that induce conflict only when coupled with stressors such as inter-group animosity, power disparities and unequal access to resources. These, however, were the circumstances in the northern Negev in the mid-20th century.

The northern Negev

Physical settings

The semi-arid northern Negev is the frontier region between the humid Mediterranean zone to the north and the Negev Desert to the south. Precipitation is concentrated during the winter months and varies between 200 mm at the south of the region and 400 mm on its northern margins. However, rainfall in the northern Negev is highly variable. Droughts in the area commonly occur in cycles, often in several consecutive years. The 1957–63 six-year drought is considered the longest one affecting the region in the last 150 years (Ran, 2007). Fig. 2 shows a time series of annual precipitation values, measured at the city of Be'er-Sheva between 1921 and 2012.

Although considerable variations in annual rainfall occurred during the drought, reports issued by the Ministry of Agriculture (MoA) indicate that even in the winters of 1958–59 and 1960–61, when precipitation levels were near-average, rainfall occurred late in the season, thereby leading to substantial losses of crops and lack of pastures (Ministry of Agriculture, 1959a, 1961).

Social, economic and political settings

The pre-drought period

The northern Negev, as other semi-arid areas in the Middle East, reflects what Reifenberg (1950) viewed as an ancient arena of cultural and ecological conflict between 'the desert and the sown'. In such regions sedentary farmers clashed with nomadic pastoralists over access to resources for thousands of years.

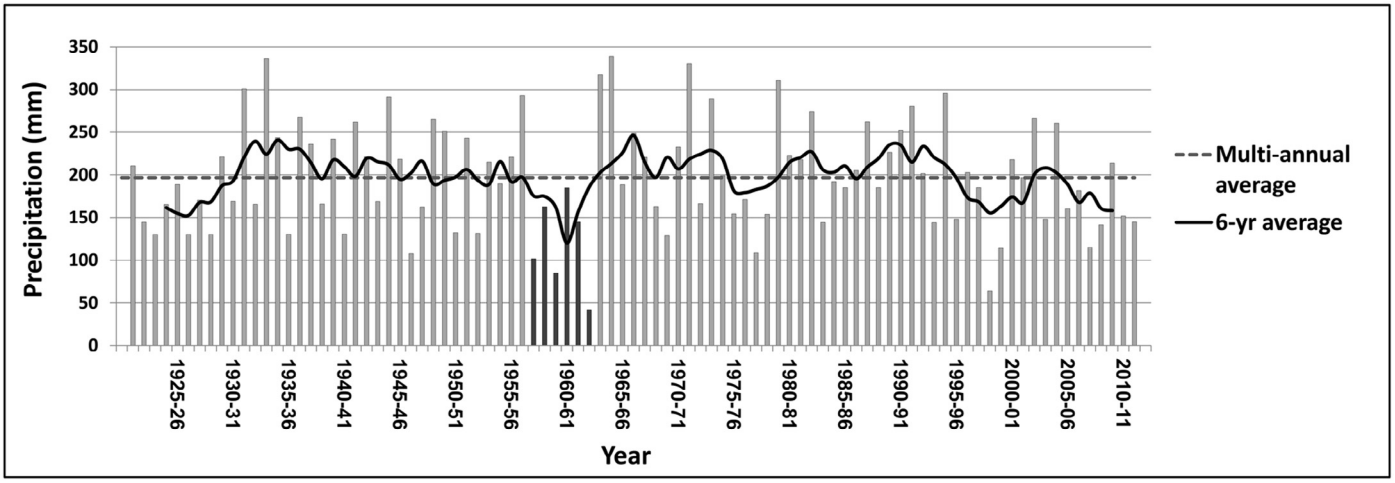

Fig. 2. Annual precipitation in Be'er-Sheva calculated for the months of September through May. Values of the studied drought are bolded. Source: Own calculation based on data obtained from the Israel Meteorological Service (2013).

For centuries, the Negev was largely inhabited and de-facto controlled by Bedouin tribes. The Bedouin economy was based on two main activities—pastoralism and patchy dry-farming which enabled the Bedouins to undertake long migrations with their livestock (Meir, 2009). Jewish settlement in the northern Negev began in earnest in the early 1940s and was largely organized in agricultural communities. The establishment of such communities was viewed by the Zionist movement as an important mechanism to expand the borders of the future Jewish state in Palestine and lay the foundations for more extensive settlement in the Negev. About 25 settlements, comprising mostly Jews of European decent, were established until 1948. The majority of these were *Kibbutzim*—collective settlements based on communal production and consumption. Most of the settlements were built as outposts, often overnight so as to overcome the restrictions on Jewish settlement in this region set by the British Mandatory Authorities. In line with the Zionist ideology of settling the Negev and transforming the Jewish people from a 'universal people' to a people living on its own land, the cultivation of field crops was practiced extensively by the settlements while grazing was limited (Kark, 1983).

While the settlements adhered to the main principles of Zionism, they were also divided into different ideological movements. Some of the *Kibbutzim* were affiliated with '*HaShomer-HaTz'air*'—a leftist movement with pro-Soviet leanings and a strong commitment for Jewish-Arab political cooperation. *HaShomer-HaTz'air* was the only Zionist movement who recognized the national rights of Palestinian Arabs, including the Bedouins, and advocated for a bi-national state. The other *Kibbutzim* and the several *Moshavim* (the latter being co-operatives based on household-level farming) were affiliated with more centrist movements. These rejected *HaShomer-HaTz'air's* bi-nationalist positions and saw the partition of the country as the only means to establish a Jewish state (Beinin, 1990).

Regardless of settlements' political orientation, the relations between the settlers and the Bedouins were largely cooperative, shaped by mutual dependency and interests in various domains. Settlers bought manure from the Bedouins, and in return allowed them to use surplus crops as fodder. While the Bedouins benefited from access to settlements' water infrastructure, the latter sought the patronage of the Bedouin sheiks for security purposes. Settlers even established joint committees with the Bedouins to maintain friendly relations (Meir, 1997). However, all this changed dramatically in 1947, following the United Nations declaration on the establishment of the state of Israel and consequent outbreak of hostilities.

