



Redefining community based on place attachment in a connected world

Georgina G. Gurney^{a,1}, Jessica Blythe^{a,b}, Helen Adams^c, W. Neil Adger^d, Matthew Curnock^{e,f}, Lucy Faulkner^d, Thomas James^d, and Nadine A. Marshall^f

^aAustralian Research Council Centre of Excellence for Coral Reef Studies, James Cook University, Townsville, QLD 4811, Australia; ^bWorldFish, Honiara, Solomon Islands; ^cDepartment of Geography, King's College London, London WC2R 2LS, United Kingdom; ^dGeography, College of Life and Environmental Sciences, University of Exeter, Exeter EX4 4RJ, United Kingdom; ^eGreat Barrier Reef Marine Park Authority, Townsville, QLD 4810, Australia; and ^fCommonwealth Scientific and Industrial Research Organisation Land and Water, James Cook University, Townsville, QLD 4811, Australia

Edited by Anthony J. Bebbington, Clark University, Worcester, MA, and approved August 10, 2017 (received for review July 11, 2017)

The concept of community is often used in environmental policy to foster environmental stewardship and public participation, crucial prerequisites of effective management. However, prevailing conceptualizations of community based on residential location or resource use are limited with respect to their utility as surrogates for communities of shared environment-related interests, and because of the localist perspective they entail. Thus, addressing contemporary sustainability challenges, which tend to involve transnational social and environmental interactions, urgently requires additional approaches to conceptualizing community that are compatible with current globalization. We propose a framing for redefining community based on place attachment (i.e., the bonds people form with places) in the context of Australia's Great Barrier Reef, a World Heritage Area threatened by drivers requiring management and political action at scales beyond the local. Using data on place attachment from 5,403 respondents residing locally, nationally, and internationally, we identified four communities that each shared a type of attachment to the reef and that spanned conventional location and use communities. We suggest that as human-environment interactions change with increasing mobility (both corporeal and that mediated by communication and information technology), new types of people-place relations that transcend geographic and social boundaries and do not require ongoing direct experience to form are emerging. We propose that adopting a place attachment framing to community provides a means to capture the neglected nonmaterial bonds people form with the environment, and could be leveraged to foster transnational environmental stewardship, critical to advancing global sustainability in our increasingly connected world.

community | telecoupling | place identity | public participation | stewardship

The notion of community is often invoked in environmental policy and management to foster environmental stewardship and public participation in management. Public participation [i.e., the processes of consulting, involving, and informing the public to allow those affected by a decision to have input into that decision (1)] is widely advocated as critical for achieving social and environmental gains. It is increasingly embedded in environmental policy, although it is important to note that the actual power afforded to the public through such processes can vary (2). Current emphasis on public participation arose primarily because of the widespread failure of entirely top-down exclusionary approaches to management, subsequent recognition of the need to gain public support for management, and, more importantly, the ethical imperative, at the very least, to “do no harm” to citizens (3). Community is the unit of social organization most often engaged with to promote public participation and stewardship, in part, because it tends to be thought of as existing among individuals who “share common interests and common identification” (ref. 4, p. 38). This property is particularly attractive to policy makers, not least because it can facilitate collective action in relation to management and stewardship. In the

context of environmental policy and management, community tends to be defined by residential location or resource use (5, 6).

However, prevailing approaches to conceptualizing community in environmental policy and management are problematic (5), especially given current global change, particularly increasing social and environmental connectedness. A well-recognized critique of conventional location and use framings of community is that they are not effective surrogates for communities of shared environment-related interests, and are thus rarely the cohesive entity often assumed in environmental policy (6). Studies show that even when people have a shared use or history in relation to a resource, their interests and preferences in regard to that resource are often heterogeneous (7, 8). This heterogeneity will only increase as contemporary social and cultural change ensures that the boundaries that historically tied people to a single location or occupation are waning (9, 10). Poor understanding of people's values regarding natural resources and misconceiving a collection of individuals as a homogeneous entity with shared environment-related interests have been shown to significantly hinder the success of community-oriented public participation and management (11, 12).

Community-oriented public participation is further limited by the localist perspective taken to community in environmental policy and management (6), which neglects the social and environmental connections with distant places that are characteristic of many modern

Significance

Effective environmental policy requires public participation in management, typically achieved through engaging community defined by residential location or resource use. However, current social and environmental change, particularly increasing connectedness, demands new approaches to community. We draw on place attachment theory to redefine community in the context of Australia's Great Barrier Reef. Using a large dataset on place attachment, our analysis of local, national, and international stakeholders identified four communities differing in their attachment to the reef and spanning location and use communities. Our results suggest that place attachment can bridge geographic and social boundaries, and communities of attachment could thus be leveraged to foster transnational stewardship, which is crucial to addressing modern sustainability challenges in our globalized world.

