Research papers

Drops of diplomacy: Questioning the scale of hydro-diplomacy through fog-harvesting

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A B S T R A C T

Hydro-diplomacy conversations have up till now been generally state- and basin-centric, focused on formal international relations and transboundary rivers. This paper applies the notion of water diplomacy to a project in rural Southwest Morocco in order to interrogate the scalar potential of water-based environmental peacebuilding.

In the Aït Baamrane region of the Anti-Atlas Mountains, a local non-profit oversees the world's largest operational fog-harvesting system, piping potable water collected from the mountains' extensive fog cover to 13 Amazigh villages. Dar Si Hmad's related Ethnographic Field School leverages the fog project's uniqueness to attract scholars to an underrepresented region, where research programming questions mainstream narratives of Morocco and sustainable development while exploring how traditional knowledges can be integrated in scientific innovation.

This paper argues that, by intentionally using fog to facilitate collaborative exchange, Dar Si Hmad is engaging in a form of hydro-diplomacy. Drawing from ethnographic data and building on international relations theories of Track Diplomacy, this paper demonstrates how fog water is being used to lay the groundwork for durable peace, intercultural understanding, and symbiotic growth. Such local iterations of hydro-diplomacy should be better understood and integrated with the emerging literature on state-to-state water cooperation in order to develop holistic expertise, share best practices, and promote positive policy interventions.

1. Introduction

In its rationale for naming 2013 as the International Year of Water Cooperation, the United Nations exclaimed, "148 countries share at least one transboundary river basin" (United Nations, 2013). Three-quarters of the world's nation-states are home to a river that crosses a political border, and this comes with a swatch of political and environmental challenges in need of creative solutions. In the past few years, "hydro-diplomacy" (or water diplomacy) has emerged as one such intended approach. The logic of water diplomacy builds on debates over environmental security, conflict, cooperation, and peacebuilding that gained traction at the end of the Cold War. Like these other fields, hydro-diplomacy is rooted in international relations scholarship, and thus emphasizes the state as the primary actor under consideration. And as is typical of hydro-political work, water diplomacy defaults to the river basin as the principal unit of analysis. This combination of biases creates a major gap for hydro-diplomacy policy and practice.

This piece seeks to highlight what hydro-diplomacy misses when rivers and states are effectively the singular scalar focus of its scope. It has five primary objections: (1) to review the emergence of hydro-diplomacy theory as a response to and expansion of environmental security and environmental peacebuilding narratives; (2) to demonstrate the state-centrism and basin bias inherent in water diplomacy scholarship and practice; (3) to show how theories of track diplomacy and attention to wide-ranging hydrologic realities can fill the hole resulting from those biases; (4) to showcase an innovative example of applied hydro-diplomacy through community-level knowledge and cultural exchange driven by fog-harvesting; and (5) to argue that the water diplomacy literature will be more robust and effective if it moves beyond its limited scalar predispositions.

The paper will first report the methods guiding this examination (Section 2), then provide a review and critique of relevant theory (Section 3). A case study on Moroccan fog-harvesting is given in Section 4, with the subsequent conclusions presented in Section 5.

2. Methods

This article situates practitioner accounts of and approaches to water-based public diplomacy in the emerging literature on hydro-

diplomacy. Theoretical examination is based on an extensive literature review of water diplomacy conceptualizations as drawn from environmental studies, international relations, geography, hydro-politics, and law. Particular emphasis was placed on (1) the predominant, mainstream discourses of water diplomacy – those perpetuated by powerful actors such as the United Nations – and (2) authors and schools of thought examining multi-level stakeholders and non-traditional actors or settings.

Empirical data is drawn from three years of participant observation with a case study in Southwest Morocco. Dar Si Hmad, a local non-profit based in Agadir and Sidi Ifni, operates the world's largest fog-harvesting system. Connected to the fog project are their Center for Language Training and Research Support and an Ethnographic Field School. Both institutions welcome foreign visitors to an under-represented region of Morocco, promoting equitable cultural exchange and technical cooperation.

Data collection involved conducting fifteen semi-structured interviews with participants in Dar Si Hmad's exchange programs, conference engagement at ten international meetings across four continents, and document analysis of organizational archives. In addition to five years of applied practice, Dar Si Hmad has conducted a decade of meteorological observation and feasibility research. This article makes use of information from technical reports, grant applications, press releases, and curriculum developed since 2006.

3. In theory

3.1. Water diplomacy: an emerging theory

Taken at face value in the broadest possible sense, 'hydro-diplomacy' simply refers to all diplomatic relations and efforts relating to water. By this reading, hydro-diplomacy (or water diplomacy) has been practiced throughout history. However, over the past decade, the phrase has come to be used in a few particular ways by theorists and practitioners of international water relations.