As a result of the war most of the Bedouins fled the Negev or were expelled from their lands. Most of those that remained in the Negev became Israeli citizens, but were relocated to two confined zones covering only ten percent of the territory they previously utilized. These areas, shown in Fig. 3 together with the location of the Bedouin tribes and the Jewish settlements, were placed under military rule. Much of the land held by the Bedouins was appropriated by the state. It was then populated with dozens of *Kibbutzim* and *Moshavim*, established by the state to absorb immigration, settle the northern Negev frontier and increase agricultural production. Such settlements had no previous relations with the Bedouins (Meir, 1997). The events in the early years of statehood have therefore transformed the Bedouins into a highly marginalized minority, socially and politically isolated from the wider and more modernized Jewish society.

As Meir and Zivan (1996) show, these events bore significant implications to the interactions between the settlers and the Bedouins. Most critically, the relations between the groups became framed by the broader Israeli–Arab conflict and turned considerably more hostile. Particularly, in the new reality in the Negev the *Kibbutzim* filled a quasi-military role and cooperated with the military authorities in securing the state's borders. This cooperation added substantial tension to the interactions between the groups. Moreover, the Bedouins faced restrictions on movement outside the confined zones. This implied that only several settlements bordering these areas were accessible to the Bedouin population. However, the need to preserve neighborly relations declined dramatically as in the new reality the settlements were no longer dependent on the Bedouins and could turn to the state for support.

The agricultural settlements were well connected to the political parties that dominated Israeli politics at the time, and to the main government agencies, especially the MoA. The political affiliation of the settlements was based on their ideological division. The *Kibbutzim* related to *HaShomer-HaTz'air* movement formed a political stronghold of the leftist '*Mapam*' party. The other *Kibbutzim* and the *Moshavim* were affiliated with the dominant and more centrist '*Mapai*' party, which led the Israeli Government during this period. *Mapam* was the more socialist and egalitarian of the two parties, advocating vigorously for equal distribution of political power and educational opportunities and against the concentration of socio-economic power in the hands of the state (Bareli, 2007). However, similarly to the pre-independence period, issues concerning the Arab population in Israel underlined the main left-center divide. While

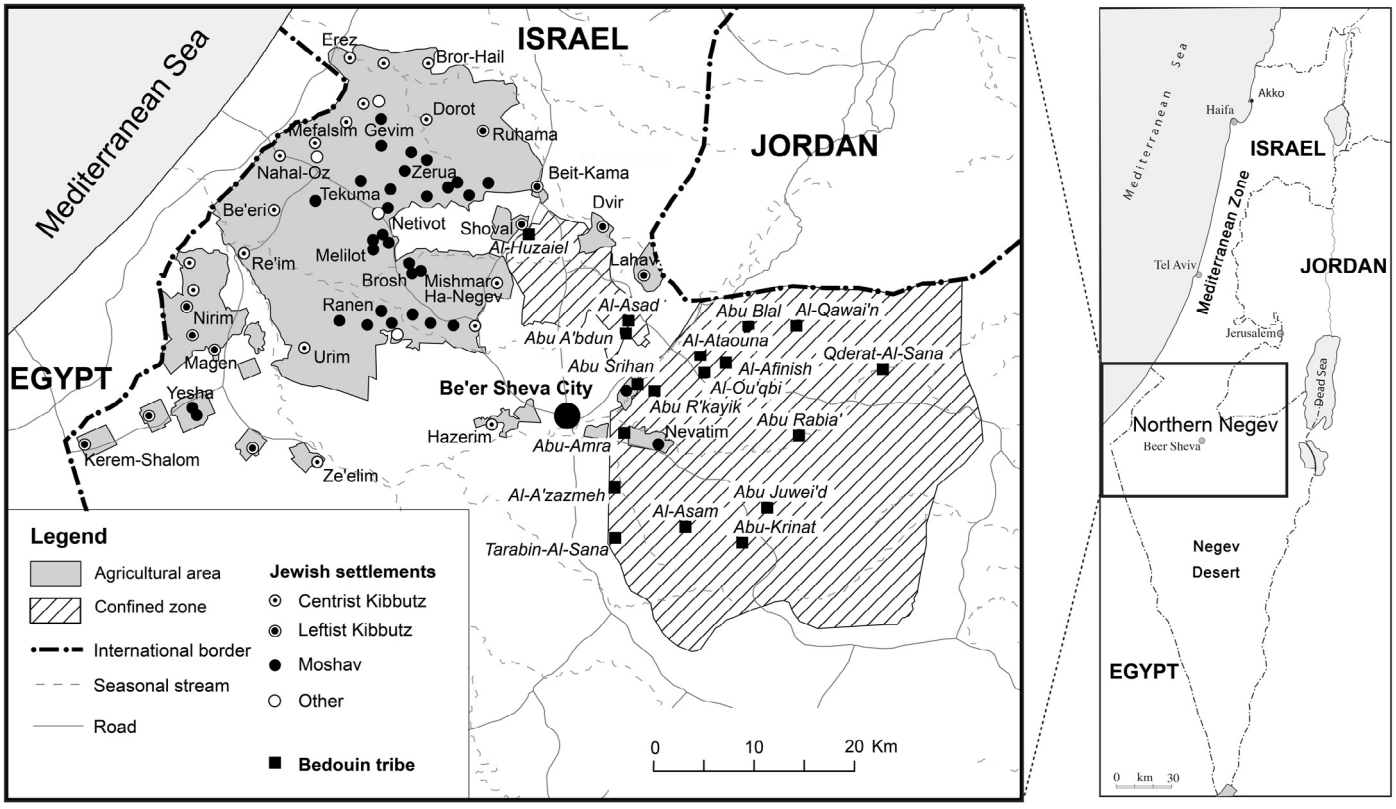

Fig. 3. Bedouin tribes and Jewish settlements in the northern Negev, 1957–63.
Sources: Israel Mapping Division (1956) and the Ministry of Agriculture (1962a).

Mapai implemented a hardline policy toward the Arab minority, *Mapam* sought to advance Jewish-Arab coexistence and advocated that Arab citizens should be granted full civil equality. Furthermore, *Mapam* saw the military rule imposed on Arab citizens as a critical obstacle to achieving peace with the Arab countries (Halamish, 2010). In line with such views, leftist *Kibbutzim* in the northern Negev undertook various actions to alleviate the situation of the Bedouins. These included efforts to end the military administration in this region, advance Bedouin land ownership claims and foil government attempts to relocate Bedouin tribes. Such actions, perceived by the state as an impediment to its control of the Bedouin population, formed a source of constant friction between leftist settlements and the authorities (Meir, 1997).

