

ARTICLE

Water and Ethnic Conflict in Iraq's Internal Frontier

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Abstract

This article examines the political ecology of water and ethnic conflict in Kirkuk, Iraq. Kirkuk is an internally disputed frontier territory, controlled by the federal government of Iraq but claimed by Kurdish nationalists. Kirkuk contains some of Iraq's largest oil fields and most productive agricultural lands. In recent decades Kirkuk has also faced water shortages tied to global climate change. The article deploys survey data, supplemented by qualitative historical research, to evaluate framing of environmental security and the relationship between water insecurity, ethnic conflict, and governance. We find that commitments to competing programs for territorial control in Kirkuk correlate with different framing of ecological risk factors. Arabic-speaking respondents frame water scarcity as a matter for the federal government. Kurdish-speaking respondents prefer to enlist the Kurdistan Regional Government or local politicians to deal with water scarcity, undercutting federal jurisdiction. These findings cast doubt on environmental security and peacebuilding theories which suggest that ecological scarcity can spur inter-ethnic cooperation toward sustainability. Rather, commitment to different ethnoterritorial programs justify different perspectives on ecological change. At a policy level, these findings show that political conciliation must come before progress in environmental peacebuilding.

Keywords: Iraq; Kirkuk; water; self-determination; violence; nationalism; political ecology

Introduction

Early research on environment and violence relied on Malthusian concepts of population overshoot and carrying capacity. When demand for resources exceeds supply, the result would be increase in societal tensions and possibly violence. Newer research in environmental security depicts environmental crises as amplifying the impact of other destabilizing social factors. Ecological crises are most likely to precipitate violence in countries with deep ethnic divisions, low state capacity, and poor economic performance. More effective and inclusive states, though, can buffer ecological shocks and maintain stability (Homer-Dixon 1994; Goodman and Baudu 2023; Kahl 2006; Busby 2022). The literature on environmental peacebuilding proceeds from similar premises, but goes in the opposite direction. Environmental stresses can also catalyze innovation and induce collaboration among otherwise antagonistic groups (Ide et al. 2021; Krampe, Hegazi, and VanDeveer 2021; Ogden 2018; Conca and Wallace 2009).

Political ecology stands apart from these largely materialistic and mechanistic theories about environmental 'triggers' to violence. Political ecology examines how political, economic, and social forces shape environmental issues and resource use through power dynamics, inequality, and historical context. Claims about the abundance, accessibility, and ownership of natural resources

justify and motivate assertions over resource-rich spaces (Bridge, McCarthy, and Perreault 2015; Robbins 2019; Watts 2013; Peluso and Watts 2001; Watts and Peluso 2013). Securing territory enables resource extraction, while resource extraction reinforces territorialization. Political ecology pays special attention to frontier zones, areas of disputed and unsettled jurisdictions and sovereignty. These frontiers are where conflicts over resource extraction and territorialization are most acute and visible. Consequently, the management of environmental insecurity at the frontier closely aligns with pre-existing territorial and nationalist agendas (Rasmussen and Lund 2018; Selby, Daoust, and Hoffmann 2022; Watts 2017).

This article examines the relationship between water scarcity and ethnic conflict in Kirkuk. It focuses on how inhabitants of this disputed territory understand the connection between societal instability and ecological change, especially shortages in water. Kirkuk is claimed by the Iraqi state and by Kurdish nationalists. Kirkuk contains some of Iraq's largest oil fields and most productive agricultural lands, fed both by rainfall and by the Tigris tributaries. The province suffered repeated bouts of ethnic violence through the twentieth century. In the last twenty years, Kirkuk (like much of Iraq and the wider Middle East) has faced temperature increases and water shortfalls due to global climate change (Zittis et al. 2022; Barlow et al. 2016). The onset of these ecological challenges is often cited as contributing to regional political instability and intercommunal violence (Norman, Martin Gil, and Barron 2024; Swain and Jägerskog 2016; King 2021; Daoudy, Sowers, and Weinthal 2022; Sowers, Vengosh, and Weinthal 2011; Akbarzadeh and Cimini 2023).

The article finds that convictions about Iraq's territorial integrity and commitment to ethno-nationalist projects inflect the framing of water insecurity. Arabic and Kurdish-speaking inhabitants of the frontier are divided in their views about water insecurity. Claims about drought and scarcity serve competing agendas of territorial acquisition, making and unmaking Kirkuk's frontier status. In a larger scope, these findings show how agendas of ethnopolitics and territorial sovereignty set the parameters for environmental thinking. Territorialization projects deploy ecological discourses as part of their maneuvers for resource exploitation.

The article proceeds in five sections. The first theorizes linkages between political ecology's focus on the construction of meaning around human-environmental interaction and the framing of different forms of ecological risk, especially related to water and the hydrosocial landscape. The second section explains how contested frontier spaces became subject to competition about the framing of ecological scarcity or abundances, creating conditions which are often rife with violence. The third section examines the hydrosocial competition in Kirkuk qualitatively, focusing on the history of conflict in Kirkuk and the way nationalist movements have claimed resources in this territory. The fourth section presents results of a public opinion survey of Kirkuk residents, showing how commitments to different programs of ethno-territorial control inflect the framing of environmental risks, particularly water insecurity. The fifth and concluding section assesses the implications of these findings for environmental peacebuilding in Iraq and larger questions of how political ecology prioritizes political reconciliation before any technical measures for ecological remediation are feasible.

Political Ecology at the Water Frontier

Political ecology has emerged as the main alternative to the materialistic bent of environmental security and peacebuilding. Both environmental security and environmental peacebuilding concentrate on ecological disequilibrium, tipping points, and feedback loops that spur or dampen political competition. Political ecology, in contrast, puts politics first, attempting to explain the social consequences of human-environment interactions. The key mechanisms of political ecology occur in the construction of shared meaning around ecological conditions and environmental change. Attitudes on environmental issues, Agrawal argues, "emerge as a result of struggles over resources and in relation to new institutions and changing calculations of self-interest and notions

of the self” (Agrawal 2005). In this sense, beliefs about natural resources and other ecological features are as important as their physical or material disposition. Such beliefs assign meaning and value to human engagement with the environment. Ecological ideas are not neutral; they are socially encoded and often politically contentious. They reinforce or challenge rights to access resources (Bryant 1998: 87; Robbins 2019: 114–26).

Water figures prominently in political ecology literature, both as a biological necessity and a bearer of symbolic value. As urbanization and industrialization necessitate more diverse and complex forms of water management, contestation becomes more variegated (Agnew 2011; Karpouzoglou and Vij 2017; Flaminio, Rouillé-Kielo, and Le Visage 2022). Boelens et al. deploy the term “hydrosocial” to incorporate the contested imaginary and socio-environmental materialization of humans’ interaction with water. The hydrosocial encompasses the physical distribution of water, plus attendant infrastructure, legal-administrative arrangements, political hierarchies, cultural institutions, and practices (Boelens et al. 2016: 2).