Theories of water diplomacy are rooted in critical hydro-politics and scholarship over environmental conflict, cooperation, security, and peacebuilding. "Environmental conflict" became a buzzword in the international security arena in the 1990s (Timura, 2001). A first "wave" (Lonergan, 2000, 67; Levy, 1995) of academic exploration in the early 1990s presented a rationale suggesting that the environment – particularly, natural resource scarcity – could cause conflict (Homer-Dixon, 1991; Libiszewski, 1992; Bächler, 1994). A second wave sought methodologies for proving those ties and a third was called for to explore nuances, with criticisms focused on the relative lack of empirically based work clearly demonstrating claimed causal links (Levy, 1995; Diehl and Gleditsch, 2000). A 1998 critique of Homer-Dixon's early work led to a back-and-forth series of articles by scholars debating methodologies and assumptions (most notably Gleditsch, 1998; Schwartz et al., 2000).

Researchers in the early 2000s responded to calls for more robust consideration and began building a counter-narrative pushing against pessimistic conceptions of environmental conflict. Deterministic ideas continue to persist, with recent disasters and political turmoil sparking renewed interest in environmental and climate-related tensions, but the academic community has generally come to agree that the environment itself is not a *sole* cause of war – rather, it may serve to trigger or further violent outcomes locally or regionally (Conca, 2002, 1), with quantitative analysis finding that "states suffering from greater levels of environmental scarcity are more likely to be involved in a militarized international dispute" (Stalley, 2003, 33).

Specific to hydro-politics, Wolf and Hamner found that violence over water generally takes place on a sub-state level in non-armed conflict settings (2000, 128) but that this violence may cross national borders and has impacts beyond the immediate location of the conflict. Though Homer-Dixon posited that the catalytic potential will become

greater as environmental degradation leads to further scarcity (1999), Allan demonstrated how the realities of today's global political economy have helped to mitigate conflict in the Middle East through virtual water (Allan, 2003). Further quantitative analysis has shown assumptions about environmental conflict – most notably the theory of 'water wars' – "to be at best overly pessimistic and at worst grossly mistaken" (Arsel, 2011, 450). Dinar and Dinar argue that water, when pertinent to survival for a state, may "either impede or enhance negotiation over the resource" (2000). Quantity and scarcity is thus not a determining factor in conflict; rather, whether or not the parties choose to negotiate is influenced by other issues like political willingness, geography, military/economic power, soft power asymmetries, and governance (Dinar and Dinar, 2000; Dinar et al., 2011).

It is against this backdrop that ideas of water diplomacy took the stage, first appearing as water-based environmental cooperation. On World Water Day 2002, then-U.N. Secretary-General Kofi Annan stated in his statement of support that "the water problems of our world need not be only a cause of tension; they can also be a catalyst for cooperation" (Annan, 2002). Academic and policy minds view water as playing "a unique and varied role" (Weinthal et al., 2011, 143), a resource that "by its nature, tends to induce even hostile co-riparian countries to co-operate" (Kader Asmal quoted in Conca, 2002, 3). Instrumentally, "[w]ater, if properly restored and managed, can be harnessed to play a critical role in post-conflict recovery by protecting public health, restoring livelihoods, supporting economic recovery, and facilitating reconciliation" (Crawford et al., 2014, 1). Some see the role between water and conflict as so intrinsically tied that the two become nearly synonymous: "Water management is, by definition, conflict management" (Fetzer Institute, 2011, 19).

Today, the connection between water and diplomacy is readily accepted. The term 'hydro diplomacy' appears in mainstream newspapers (MacDiarmid, 2015). Tufts University hosts a Water Diplomacy Graduate Program. The European Commission includes water diplomacy as a policy pillar. UNESCO's International Centre for Water Cooperation regularly holds water diplomacy symposia and events. UNITAR has launched an "Introduction to Water Diplomacy" online course. Major organizations like the World Water Council are including hydro-diplomacy in the title of their annual reports. This movement behind the concept is perhaps best captured by the title of an oft-cited adelphi report: "The Rise of Hydro-Diplomacy" (Pohl et al., 2014).

3.2. Hydro-diplomacy: peace, conflict, and cooperation

Though the language of 'water diplomacy' is now widespread, there remains variation in the term's meaning. Two sometimes-competing yet complementary approaches exist within theoretical literature and policy approaches. One focuses on the use of diplomatic methods for water management; the other highlights water as a gateway to cooperation.

School 1 emphasizes the need for cooperation in order to address water issues. In this framing, "water diplomacy is a theory and practice of adaptive water management" to manage "conflicts over water" through "diplomacy that takes science, policy, and politics into account" (Islam and Susskind, 2012, 323). Water diplomacy's purpose is to put the skills "of the diplomatic body to the benefits of challenges posed by the decrease in per capita freshwater quantities" (UNITAR, 2013, 9). It "includes all measures… that can be undertaken to prevent or peacefully resolve (emerging) conflicts and facilitate cooperation related to water availability, allocation or use" (Huntjens et al., 2016, 4).

Beyond using diplomatic tools to prevent or resolve water-related conflicts, some theorists argue that water diplomacy can "transform the potential risk of competing demands… over water into forms of cooperation that extend beyond water and economics" (Hefny, 2011, 26). The adelphi report suggests that "transboundary water governance can give foreign policy makers a toehold for making progress on crucial

foreign policy interests… a promising entry point for diplomats aiming for high peace dividends" (Pohl et al., 2014, i).