Only a few years before the drought conditions for agriculture in the northern Negev improved significantly, when in 1955 the Jewish settlements were connected to a main conduit which delivered water to the region from the Yarkon Springs in central Israel, reflecting the importance of the Negev in the Israeli settlement projects. However, the majority of the Bedouin population, although residing in the more arid confined zones, was not connected to this pipeline. The restricted mobility of the Bedouins strained this population even further, as pastures in the confined areas were in short supply even in years of average precipitation (Ministry of Agriculture, 1960a). Repeated attempts made by herders to graze their livestock on their traditional lands, transferred to the agricultural settlements, caused frequent conflicts (Meir & Zivan, 1996).

The economic activities practiced by herders and farmers often form the primary trigger of conflicts between these groups. The main economic features of the two population groups in the beginning of the drought are summarized in Table 1. While certain settlements raised some livestock and the Bedouins cultivated crops, the economic diversification of the groups did little to reduce the drought's impacts.

The drought period

Already in the first year of the drought the Jewish settlements were severely strained by additional expenses for irrigation, loss of crops, and low prices for the remaining withered yields. Such losses strained the settlements to the point of an existential threat (Negev Settlements Drought Committee, 1958). Table 2 details the drought's impacts on five *Kibbutzim*. The reduced yields are shown for wheat and barley, the two main crops cultivated in the northern Negev.

Being more dependent on natural water sources and rain-fed pastures, the Bedouins suffered even greater impacts. Livestock mortality

Table 1
Main economic features of the Bedouins and the Jewish settlements.[a]

Population	Main source of income	Secondary sources of income
Farmers	Field crops, ranging between 40% and 70% of total revenues. Main crops: wheat, barley and crops for silage	Dairy cattle, small herds of sheep and goats, poultry and plantations
Bedouins	Livestock. Size of herd in 1958: 120,000 sheep and goats, 2000 cows and 8000 camels	Field crops, mostly rain-fed barley which was used as pastures in dry years, wage labor

[a] Sources: Ministry of Agriculture (1959a, 1962b).

Table 2
Reduced agricultural yields in five *Kibbutzim*, calculated as declines from average yields in years preceding the drought. The associated economic losses are shown in Israeli Pounds.[a]

	Reduced yields and economic losses in 1958					Economic losses in other drought years		
Kibbutz	Non-irrigated wheat	Irrigated wheat	Non-irrigated barley	Irrigated barley	Economic losses	1959	1961	1962
Bet-Kama	–44%	0%	–56%	–45%	90,910	125,900	74,150	160,051
Mishmar Ha-Negev	–58%	–47%	–70%	–58%	124,530	136,000	73,040	167,271
Shoval	–28%	–35%	–70%	–7%	97,970	104,714	118,732	244,275
Lahav	–57%	–12%	–68%	–	191,510	157,650	73,700	176,609
Dvir	–48%	–3%	–59%	–25%	133,390	154,550	74,450	176,050

[a] Sources: Negev Grains (1958); Ministry of Agriculture (1959a, 1962a); Israel National Bank (1961).

reached 40% as early as the second drought year, many water holes dried and basic water needs were not always met (Ministry of Agriculture, 1959b). Although the Bedouins were allowed to leave the confined zones with their herds already in 1958, restrictions on mobility were occasionally toughened, thereby threatening their livestock with starvation. The conditions experienced by the Bedouins were so severe that even isolated cases of malnutrition were reported as the drought persisted (Ministry of Health, 1960).

In addition to the coupling of the Jewish farmers' reduced productivity with famished herds roaming throughout the northern Negev, both groups were also armed, thereby aggravating the severity of potential conflicts. The probability of such conflicts was further magnified due to the introduction of irrigation to the region, as irrigated crops were less affected by the drought (see Table 2), in turn increasing the material basis for friction.

On the national level, the political economy of Israel followed the 'developmental state' model, in which the state formed the major agent of socio-economic development. In the domestic field the broad objectives of this ideology reflected Israel's interests in increasing its political, social and economic capabilities. This implied, among other issues, comprehensive control of agricultural production and allocation of economic resources including land (Levi-Faur, 1998). It also implied that the state's absolute hegemony over internal issues enabled it not only to keep the Bedouins under military rule but also to control the Jewish settlements economic activities. Moreover, the state was interested in preventing wide-scale social unrest and avoiding the use of openly violent repressive measures against Arab citizens. Hence, any conflict in the drought stricken northern Negev would have impeded this objective.

Research method

Approach

Similarly to most other studies examining farmer–herder relations, we apply a case study methodology. Complex large-N investigations of inter-group relations are hampered by various problems. These stem from the inherently local nature of such relations, associated with historical trajectories and political–institutional capacities. Most importantly, many of the explanatory factors are qualitative and their quantification, if possible at all, results in substantial loss of information.

An encompassing approach to the analysis of the events that occurred during the drought is further facilitated by examining their spatial variation. Because migration is considered an important pathway to conflict, inter-group interactions that took place due to Bedouin migration to the Mediterranean zone are distinguished from those that occurred within the northern Negev, where Jews and Bedouins are more familiar with each other. Cases exhibiting considerable temporal variation in inter-group or institutional responses to the conditions induced by the drought are also isolated.

We are assisted by insights derived from multiple theoretical lenses including political ecology, political geography and environmental security, to explore and interpret the events that took place during the drought. Focusing largely on the explanation of conflicts and frequently adopting a historical approach, political ecology emphasizes power relations and politics as main variables affecting access to resources (Bassett, 1988). Environmental security scholars often emphasize the role of the state in negotiating disputes and allocating scarce resources (see Homer-Dixon, 1994). In line with these approaches as well as with perspectives from political geography studies (e.g. Le Billon, 2001), the pre-drought relations between the Bedouins and the settlements, the power disparities between these groups and the actions taken by the state to allocate resources and regulate inter-group interactions are central to the interpretation of the study's results.

Broadly perceived as the susceptibility to sustain harm, vulnerability forms another main dimension in this study. Vulnerability encompasses various elements such as dependency on climate-sensitive activities, access to alternative income sources, and institutional capacity to positively affect local livelihoods and manage environmental changes (Barnett & Adger, 2007).