Framing is key to constructing the hydrosocial landscapes. Frames are cognitive and discursive schema that interpret, explain, and give meaning to the world. Frames take multiple forms. Diagnostic frames evaluate a circumstance and assign it problem status: whether the situation is a problem, as opposed to an immutable or irresolvable condition. Prescriptive frames point to measures that address the diagnosed problem and assign responsibility for action (Snow and Benford 1988; Entman 1993: 52; Rein and Schön 1996; Bromley-Trujillo and Poe 2020). Framing constrains public policy and the implementation of collective action because the lack of a common frame hinders agreement about what measures need to be taken (van Hulst and Yanow 2016; Dodge and Metze 2024; Druckman 2004; Majone 2008).

Framing environmental resources as scarce (versus abundant), private (versus public), dangerous (versus benign), reflects preexisting political and social commitments and motivations. Framing predisposes individuals to see or emphasize certain aspects of the situation in ways that parallel prior values or worldviews (Vaughan 1995: 172). Ethnic identities constrain which phenomenon people believe warrant attention and how they believe those issues should be addressed (Lieberman and McClendon 2013). Views about the environment are often polarized in this way. Some groups are more likely to see environmental issues as salient; they would adopt frames that link environmental and political conditions. Others downplay the severity of these same issues or reject political interventions (Kerr, Hughey, and Cullen 2016; Lazri and Konisky 2019; Song et al. 2020). Still, alternative scenarios are possible. Several studies detail ethnically divided societies becoming more cohesive in response to environmental hazards and natural disasters, helping to avert potentially violent escalation (Johnson, Rodríguez, and Quijano Hoyos 2021; De Juan and Hânze 2021; Taher et al. 2012; Adano et al. 2012). Environment challenges can precipitate new and inclusive notions of identities and associated common framing of environmental challenges (Figueredo and Dean 2023; Swain and Öjendal 2018).

Ethnic and Ecological Competition at the Frontier

The competition of ecological ideas is especially acute in places where sovereign authority is most fiercely disputed. Theories of resource wars (Le Billon 2012) and violent environments (Peluso and Watts 2001) often focus on frontier spaces, areas where legitimacy, authority, and sovereignty are most unsettled. Across the developing world, state authorities share powers and responsibilities for governance with a range of nonstate actors. The entire matrix of state, private, customary, and religious authorities comes into question at the frontier (Watts 2017). Rebel groups or other nonstate actors have assumed control over dams and other types of hydrological infrastructure in the wake of state failures or collapse (Gilmore et al. 2025; Baldwin et al. 2018; Schillinger and Özerol 2023; Allouche 2010). Rulemaking at the frontier is polycentric, with different forms of authority tending to conjoin, ally, and intermingle (Ostrom 2017; Migdal 2001; Lust 2022). At the same time, though, frontier authority can be unequal and disorganized, prone to uncertainty.

The response to the uncertainty of the frontier is the drive to territorialization, asserting exclusive control over discrete space (Rasmussen and Lund 2018). Territorialization is a spatial twin of state-building. It defines the territorial extent over which the state can purport to hold the monopoly over legitimate violence. Territorialization, thus, asserts exclusive control over discrete space and singular rights to ecological resources therein. Territorializing practices seek to categorize, regulate, and refashion terrain and ecosystems, replacing fuzzy demarcations with firm and clear borders. These practices have a similar approach to human habitation, sorting people into citizens and noncitizens, civilized and uncivilized, local and foreign, etc (Storey 2025; Elden 2009; Sassen 2000). Ecological narratives undergird territorialization at the frontier. On one hand, frontiers are deemed undeveloped and underpopulated. On the other hand, these same spaces are seen as teeming with potential natural wealth, such as water, land, and minerals. This juxtaposition of scarcity and abundance impels territorial control at the frontier (Selby, Daoust, and Hoffmann 2022). Yet these efforts inevitably generate resistance. Rival states pursue their own territorialization strategies in the same space (Sahlins 2023). Internal frontiers arise where states maintain a kind of special jurisdiction, often to manage conflictive relationships between transplanted settlers and so-called sons of the soil. Such internally defined composite areas can generate intense violence, with no power able to assert total autonomy (Scott 2009; Ron 2003; Fearon and Laitin 2011; Nordås 2018).

The resulting friction further unsettles authority at the frontier. Selby, Daoust, and Hoffmann, examining Sudan, Syria, and Palestine, casts doubt on conventional accounts that depict drought or other ecological collapses as violence triggers. Instead, they find that the fundamental invitation to conflict is “real or imagined abundance of land and associated water resources.” Darfur, Hasaka, and Gaza became targets for territorialization and state expansion because of the belief that they harbored unrealized but exploitable ecological bounties. State agents, migrants and settlers, domestic and foreign investors, and resident indigenous populations each brought to bear their authority claims over these resources. Ecological subjectivities transform resources and territory into points of violent contention (Selby, Daoust, and Hoffmann 2022: 206). Ecological framing and ideas appear in other forms during frontier conflicts as well. States cite the need for environmental conservation to curb wasteful local practices or to establish national parks and nature preserves. Such measures render ecological problems like water scarcity into “politically neutral, technical and/or managerial issues which can be ‘objectively’ solved according to technical knowledge, ‘rational water use’ and good governance” (Boelens et al. 2016: 2). Put in practice, though, they often seem little more than land grabs that marginalize indigenous peoples and pave the way for the state’s preferred forms of resource extraction (Luke 1995; Kelly and Ybarra 2016; Lunstrum 2014). Indigenous actors deploy their own ecological imaginaries in resistance to states. On one hand, they tout their ethnic homeland as a kind of pristine ecological zone that must be defended from foreign intrusion. On the other hand, they see the purported abundance as something which could sustain their own alternative political projects (Nakai 2025; Le Billon 2021; Dawson 2000).

The framing of frontier ecologies serves competing political projects. “The *ideas* of what constitutes the nature of resources, as well as the *rules* that govern their use and control, are reworked,” in the resource frontier, according to Rasmussen and Lund. “The institutional debris of obsolete and recovered fragments of rules, institutions, forms of organization, and artifacts combine to shape and territorialize space” (Rasmussen and Lund 2018: 389). These ecological imaginaries are the result of power relationships and reflect the divergent priorities of the actors vying for frontier control. This is true of water as much as for any other type of resource. As Hommes et al. note

struggles over territories need to be understood as struggles over imaginaries and associated identities, subjectivities and meanings that concern the wished-for hydrosocial territorial order and the ways of life that are regarded as ‘good’ and desirable (and those that are not) (Hommes, Hoogesteger, and Boelens 2022).