The more expansive take of School 2 borrows from the logic of environmental peacebuilding, which can be seen as the umbrella field of water diplomacy. Early writing on the topic sought "to pinpoint the cooperative triggers of peace that shared environmental problems might make available" and to "ask whether environmental cooperation can trigger broader forms of peace" (Conca, 2002, 5). Advocates of environmental peacebuilding assert "It will be relatively easier to initiate cooperation on environmental matters than on other issues" and that "environmental cooperation may in turn spill over to help the countries in the region build the mutual trust necessary to address other traditional issues of dispute" (Swain, 2002, 81). This is hardly an automatic process, of course. "Cooperation on the Indus River shows that even under the most problematic conditions, water can bring cooperation", but "it is up to the state actors to make choices and nurture that water-based cooperation into peacemaking" (Swain, 2002, 82).

Regardless of whether hydro-diplomacy is framed as cooperation for water or water for peace, it is important to consider the fundamental nature of the cooperation or conflict at play. In most of the literature on environmental conflict and cooperation, the two are presented as a dichotomous either/or. Using examples from transboundary river basins, however, Mirumachi shows how conflict and cooperation can *coexist*, with the same parties agreeing and collaborating on some aspects of governance and supply while clashing over others (Mirumachi, 2015; see also Mirumachi, 2006; Mirumachi and Allan, 2007; Mirumachi and Warner, 2008, and Zeitoun and Mirumachi, 2008). Additionally, environmental cooperation can exist alongside not only environmental conflict but also other forms of political and/or military conflict: Through the Indus Waters Treaty, India and Pakistan were able to "safeguard their long-term water supply" through cooperation even in the midst of "wider tensions between the two countries" (Alam, 2002, 350). Nor does environmental cooperation on one issue guarantee cooperation on others: The Indus Waters Treaty "did not lead to an easing of tensions over other areas of dispute such as Kashmir" (Alam, 2002, 350).

As well as underscoring that conflict and cooperation can take place at the same time, critical hydro-politics literature has demonstrated that cooperation is not automatically positive: "the mere existence of cooperation is less important than the content, scope, and orientation of that cooperation" (Conca and Dabelko, 2002, 222). Treaties may end surface violence even as they "fail to create warm relations or eradicate mistrust" (Mitha, 2010, 124). 'Cooperation' is a multifaceted process and concept, and does not always involve relationship building or systemic fixes. "Functional cooperation", for example, is "driven by bottom-up technical and situational demands" (Tanner et al., 2007, 186). The historical tendency to seek technological fixes to environmental problems can limit the efficacy of environmental cooperation and be detrimental to long-term sustainability, as it avoids addressing the related social and cultural insensitivities and tensions (Nalven, 1986). Mirumachi shows how securitizing the Tanakpur Barrage allowed Nepal and India to form an agreement rather than entering into state conflict but that this cooperation did not necessarily lead to ideal outcomes for the environment or people (2013).

Nor is all conflict is inherently bad. Conflict can help encourage societies to create the tools needed for responding to scarcity. "[P]articipatory and inclusive resource management regimes may enable communities to construct resource use conflicts in ways that help to prevent unproductive conflict" (Martin, 2005, 329). In order to reach its full potential, hydro-diplomacy theory, policy, and practice must take these lessons into account.

3.3. Transboundary water interactions: the river runs deep

Despite scholarship warning about the potential pitfalls of superficial cooperation, hydro-diplomacy literature continues to champion technical collaboration and shared institutions for water management with relatively little critique or long-term impact evaluation. Nor is this its only gap.

Like the vast majority of hydrological and hydro-political scholarship, water diplomacy is intensely focused on rivers. In practice and analysis, transboundary rivers and basins are some of the most visible and tangible shared natural resources. It is thus unsurprising that a great deal of the water diplomacy literature has focused primarily on rivers, appearing in academic and policy minds as the stage on which hydro-diplomacy plays out. The adelphi report on hydro-diplomacy consistently refers to river basin organizations as primary actors and makes use of no fewer than nine international rivers to showcase the theory's potential. The Hague Institute for Global Justice's program on water diplomacy specifically positions their work within a river basin wide context (Huntjens et al., 2016, ii). Hefny's approach is one of a process "among riparian states", again reiterating the river-centrism (2011, 21). Another definition explicitly focuses water diplomacy as happening "over transboundary freshwater resources such as lake, river, and aquifer basins" (van Genderen and Rood, 2011, 10). This last at least acknowledges groundwater – a major resource vastly underconsidered in water law and governance (see Eckstein, 2017) – but continues to limit the physical, spatial scale of hydro-diplomacy by remaining basin-centric. "Transboundary waters" seem to have become effectively synonymous with "river".