Beyond the elaboration of the main explanatory factors, the operationalization of conflict and cooperation merits particular attention.

Operationalization of conflict and cooperation

Because the literature on farmer–herder relations has focused on 'negative' interactions between these groups, it does not provide a framework to operationalize a more complex dependent variable. Therefore, the operationalization of conflict and cooperation draws substantially on other literatures, where these concepts have received considerable attention. These include studies examining intra-state interactions over water resources (Böhmelt et al., 2013; Funder et al., 2010) and between hostile parties affected by disasters (Gaillard, Clavé, & Kelman, 2008).

A brief review of this literature shows that conflict and cooperation are not viewed as two diametrically opposed states, as they can span different intensities. Therefore, such interactions are commonly viewed as comprising a continuum. Böhmelt et al. (2013) and Funder et al. (2010) examined 'conflictive' and 'cooperative' events on a wide spectrum, ranging from collective violence to joint actions taken by the cooperating entities. Actions of a unilateral character were also considered as cooperative or conflictive. As the purpose of this study is not to quantify conflict and cooperation, a simple four-stage continuum of these concepts is employed. The continuum is shown in Fig. 4 with several generic examples for each type of interaction.

On the 'negative' side of the continuum, conflictive events are regarded as signs of overt tensions between farmers and herders. Typically, such events are expected to comprise actions that are taken by members of at least one group, which challenge the other group's right to access a field or a pasture, or act to undermine its ability to cope with the drought. We adopt a simple guideline to distinguish between 'severe' and 'moderate' events, based on whether they

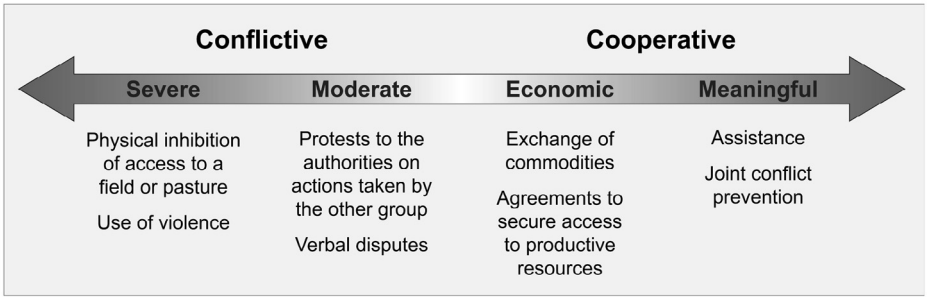

Fig. 4. The four-stage continuum of conflict and cooperation.

involved the use of force or not (Böhmelt et al., 2013; Funder et al., 2010). Severe events may include outbreaks of violence and physical inhibition of access to productive resources. Damages to crops or livestock induced by members of the other group, protests to the authorities on such actions and verbal disputes constitute moderate events (Bassett, 1988; Turner et al., 2012).

Actions and events that signal 'positive' interactions are defined as cooperative. Such events are likely to comprise joint actions to cope with the drought and prevent conflicts or the assistance of one group to the other. We define cooperative events manifesting mutual material interests as 'economic' (see Breusers et al., 1998). Such events may include exchanges of services and agreements to secure access to productive resources. Actions centered on improving inter-group relations are defined as 'meaningful' and may include assistance, advocacy and joint conflict prevention. We view such actions as more substantive than economic cooperation not only due to the essence of the underlying interest, but also because of their potential long-term positive effect on inter-group relations (see Gaillard et al., 2008).

Data collection and analysis

Triangulation of information from multiple sources was used to understand the effect of the drought on conflict and cooperation. The majority of the data was obtained by extensive archival work based largely on the examination of the available reports, correspondences, meetings protocols, and other documents issued by the MoA. The MoA was the main authority responsible for managing the drought's impacts and headed the national and regional drought committees established for this purpose. Its records include also documents from other agencies involved in the drought response as well as numerous letters sent by Bedouins and Jewish farmers, which provide another source of information on the events that took place during the drought. Additional sources include reports issued by the Negev Military Governor, correspondences of agricultural settlements and Bedouins with Jewish and Arab *Knesset* (parliament) members and several published memoirs and media reports. However, we acknowledge that the bulk of our data depends on second-hand accounts, some most likely self-serving, of conflict and cooperation. Such accounts will tend to capture larger-scale violent forms of conflict and publicized community-level acts of cooperation most likely facilitated by external organizations and the government. More diffuse and local interactions are likely to be missed.

The data were classified against a predetermined set of criteria in order to facilitate its analysis along the inter-group level and the state/institutional level. Inter-group interactions were classified along the definitions elaborated in the previous sub-section as well as according to their geographical location (i.e. northern Negev or Mediterranean zone). The borderline between the Mediterranean zone and the northern Negev was set according to the line delineated by the Ministry of Agriculture (1962a). Actions taken by institutions were grouped into two main categories according to their recorded or potential positive/negative effect. 'Positive' actions include those that contributed to cooperation or limited conflicts either directly (e.g. cessation of confrontations) or indirectly by reducing the drought's impacts (e.g. relief assistance). 'Negative' actions enhanced the potential for conflicts or limited cooperation, also directly (e.g. refusing to intervene in conflicts) or indirectly (e.g. denying compensation for farmers for livestock-induced crop damage).

Results

Conflict and cooperation between farmers and herders

The interactions between Jewish farmers and Bedouin herders ranged from violent clashes to extensive assistance and advocacy, thereby encompassing a wide spectrum of conflict and cooperation. These interactions were also affected by the Israeli institutions. The locations of some of the more prominent conflictive and cooperative interactions are shown in Fig. 5. The actions taken by state institutions during the drought are summarized in the next sub-section.

Already in the first drought year restrictions on the movement of the Bedouins and their herds outside the confined zones were eased, and herders reached various parts of the northern Negev and the Mediterranean zone (Fig. 5 shows an approximation of these areas, based on various reports). Although partially controlled by the Military Governor and the MoA, the presence of herds near cultivated fields resulted in numerous cases of crop damage, particularly in the southern part of the Mediterranean zone. Fig. 5 significantly underrepresents the number of such moderate conflictive events, as a single symbol of encroachment often represents multiple events in the same region. In response to such encroachments, many farmers complained to the MoA, arguing that they have already suffered losses due to the drought and demanding financial compensation and/or the presence of the police. Some farmers even warned the MoA that the next encroachment will lead to violence.