Devising new rules about resource use, then, deepens and extends power projection at the frontier in ways that intensify conflicts over the rules governing water (Boelens et al. 2016: 6-7).

Ethnic Violence and Hydrosocial Contention in Kirkuk

The Iraqi province of Kirkuk bears the hallmarks of frontier space: contested and violent territorialization, resource competition, and population shifts (Natali 2015). After World War I, Kurdish, Turkish, and Arab Iraqi nationalists claimed Kirkuk, then part of the ex-Ottoman governorate of Mosul. A League of Nations inquest found Turkish and Arabic speakers dominated the city of Kirkuk, while Kurdish speakers were the majority in outlying rural areas. Incorporating Mosul into Iraq was considered vital because the northern mountains were the only part of Iraq with sufficient rainfall for dry farming. The Tigris River and its tributaries flow from Turkey and Iran through the Zagros highlands to central Iraq. The discovery of oil in Kirkuk 1926 further heightened the area's importance. The oil industry attracted economic migrants from across Iraq and other parts of the region and changed the area's demographics. It brought Kirkuk in the circuit of global capitalism (Bet-Shlimon 2019). The Iraqi government and Kurdish nationalists engaged in repeated rounds of violence and negotiation. Saddam Hussein's Arab Ba'ath party unilaterally announced an autonomy plan for the north, but pointedly excluded Kirkuk from the autonomous administrative zone. Kurdish factions rejected the plan as politically and territorially insufficient and fighting continued (Anderson and Stansfield 2009).

Competition over northern Iraq's hydrosocial landscape intensified. The Iraqi government dammed the Tigris tributaries to harness water and supply electricity to the oil industry. Kurdish insurgents targeted both dams and oil installations through the 1970s and into the Iran-Iraq War (1980-1988) (Ahram 2023). The government's response became more lethal, culminating in the ethnic cleansing of Kurds known as the Anfal, razing thousands of Kurdish villages and killing 50,000 to 100,000. Destruction concentrated along Turkish and Iranian borders and Kirkuk, suggesting an intent to shift the demographic balance to nullify Kurdish territorial claims. The government encouraged Arabic-speaking Iraqis to migrate to Kirkuk and pressured Turkmen and other groups to adopt Arabic and declare themselves Arab in official documentation (Hiltermann 2007). In 1991, after the first Gulf War, Kurdish rebels seized control of Erbil, Dohuk, and Sulaymaniyah provinces. In 1992, they held elections to establish the Kurdistan Regional Government (KRG), claiming it resumed the abortive 1970 autonomy plan. Baghdad viewed it as a rebel enclave and imposed a blockade, cutting off Kurdish access to Kirkuk.

The overthrow of Saddam in 2003 marked a key transition for Kirkuk. The 2005 constitution introduced federal consociational power-sharing between Arab and Kurdish elites and recognizing the Kurdistan Regional Government (KRG) as a regional authority. The constitution set out vague provisions for shared administration over oil and water resources. Article 140 pledged a referendum in Kirkuk to decide if residents wanted to join the Kurdistan Region or remain under the central government. However, Iraq's interethnic bargain was uneasy. Ascendent Arab Shi'i parties saw their leadership in Iraq as unassailable due to their demographic majority. Kurds, who comprised roughly 15 percent of Iraq's population, continued to push to maximize autonomy, even to the point of secession.

The downfall of Saddam brought the return of Kurdish refugees and KRG troops to Kirkuk. Arab and Turkoman communities mobilized militias to resist Kurdish encroachment. No referendum occurred, leaving Kirkuk under central government jurisdiction, disappointing Kurdish leaders. Disagreements over the disposition and control of oil and water in Kirkuk continued. In 2014, the Islamic State insurgency seized Mosul, gaining support in Sunni Arab areas facing water shortages. KRG forces seized Kirkuk and moved forward with a plebiscite on independence in 2017. The Iraqi government declared this unconstitutional and moved to retake the disputed territory. Thousands of Kurdish residents fled Kirkuk for the KRG. Since the reentry of federal forces to Kirkuk, Kurdish residents distrust the central government, citing encroachment by Arab militias and judicial corruption (Hasan Hama and Hassan Abdulla 2019). Statements from political elite in Kirkuk underscore how current contestation over land was placed within narratives of continued ethnic conflict. The Kurdish mayor of Qara Hanjir, a subdistrict east of Kirkuk city, related that after the

Kurdish withdrawal of 2017, “Arabs have been attempting to reclaim these lands, presenting the renewed Ba’ath-era contracts to assert ownership over Kurdish farmers’ lands” (Ali 2019).

Overlaying these political tensions are worsening environmental conditions, especially concerning water. The combination of a region-wide drought and increased upstream impounding of water by Turkey and Iran created severe water shortages. In 2003-4, according to hydrological studies, Kirkukis had nearly 24,000 cubic meters per capita for drinking, agriculture, and industrial usage. By 2020-21, Kirkukis had access to only 758 cubic meters per capita (Yaseen and Faris 2024). Industrial waste, especially from the oil sector, polluted waterways and aquifers (Qasim 2021). These conditions have increased competition for water and especially heightened competition between agriculturalists for access to irrigation and between the agricultural sector and the oil industry. At the same time, competition for water resources is part of the imaginaries of ongoing ethnic conflict. For Kurds, ecological exclusion was perceived as an extension of the Iraqi government’s history of political exclusion and Arab domination. Mohammed Ameen, a Kurdish farmer in Sargaran north of Kirkuk city related that

the Ba’ath regime moved Arab farmers to Kirkuk for demographic alteration, yet we also know that the peasants stay because they want access to the land and water resources especially in Dibs and Sargaran areas which have abundant water from the Little Zab River... the area provides such advantages that no one would choose to leave it voluntarily, especially when they [Arabs] receive government backing and contracts to access the land (Mamshai 2025a: 181).

On the other hand, local Arab leaders in Kirkuk blamed the KRG for diverting waters upstream, harming the province’s agriculture in a “deliberate strategy” to put pressure on the federal government (Mamshai 2025a: 74). These competing images of Kirkuk’s bygone water bounty mirror each other. Each attribute the spoilation of the frontier to the ethnic rival. Both agree, though, that Kirkuk’s ecological bounty is not so much naturally declining as intentionally degraded.

