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# Narratives of Cooperative Ecological Science: The Case of Israel and Jordan

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As ecosystems do not follow human-made borders, cross-border environmental cooperation can be highly effective, perhaps even necessary, for both scientific insight and conservation efforts. Several environmental cooperation initiatives between Israel and Jordan emerged since the peace treaty of 1994. These initiatives had the explicit double goal of peacebuilding and enhancing regional environmental protection. However, as political relations between Israel and Jordan have been unstable and often tense during this period, cooperation toward these goals has often proved challenging. The current study investigates one such attempt at regional scientific environmental cooperation, specifically, cooperation between Jordanian and Israeli long-term socioecological research centers. Eleven in-depth interviews with Israeli and Jordanian scientists, who constitute all the participating scientists in this initiative, were conducted in order to identify the benefits and challenges of their cross-border collaboration. A thematic analysis of the interview contents was then performed to compare the results with models and theories pertaining to intergroup relations from the field of social psychology, theories that are particularly relevant to this case study because they see collaboration toward a common goal as especially productive for decreasing intergroup prejudice and hostility. Specifically, Allport's (1954) "contact theory", and its derivatives in this context, were discussed, which asserts that personal contact between members of different groups leads to less intergroup prejudice and decreases intergroup hostility. Other social psychologists have developed Allport's work and argue that decategorization (seeing people as individuals rather than groups) and recategorization (perceiving people from both groups as belonging to the same metagroup) are 2 additional important processes that are necessary to reduce intergroup tensions and that find support in the current investigation. The study concludes by proposing a model that describes group-identity factors, as well as other factors, contributing to the success and failure of cross-border scientific environmental initiatives in areas of regional conflict.

### **Public Significance Statement**


The study looks at the case of scientific cooperation amongst a group of Israeli and Jordanian scientists in the desert area that spans the two countries. It examines how factors of group identity are related to success and failure of such cross-border projects in areas of regional conflict. Findings suggest that group identity is less of a barrier to cooperation in comparison to issues of security and logistics.

*Keywords:* environmental cooperation, group identity, peacebuilding, contact theory, Middle East

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Cross-border scientific collaboration can be highly productive for ecological and socioecological research initiatives. It has the capacity to provide data pertaining to a shared ecosystem under differing social, economic, and political contexts, subsequent biophysical changes, and human responses to those changes (e.g., Dallimer & Strange, 2015; López-Hoffman, Varady, Flessa, & Balvanera, 2010; Orenstein & Groner, 2014). Forming what Hass calls an “epistemic community” (Haas, 1992) enables researchers to aggregate knowledge with others who share similar values, norms and principles. However, in areas of conflict, scientific collaboration can be challenging due to intergroup hostility, external political pressures and constraints, and security issues.

This introduction first reviews the relevant literature on group identity perceptions and decreasing intergroup hostility during conflict using Allport’s Contact Theory as a conceptual organizing framework. It then moves on to discuss the subject of environmental bottom-up peacebuilding initiatives and people-to-people scientific collaboration. Lastly, it presents some of the most prominent collaborative ecological scientific initiatives between Jordanian and Israeli scientists following the 1994 peace treaty between those countries. Following the introduction, we present our research on a case study of Jordanian-Israeli scientific cooperation in the Wadi Araba/Arava Valley, which is shared by the two countries. In the current study, we interviewed the participants of a cooperative project to understand their motivations, opinions, and perceptions of their work together, and we present and discuss the main themes mentioned in the interviews. We conclude by assessing our results in light of Allport’s Contact Theory and other relevant theories that explain the dynamics of intergroup people-to-people initiatives and consider the benefits of the interaction and barriers to further success.

### Contact Theory

Human behavior pertaining to intergroup interactions, including cooperation, has been a prominent subject of inquiry in the field of social psychology. A common notion in this respect is that of “group identity”. Group identity is a concept that proposes that one’s self-perception is highly influenced by that individual’s perception of the group to which he or she feels they belong. Contact theory, a hypothesis originally suggested by Allport (1954), states that when addressing intergroup conflict, and given the appropriate circumstances, one can decrease hostility, prejudice, and discrimination by catalyzing contact between individuals and groups. Allport suggests that these negative feelings stem from, or are magnified by, separation and lack of knowledge. He stipulates that intergroup relationships can be improved through encounters that are characterized by: (a) institutional support and support of in-group<sup>1</sup> social norms, (b) creation of situations that advance close contact, (c) equal status, and (d) conditions of codependency and cooperation between the groups.

Allport’s theory was since elaborated upon and tested by many other social psychologists. Pettigrew and Tropp (2006) maintain that while Allport’s four elements may facilitate successful contact, they are not essential for its success. Moreover, they claim, the perception and measurement of these elements by participants or scholars is subjective. They offer two additional elements that they see as central to meaningful and positive interaction: salience of group identity (i.e., awareness of group affiliation during con-

tact) and the significance attributed to the intergroup contact. This deviates from Allport’s model, as one of his intergroup process goals is to blur the group boundaries and create de-categorization, that is, treating participants as individuals rather than part of a collective group (Miller & Brewer, 1984). This approach, also known as the “Personalization Model”, assumes that intergroup contact can be constructed in a manner that will make the group identity less prominent and will promote opportunities to get to know out-group members as individuals. Personalization researchers have contended that it also enables generalization to the group level, that is, to decrease prejudice not only on a personal level with the participants in the contact situation, but also on a group level, regarding the entire out-group (Marcus-Newhall, Miller, Holtz, & Brewer, 1993; Miller, Brewer, & Edwards, 1985).

The Recategorization Model or Shared Group Identity Model (Gaertner & Dovidio, 2000; Gaertner, Dovidio, Anastasio, Bachman, & Rust, 1993) is also based on the assumption that decreasing the prominence of group categories is the key to the positive influence of the contact experience. Recategorization does not erase group identity but rather attempts to construct a new higher-level group identity that includes both groups. When “They” (the out-group members) become part of “Us” (the in-group), it is assumed to lessen in-group bias between the groups and decrease intergroup hostility. For instance, and with particular relevance for the current study, Kelman (1999) argues that a long-term resolution of the Arab-Israeli conflict requires the development of a “transcendent” identity for Jews and Arabs that does not threaten the specific identity of each. However, Brewer (2000) claims that it is difficult to maintain such changes in group identity perception since people have a need to be included in defined groups that have clearly marked boundaries between them and other groups. He claims that very inclusive high-level groups (such as “all people”) do not fulfill this need to belong to a clearly defined and unique group, nor does personalization.