Yet, only five violent events were reported, two of which were limited to threats with weapons. The other three events resulted in 26 injuries overall, but with no reported deaths (Ministry of Agriculture, 1958; Negev Military Governor, 1963). Most importantly, such severe conflicts occurred only in the Mediterranean zone. The first event, which involved the use of firearms and resulted in the injury of one farmer, occurred on the southern margins of the Mediterranean zone during the first drought year. However, in spite of its proximity to the area defined as the northern Negev, the conflict took place in fields cultivated by two *Kibbutzim* from the north of Israel. Such distant fields were often allocated to *Kibbutzim* by the state, in order to provide them with normatively-determined sufficient income. The other four events occurred further north during the last and driest drought year. The most northern one of

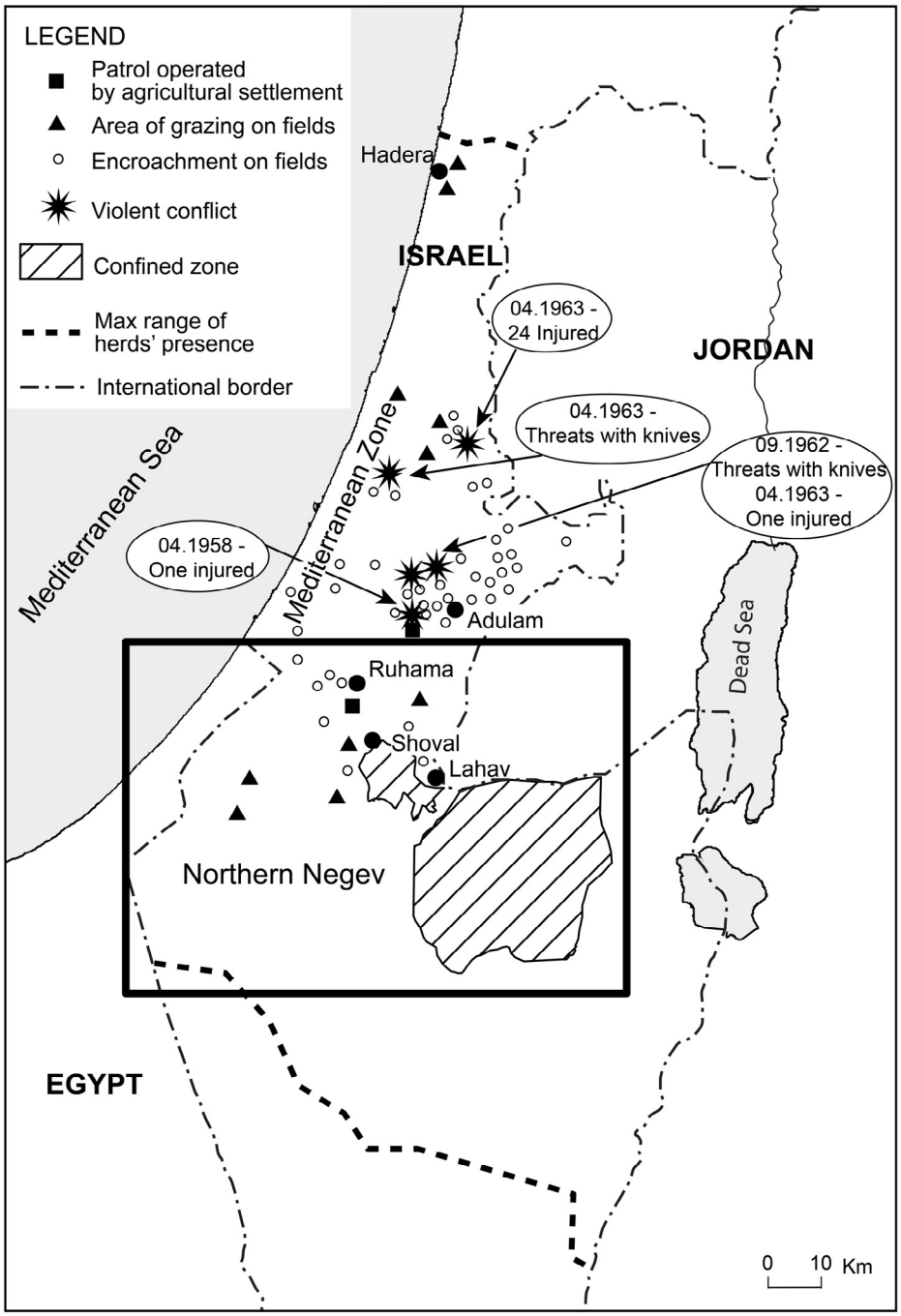

Fig. 5. Prominent cooperative and conflictive interactions between Jewish farmers and Bedouin herders.

these involved communal violence, with 40 members gathered from several *Moshavim* and 40 Bedouins. Overall, the violent events involved five *Moshavim*, and three *Kibbutzim* from northern Israel. One of the latter was affiliated with the leftist '*Mapam*' party.

The friction between farmers and herders led to another form of severe, though less frequent conflictive action—the operation of patrols by agricultural settlements in order to prevent encroachment on fields, with the approval of the Military Governor and the MoA. Such patrols were operated by *Kibbutz Ruhama* in the northern Negev in response to repeated crop damages, and by one of the northern *Kibbutzim* mentioned above, after its involvement in a violent clash.

Several types of cooperative interactions also took place during the drought. Largely mediated by the MoA, farmers in the northern Negev and the Mediterranean zone provided water to livestock grazing near their fields and were reimbursed for their expenses, thereby illustrating a limited form of 'meaningful' cooperation. Economic cooperation was manifested as grazing on failed crops or stubble in return for payment, and was also practiced in both regions. However, the data on such events is at a regional level and no details are available regarding the specific settlements involved. This practice was only partially mediated by the MoA. Direct agreements between farmers and herders were also made but have not been well recorded. In certain cases, Jewish and Arab farmers from the

Table 3
Selected examples of institutional responses to the drought.