Even amidst these overlapping crises, though, forms of peace are visible in Kirkuk. Contrary to popular concerns that water access in Kirkuk is weaponized for the benefit of different ethnic factions, Mamshai finds that committees of technicians from the KRG and federal authorities meet regularly to coordinated water flow. Although these negotiations can be contentious, especially with less water arriving from Iran, they generally seek technical solutions to difficult ecological problems (Mamshai 2025a: 280). More granularly, O’Driscoll and collaborators, using surveys and participant observation, underscore that Kirkukis usually avoid overt measures that might lead to conflict or tensions with neighbors. In a polyglot community such as Kirkuk, one important way to avoid conflict is by switching languages to accommodate an interlocuter in their native tongue (O’Driscoll and Bourhous 2024; O’Driscoll 2021). With neither the federal government of Iraq nor the KRG able to ensure ecological and political protection for their citizens and residents, people in Kirkuk (as in much of northern Iraq) often rely on locally-embedded tribal and religious leaders or even militias to arbitrate disputes and assert rights to water (Norwegian Refugee Council 2023; Berghof Foundation 2023). In a frontier zone riven by ethnolinguistic cleavage, polyglottism and code-switching contribute to sustainability. This ability to live together and maintain a semblance of peace suggests that cooperation on environmental remediation is still possible.

Popular Perceptions of Water Insecurity in Kirkuk

A public opinion survey helps elucidate popular conceptions of political ecology and understandings about the connection between environmental change, security, and governance (Blommaert and van de Vijver 2013; Csutora, Zsoka, and Harangozo 2021; Doolittle 2015; Ybarra 2018). We conducted the survey in the summer of 2023, selecting both urban and rural settings in the districts of Shwan, Kirkuk city, Laylan, and Daquq. These eastern areas of the Kirkuk province are the most

ethnically diverse and also the hardest hit by water scarcity. Enumerators hired by a local survey firm carried hand-held laptops and cell phones, visiting the local market (*bazaar/suq*) over several days. Respondents were told that responses were kept anonymously and subject to the ethics review standard. The questionnaire usually took 20 minutes to complete. There was no remuneration offered. The basic demographic breakdown is provided below in Table 1.

Special care is devoted in the polling to assure safety and security. In a frontier space like Kirkuk, the threat of violence endangers both researchers and research participants (Haer and Becher 2012; Bell-Martin and Marston Jr 2021; Brück et al. 2016; Wood 2006; Krause 2021; Driscoll and Schuster 2018). The survey instrument is designed to avoid asking questions that might elicit self-censors or reveal potentially damaging information. The battery addresses basic demographics, broad questions on political outlook, and questions regarding attitudes toward environmental risk and overall political orientation. Some questions were considered too pointed to be included. For instance, the

Table 1. Demographic Breakdown of Respondents

Gender	
Male, percentage	71
Female, percent	29
Observations	609
Language of Survey	
Arabic, percentage	52
Kurdish, percentage	48
Observations	609
Field of employment	
Agriculture, percentage	63
Nonagricultural, percentage	38
Observations	609
Education (Brackets)	
No formal education, percentage	44
Middle to high school, percentage	54
Higher education, percentage	1
Observations	609
Age (Brackets)	
20–30, percentage	8
31–40, percentage	28
41–50, percentage	37
50–60, percentage	18
60–70, percentage	9
Observations	609

survey avoided asking questions specifically related to specific political parties, which could be a source of security concerns for respondents.

By design, enumerators also did not ask respondents about ethnolinguistic identity directly in order to avoid biasing responses or eliciting self-censorship. Instead, respondents could indicate a preferred language on the tablet and proceed to take the survey in either Arabic or Kurdish. This language choice is a strong proxy for ethnolinguistic affiliation, but was kept confidential in face-to-face interactions.

Measuring the Attitudes on Water Scarcity

We asked respondents about two distinct aspects in their framing of the diagnostic and the prescriptive. The former involves evaluation of circumstances and assignment of problem status; the latter involves identifying potential solutions or responses to the defined problem. To measure the *diagnostic framing*, the survey measures levels of agreement with the following proposition about water scarcity and ethnic conflict, measured on an ordinal scale, where 1= strongly disagree; 2= somewhat disagree; 3= no conviction; 4= somewhat agree; 5=strongly agree.

Water scarcity and drought contribute to tensions between Kurds, Arabs, Turkmen, and other ethnicities and sects in Iraq in general.

To measure *prescriptive framing*, we ask respondents which governing authority they would enlist for dealing with water insecurity. The question was posed as follows:

If you or a member of your family or relatives encountered problems related to water shortage and irrigation, or problems associated with climate change (drought), who is the authority you would seek to solve such problems?

Respondents had a non-exclusive menu of authority figures they could select. Options were a) the federal government of Iraq (GoI); b) the KRG; c) party politicians and officials; and d) nonstate actors (i.e. tribal chieftains, religious leaders, militias, etc.). This proposition is meant to measure what individuals see as potential solutions to water management issues at a personal level.

Measuring Territorialization

We measure attitudes to territorialization through the two questions. First, we ask a question related to Iraqi nationalism and Iraq's territorial integrity

Kurdish rule in Kirkuk and other disputed territories was a sign of the division of Iraq. These areas should be subject to the Baghdad central government.

This is ranked ordinally from strongly disagree (=1) to strongly agree (=5).

Secondly, we ask the respondent about their preferred security arrangement for Kirkuk

What is the best way to ensure security in Kirkuk and other disputed territories?

Respondents were given a categorical choice of the following exclusive options: a) management by the federal government of Iraq (GoI) (i.e the status quo since 2017); b) management by the KRG; c) joint management by the KRG and the federal government; and d) do not know.

It is important to note that responses on territorialization are partially correlated with ethnolinguistic status, as shown below in [Figure 1](#) and [2](#) below. Members of Kirkuk's ethnolinguistic communities harbor diverse views about the Iraq's territorial integrity and about how Kirkuk should be governed. Arabic-speakers largely favor the status quo: direct federal control over Kirkuk. Kurdish-speakers are more divided, but mostly favor placing Kirkuk under KRG control or creating a joint administration with special territorial status.