Author contributions: G.G.G., J.B., H.A., W.N.A., M.C., L.F., T.J., and N.A.M. designed research; G.G.G., M.C., and N.A.M. performed research; G.G.G. analyzed data; and G.G.G., J.B., H.A., W.N.A., T.J., and N.A.M. wrote the paper.

The authors declare no conflict of interest.

This article is a PNAS Direct Submission.

Data deposition: The data reported in this paper are available at the Social and Economic Long Term Monitoring Program (SELTMP) for the Great Barrier Reef, seltmp.eatlas.org.au/seltmp/survey-data.

¹To whom correspondence should be addressed. Email: georgina.gurney@gmail.com.

This article contains supporting information online at www.pnas.org/lookup/suppl/doi:10.1073/pnas.1712125114/-DCSupplemental.

sustainability problems (13). Emerging literature on place attachment suggests that increasing mobility (both corporeal and that mediated via information and communication technology) allows people to form bonds to places other than those in close proximity (10), suggesting that nonlocal people can be affected by change (e.g., degradation) of distant places. Further, a localist perspective of community precludes public participation and stewardship of non-local people, the engagement of whom is particularly important, given that many drivers of current environmental change originate and require management and political action at scales beyond the local (14). For example, addressing climate change, a key driver of environmental change globally, requires reduction of greenhouse gas emissions, which people across the world can contribute to by participating in climate policy lobbying and reducing their household consumption, for example. Thus, people living far from a particular place can increasingly affect and be affected by management and policy influencing that place, yet the localist perspective taken to community ensures that community-oriented public participation excludes these nonlocal stakeholders. Addressing contemporary sustainability challenges urgently requires new approaches to defining community that are not only consonant with our increasingly connected world but also remain place-based.

Here, we draw on place attachment theory to propose a framing for redefining community in environmental policy and management that puts people's shared emotional and functional attachments to a natural resource at its core. We use cluster analysis to examine if place attachment can serve as a common ground for local, national, and international stakeholders, and therefore as a basis for communities spanning spatial boundaries, a framing of community in line with Webber's seminal proposition of "communities without propinquity" (15). We do not propose that conventional use and location framings of community are redundant, rather that multiple forms of community are constituted across different people and nature relations and can play complementary roles in environmental policy. Although the literature on community in environmental management has long emphasized the fallacy of assuming that use and location communities share environment-related interests, little attention has been given to how the notion of community can evolve to meet the challenges of modern sustainability problems, particularly the transnational social and environmental connections they entail. Thus, finding solutions to modern sustainability problems requires examination of new framings of community and how they relate to conventional use and location framings.

To this end, we investigate multiple framings of community in relation to the iconic Great Barrier Reef (GBR), a World Heritage Area in Australia, which is critically threatened by drivers requiring civic, management, and political action at scales ranging from local to global. Indeed, recent climate change-induced coral bleaching in the GBR, which is an unprecedented event (16), highlights the pressing need for engaging nonlocal stakeholders in public participation and transnational stewardship. Using data on place attachment from 5,403 respondents surveyed adjacent to the GBR but residing locally, nationally, and internationally, we (i) identify whether respondents form homogeneous emergent communities based on multiple dimensions of place attachment and (ii) examine how resulting attachment communities relate to the communities of use and communities of location typically used in environmental policy and management.

Place Attachment

Place attachment describes the bonds people form with places and the meanings they ascribe to them (17). It is often conceptualized as having two dimensions (e.g., ref. 18), comprising emotional (place identity) and functional (place dependence) attachments. Place identity captures how places offer individuals the opportunity to express and affirm their identity, while place dependence refers to attachment to a place because of its instrumental value in achieving a desired goal. Given that place

attachment is an important element of human well-being (19), individuals' bonds with a place shape their evaluations of change to that place (20), influencing how they are affected by environmental management and how they engage with it. Indeed, studies have demonstrated the link between place attachment and pro-environmental attitudes and behavior (e.g., ref. 21), and suggest that shared person-place bonds may foster collective action (e.g., ref. 22). Thus, understanding place attachment provides an important means by which policymakers and managers can identify and engage stakeholders in public participation.