Positive effect—contributing to cooperation or limiting conflicts	Main responsible institutions
Direct limitation of conflicts	
Cessation of confrontations and livestock encroachment on fields	Police, military
Compensation of farmers for damages caused by livestock	Ministry of Agriculture
Operation of patrols to prevent encroachment of herds on fields	Ministry of Agriculture
Obligation to compensate farmers before herds arrive to grazing areas near their fields	Ministry of Agriculture
Indirect limitation of conflicts	
Provision of food and water for Bedouins and their herds	Ministry of Agriculture
Initiation of public works projects for Bedouins	Ministry of Internal Affairs
Grants and loans for farmers	Ministry of Agriculture
Development of alternative income sources for settlements	Ministry of Agriculture
Development of a long-term plan for the management of pastures and herds	Ministry of Agriculture
Development of programs to settle the Bedouins including planned work in construction and industry	Ministry of Agriculture
Facilitation of cooperation	
Paying farmers for supplying water to herds	Ministry of Agriculture
Paying farmers for the use of fields where crops failed or stubble remained as pastures for herds	Ministry of Agriculture
Negative effect—contributing to conflicts or limiting cooperation	**Main responsible institutions**
Direct contribution to conflicts	
Claiming that farmers should guard their fields	Ministry of Agriculture
Mistakenly allocating fields under cultivation for grazing	Ministry of Agriculture
Indirect contribution to conflicts	
No compensation for livestock losses	Ministry of Agriculture
Reduction of compensations to farmers prior to generation of alternative income sources	Ministry of Agriculture

Mediterranean zone even transported Bedouin herds to their fields in order to benefit from this form of cooperation. Overall, about 8000 goats and sheep were transported as far north as the *Hadera* region (Ministry of Agriculture, 1959c).

The most meaningful and extensive cooperative interactions occurred between the Bedouins and two *Kibbutzim* adjacent to the confined zones—*Shoval* and *Lahav* (see Fig. 5). Both of these *Kibbutzim* were affiliated with the leftist '*Mapam*' party. These interactions comprised mostly of assistance of the *Kibbutzim* to the Bedouins, which were more severely affected by the drought. Because of their proximity to the confined zones, the interactions between these *Kibbutzim* and the Bedouins were not limited to the herders that arrived near their fields, but encompassed a wider Bedouin population. The assistance and advocacy activities of *Shoval* and *Lahav* included locating potential grazing areas in harvested fields of *Kibbutzim* in the Mediterranean zone, attempts to stop profiteering in lands leased to the Bedouins, and sending requests to the Ministry of Education to distribute food to the Bedouin children.

Other activities had a pronounced political nature. Rather than being mediated by the authorities as some of the other cooperative inter-group interactions were, these two *Kibbutzim* filed complaints to the Military Governor and the MoA, both identified with the prominent centrist party—*Mapai*, protesting against the limitation of the Bedouins' freedom of movement and their discrimination in the allocation of plots for cultivation. Furthermore, *Shoval* and *Lahav* coordinated some of their actions with the left-wing party—*Mapam*, and communicated the impacts of the drought on the Bedouins to its parliament members, in order to present them in discussions at the Israeli Parliament (Mapam, 1958). However, rather than reflecting interactions based solely on unilateral assistance, these *Kibbutzim* asked the Bedouins to support *Mapam* in years of national elections.

Institutional responses to the drought

Responses to the drought taken by state institutions were extensive and affected inter-group interactions in several ways. Selected examples of such responses are summarized in Table 3 and are classified according to their positive or negative contribution to inter-group relations, as elaborated in the 'research method' section.

Most of the responses had a positive effect on inter-group interactions, largely by limiting conflicts rather than by inducing cooperation. Measures that limited conflicts consisted of both direct and indirect measures. Indirect measures included the intervention of the police and the military in confrontations, their attempts to remove herds from cultivated fields on which they encroached and the compensation of farmers for crop damages by the MoA. Other measures were preventative, often following occurrences of conflicts. In order to prevent crop damage, the MoA marked livestock corridors between fields, allowed only the grazing of sheep in certain areas (as these are considered to induce smaller damages to agriculture than goats and camels), and operated several patrols which accompanied the Bedouin herds. The operation of such patrols was more prominent in the northern Negev, thereby possibly explaining the smaller number of reported encroachments in this region in comparison to the Mediterranean zone (see Fig. 5). To further reduce potential inter-group frictions, the MoA pledged to compensate farmers for crop damage prior to the arrival of herds to grazing areas near their fields (Ministry of Agriculture, 1959a, 1960a). However, some actions taken by the MoA directly increased friction between the groups, particularly claiming that it is the responsibility of farmers to guard their fields. Several cases in which the MoA mistakenly allocated fields under cultivation for grazing were also reported (Ministry of Agriculture, 1958).

Other measures taken by state institutions aimed to alleviate the drought's impacts, thereby indirectly reducing the potential for conflicts. Largely under the responsibility of the MoA, relief actions commenced as early as the first year of the drought. The relief scheme for farmers was based on loans and grants allocated by the MoA and the Ministry of Finance, in addition to the reduction of taxes and water tariffs. The Bedouin population received more basic aid from the MoA, the Ministry of Internal Affairs and the Ministry of Health. The assistance included the provision of water and food and the generation of alternative income sources in public works projects. Various measures were undertaken by the MoA to supply water, feed and grazing areas for the herds, including the planting of pastures and the allocation of nature reserves for grazing (e.g. in the *Adulam* region in the southern part of the Mediterranean zone). However, the Bedouins were not compensated for livestock mortality. Similarly, compensation rates for crop losses were smaller than those received by Jewish farmers.

Two years after its onset, the drought also spurred the planning of long-term adaptations, formulated largely by the MoA. The plans for the Bedouins were based on their settlement and

included their integration in construction and industry, while a plan for the management of pastures and herds was also developed (Ministry of Agriculture, 1960a, 1960b). Although it was not implemented within the period studied (1957–63), the settlement plan necessitated the approval of the Israeli Government, which was granted in 1962. This decision ultimately led to a wide ranging effort to settle the Bedouins, a discussion of which is beyond the scope of this paper. Adaptation plans for the Jewish settlements were also devised. These advanced the development of alternative income sources, including industry and other types of agriculture such as orchards (Ministry of Agriculture, 1962a). However, flaws in the reduction of the drought's impacts, such as reduced compensations for crop losses and reduced water quotas preceded the implementation of these adaptations, thereby straining the settlements' economies even further, and indirectly amplifying the potential for conflicts triggered by livestock-induced crop damage.