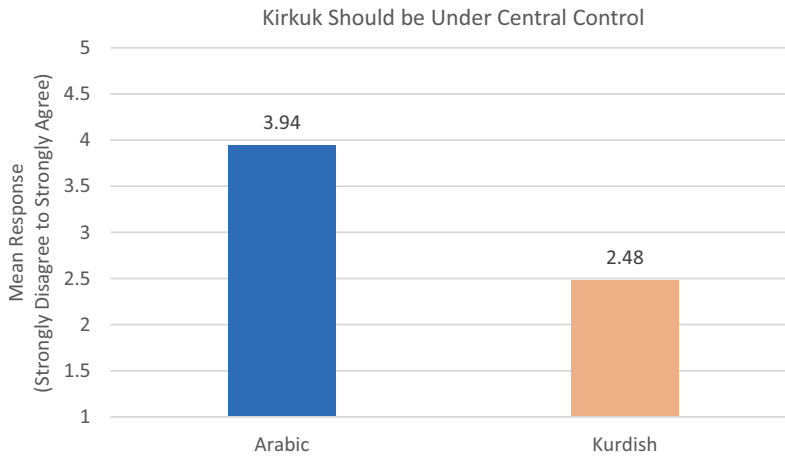


Figure 1. Commitment to Iraqi Nationalism, by Ethnolinguistic Group.

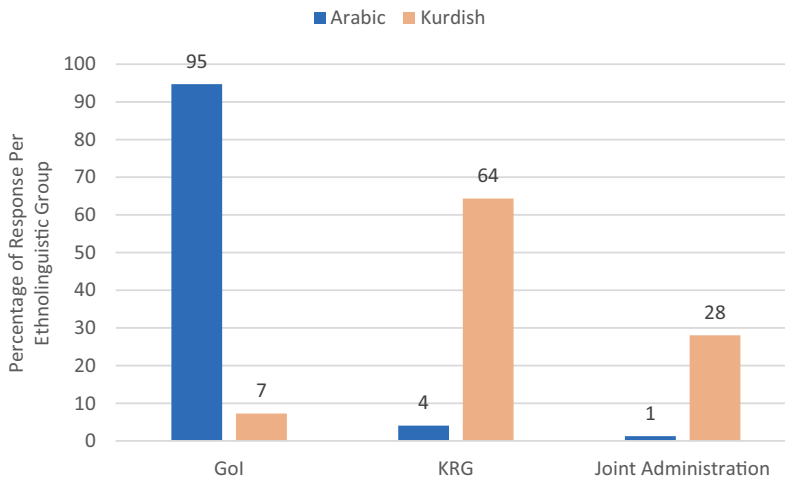


Figure 2. Preferred Territorial Solution for Kirkuk, by Ethnolinguistic Group.

Results and Findings

Analyzing Diagnostic Frames

To analyze diagnostic framing, we begin with OLS regression using STATA v. 18.5. We include independent variables for age, gender, education, and a dummy variable for ethnolinguistic affiliations (Kurdish language=1). Results are shown in Table 2 below. Two variables are strongly and consistently associated with water insecurity framing. The first is ethnolinguistic affiliation. There are significant differences between Arabic and Kurdish-speakers in all aspects of diagnostic framing of water insecurity. Arabic-speakers are more likely to believe that water shortages contribute to ethnic conflict, to rural tensions, and to economic problems. Kurdish-speakers in contrast, are collectively less likely to accept such framing of water shortages. Put another way, Kurdish-speakers are more dubious of frames that attribute political problems to environmental factors. A second variable that stands out as strongly and positively correlated with the water insecurity frame is gender. Men tend to agree with these propositions more often than women within the sample.

Table 2. OLS Regression ResultsDiagnostic Framing About Water Security

Model	1	2	3
Age (Bracket)	–0.0353 (0.344)	–0.00749 (0.841)	–0.0349 (0.349)
Male	0.147* (0.070)	0.134* (0.092)	0.160** (0.048)
Agricultural Occupation	0.125 (0.173)	0.118 (0.191)	0.128 (0.165)
Education (Bracket)	–0.0309 (0.366)	–0.00766 (0.822)	–0.0326 (0.338)
Ethnolinguistic: Kurd	–0.476*** (0.000)	–0.211** (0.030)	–0.131 (0.397)
Iraqi Nationalism		0.182*** (0.000)	
GOI			0 (.)
KRG			–0.317* (0.068)
Joint			–0.429*** (0.005)
Don't Know			–0.482 (0.597)
_cons	4.610*** (0.000)	3.798*** (0.000)	4.621*** (0.000)
N	609	609	609
F	9.059	11.27	6.700

p-values in parentheses; * *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01

Models 2 and 3 in Table 2 expand on this basic model by adding variables for territorialization. Figure 3 presents the marginal effects of the territorial preferences variable (Table 2, Model 3) with all other variables held at their mean. This represents how much territorial preferences impact framing of water scarcity as a cause of instability. The models and figures show which supporters of the current status quo in which the federal government of Iraq controls Kirkuk directly are most likely to adopt in the water insecurity framing. Those favoring revising Kirkuk's territorial status, whether by attaching Kirkuk to the KRG or joint rule, are somewhat less likely to frame water shortages as a cause of conflict. While the difference is fairly small at a substantive level (perhaps between a “strong agree” and “somewhat agree” on the 1–5 scale), it is important to note that this gap persists even while controlling for Kurdish ethnolinguistic affiliation. As there is reason to believe that ethnolinguistic affiliation and territorial preferences are strongly connected in Kirkuk, this disparity in framing water security requires is an important substantive finding.

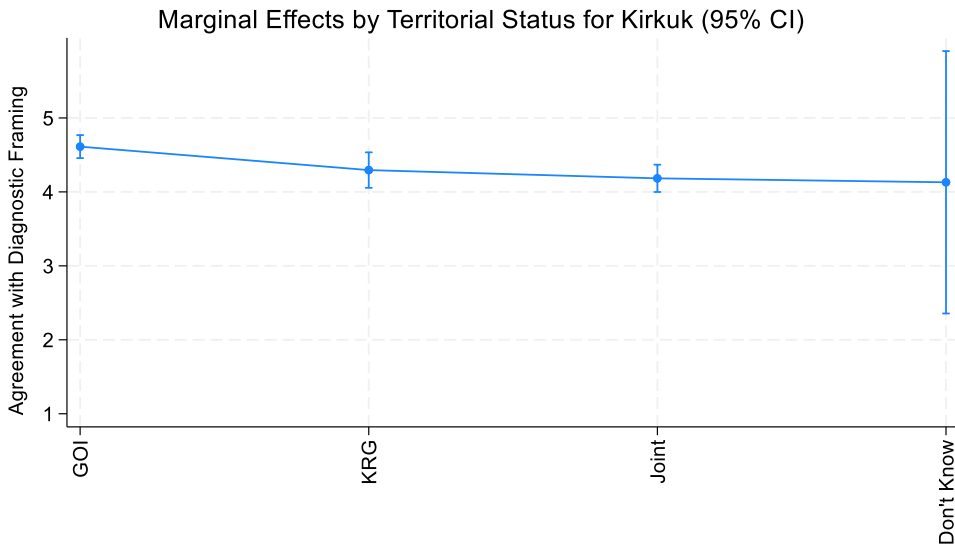


Figure 3. from Table 2, Model 3.