In reality, rivers are a mere fraction of the planet's water resources (0.0002% (Shiklomanov and Gleick, 1993)). Limiting hydro-diplomacy to freshwater discounts 97% of the Earth's supply, even as this ocean-based bulk becomes increasingly used for anthropocentric purposes via desalination, saline water agriculture, and the like. Even when considering only freshwater not frozen in glaciers or in underground aquifers, rivers contribute only 0.5%; atmospheric water accounts for six times that amount and soil moisture nearly eight times (Shiklomanov and Gleick, 1993).

There is thus a strong disconnect between hydrological realities and hydro-political emphasis. In a piece reflecting on a decade of critical hydro-hegemony theoretical work, the London Water Research Group acknowledged their own river-centrism and called for scholarship to move "beyond the river basin as the primary unit of analysis in international water issues" (Warner et al., 2017, 5). The water diplomacy community must do the same if it is to fully realize its potential as an interdisciplinary, intersectoral approach to shared water management.

3.4. International cooperation: multi-level actors and track diplomacy

In addition to maintaining a disproportionate focus on rivers as the unit of analysis, hydro-politics has followed classic international relations in being state-centric. Nation-states and state-based institutions are regularly seen and approached as the primary actors in water diplomacy. Some basic definitions even go so far as to *require* a state actor: "Water diplomacy, also referred to as hydro-diplomacy, can be broadly defined as all contact between (non-)state actors and *at least one state* or international governmental organizations…" (van Genderen and Rood, 2011, 10, emphasis added). In their water diplomacy glossary, leading theorists Islam and Susskind define diplomacy as "the practice of interaction among nations aimed at avoiding hostility among the parties" (2012, 317).

However, just as rivers represent a miniscule fraction of Earth's water resources, states make up a minute percentage of the potential actors in diplomacy. There are fewer than two hundred states in the modern world, compared with hundreds of thousands of organizations and billions of individual persons – to say nothing of non-human animals, ecosystems, future generations, and other non-traditional agents.

Yet while international relations has traditionally been focused on the state, just as was the case with ideas of environmental conflict and cooperation, traditional understandings of and approaches to diplomacy have been challenged in recent decades. The dominance and
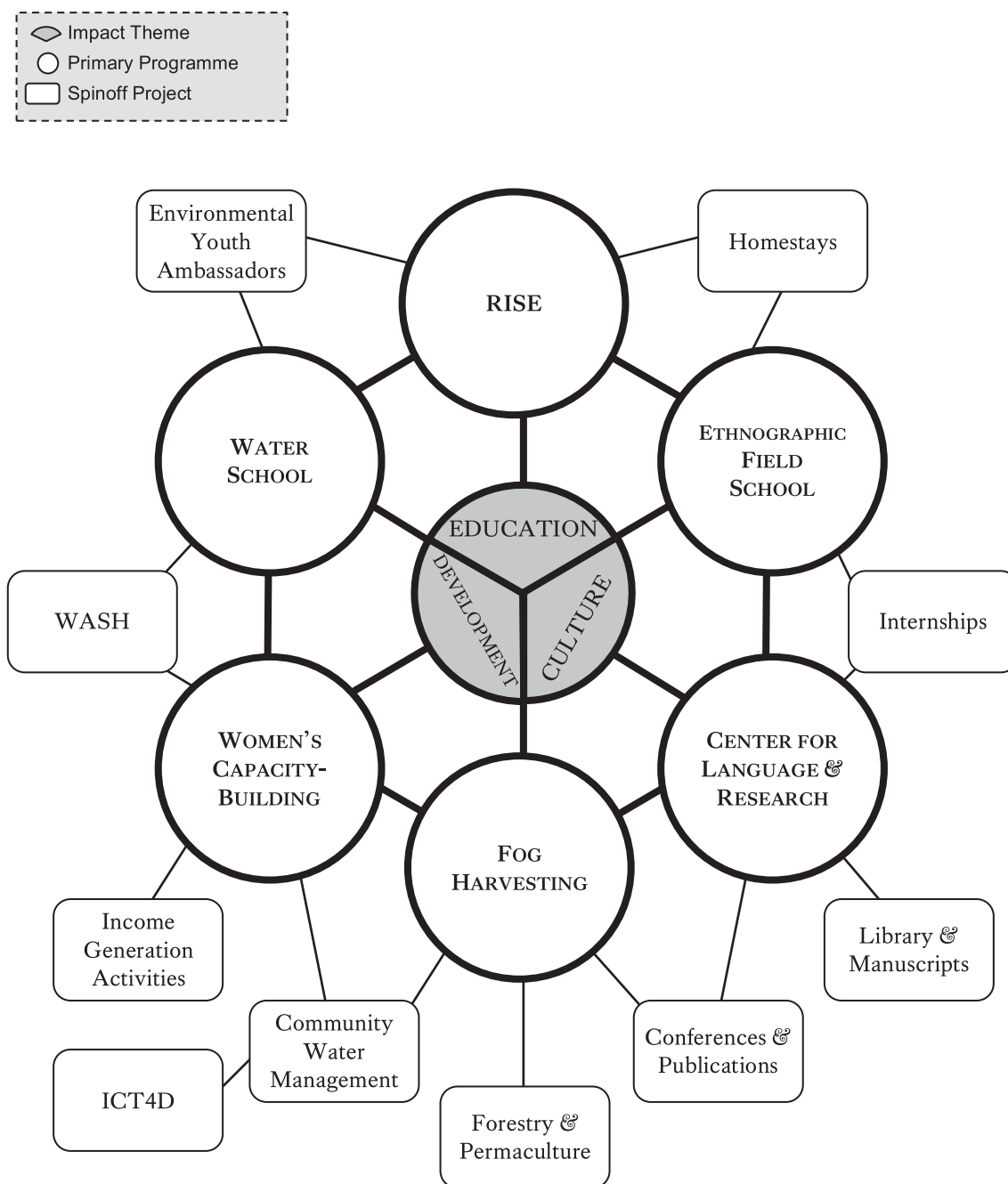
Fig. 1. Program overview of Dar Si Hmad.