These and other criticisms led to the recommendation of a new approach to intergroup contact, according to which contact that keeps the salience of (separate) group identities is most effective in reducing prejudice. This model, called the Mutual Differentiation Model (originally developed by Hewstone & Brown, 1986) encourages the groups to see both in-group and out-group as completing each other in their abilities and hence promote cooperation between them toward a shared goal. Thus, the groups manage to keep their sense of uniqueness while presenting their strengths as complementary to one another, thereby enhancing their group (and also self) perception. This model, it is claimed, also enables the capacity to, later on, generalize from the specific interaction to the entire out-group in the “real world” (Brown & Wade, 1987; Hewstone & Brown, 1986).

Several newer models for enhancing the potential of conflict resolution between groups integrate some, or all, of the models mentioned above. For instance, Pettigrew (1997, 1998) claims that the ideal combination between these models is a sequence in which the participants experience de-categorization, followed by salient categorization and finally recategorization. This process, he claims, will cause not only a decreased level of intergroup hostility

<sup>1</sup> The term “in-group” describes what a person perceives as “my” group—a group to which they feel they belong.

but also an ability to generalize to other out-group members and to other intergroup situations. Brewer's criticism can also be addressed by the claim made by Gaertner and Dovidio (2000), who argue that in successful group contact interactions, the participants will feel that they simultaneously maintain their original in-group identity and also take on an additional higher-level identity that includes the out-group members, also leading to decreased levels of prejudicial hostility.

Contact theory, and its various derivative and parallel theories reviewed above, have been analyzed and appraised using an expansive diversity of case studies, including, for example, studies about Chinese students in the United States (Chang, 1973), interracial workers in South Africa (Bornman & Mynhardt, 1991), German and Turkish schoolchildren (Wagner, Hewstone, & Machleit, 1989) and Australians and Vietnamese immigrants (McKay & Pittam, 1993).

An extensive amount of research relevant to the focus of this paper has been done specifically on encounters between Arabs and Israelis (Abu-Nimer, 2001; Bar-Tal & Labin, 2001; Maoz, 2000, 2005; Al-Haj, 2002; Sa'di, 2002). These studies provide support for the notion that intergroup contact usually has a positive effect on overcoming prejudice, even when the situation does not include all of the conditions specified by Allport (1954). It is, however, important to mention that the opposite can also be the case: Negative intergroup contact, that is, contact under circumstances that cause misunderstandings or outright conflict (Paluck, Green, & Green, 2019), and an asymmetrical relationship between negative versus positive contact, has the capacity to make group membership salient and cause the persistence of intergroup conflicts (Paolini, Harwood, & Rubin, 2010). Dixon, Durrheim, and Tredoux (2005) therefore argue that contact literature has at times become detached from (and even irrelevant to) everyday life in divided societies.

### Bottom-Up Peacebuilding and Environmental Cooperation

The concept of improving intergroup relations through contact and cooperation is at the heart of many bottom-up peacebuilding initiatives (i.e., those inspired by individuals and civil society organizations, as compared to government initiatives). Bottom-up peacebuilding is an approach toward conflict resolution that empowers local populations that lack political and economic influence, allowing them to consolidate and develop necessary resources for peace initiatives (Aliyev, 2010). Lederach (1997) suggests that one reason why bottom-up peacebuilding efforts can be more effective than those originating through government initiatives for example, is because leaders, due to their high public profiles, are often "locked into position", since they are under a tremendous pressure to maintain a stand of strength vis-à-vis their adversaries and their own constituencies. On the other hand, other actors have significantly more flexibility and leeway to adapt and learn, working closely both within and outside the conflicted parties, hence opening a space for dialogue and collaboration as well as providing tools for preventing violent conflict and promoting peaceful solutions (Miall, 2004).

Former UN Secretary-General Boutros-Ghali suggested a concept of peacebuilding as an effort to "consolidate peace and advance a sense of confidence and well-being among people"

through "sustained, cooperative work to deal with underlying economic, social, cultural and humanitarian problems" (Boutros-Ghali, 1995: 67–72). According to the UN Environmental Program (UNEP), peacebuilding embodies "the identification and support of measures needed for transformation toward more sustainable, peaceful relationships, and structures of governance, in order to avoid a relapse into conflict" (Mrema, Bruch, & Diamond, 2009: 57). These definitions of peacebuilding can be easily connected to ecological considerations as environmental challenges create high-stake choices in war-torn societies: If handled well, they may create a solid foundation for peace and sustainable development, but if they are handled poorly, they risk undercutting an already tenuous peace (Conca & Wallace, 2009).

Environmental peacebuilding integrates collaborative projects and organizations that work toward sustainable environmental solutions into the peacebuilding process. Problems related to climate change, invasive species, and scarce natural resources do not stop at national borders. This is why transnational environmental projects, NGOs, and institutions can be seen as bridges for transcending national barriers (Mackelworth, 2012). UNEP has identified multiple opportunities for peacebuilding in environmental cooperation schemes, including supporting economic development and encouraging sustainable livelihoods, as well as catalyzing dialogue, confidence building, and cooperation. It also explicitly recognized that peacebuilding cannot be achieved by political leaders alone (United Nations, 2010), hence the need for other paths of implementation.

In this article, we examine a case study of bottom-up environmental and scientific cooperation between Israel and Jordan, the obstacle its participants faced due to the ongoing Arab-Israeli conflict, and possible positive effects which this scientific initiative can have on peacebuilding.