Analyzing Prescriptive Framing

To examine prescriptive framing regarding which arena of authority is appropriate for dealing with water insecurity, we begin with descriptive statistics. Respondents had a non-exclusive menu of authority figures they could select to deal with water insecurity: the federal government of Iraq (GoI), the KRG, local party politicians, or nonstate actors. Table 3 shows total responses and responses broken down by Kurdish versus Arabic-language selection. Percentage totals surpass 100 percent because individuals can select more than one option. The results show scant interest in nonstate solutions. Few residents in Kirkuk see nonstate arenas of authority as responsible for water management. There is instead pronounced focus on formal institutions, both the state (GoI or KRG) and politicians and political parties that can influence the state.

But views of the state itself are highly fractured. Arabic-speakers see water management as something the federal government should handle. Hardly any Kurdish-speakers in Kirkuk agree. In contrast, they frame water management as something that should be handled by the KRG primarily (despite the KRG's expulsion since 2017) or by local party politicians. T-tests confirms that differences between Arabic and Kurdish-speakers are statistically significant (see table 3).

For more intensive testing, we run separate binary logistical regression evaluating the odds of selecting each of these arenas of authority, shown in Table 4 below. The basic models (numbers 1-4)

Table 3. Percentage of Respondents Selecting Different Arenas of Authority with T-Test for Differences Between Ethnolinguistic Groups (Note: Responses are not exclusive)

Selected Arena of Authority for Dealing with Water	Combined (n=608)	Arabic-Speakers (n=320)	Kurdish-Speakers (n=288)	Two-tailed p-value
Gov't of Iraq (GOI)	47%	77%	15%	(.000)***
Kurdistan Regional Gov't (KRG)	15%	3.4%	27%	(.000)***
Local Politicians	53%	33%	74%	(.000)***
Nonstate Actors	11%	15%	5%	(.000)***

p-values in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Binary Logistical Regression Results: Prescriptive Framing of Water Insecurity

	1	2	3	4
	GOI	KRG	Local Politicians	Nonstate Actors
Age (Bracket)	−0.0429 (0.694)	−0.321** (0.011)	0.520*** (0.000)	−0.165 (0.267)
Male	−0.348 (0.150)	−0.0550 (0.837)	−1.369*** (0.000)	0.917** (0.022)
Agricultural Occupation	−0.306 (0.221)	−0.558* (0.086)	0.633*** (0.008)	0.923** (0.012)
Education (Bracket)	0.300*** (0.003)	−0.490*** (0.000)	0.392*** (0.000)	−0.391*** (0.009)
Ethnolinguistic: Kurd	−2.986*** (0.000)	2.628*** (0.000)	1.712*** (0.000)	−1.405*** (0.000)
_cons	1.412*** (0.002)	−1.663*** (0.003)	−2.044*** (0.000)	−2.148*** (0.001)
N	608	608	609	609
	5	6	7	8
	GOI	KRG	Local Politicians	Nonstate Actors
Age (Bracket)	−0.0461 (0.675)	−0.191 (0.156)	0.481*** (0.000)	−0.132 (0.382)
Male	−0.346 (0.151)	−0.0892 (0.748)	−1.351*** (0.000)	0.917** (0.023)
Agricultural Occupation	−0.303 (0.226)	−0.533 (0.115)	0.642*** (0.008)	0.901** (0.014)
Education (Bracket)	0.298*** (0.003)	−0.348*** (0.008)	0.342*** (0.000)	−0.377** (0.012)
Ethnolinguistic: Kurd	−3.026*** (0.000)	3.341*** (0.000)	1.162*** (0.000)	−1.109*** (0.004)
Iraqi Nationalism	−0.0266 (0.829)	0.572*** (0.000)	−0.423*** (0.000)	0.229 (0.206)
_cons	1.526** (0.028)	−4.432*** (0.000)	−0.222 (0.721)	−3.155*** (0.003)
N	608	608	609	609

p-values in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

present the odds of selecting each arena of authority accounting for age, gender, whether they have an agricultural occupation, education level, and the ethnolinguistic dummy (where Kurdish language is coded as 1). Again, we see evidence of disparities between the Arab and Kurdish ethnolinguistic groups in selecting arenas of authority. We include the interval variable measuring commitment to Iraqi nationalism and retaining Kirkuk under federal authority in models 5 through 8 in Table 4.

We further explore territorialization running the regression with identical controls but replacing the ordinal variable measuring Iraqi nationalism with a series of nominal variables reflecting whether respondents preferred federal authority, KRG authority, or joint authority in Kirkuk. Results appear in Table 5. Figures 4–7 derive from the models in Table 5, depicting the marginal effect of the nominal territorialization variables. This graphically illustrates how commitments to different territorial schema for Kirkuk influence the likelihood of selecting different arenas of authority for dealing with water insecurity. Again, we see that ethnolinguistic affiliation and

Table 5. Binary Logistical Regression Results: Prescriptive Framing Using Nominal Variables

	1	2	3	4
	GOI	KRG	Local Politicians	Nonstate Actors
Age (Bracket)	–0.0639 (0.567)	–0.323** (0.011)	0.548*** (0.000)	–0.173 (0.247)
Male	–0.277 (0.261)	–0.0483 (0.857)	–1.500*** (0.000)	0.942** (0.019)
Agricultural Occupation	–0.365 (0.157)	–0.544 (0.104)	0.620** (0.011)	0.948*** (0.010)
Education (Bracket)	0.299*** (0.004)	–0.493*** (0.000)	0.406*** (0.000)	–0.393*** (0.008)
Ethnolinguistic: Kurd	–1.732*** (0.000)	2.438*** (0.000)	0.249 (0.512)	–0.985* (0.068)
GOI	0 (.)	0 (.)	0 (.)	0 (.)
KRG	–1.485*** (0.001)	0.270 (0.609)	1.381*** (0.002)	0.0257 (0.968)
Joint	–1.480*** (0.000)	0.204 (0.669)	1.931*** (0.000)	–0.784 (0.167)
Don't Know	0 (.)	0 (.)	0 (.)	0 (.)
_cons	1.561*** (0.001)	–1.682*** (0.002)	–2.153*** (0.000)	–2.126*** (0.001)
N	607	607	608	608

p-values in parentheses * *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01