seeming permanence of the United Nations, the codification and expansion of international law, and the rise in instant global communications have shifted the way governments interact with each other and the world. "Track Two Diplomacy" was coined as a phrase in 1981 by Montville in theorising "an unofficial, informal interaction between members of adversary groups or nations that aims to develop strategies, influence public opinion, and organize human and material resources in ways that might help resolve their conflict" (Montville, 1991, 162). The term created space in academic literature for conceptions of the public's doing diplomacy. Montville points to the Oslo Accords as the most famous Track Two dialogue processes, and suggests that the Accords did result in a lot of positive firsts – many of them centred around water issues – even if they are now seen as a failure (2009).

Since Montville's original formulation, the "Tracks" of diplomacy have taken off in several sometimes-divergent directions, with various

authors naming and describing Tracks 1, 1.5, and 2 (see, e.g., Böhmelt, 2010; Çuhadar, 2009; Çuhadar and Dayton, 2012; and Mapendere, 2000). Categories are generally based on the type of actors intervening, as well as the kind of intervention, distinguishing between "work which seeks to bring together the leaders within a conflict situation and those reaching out to the wider population" (Popiolkowski and Cull, 2009, 3).

Relatively few comparative studies of non-state diplomacy exist, with the majority of research exploring single events (Çuhadar and Dayton, 2012), but the extant studies do indicate that Track 2 diplomatic efforts are most useful when used as a pre-negotiation strategy (Çuhadar and Dayton, 2012, 158; see also Fisher, 2006; Nan, 1999). Çuhadar asks whether diplomatic efforts can be 'transferred' between tracks. Examining negotiations over water and Jerusalem in Israeli-Palestinian peace processes, he finds that Track 2 efforts contributed more to the *processes* than the actual outcomes of formal negotiations

(2009: 651). Building from the study, Çuhadar suggest various strategies for moving between tracks, including persons involved in Track 2 diplomatic processes advising during formal negotiations without being the official representatives and sending information and suggestions to policymakers (2009: 655).

Most scholars agree that Track 1 Diplomacy is more 'effective' or necessary to gain peace. Böhmelt argues that this is because it gets more resources, and while this may be true to some extent, we can also challenge what is meant by 'effective'. When efficacy is measured in terms of a formal settlement or ceasefire at the highest levels (as it is in Böhmelt, 2010), the armed violence may well end. But this does not necessarily promise any sort of friendliness between the countries, an end to tensions, or resolution of the initiating problems. Track 2 Diplomacy, on the other hand, can be strongly tied to sustainable peace in its work to overcome stereotypes of negative perceptions and re-humanize the 'other'; reframe stories and historical narratives of conflict; empower young people and others through training; and solve shared problems (Çuhadar and Dayton, 2012). Derian suggests that diplomacy can be thought of as the mediation of the process of othering; his use of theories of alienation and estrangement – and the growing attention to Tracks 1.5, 2, and 3 – can be seen as making diplomacy scholarship and practice less state-centric and focused on society as a whole (Derian, 1987).

Diplomacy is changing, engaging non-traditional actors and methods. With this evolution, its study is becoming more and more relevant to sustainable development and durable peace. Segments of the water diplomacy literature are beginning to do the same; the Hague Institute, for example, acknowledges the role of "state and non-state actors, "between and within states", for "public and private stakeholders" (Huntjens et al., 2016, 4). As hydro-diplomacy continues to develop and grow in prominence, its advocates should make use of progressive knowledge and theories in both hydrology and diplomacy – rather than being innovative only by combining base traditions in two fields – in order to ensure its relevance and maximize its impact. This paper now turns to an empirical case study and analysis demonstrating how this might be done.

4. In practice

4.1. Dewing diplomacy: Dar Si Hmad's fog-harvesting

Dar Si Hmad is a local non-profit in Southwest Morocco whose flagship project involves harvesting potable water from the region's intense fog cover to support local livelihoods. Building from this unique technological intervention for sustainable development, the organization runs a variety of cultural exchange, scientific collaboration, and environmental education programming. Fig. 1 provides an overview of Dar Si Hmad's related initiatives.