### Bottom-Up Initiatives Between Jordan and Israel

Israel and Jordan signed an official peace treaty in 1994, shortly after the Oslo Accords between Israel and the Palestinian Authority. The treaty between Israel and Jordan encourages cooperation in both science and the environment. Annex IV of the Israel-Jordan treaty deals entirely with environmental cooperation and states the following:

Israel and Jordan acknowledge the importance of the ecology of the region, its high environmental sensitivity and the need to protect the environment and prevent danger and risks for the health and well-being of the region's population. They both recognize the need for conservation of natural resources, protection of biodiversity and the imperative of attaining economic growth based on sustainable development principles. In light of the above, both Parties agree to cooperate in matters relating to environmental protection in general and to those that may mutually affect them. (Israel-Jordan Peace Treaty - Annex IV, 1999)

The Annex specifically mentions the need for cooperation regarding research and technology and particularly focuses on water sources (The Red Sea, the Dead Sea, and the Jordan River), as well as the Arava Valley/Wadi Arava desert area shared by the two countries (Israel-Jordan Peace Treaty - Annex IV, 1999). In terms of geographic focus, Portman and Teff-Seker (2016) studied four joint Israeli-Jordanian environmental government and local government initiatives and found that projects that were located in a



peripheral geographic area were more stable and that cooperation on less visible professional or scientific levels can be durable even in times of heightened political or regional tensions that severely interrupt other types of joint initiatives. Their findings also indicated that third-party involvement, visibility, common goals, urgency, and security were also very relevant for long-term sustainability and success (Portman & Teff-Seker, 2016).

Several other regional environmental initiatives provide additional support for the claim that grassroots initiatives can be effective and demonstrate that people on both sides of the border wish to cooperate, especially when they share similar values, such as the desire for environmental protection. Examples of such collaboration in the environmental realm are provided by the Israel-Palestine Center for Research and Information (IPCRI), Friends of the Earth Middle East (FoEME/EcoPeace), and the Arava Institute for Environmental Studies (AIES). Each of these three organizations operates at the grassroots level by encouraging people-to-people interactions as a mechanism to build mutual trust and empathy and establish a cohort of civil society actors who can collaboratively address and ultimately resolve regional environmental challenges (Alleson & Schoenfeld, 2007; Schoenfeld, Zohar, Suleiman, Alleson, & Sipos-Randor, 2014; Twite, 2005; Zohar, Schoenfeld, & Alleson, 2010; Zwirn, 2001). There are several NGOs and supranational organizations that operate based on these principles and fund numerous efforts that focus specifically on bringing members of the scientific community together in collaborative projects with US and European partners (DFG, 2016; USAID, 2018).

In contrast to the widely perceived demise of the Oslo Accords (Beinin, 1999), the Israeli-Jordanian peace treaty has proven more durable (Fortna, 2003). However, despite the apparent durability of Israeli-Jordanian relations, Jordanian public opinion regarding the peace accords with Israel varies widely and includes a large amount of opposition. Boycotts are publicly urged against all those who work with Israel in any context, while legislators often demand the official renunciation of the peace treaty (Abadi, 2015). Relations with Israel are further complicated by ethnic divisions within Jordan, whose population consists of both Hashemite Bedouin and Palestinian refugees and their descendants. These groups often view relations with Israel quite differently from one another (Zahran, 2012).

The lack of popular support for the normalization of relations with Israel underscores the rationale of encouraging grassroots peacebuilding efforts between the countries. While some small-scale efforts exist, there is a general lack of interaction between Israelis and Jordanians at the grassroots level, which prevents the possibility of realizing the multiple benefits attributed to such interaction in contact theory. Even in the realm of economic cooperation, considered by some to be one of the most promising venues for cooperation, interactions are not stable due to regional political instability (Mitha, 2010). For instance, sudden outbreaks of violence such as the shooting of a Jordanian judge at the border crossing (Rudoren, 2014) or periodic confrontations between Israel and Palestinians in the Gaza Strip can cause anxiety and hence affect the cooperation in a negative way (Portman & Teff-Seker, 2016).

Yet studies suggest that where governments and national leaders have failed at building peace, grassroots initiatives which aim to make peace via civil society initiatives might still be successful. Atieh (2005) suggests that the formal resolution of intractable conflicts often

requires an accompanying process of mutual reconciliation between the communities involved whereby popular beliefs in each society are transformed from belligerent perception to peace-supporting ones. Following their study of Israeli-Palestinian grassroots initiatives, Adwan and Bar-On (2004) suggest that grassroots peacebuilding during a violent conflict can be a strategy used to facilitate future postconflict peace processes. Maoz (2000) found that, against the background of negative emotions and experiences reflected in a workshop setting, the workshops' dialog-based encounter did enable the Israeli and Palestinian youths to interact on a personal level. He demonstrated that each group's perceptions of the other became significantly more favorable on various dimensions, for example characterizing the outgroup members as "considerate of others" and "tolerant", which are directly relevant to processes of creating cooperative relations between the two sides.

It should, however, be taken into consideration that people who choose to participate in intergroup meetings or are willing to knowingly cooperate with members of the outgroup, as in this case study, may possess particular a priori characteristics that foreshadow productive interactions with members of the outgroup. Specifically, they might be more politically moderate and predisposed toward cooperating with the "other side" than many people of their ingroup and therefore more prone toward discovering common values and being more open toward the possibility of recategorization. Kellen, Bekerman, and Maoz (2013), among others, called this "an easy coalition" between supposedly rival sides.

### Science-Based People-to-People Initiatives

International organizations interested in promoting regional stability and peacebuilding often promote scientific collaboration between two or more parties as a necessary condition for receiving project funding. USAID's Middle East Regional Cooperation (MERC) funding is predicated on people-to-people initiatives. One of the main goals of MERC is to promote peaceful cooperation between Arab and Israeli scientists (USAID, 2018). Research supports the contention that contact theory is particularly applicable in the scientific/academic realm, as collaborative research is "the strongest form of relationship" between research partners (Kyvik & Larsen, 1997). However, since scientists are primarily interested in advancing the state of knowledge in their field, there must be additional incentives for them to participate in people-to-people initiatives beyond the motivation to promote peace and cooperation.

One such incentive is improved science, as suggested by Masquoui (2009), who argues that many peacebuilding actions require inputs from science and technology and in particular the acquisition and application of knowledge. Fortunately for scientists whose priority is scientific and professional advancement, research also suggests that successful cooperation results in increased academic output. The positive impact of cooperation is correlated with the number of publications and citations (Davidson Frame & Carpenter, 1979; Luukkonen, Persson, & Sivertsen, 1992). Further incentives are environmental protection and rehabilitation, which may be central to the scientists' normative objectives. Lastly, research funding may be an important incentive as well.