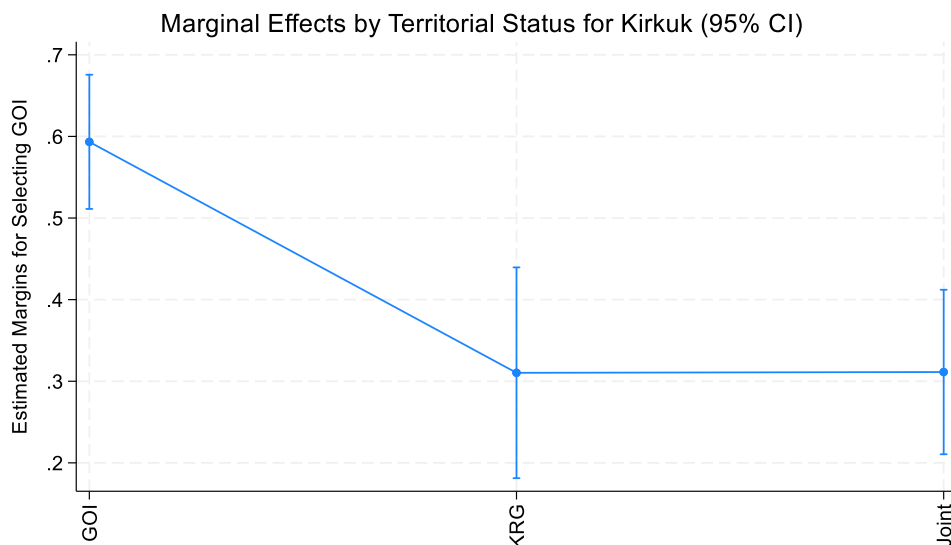


Figure 4. Marginal Effects from Table 5, Model 1.

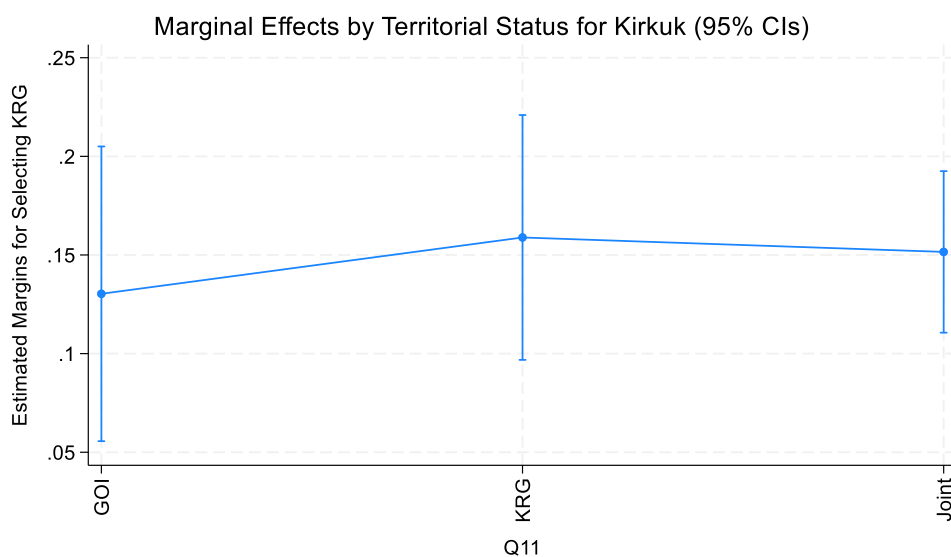


Figure 5. Marginal Effects from Table 5, Model 2.

territorialization consistently affect prescriptive framing of water scarcity. Those who favor Kirkuk's integration under Iraq's central authority – largely Arabic-speakers – are the most likely to enlist the federal government for help dealing with water shortages and reject involvement by the KRG, party politicians, or nonstate actors. By comparison, those favoring revising Kirkuk's territorial status – largely Kurdish-speakers – are more willing to involve multiple arenas of authority in day-to-day water management.

Overall, the results show that those most committed to the Iraqi state's territorial agenda in Kirkuk are the most likely to diagnose water insecurity as endangering stability. They are also the

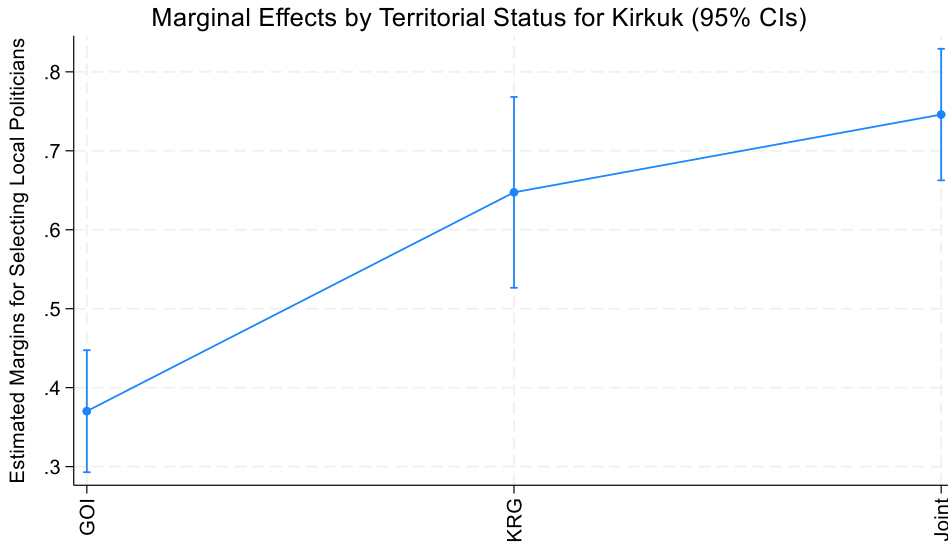


Figure 6. Marginal Effects from Table 5, Model 3.

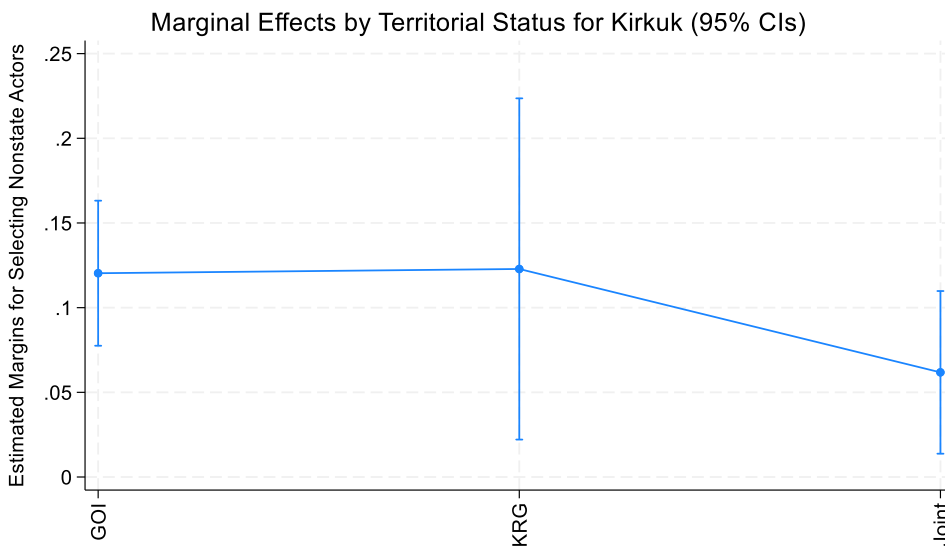


Figure 7. Marginal Effects from Table 5, Model 4.