Aït Baamrane is at the edge of the Sahara and faces endemic drought with increasing intensity. The *Chergui* Saharan wind, blowing in from the south, adds to the extreme weather conditions and further dries the area. Rural villages in the *bled* (countryside) gather what little rainfall there is in household cisterns but are regularly required to buy expensive water from visiting water trucks. Neighborhood wells are open and used for livestock, but their supplies are also frequently used for household consumption. With several families relying on a single source based a long walk from their houses, the seemingly basic chore often takes women and girls hours from their day. Water stress is effectively constant, with indigenous villagers using only around eight liters of water per person per day (compared to an average of eighty-five in the country's urban cities). The classic environmental conflict scholarship reviewed in Section 3.1 views these realities as a recipe for violence, with environmental marginalization pushing poor people even further into poverty and increasing tension (Swain, 2002, 63; Homer-Dixon, 1999, 16). The systemic gender-based violence occurring around water collection, as well as low levels of inter-village conflicts

sparked by resource inequality, are examples of the sub-state, non-armed settings Wolf and Hamner identified as prime sites for water-related violence (2000, 128). But as environmental peacebuilding advocates argue, this conflict potential is far from inevitable – depending instead on human responses.

In 1989 at a conference in Canada, Dar Si Hmad's president Aissa Derhem encountered the work of FogQuest, an organization bringing modern technology to the ancient practice of fog collection, a survival mechanism of the Canary Islands' original inhabitants (Marzol, 2005). Expanding on their more basic method, FogQuest installs mesh or metal nets in fog-rich areas that are otherwise water poor. As the weather systems pass through, water droplets condense onto the material and drip into troughs below. Aissa realized this might work in his home community: Though Mount Boutmezguida near Sidi Ifni receives an average annual rainfall of only 112 mm, it is blanketed by fog for around 150 days a year.

Installing their first generation of nets allowed Dar Si Hmad to begin providing water for five villages, distributing 2.3 million liters a year with six hundred square meters of Phase 1 nets (Dodson and Bargach, 2015). Today, Dar Si Hmad oversees a growing number of Cloud-Fishers™ – a more effective net using polyester spacer fabric to capture as many condensed fog droplets as possible and a high-density polyethylene support grid held by rubber expanders to withstand winds of up to one hundred twenty kilometers per hour. Remote sensing equipment and a custom-built meteorological observatory monitor fogwater yield, net efficiency, and weather patterns. Cisterns mixing fogwater with solar power pumped groundwater reserves, a UV water filtration system, and gravity fed pipelines make up a sustainable distribution system supplying nearly one thousand people across thirteen villages. The technical expertise and financial support to make this enlarged operation possible, the ways in which Dar Si Hmad is sharing their experience, and the sociocultural spinoff projects enabled by the fogwater tell a story of multi-track, multi-faceted diplomacy built not around a transboundary river by state governments but rather around a much less concrete water source by a dynamic group of civil society leaders and indigenous communities. This case study is thus a locally based empirical example contradicting 'water wars' theories through the *cooperation for water* approach of the first school of water diplomacy reviewed in Section 3.2, championed by Islam and Susskind.

4.2. Multi-track water diplomacy, school 1: cooperation for water

As discussed in Section 3.4, since the coining of the term "Track Two Diplomacy" by Montville in 1991, the demarcation and total number of tracks have varied between utilising authors and organizations. For the purposes of this discussion, Track 1 refers to the traditional, state- or authority-led, formal negotiations and agreements of diplomacy. Track 2 Diplomacy involves the unofficial work of civil society leaders between communities and/or countries focused on problem solving around a conflict or source of tension. Track 3 denotes relationship-building and public mobilization, building cross-community understanding and engaging the general public in order to promote warm relations for durable peace.

When multi-track diplomacy theory is applied to the hydro-diplomacy sphere, many activities and initiatives beyond river basin organizations and transboundary water treaties become relevant. Dar Si Hmad's intentional effort – and need – to engage communities beyond Aït Baamrane in the fog project is one such case.

In 2006, in close partnership with the Canadian-based water advocacy organization FogQuest, hydrologists at the University of La Laguna at Tenrife, and Amazigh villagers living in Zekri, Dar Si Hmad launched an observation phase to evaluate the region's weather patterns and the feasibility of fog-harvesting (Marzol et al., 2011). On 21 March 2015, the system was inaugurated and some three hundred villagers gained access to drinking water via taps in their homes (Fig. 2).

This project required academic and technical cooperation for water,

Fig. 2. US Embassy Chargé d'Affaires Matt Lussenhop samples fog water from Amazigh fog technician's home during the Fog Inauguration (Source: Dar Si Hmad 2015).

involving actors from multiple countries in an example of successful Track 2 hydro-diplomacy. Funding sources from institutions like USAID led to the involvement of foreign dignitaries, invoking ideas of Track 1.5 diplomacy through sanctioned yet only semi-official relations. Today, Dar Si Hmad has expanded its Track 2 diplomatic efforts to improve its water distribution capacities, and more fully engaged in Track 2.5 and 3 work by better integrating foreign technical knowledge with local practice implementation. Supplying a few of the villages was a promising start. But numerous concerns drove Dar Si Hmad to continue seeking external collaboration and further technical exchange. The high wind speeds at the top of Mount Boutmezguida (1225 m above sea level) wreaked havoc on the rather flimsy material of FogQuest's Large Fog Collectors. Other villages in the region were aware of the project and regularly asking about when they would be added to the fog system, with skepticism and jealousy occasionally creating inter-community tensions. Sustainability, both environmentally and financially, was another concern.