### Previous Studies of Science-Based Initiatives

There are several examples of science-based, people-to-people initiatives that have peace-building goals, particularly between

Arabs and Israelis in the Middle East. Scham (2000) describes a study based on a survey of 195 cooperative research projects, conducted jointly by Israeli scholars and their Arab counterparts from the Palestinian Authority and Jordan, arguing that joint research creates a valuable opportunity for contact in a nonpolitical setting that embodies mutual respect and shared goals.

Research in applied scientific subjects such as medicine, agriculture, water, and environment comprised two thirds of cooperative projects in Scham's study. They represented areas in which there was considerable need for development, especially in several Arab countries. A particular advantage of encouraging research in these areas is that, with the exception of water, they are less politically charged, which is posited to neutralize the potentially destructive impact of political disagreement. Funding for collaborative initiatives also comes from United Nations and World Bank sources, as well as other organizations based in North America, Europe and in Israel, including governmental and nongovernmental organizations alike (Scham, 2000).

### Research Purpose and Questions

The aim of the current study is to deepen the understanding of how joint scientific research takes place between Jordanian and Israeli research scientists, and to extract and analyze the views that researchers hold regarding their own identity and their perceptions of the identities and motivations of their partners across the border. It addresses the following research questions:

1. What motivates researchers to cooperate with their peers across the border?
2. What are the main challenges to researchers who choose to participate in cross-border cooperation?
3. Is group identity related to researcher willingness or ability to cooperate?

The study also aims to shed light on other aspects of the relationship that may have influenced the character and depth of cooperation between the two sides. In the pursuit of answers to these questions, the study intends to explore researchers' perceptions, fears, and motivations on both sides of the border.

### Research Methodology

#### Case Selection

The Center for Hyper-Arid Socio-Ecology (CHASE), was developed at the Arava Institute for Environmental Studies (AIES), an education and research institute established to encourage trans-boundary environmental and peace studies. CHASE focuses on socioecological systems, that is, complex, integrated systems that emerge through the continuous interactions between human societies and ecosystems (Collins et al., 2011; Haberl et al., 2006; Redman, Grove, & Kuby, 2004). The center is dedicated to the study of such socioecological systems in the Arava/Arava valley. Jordanian and Israeli researchers share the common goal of protecting biodiversity and the natural resources of the region while enabling sustainable human development for the region's residents. The center's research projects focus on environmental issues related to the region: acacia

tree distribution and population health, mapping of ecosystem services and biodiversity, and research of the rare sand dune ecosystem. CHASE objectives state that it is dedicated to researching these issues through a trans-border lens that necessitates collaboration between research scientists on both sides of the Israeli-Jordanian border (Arava Institute of Environmental Studies, 2013).

We interviewed all the Jordanian and Israeli researchers engaged in CHASE activities at the time of the study ( $n = 11$ ). Although CHASE is a research center at AIES, the Jordanian scientists that were interviewed were associated with CHASE and not with AIES. Some of the Israeli CHASE participants were also faculty members of AIES.<sup>2</sup> The participants worked in different universities and research centers across both countries, included both male and female respondents, and were of multiple ages (ranging between 28 and 60 years). Each scientist had had at least one cooperative experience working with scientists from the second country.

### Data Collection

We conducted 11 semistructured, in-depth interviews with CHASE-affiliated scientists, six of whom were Israelis and five Jordanians (see Table 1). The first set of questions focused primarily on cross-border scientific cooperation, while the second dealt specifically with identity, perceptions, and values of the respondent. When applicable, follow up questions were asked in order to expand upon particularly relevant topics that the interviewee brought up. In both Jordan and Israel, we inquired about general background information of the participants before moving to the questionnaires. This information included the respondent's age, their educational background, and their place of birth. Additionally, we asked about their position within the research project. After gathering this information, we moved forward to the two batteries of questions which can be found in the appendix.

All interviews lasted between 30 and 90 min and were recorded and transcribed, with the exception of two cases in which the participants requested not to be recorded. In these latter cases, written notes were taken during the interviews. Although anonymity was assured for all participants, some of the interviewees requested that all identifying features of their identity be kept anonymous, including their place of work and other personal details. For this reason, some information was removed from this paper, including specific details about the research and the nature of the cooperation. Interviews were conducted in English by the primary author with the exception of one interview, which she conducted in German (and translated into English). The interviewees gave their consent for using these materials for research purposes (anonymously) and to the publication of the results. Several respondents requested to review the article prior to publication; they were sent the article and their consent was given.

### Data Analysis

Our methodology for analyzing the data retrieved from the interviews was thematic analysis (Aronson, 1995; Boyatzis, 1998; Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006; Vaismo-

<sup>2</sup> As were two of the authors at the time.

Table 1  
Questionnaires

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Questionnaire 1: Profession-Centered Questionnaire	
1. What was your motivation to work together with Israeli/Jordanian researchers on CHASE?	
2. Which difficulties did you face concerning your work with Israelis/Jordanians on CHASE?	
3. Could you please explain the way in which the cooperation works in detail?	
4. Why do you think that Israelis/Jordanians cooperate with Jordanians/Israelis on CHASE?	
5. Which difficulties might Israeli/Jordanian researchers be facing?	
6. What does the cooperation from the Israeli/Jordanian side look like?	
7. What are the advantages and disadvantages of your cooperation with Israelis/Jordanians?	
8. What do you think might improve the cooperation?	

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Questionnaire 2: Identity-focused Questionnaire	
1. How would you identify yourself? (If several types of identity occur to you, please put them in order of importance.) Which feelings and emotions do you have towards your identity?	
2. Which feelings and emotions do you have towards your identity?	
3. Does any aspect of your identity have an influence on your work?	
4. How do you perceive the Arab-Israeli conflict?	
5. Does the Arab-Israeli conflict influence your work and if so how?	
6. Did your perception of the conflict change during the time you spent with Israelis/Jordanians?	
7. Tell me about a significant experience you had during cooperation.	
8. Have you experienced any internal conflicts while cooperating with each other? Can you tell me more about it?	
9. What is it like to live and work together with Arabs/Israelis?	
10. What is your opinion on peace-building or what would you suggest in order to build peace?	

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Note. CHASE = Center for Hyper-Arid Socio-Ecology.

radi, Turunen, & Bondas, 2013), which includes extracting parts of the text, coding them, and creating themes. In a second step, we connected the insights derived from the newly created themes to address the research questions.