most likely to prescribe enlisting the government of Iraq to manage day-to-day water scarcity problems. Only the Iraqi state can – or should – rescue Kirkuk from water insecurity. In this way, ecological ideas about scarcity foster Iraqi Arab penetration at the internal frontier. In contrast, those opposing Iraqi state's designs on Kirkuk are less likely to accept the water insecurity frame as a diagnosis. They see the roots of Kirkuk's problems elsewhere. Moving to prescriptive framing, they are reluctant to enlist the Iraq government for help with water scarcity. They prefer to rely on the KRG as well as politicians to handle these challenges. Even though these politicians may eventually have to petition Baghdad, this intermediation is preferable to inviting the federal government to consolidate control in disputed Kirkuk. These ecological subjectivities, their understanding of the

stakes in Iraq's environmental crisis and what might solve it, align with alternatives to the state's integrationist plans. The hydrosocial space becomes a front of nationalist contestation.

Conclusions

Iraq is high on any watchlists of ecologically-vulnerable countries (Al-Obaidi et al. 2022; Jaff 2023; Varis, Keskinen, and Kumm 2017). Indeed, the entire Middle East faces rising temperature and water depletion, coinciding with grave social and political upheaval. Studies in Iraq depict multiple forms of hydrosocial contestation. The exact shape depends both on local ecological and political conditions (Rizzi and Mollinga 2024; Mason 2022; Al-Rubaie, Mason, and Mehdi 2021; Jongerden et al. 2019; Hassaniyan 2021; Al Kli, Miller, and de Waal 2024). The ubiquity of water insecurity across Iraq, some suggest, could spur momentum toward environmental and political remediation (von Lossow, Schwartzstein, and Partow 2022). A report by the Century Foundation, for instance, expresses guarded optimism about an emerging consensus among Iraqis about climate change as a real danger. Such a "clear definition of the problem," the report avers, might invite "viable responses, which also focus on human agency – remediations, adaptation, sometimes even reversals and solutions" (Shuker 2023). Diagnostically framing the severity of ecological crisis can lead to new kinds of inter-ethnic collaboration and problem solving.

This article places the ecological and political challenges of Iraqi in a broader setting. Shifts in material ecological conditions connect to the ideas and practices which actors deploy to understand and address environmental challenges (Daoudy 2021). The struggle over resources in Kirkuk began decades before the current water crisis manifested. This enables residents of Kirkuk to imagine (or remember) an ecological golden age of frontier abundance. Ecological imaginaries in Kirkuk intertwine with rival projects for ethnonational territorialization. Each of these projects frame the territory's water scarcity in different ways. Those favoring Iraq's state-building project, mostly Arabic-speaking Kirkukis, are also the most likely to accept the traditional environmental security framing. They believe that water scarcity is a trigger of social and political tensions. They also insist that the Iraqi state alone manage water scarcity. In contrast, those favoring alternative state-building projects, namely the Kurdish counter-state, dispute this framing. They are more likely to see Kirkuk's problems as fundamentally political, not ecological, and they also prefer that other authorities step in to manage the ecological risk.

These findings have considerably pessimistic implications for the role of water in environmental security and peacebuilding (Weinthal, Troell, and Nakayama 2011; Weinthal and Johnson 2018). The environmental security and peacebuilding literatures share the assumption that material environmental change induces and precedes political and social change. Ensuing policy prescriptions accordingly tend to focus on technical solutions to mitigate shortage or ameliorate allocative disputes that could spur to violence (Krampe, Hegazi, and VanDeveer 2021; Ide 2020). The political ecology approach does not deny the impact of drought and ecological scarcity on human survival. But it offers a more nuanced view of human-ecological interactions. Scarcity or lack of a technical ingenuity do not spur people to adopt strident political stances. Political agency and ideas are the primary determinants of war, peace, and ecological sustainability. Disparate environmental frames are embedded in commitments to antagonistic projects for territorialization, nationalism, and state-building.

Kirkuk is hardly exceptional as an internal frontier, subject to unsettled sovereignty claims and rival ethnoterritorial ambitions. Indeed, the Kurdish drive for self-determination has contributed to the formation of multiple internal frontiers across Turkey, Syria, Iran, and Iraq. In each of these, conflicts over water and other resources are prominent (Yıldırım 2024; Mamshai 2025b; Daoudy 2020; Bilgen 2018; Hommes, Boelens, and Maat 2016). We might expand the scope further. In Asia alone we might mention Palestine (Haddad 2011), Aceh (Green IV 2013), Russian sub-federal regions such as Tatarstan (Tulaeva, A., and Snarski 2024), and Kashmir (Bhan and Trisal 2017). In all such spaces, environmental governance must navigate competing claims of ethnopoli-

control and ownership. Rival ecological and political imaginaries of territorial status loom over the pursuit of environmental security. These dynamics illustrate a larger trend. As great powers like United States, Russia, and China appropriate and manipulate environmentalist framing to serve their larger strategic ends, they ultimately undermine efforts to foster international collaboration on climate change (Toal 2024). Frame polarization, driven by ethnonationalist projects, undercuts the bases for intercommunal collaboration in ecological governance. Even seemingly benign and technical governance approaches are controversial when viewed through polarized frames. Peace requires political reconciliation and the construction of shared ecological imaginaries before technical solutions become feasible.

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Appendix

Summary of Key Variables

Territorialization Variable

Q: Kurdish rule in Kirkuk and other disputed territories was a sign of the division of Iraq. These areas should be subject to the Baghdad central government (Question 10)

Ranked ordinally from strongly disagree (=1) to strongly agree (=5).

Diagnostic Framing Variable

Q: Water scarcity and drought contribute to tensions between Kurds, Arabs, Turkmen, and other ethnicities and sects in Iraq in general (Question 19)

Ranked ordinally from strongly disagree (=1) to strongly agree (=5).

Table A1

Variable Name	N	Mean	Standard Deviation	Min	Max
Q10_R	609	3.253	1.174	1	5
Q19	609	4.427	.9292	1	5