A new partnership with the German Water Foundation (Wasserstiftung) was formed. Building on lessons learned from FogQuest and another project in Eritrea, an engineering team began work on what is now the CloudFisher™ Pro (Trautwein et al., 2017). In May 2016, the Federal Ministry for Economic Cooperation and Development of Germany granted funding for the new nets' construction, whose installation has expanded the fog system from five to thirteen villages. Water supply in the region became possible through the Track 2 technical exchange of Moroccan, Spanish, Canadian, and German researchers and funders and Track 3 work of the fog villages themselves in making the project feasible on the ground – a prime example of cooperation for water with virtually nothing to do with rivers, basins, or state-led actors that can and should actively inform growing hydro-diplomacy theory and knowledge.

Today, Dar Si Hmad receives regular requests for support from sites hoping to implement similar projects. Its team is now traveling around Morocco to explore the feasibility of further regional extension; meanwhile, foreigners from other established or potential programs are visiting Agadir and Sidi Ifni to view the system and share technical information – highlighting how successful multi-track hydro-diplomatic efforts can lead to further encounters and spin into increased dividends of both water and peace. The next section explores how the ideas of the second school of water diplomacy, leveraging shared water concerns

and resources to build goodwill, manifest in this particular case study.

4.3. Multi-track water diplomacy, school 2: water for peace

Beyond employing Track 2 and 3 diplomacy to make the fog project a reality, the fog project is now being used as a multi-track diplomatic tool – transforming cooperation for water into water for peace. At the Track 1.5 and 2 levels, Dar Si Hmad and the Moroccan state publicize the fog-harvesting project and its spinoffs as examples of technological advancement and sustainable engineering originating in the developing world. The organization regularly attends academic and scientific conferences around the world. Most notably, Dar Si Hmad was awarded the Momentum for Change Lighthouse Award by the United Nations Framework Convention on Climate Change in November 2016, attending COP22 as a civil society partner and being recognized by Ban Ki-moon. The fog villages' community liaison attended and was interviewed by international media outlets, leading to direct Track 3 outcomes as a young woman who had never been more than five miles from her birthplace engaged with foreign individuals, creating positive encounters with the 'other' and taking stories back to her home in the *bled* (Moroccan countryside) (Fig. 3).

Much of the media attention gained in spaces like COP22 serves a functional purpose for Dar Si Hmad, with the resulting high-level soft diplomacy outcomes for the Moroccan state a happy side effect. But trained as an anthropologist, director Jamila Bargach also saw the opportunity to leverage the uniqueness of the initiative – and the accompanying expertise and partnerships with local communities – for further impact by intentionally expanding into localized and people-to-people water for peace efforts. The Center for Language and Research supports foreign researchers through homestays, language instruction, and office placement. In addition to accommodating the experts who come to collaborate on the fog project, CELAR offers services to other visiting researchers exploring any number of topics. Southwest Morocco is underrepresented in academic examinations of the country, as are narratives of technical innovation and focused local investigations, with cities to the north and stereotypical nods to blended heritage far more common considerations (Lansing and Farnum, 2017). Through targeted access and training, CELAR seeks to shed light on elements of the country traditionally marginalized and encourage further academic engagement across a wide range of topics and spaces.

Fig. 3. Fog villager and community representative Zahra is interviewed during COP22, with translation provided by Environmental Youth Ambassador Abdelhaq Ait Boulhous (Source: Dar Si Hmad 2016).

CELAR's efforts are partnered with the Ethnographic Field School, through which Dar Si Hmad operates as a study abroad host for primarily American audiences. The Field School works with university partners to develop courses on culture, environmental science, and sustainable development. Programs are run throughout the year and frequently revolve around the fog-harvesting project, but even sessions without environmental dimensions are made possible only because of the privileged relationships built with rural communities through fog.

Nor are the efforts limited to non-Moroccan audiences. The water supplied to partnering fog villages is joined by a number of literacy, sanitation and hygiene, and capacity-building trainings for women and children; these programs are supported by the Environmental Youth Ambassadors – university students from Agadir trained in journalism, multi-media, and community organizing. For many of these urban youth, volunteering in the fog villages is their first time encountering rural Amazigh communities and is a "form of diplomacy itself, in a way" according to the project manager. The EYAs also represent Dar Si Hmad and Moroccan environmental activists at conferences around the world, including the twelfth Conference Of Youth (COY12) in the run-up to COP22, multi-tracking their ambassadorial work.