As Coffey and Atkinson (1996) suggest, the analytical process led to data expansion (making new connections between concepts), transformation (converting data into meaningful units) and reconceptualization (rethinking theoretical associations). The themes were extracted by reading the printed transcripts multiple times, by two of the coauthors, and marking relevant paragraphs and assigning themes to specific phrases, while linking them to the theoretical framework—contact theory models—where applicable. One example of such a theme would be “nature knows no borders.”

## Results

We identified a series of relevant themes that were prevalent and persistent throughout all interviews. Some of these pertained to group identity and group relations, while others related to challenges, benefits, and imbalances noted by the interviewees. After identifying themes and assigning them to various quotes, we grouped them into several categories to gain further insight (see Table 2). The following results address the themes that were found in at least three different interviews.

### Self-Group Identity and Out-Group Perception

Some of the most prominent and recurring themes had to do with how certain processes related to group identity. These included (a) *de-categorization* (personalization, seeing a member of the second group as an individual) and (b) *recategorization* (perceiving members of both groups as one meta group or cross-sectional group). Both of these approaches can replace negative outgroup preconceptions by creating new shared, self-ascribed categories (e.g., “scientist” or “environmentalist”) as opposed to

“imposed/external” ones (e.g., “Muslim” or “Jewish”) and therefore lead to prejudice reduction. Several examples from various interviews were chosen in order to demonstrate these processes.

### Self-Ascribed Main Identity and Out-Group De-Categorization

This theme describes the relationship between the scientists’ self-ascribed main identity and their tendency to de-categorize/personalize the outgroup, that is, recognize or emphasize individuality rather than their group affiliation. We found that interviewees described their main identity as not, or not primarily, through ethnicity or religion. Instead, the emphasis was on categories which were phrased in terms of individual choice, such as profession or specific academic disciplinary foci, ranging from an interest in nature to an identity closely linked to studying and preserving the environment. Other forms of identification included the more personal sphere, such as identifying as a parent, or as somebody who enjoys spending their free time in nature. Some interviewees even chose to express their sense of identity through their ideological beliefs, such as the belief in peace and coexistence.

The following quote by an Israeli researcher demonstrates how important certain aspects of self-ascribed identity were for the researchers: “Oh, I didn’t say environmentalist. I should have said environmentalist on that question on identity. Go back, add environmentalist, cause that’s really crucial.” A Jordanian researcher went even further by explicitly stating that self-ascribed identities, whether of the respective in- or outgroup, do not matter: “Nationality is not important. Also, religion is not important. It depends on the person you are dealing with.”

Several other accounts suggest, however, that self-ascribed and externally imposed identities do not necessarily contradict each other. In two cases, researchers even state that they are motivated

Table 2  
Main Themes and Sub-Themes

Main themes	Sub-themes
De-categorization	<ul style="list-style-type: none"> <li>• Emphasizing individuality over group affiliation (e.g. environmentalism, being a parent, belief in peace and co-existence, “old-school socialist”, etc.)</li> <li>• Main identity is not primarily based on externally-imposed group labels, thus not (or not only) defined by religion, ethnicity or nationality</li> </ul>
Recategorization	<ul style="list-style-type: none"> <li>• Detachment from the politics of one’s government and instead a closer focus on grassroots movements and environmentalism</li> <li>• Self-identification as part of “the other” group</li> <li>• Seeing oneself as belonging to a group of regional environmental scientists</li> </ul>
Common values	<ul style="list-style-type: none"> <li>• Identity perception that is connected to the environment and/ or science can “overcome” group borders and - perceptions</li> </ul>
Challenges	<ul style="list-style-type: none"> <li>• The Israeli - Palestinian Conflict and negative out-group judgment</li> <li>• Anti-normalization and professional obstacles</li> <li>• Security and personal safety</li> <li>• Project-related difficulties</li> <li>• Misunderstandings and difficulties relating to communication</li> </ul>
Benefits	<ul style="list-style-type: none"> <li>• Access to information and advancing the state of knowledge</li> <li>• The role of face-to-face interactions in the process of trust building</li> <li>• Holistic ecosystem view</li> </ul>
Motivation	<ul style="list-style-type: none"> <li>• A desire to understand the shared ecosystem</li> <li>• Acquiring more knowledge and data</li> <li>• Learning more about what happens on the other side of the border</li> <li>• Networking</li> <li>• Funding</li> <li>• Technological innovations</li> </ul>

to cooperate because of their externally imposed identity (e.g., national, religious), and not despite it.

### Recategorization as Regional Environmental Scientists

The tendency to describe oneself as a regional environmental scientist was recurring among the interviewees. In fact, this theme can be described as one of the most persistent ones, as most of the interviewees mentioned it in one form or another. One Israeli researcher said: “First of all, I’m an Ecologist, I’m a researcher, then a teacher, maybe dealing with environmental campaigns and I do not see myself at all as dealing with politics.” He therefore emphasizes his chosen identity, as opposed to an externally imposed, or historically determined one, and the desire to not have to intervene with political issues.

Environmental activism suggests however, that a person is not apolitical by any means, but that the desire for political change is streamlined toward a movement from the ground up. The following quote by a Jordanian researcher is a vivid demonstration of recategorization as the researcher self-identifies as part of a group of regional environmental Israeli researchers, and distinguishes himself from cooperating researchers who are located in Jordan:

[I tried] to work a little bit with the Jordanians, have some meetings [. . .] so that it might help them trust us [the research team on the Israeli side], help us to be approachable and love the idea of working with us.

While still being aware of his national identity, the researcher identifies in this particular situation with the research group, and the borders separating the in-group or out-group become less relevant for him. This can be viewed as an ideal example for what Pettigrew (1997, 1998) describes as a sequence in which the participant experiences de-categorization first (he addresses Jordanians as “them”), followed by recategorization (he is part of the “us” that in this case is CHASE, a group composed of Israelis and Jordanians).

### Common Values: Bridging the Divide

Some respondents speak about a layer of identity that was more prominent than the notions of national, religious or ethnic identity—for example, identity perception connected to the environment and/or science. This created a type of bridge between the two scientists, despite what divides them. As one Jordanian scientist said: “For me, science does not have borders. When I work with another person, I think about their ideas, I don’t think about their nationality.”