Discussion

This study examines the effect of a severe drought on a spectrum of conflict and cooperation between Bedouin herders and Jewish farmers in the conflict-prone northern Negev region. The results indicate that the full scope of interactions occurred during the drought. Thus, a wider perspective of the relationship between climate, its effects on resource availability and the emanating societal responses emerges from this study than the one illustrated by studies focusing solely on conflict or its absence.

The reduced resource productivity induced by the drought contributed to two common forms of conflictive and cooperative events—encroachment on fields, and grazing on stubble or withered crops in return for payment. In both cases a distinct change can be discerned from the previous era. Conflicts ensued where they did not occur previously, and the extent of cooperation expanded. Due to the increasing hardship experienced by their Bedouin neighbors adjacent *Kibbutzim* took an active approach vis-à-vis the state to alleviate the hardship induced by the drought as well as extensive economic cooperation to the same end.

Because only several encroachments evolved into clashes, the findings provide very limited support for the environment-violence perspective advanced by neo-Malthusians. Furthermore, the results stress the importance of analyzing environmental stressors and inter-group interactions within a wider context of socio-political factors, as argued by political ecologists (e.g. Bassett, 1988; Turner, 2004).

As the results suggest, actions taken by state institutions had a pronounced effect on inter-group interactions. Limitation of conflicts was achieved by a combination of direct and indirect measures. The most common reactive measure—compensation for crop damage, was identified by Bassett (1988) as a critical response to reduce tensions between farmers and herders.

The integrated relief activities highlight an important aspect of indirect conflict prevention. Such actions enabled both populations, especially the agricultural settlements, to maintain a basic standard of living, thereby reducing their incentives to engage in violence over crop damage or access to pastures. More fundamentally, the adaptation programs spurred by the drought could potentially reduce future conflicts by shifting the economic basis of the agricultural settlements and the Bedouins toward non climate-sensitive activities.

Although an institutional transition from reactive responses to conflicts to preventative measures was observed, the addition of adaptation plans to relief measures after two drought years illustrates an even clearer process of institutional learning. Institutional learning is essential to reduce long-term livelihood vulnerability, recognized by Barnett and Adger (2007) as an important cause of resource conflicts. More broadly, the active intervention of the state in the groups' interactions and livelihood adaptation is clearly different from the weak institutional structure associated with farmer–herder conflicts in the contemporary Sahel and during the Ottoman rule over Palestine (Benjaminsen et al., 2012; Schein, 2012). Thus, the findings obtained by this study stress the critical role of the state in the management of both the environmental changes and their social implications.

However, a more critical examination of the events that took place during the drought illustrates the substantial effect of power disparities on state actions in the face of scarcity. In line with the environmental security literature, such actions were associated particularly with resource allocation and conflict management. The power disparities between the groups and the affinity between the agricultural settlements and the state implied that the farmers benefited from greater relief assistance. Similarly, only the settlements were connected to the main conduit that delivered water to the northern Negev. Such differential resource allocation before and during the drought explains the more severe impacts experienced by the Bedouins. The coupling between adaptation plans and attempts to sedentarize the Bedouins indicates that the prevailing power structure and political considerations were deeply embedded also in measures to reduce long-term vulnerability.

The prevailing power structure also shaped the manner in which the state sought to reduce potentially conflictive interactions. Restrictions were placed mostly on the Bedouin herders, particularly during their migrations outside the confined zones. The operation of patrols by farmers in coordination with the authorities provides a particularly evident example of the effect of power disparities on the unequal enforcement of conflict prevention measures.

Beyond the limited level of conflict, the grazing of herds on failed crops in return for payment illustrates a 'win–win' situation, in which farmers reduced their financial losses and herders benefited from pastures for their livestock. Such cooperative interactions are markedly different from the 'zero-sum' framing of environmental conflicts elsewhere. Thus, in contrast to the view of pastoralism and agriculture as competing land-uses, this form of cooperation shows that they can also be complementary.

On the inter-group level, two main factors emerge as the most critical ones affecting the interactions between farmers and herders—a spatial dimension related to the proximity between the populations which explains mostly different degrees of conflict, and the political affiliation of the agricultural settlements. The effect of these factors is most evident when each is held constant. This is illustrated in Fig. 6, with names of representative settlements involved in the interactions.

The spatial dimension of the interactions is most conspicuous when examining the responses of the centrist *Kibbutzim* and *Moshavim* to crop damage (the left quadrants on the vertical axis in Fig. 6). While such settlements experienced crop damage also in the northern Negev, the resulting frictions led to violence only in the Mediterranean zone. The spatial effect on conflict is stressed even further when considering the involvement of northern *Kibbutzim* in the violent events, including that of a leftist *Kibbutz* (upper-right quadrant).

The materialization of frictions to violence in the Mediterranean zone but not in the northern Negev indicates that migration, at least in its short-term form, may lead to conflict in receiving areas. Two main factors may explain this phenomenon. In line with the 'resource curse' theory, the relatively high resource availability in the Mediterranean zone, which suffered considerably less impacts than the northern Negev, might have provided a stronger material basis for conflict (see Adano et al., 2012). Perhaps more fundamentally, the findings also suggest that violence was caused due to the lack of previous familiarity between the groups and the absence of conflict resolution mechanisms, highlighted by Moritz (2010) as major conflict-inducing factors. Such mechanisms were established in the northern Negev, particularly in *Kibbutzim*, which