Through its multiple side projects, Dar Si Hmad leverages fog-harvesting technologies, water production, and associated research to foster equitable exchange, using the uniqueness of the project to draw in visitors and share a different story than the one usually told (Lansing and Farnum, 2017). Conversations between research partners, funding agencies, university professors and students, and the local communities enhance intercultural understanding. Reflecting on their people-to-people diplomatic exchange efforts, staff members say "There is a change in the way they perceive Arabs, Berbers, Muslims" that visitors take back to their home communities. The team sees "having the opportunity to bring together different ideologies, different countries, different cultures, different minds, different backgrounds" as a way "to meet and to understand each other and to try to discuss issues between them before they become huge and difficult… If we have more chances like this, I think we are more able to build peace in the world".

The logic of Water Diplomacy School 2 suggests that "transboundary water governance" is "a promising entry point for diplomats" that "can give foreign policy makers a toehold" (Pohl et al., 2014, i). The intentional and effective hydro-diplomacy work made possible by Dar Si Hmad's fog-harvesting makes it clear that this potential is far from limited to river basins or state actors – and that drops of fog can create far more than a simple toehold, instead creating and holding open entirely new doors to local and international relationships promoting the cultural understanding and resource equity necessary for sustainable peace.

4.4. Beyond blue skies and silver linings: the dark side of diplomacy

Scholars like Mirumachi reviewed in Section 3.2 call attention to the coexistence of conflict and cooperation in water interactions and remind us that conflict is not inherently bad, nor is cooperation automatically good. Considering these contentions, a few issues come to light.

Firstly, the fog-harvesting project has created a number of effects at multiple diplomatic levels. Superficially, these various outcomes are positive. Projects meant to provide water for local communities led to the creation of cross-cultural exchange programs; international technical collaboration created spaces for media attention and additional cooperation, which has in turn encouraged new fog-harvesting projects around the world. However, multi-track diplomacy means multi-track actors – and, without fail, unequal distributions of power between those actors. Having state and foreign officials at the Fog Inauguration was a source of pride for Amazigh villages, but their presence also diverted a great deal of resources and attention that would otherwise have been focused on the communities themselves. A fairly small impact in that moment, but something that adds up over time with increased programming and reinforces extant imbalances between populations. In arenas like COP22, Dar Si Hmad is regularly named as a prime example of development done right. This brings additional publicity, resources, and access, but too often Track 2 and 3 actors are effectively silenced in Track 1 and 1.5 diplomatic work as state officials speak for or over local voices – even while claiming them as examples of Moroccan innovation and good governance.

Secondly, supplying water to villages may inadvertently help cover, push aside, or even exacerbate underlying concerns and inequalities. The fog system creates a *de facto* equality of time between the sexes, saving women hours each day without the need to walk to neighborhood wells and making household chores a great deal easier. However,

gender equity should not be assumed as an immediate effect of water provision. In many water-scarce regions, women have a privileged ancestral role as water guardians. Serving as resource gatekeepers is a source of power for women and may be one of the few ways women in villages can materially exert their agency – a hard tool when soft diplomacy fails. Water supply projects that do not take these considerations into account can inadvertently create harm, disrupting traditional gender norms without facilitating positive alternatives. Dar Si Hmad's participatory approach to the fog-harvesting initiative identified this as a potential issue early on. Recognizing water as a source of power, the organization worked to ensure women continued to hold control in the new system through creative technologies and capacity-building programs (see Dodson, 2014; Dodson and Bargach, 2015). Without that careful attention and the implementation of targeted programming, both the cooperation for water and water for peace hydro-diplomatic efforts of Dar Si Hmad may have come at the cost of further disadvantaging indigenous women.

These findings should serve as a cautionary tale for the hydro-diplomacy community: The potential is vast. But not all of that potential is positive. Regular assessment, community engagement, and intentional efforts to include the most vulnerable in ways led by them are necessary to ensure that water-based collaborations are positive for everyone.

5. Conclusions

Theorizations of water-related conflict, cooperation, and peace-building have come a long way since the pessimistic and under-researched 'water wars' claims of the 1990s. Hydro-diplomacy has broken new ground as an innovative integration of water resources management, international relations, and environmental cooperation. Yet for all its vision, the concept remains embedded in the biases of its source disciplines.

Water is more than a river, and diplomacy more than a treaty. Basin- and state-centrism in hydro-diplomacy limit its potential for ingenuity. Theorists and policymakers should see past the obvious mechanisms of water diplomacy to learn lessons from practice happening at other scales. Expanded hydrological concepts like the precipitationshed (Keys et al., 2012) and political theories such as public diplomacy are available to us. Empirical data from applied initiatives, among them Dar Si Hmad's fog-harvesting system and related technical and cultural exchange programs, exists. Desegregating our thinking around and amalgamating lessons drawn from a wide range of water-based approaches to relationship-building will further the field of hydro-diplomacy. If we are able to step outside the bounds of our river basins, our state-level analyses, and our subject boxes, the transboundary and transdisciplinary field of hydro-diplomacy can equip us all – individuals, groups, organizations, *and* states – to be water-led peacemakers.

Acknowledgements

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