Another Jordanian researcher remarked that science and the preservation of the environment should stand above intergroup conflict:

This is science. If we’re gonna turn science into a political conflict and just because we have this problem, political issues with this country, we’re not gonna do science with these people, that’s really a big mistake because I just see science as something holy, something that everyone can benefit from, something that will get people to manage resources better. We [. . .] leave politics for politicians, and we will do things differently.

Both quotes emphasize the role that science and environmental values can play in creating a bridge between otherwise divided populations and in blurring what others view as robust group borders and perceptions.

### Challenges, Benefits, and Imbalance

#### The Israeli-Palestinian Conflict and Negative Out-Group Judgment

We found that in most cases, Jordanian researchers were at risk of facing repercussions if their universities or colleagues were to find out that they cooperate with Israelis on joint projects. One Jordanian researcher explains:

From our side, it is that we are afraid to be punished. And they [the university administration] punish us as if you did a crime: [. . .]



working with Israelis. [ . . . ] Socially punished. There are no sanctions or legal restrictions, but socially you will be isolated. They make you feel as if you are the one who gave up Palestine.

Another Jordanian researcher expresses their concern about the deterioration of the political conflict, which may have a detrimental effect on cooperative research, stating that it is getting worse:

The political situation is not helping. And it's getting worse. Every year it's getting worse. There was a time when the political situation was good . . . kind of peace . . . kind of green light. [ . . . ] You [ . . . ] could even say that Israelis are there[1] but now it's declining.

The researcher added that: "it's a shame because [from] my side I was working with very supportive researchers from Israel [ . . . ]. It's a shame because if we don't do the cooperation, both sides will lose a lot." This is an example of a situation where categorization is detrimental to environmental peacebuilding efforts, as the Israeli outgroup is perceived by some of the Jordanians as a homogeneous group (a hallmark of categorization) rather than as individuals. This, in turn, causes Jordanian scientists who wish to cooperate with Israeli scientists to expose themselves to a similar type of prejudiced categorization, in which Jordanians who work with Israelis are also stereotyped as working against the interests of Jordan and the Jordanian ingroup.

### Antinormalization Pressures and Professional Obstacles

Despite most interviewees describing their personal identities as related to academia, science, and environment, national and religious identities nevertheless heavily influenced the nature of the interaction and introduced another element of imbalance regarding the costs and benefits of trans-border cooperation. One Israeli lists the many difficulties which Jordanian scientists are facing due to working in a joint project with Israelis, and he points out the immense imbalance by which their relationship is characterized:

Look, I only benefit from them. For me, it's almost 100% benefit. "Oh, X works with Jordanians, he's international, promoting peace, he's improving Israel's reputation", [ . . . ] and for them, they can get blacklisted, they can get thrown out of their job, they'll have people who refuse to work with them. So [ . . . ] I appreciate it even more because they're willing to. But it doesn't make for a really easy relationship.

Working inside of Israel poses additional difficulties, as one Jordanian researcher remarks. He speaks of the impossibility of receiving a job offer in Jordan afterward, and points out that it will not be possible to travel to any Arab country but Egypt, due to the Israeli visa in his passport. Further findings indicate that some of the hindrances are related to bureaucracy and administration. Funding for research projects cannot be transferred through Jordanian universities, so other ways are found, often involving an intermediary institution. The reason for this is that the cooperation often happens in secrecy, especially if the university administration is explicitly opposed to joint work with Israelis. As one Jordanian researcher remarks:

I would say the only difficulty I face is, you know, transferring the money. You [ . . . ] cannot transfer the money to their universities because they're doing research and their universities do not know that

they are doing research with Israelis and they wouldn't accept it. One of them is fine, his dean, the dean of his department came to one of the conferences with Israelis and he knows that he works and encouraged them to work with Israelis.

One of the many bureaucratic hindrances which result from this situation is that it is quite difficult for Israelis and Jordanians to publish a research paper together, as a joint publication would publicly reveal the cooperative project. This causes further difficulties, as organizations providing funding often require joint papers to be published. One possible solution can be found in including researchers from other countries into the project and turning it from a bilateral project into an international one. However, adding one or more parties could also have implications for funding, as certain agencies would not support the work of additional parties while others might encourage and even demand it.

### Security and Personal Safety

When asking one of the researchers from Jordan about their perception of the incident in 2014, in which a Jordanian judge was shot at the Allenby border crossing by Israeli soldiers, he gave the following reply:

Although I lived here [in Israel] for three years this is scary. It is scary because you really do not see safety anymore. And you know that I just crossed like that guy so this might happen to me as well and it's very bad [ . . . ].

Apart from political events, the cooperation itself can also harm individuals' personal safety, as remarked by an Israeli researcher:

Those people [the Jordanians cooperating in the joint project] are frightened for their job, they're frightened for their lives and it makes it very difficult. [ . . . ] They get angry at me because I was not sensitive enough, they get angry at me because they're under pressure and sometimes it's not my fault. [ . . . ] If you fear for your life then some of them, my colleagues, stop talking to me for like six months.

He thus points out that the Jordanian scientists' reason for concern stems from the aforementioned antinormalization sentiment in Jordan. Moreover, it is possible to see here that this fear causes several levels of tension: internally, in the internal dialogue of the Jordanian researchers that become uncertain about whether the cost of participation is worthwhile; between pro- and antinormalization Jordanians; and between Jordanians and Israelis, because the Jordanians feel that the Israelis do not assign the appropriate significance to this situation or appreciate the sacrifice that Jordanian scientists have to make in order to cooperate with them.

### Project-Related Difficulties

The fact that the CHASE framework had to do with long-term monitoring was an additional obstacle, as demonstrated in the statement below, made by a Jordanian scientist:

Clearly there are hindrances in Jordan because sometimes people are put off by the long-term aspect. Rather, they want quick results, to publish fast, and so forth We are not used to the idea [ . . . ] And "long-term" means that you have to do monitoring or studies which last long. And maybe it is necessary to consider that it takes three to five years to have a few results which can be published. And people [in Jordan] do not like that.

He further elaborates that researchers need to bring their own funding to the research project and that the idea of a research network is not yet fully implemented in Jordan. An Israeli researcher speaks out about this topic as well and points to the very abstract nature of joint monitoring efforts at this early stage:

The [network] doesn't exist. It's an idea. And we want to make it into a physical entity, but it's not. The difficulty is going to be creating an entity and I hope we get there, but we need money and we need a lot more commitment.