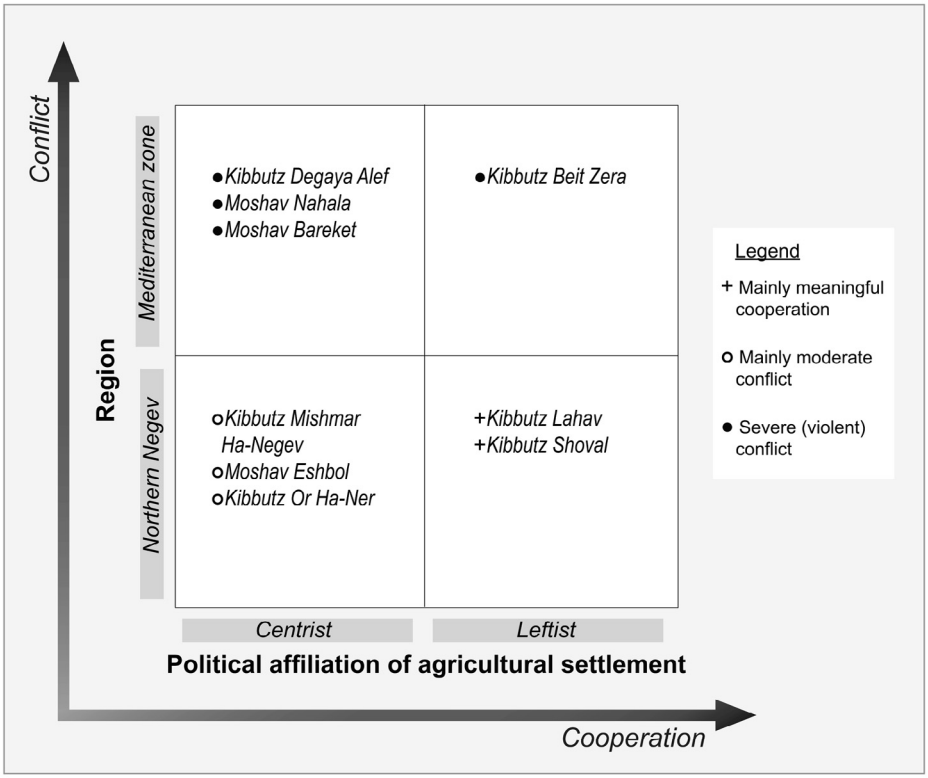

Fig. 6. Effects of space and settlements' political affiliation on conflict and cooperation.

appointed representatives responsible for maintaining neighborly relations with the Bedouins and the diffusion of tensions prior to the drought (Meir, 1997).

The political affiliation of the agricultural settlements and its association with societal values was an important determinant of intergroup cooperation, particularly in the northern Negev (lower quadrants on the horizontal axis in Fig. 6). In this region, the interactions between the Bedouins and the *Kibbutzim Lahav* and *Shoval*, affiliated with the leftist and egalitarian *Mapam* party, exhibit more intensive and meaningful cooperation than between the Bedouins and centrist settlements and are characterized by a pronounced political nature. Most importantly, these *Kibbutzim* utilized their political and social influence to assist the Bedouins. This assistance was used to increase the leftist party's power by gaining the support of this population and reduce the potential for conflicts, thereby turning a zero-sum game into a political positive-sum game. The cooperative interactions between the *Kibbutzim* and the Bedouins are also related to their pre-drought relations. *Lahav* and *Shoval* were able to maintain a minimal level of interaction with the Bedouins during the military administration era, showing that even a short continuing relationship can help to build reciprocity and trust and take into consideration the potential future effects of current behavior (Ostrom, 2000). In this sense, the focus of the interactions on the drought's impacts indicates that the hardship they induced served as an impetus for strengthening the relationship between the groups.

Conclusions

The main objective of this study is to enable a better understanding of the processes linking between climatic perturbations and the resulting societal responses. To this end, archival sources were used to examine the effect of the 1957–63 drought on conflict and cooperation between politically powerful Jewish agricultural settlements and disenfranchised Bedouin herders in the conflict-prone northern Negev region. Although results yielded by case studies are affected by their settings, several generic conclusions can be derived from the northern Negev case.

On a broad level, the concurrence of conflict and cooperation during the drought indicates that the application of a wide framework, which considers both conflict and cooperation, enables a more comprehensive understanding of the societal implications of climate change and climate extremes than achieved by focusing only on conflict or its absence. The most common interactions, either as conflictive events associated with crop damage or as cooperation which reduced the drought's impacts, highlight that incentives to conflict and to cooperate are similar and are based on the exigencies of daily life. In this sense, extreme climatic events can constitute important elements in the initiation or enhancement of cooperation between otherwise conflict-prone groups.

As indicated by the occurrence of violence in Israel's Mediterranean zone but not in the northern Negev, migration may lead to conflict. Because migration patterns of resource-dependent groups may be affected by climatic variables (see Bassett & Turner, 2007), climate change may alter the geographical distribution of conflict-prone areas. Thus, host communities, particularly those that lack prior relations with the migrating groups, may be faced with the challenges these migrations can pose to their security.

Political attitudes associated with societal values and power disparities also have a considerable effect on conflict and cooperation. In the northern Negev political considerations affected both the imposition of restrictions on Bedouins by the state and the assistance given to them by the *Kibbutzim Lahav* and *Shoval*, in cooperation with the left-wing party *Mapam*. It seems thus that prior relations, or lack thereof, are an important variable explaining to what extent the likelihood of cooperation will be greater or smaller than the likelihood of conflict in drought situations.

The extensive institutional response to the drought indicates that the state is critical in reducing the potential for violence. As climate change may amplify the potential for conflicts by adversely affecting peoples' livelihoods, states should adopt an integrated approach to tackle this problem. Beyond measures to directly limit frictions, states should also address the impacts of climate change. During an ongoing crisis and its aftermath, relief assistance is important to maintain a basic standard of living and reduce the incentives for conflict. However, states should also implement long-term adaptations. Such adaptations should aim to reduce the vulnerabilities which make certain groups inherently susceptible to the adverse effects of climatic perturbations, and thus also to conflict (see Barnett & Adger, 2007). Because states' responses to climate extremes are embedded within prevailing power structures, they are likely to result in socially differentiated outcomes. In this sense, states are more likely to reduce the short-term vulnerability of disenfranchised groups to climatic shifts than changing the fundamental power disparities that may contribute to future conflicts.

The findings obtained by this study also indicate that short-term climate extremes may have long-term implications to inter-group and group–state relations. As this study has shown, politics, conflict, cooperation and livelihood vulnerability are closely related. Political attitudes and inter-community relationships can exacerbate or mitigate the effects of climatic change or perturbations. The track these relationships take in stressful situations, such as droughts, can be affected by institutional actions, which in turn are mediated by states' adaptive capacity and the politics driving these responses.

Conflict of interest

The authors of this paper declare no conflict of interest.

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