Interviewees also noted that while the Israeli researchers were able to obtain funding from the Israeli Ministry of Regional Cooperation, the Jordanian researchers could not rely on their Regional Government to offer support for cooperative projects and were mostly financed through third-party funding.

### Misunderstandings and Difficulties Related to Communication

It is evident that face-to-face and intergroup communication are the main preconditions for validating contact theory. However, due to the nature of the cooperation and the aforementioned difficulties, direct communication was not always possible. Further, this challenge led to several additional problems. An Israeli-based Jordanian researcher answered a question about whether he faced any difficulties with Israeli researchers by stating that he does not. However, he noted that he observed that difficulties between Israeli and Jordanian researchers mostly occur as a result of miscommunication. Another Jordanian researcher added that cultural differences may play into the difficulties created by miscommunication: "We talk about two different cultures. So, the way of communication between Israelis and Jordanians is different." An Israeli researcher also pointed to the challenges created by miscommunication:

We start to make in your imagination why this other guy doesn't answer and he's starting to be annoyed that he's not answering your question and all that. And then there is this thing to do, to just pick up the phone and call instead of thinking this stuff. [. . .] Okay, sometimes they do not really understand your e-mail. Sometimes they didn't see your e-mail. There could be many, many reasons, so you have to find a different mode of communication.

Generally, we have found that the cooperation was greatly enhanced by opportunities in which the researchers could communicate face-to-face, or at least over the phone, as is elaborated in the next section.

## Benefits and Motivation

### The Role of Face-to-Face Interactions in the Process of Trust Building

As became evident in the previous sections, communication is the key, both to successful cooperation in research projects and to the building of peace and trust. An Israeli respondent emphasized the importance of meeting face to face, because "all the problems of the world can be solved with communication." The same respondent mentioned one incident in particular which showed how the compli-

cated situation of working across borders in areas of conflict can sometimes lead to uplifting incidents:

One time . . . this is one of the funny incidents I remember that we would work just across the border, so we could see each other. So it was kind of fun, you know to call them, to call their cell phone and talk and then we could actually shout to each other across the border.

One Jordanian scientist even listed interpersonal communication with Israeli and international scientists as one of the reasons why he got engaged in cooperation. Further, he spoke about the importance of building trust through face-to-face interaction:

When you want to build trust you have to talk to these people, you have to have conversations, have meetings, [. . .] to eat with them, go out with them. Usually, when we go [to Jordan] we have dinner together, we have fun, then we go [and] we have hookah, just chill for a couple [of] hours, you just talk and you know more about the person and the person knows more about you. People start to open up and build trust.

This quote demonstrates the immense importance of building trust by meeting informally and spending time together aside from work.

### A Shared Ecosystem View

Respondents generally agreed that regional scientific cooperation in the Wadi Arabah/Arava Valley was necessary because the ecosystem is shared between the two states. A Jordanian scientist remarks: "It's one landscape unit and you have to cooperate", and another states "if I was working in anything else, maybe I wouldn't think that it is necessary to work with Israel." An Israeli researcher argued that a mutual interest in preserving a shared ecosystem can even lead to peace building:

So they have this desalination plant that maybe will do peacebuilding. This is so important, to [. . .] have mutual interests. So I was really disappointed that they [the Israelis] started to build a new airport in the Arava desert instead of using the Jordanian airport or to have or make a mutual airport for both countries. [. . .] If you have such mutual interests whether it's science or economy, that will build peace and will strengthen the peace.

A Jordanian researcher emphasized that "from a geographic point of view, it is the same, but people are different," and another Jordanian researcher emphasized the importance of knowing the conditions of the ecosystem on both sides of the borders:

Because, deciding to work in this area in the South, similarly in the West Bank, there is the same species in the area in the South of Jordan. I'd like to know the distribution. Wadi Arava is one area, but it is divided into two parts, especially working in genetics, the population's distribution in that area.

This approach of one ecosystem shared between the two groups corresponds with other studies that have found that a scenario in which two parties from a postconflict area share a joint ecosystem can offer vast opportunities for cooperating and environmental peacebuilding (Fisher et al., 2000; Kemkar, 2006).

## Personal Motivation

Interviews indicated that researchers from both groups had personal motivations for cooperation, such as a desire to understand the shared ecosystem, acquire more knowledge and data, and learn more about what happens on the other side of the border. Networking and funding were also relevant for motivation to participate in the project. For instance, when asked why he is cooperating with Jordanians on the CHASE project, an Israeli researcher stated that he “can learn from them [the Jordanians]. [ . . . ] about their society, [ . . . ] about what they think, [ . . . ] I can conduct research that’s trans-border.” A Jordanian, asked the same question referring to the Israeli researchers, replied: “They are supportive [ . . . ] They support us with ideas. At the same time, they benefit also from our knowledge.” Another Jordanian researcher spoke about networking and technological innovations as his main driving force and continued, explaining that expanding the scope of the research is another important motivation:

I think the first motivation or the main motivation is to reframe cooperation. They want to work with their neighbors. [ . . . ] To have another nearby research area or research region, where you can actually do the same research and it will be more interesting by diversifying your study area, is something good for any research. So that is both, working with Jordanians as regional cooperation and also I think making the research broader.

In terms of funding, third-party funding is available for the cooperation between Jordan and Israel. Usually, it is accessed by the Israeli researchers and then shared with the Jordanian team, especially if it is governmental funding, because Jordanians may have less access to receive this type of funding. In the end, both sides benefit from the shared resources, as one Jordanian researcher remarks. Some researchers stated that their motive to work together was of an ideological nature, as in the following example by an Israeli researcher: “It’s called Cold Peace [referring to the political situation between Jordan and Israel] and you can . . . our job is to warm it up.” This last remark indicates that the researcher in question sees himself as someone who, while belonging to one of the groups, is also outside both groups, trying to improve the relationship between them. Second, it leads us to the discussion, in which we return to the aforementioned theories relating to identity and the impact that processes, such as the one we studied, can contribute to environmental peace building.

## Discussion

The study findings suggest that identification is a complex process, characterized by several layers of identity. One such layer is “self-ascribed identity”. It includes the way in which respondents describe themselves as an individual human being, for instance “environmentalist” or “humanist”. The second layer, sometimes mentioned as less relevant for self-identification, can be put into terms as “other-ascribed identity” or “imposed identity”. This term includes all the aspects of oneself which one is aware of, but which are “other-ascribed”, which means not chosen but attributed to them by society, as is often the case of the ethnic, national, and even religious identity into which people are seemingly “born”. Both or all of these layers should be considered, and findings suggest that allowing for group salience of any kind is a possible

part of continued successful intergroup contact or cooperation, rather than an obstacle for them.

We identified five personal main benefits, relevant for both Jordanian and Israeli researchers, which respondents ascribed to cooperation: (a) supporting a holistic view of the shared ecosystem (including data access), (b) more networking and professional opportunities, (c) access to third-party funding, (d) social, professional and institutional support; and (e) intercultural exchange.

Findings also indicated that six challenges had a major impact on the nature and success of the cooperation (or lack thereof), including: (a) negative in-group judgment and consequences thereof, (b) bureaucratic and administrative difficulties, (c) lack of funding (e.g., lost opportunities), (d) institutional and professional obstacles, (e) lack of personal safety, and (f) project instability/uncertainty.

It should be noted that a certain asymmetry was apparent throughout the interviews. Specifically, obstacles were not perceived equally between Israelis and Jordanians. Lack of personal safety was not cited as a problem for Israeli respondents, while among Jordanians, both personal and institutional security was a challenge. It was important for Jordanian respondents that their counterparts realized and acknowledged this asymmetry, as is addressed by Allport’s (1954) claim that contact must be balanced in order to reduce intergroup tension. It should be noted that there is a conspicuous imbalance between benefits and difficulties encountered by each side (see Figure 1). While Israeli scientists enjoy a relatively high acceptance and even praise for the work which they perform across the border, Jordanian scientists often encounter immense difficulties and face danger if it is known that they are working with scientists from Israel. This finding is in line with those of Arieli’s (2016), Portman and Teff-Seker (2016), and Cohen and Ben-Porat (2008), that recognize this trend of broadening Jordanian opposition to normalization of relations with Israel constituting a major deterrent for Jordanian professionals to engage in interactions with Israelis.

It would be reasonable to assume that scientific and environmental cooperation in conflicted areas would not succeed due to group-based animosity, bias, and prejudice. Our findings, however, suggest that people involved in scientific environmental cooperation (SEC) in Israel and Jordan cooperated despite, and at times because of, diverse views regarding their group identity and regarding their relationship with the outgroup. Despite the many challenges faced, we found that SEC in Israel and Jordan were surprisingly successful.

The emphases and themes that arose in the interviews suggest that there may be other theoretical frameworks that more accurately describe the dynamics of the cooperation between scientists in this case study. One such theoretical framework is that of self-categorization theory (SCT). SCT focuses on the ways in which people define themselves as individuals and group entities (Turner & Reynolds, 2011). Turner, Hogg, Oakes, Reicher, and Wetherell (1987) suggest three levels of self-categorization: (a) the superordinate category of the self as a human being (universal human identity); (b) the intermediate level of the self as a member of a social in-group, as defined against other groups of humans (social identity); and (c) the subordinate level of personal self-categorization based on interpersonal comparisons (personal identity; Hornsey, 2008).

Finally, CHASE provides a good example of Allport’s assertion that another main condition for successful contact is cooperation



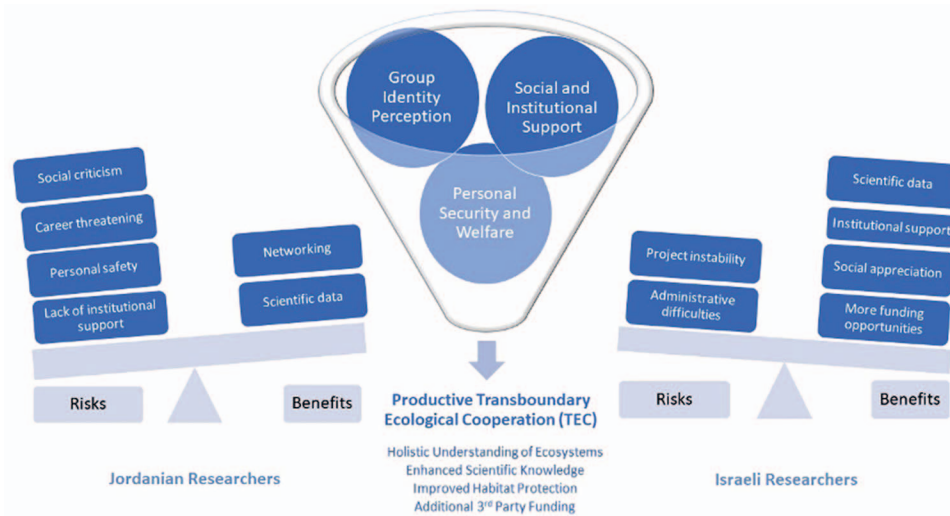


Figure 1. Ecological environmental cooperation; process advantages and disadvantages in the Center for Hyper-Arid Socio-Ecology (CHASE) case study. See the online article for the color version of this figure.

on an issue where both sides perceive the contribution of the other as necessary or even vital for reaching an important mutual goal. In particular, the study findings indicate that personalization and recategorization are both results of environmental peacebuilding initiatives, and in turn, they also serve to support and enhance it. The study findings also suggest that while group identity can be an important factor in some cases of environmental peacebuilding, other challenges and imbalances should be addressed in order to continue the cooperation and reach optimal results. In many ways, cooperation toward a common goal has lifted researchers above divisive categories and united them through their shared values despite the obstacles imposed by society and bureaucracy. Respondents were very positively predisposed to the idea that cross border scientific cooperation has an important positive impact on peacebuilding.

Whether the cooperative project had broader impacts on potential for peacebuilding is a question beyond the scope of this research, but one that should be further explored. We do recognize that all of the participants of the study were people who chose to cooperate with scientists belonging to the out-group. Future research should also include researchers who chose not to cooperate with out-group members. We also suggest further research that includes the analysis of group perceptions before and after the long-term encounters, as well as the application of the insights gained from this study in other geographical regions.

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