The vast majority of literature on place attachment has focused only on local stakeholders [i.e., relations with proximate areas (23)]; thus, place relations can be associated with forms of parochialism and are often assumed to be negatively associated with mobility (10). The few studies (24, 25) examining cross-scale place attachment have tended to examine individuals' attachment to places of increasing scale; for example, Gustafson (25) compared Swedish individuals' attachment to their residential area, region, Sweden, and Europe. Studies have also compared place attachment to a particular place between permanent residents and nonpermanent residents (e.g., ref. 26) or tourists (e.g., ref. 27) and between distant and proximate visitors (e.g., ref. 28). However, our study explicitly examines attachment to a particular place among people living locally, nationally, and internationally to that place. A further research gap we fill is quantitatively identifying different types of attachment (10). Although a number of studies have identified types of attachment qualitatively [e.g., Hummon's (29) five types of sense of place], existing quantitative analyses tend to compare attachment dimensions between groups identified a priori (e.g., refs. 24, 26, 28) or to segregate respondents post hoc based on the magnitude of a single composite attachment measure (e.g., ref. 27). These types of analyses do not assess whether individuals can be grouped based on similar levels of different dimensions of attachment, and therefore do not allow identification of types of attachment. Quantitatively identifying types of attachment (rather than magnitude of attachment only) requires multivariate classification analyses that segment data into homogeneous groups (e.g., cluster analysis); such analyses have had limited application in the place attachment literature (but ref. 30, which was in relation to local residents only). Therefore, our study extends existing research on cross-scale place attachment (e.g., refs. 24–28) by examining whether types of attachment (i.e., emergent attachment communities) can be identified among individuals residing locally, nationally, and internationally to a particular place.

We classified our respondents using cluster analysis based on place identity and place dependence in regard to the GBR, which we operationalized with 10-point Likert scale statements. We distinguish two subdimensions of place dependence, namely, direct and indirect dependence. This distinction reflects Rivlin's proposed dichotomy of place meanings based on the nature of people's place experience (31). She suggests that place meanings can arise either through ongoing direct experience and "personal life history" in an area or through indirect experience (e.g., exposure via media) and the "qualities of the place." Capturing these two forms of place dependence, thus recognizing that people may instrumentally value a place irrespective of their level of direct experience with it, is increasingly relevant in our highly mobile world and is of particular relevance to our study, given the iconic status of the GBR. Further, these two forms of place dependence allowed us to include functional attachment associated with fulfillment of both activity-specific goals (i.e., direct dependence measure) and more general well-being goals (i.e., indirect place dependence).

Results

Our cluster analysis based on 5,403 respondents' reported levels of place identity and place dependence (direct and indirect) revealed four distinct clusters (Fig. 1A). Each cluster represents a group of stakeholders who share similar levels of place identity, direct and

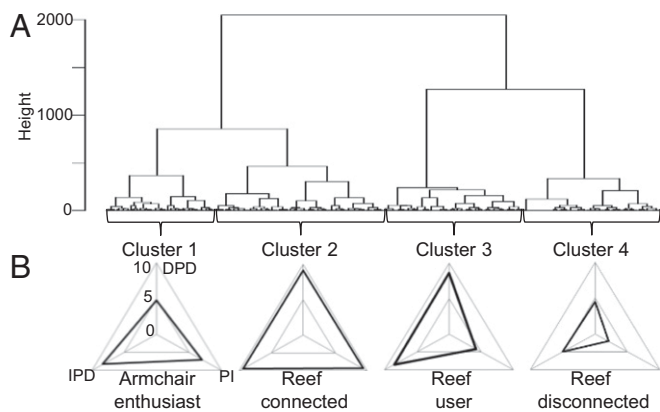


Fig. 1. Results from cluster analysis showing classification of respondents ($n = 5,403$) based on three dimensions of place attachment. (A) Dendrogram reveals respondents form four distinct clusters, representing four emergent communities based on place attachment. Height refers to dissimilarity based on Euclidean distance. (B) Spider diagrams show mean level of indirect place dependence (IPD), direct place dependence (PD), and place identity (PI) per cluster. Cluster names are based on type of place attachment as indicated by the level of each attachment dimension. High values on spider diagram axes represent high levels of the relevant place attachment indicator.

indirect place dependence, and therefore type of attachment to the GBR. The four clusters indicate four emergent communities based on place attachment, which we named based on their type of place attachment as indicated by the level of each of the attachment dimensions (Fig. 1B). Cluster 1 ($n = 2,314$) is composed of individuals who have low direct place dependence, but the GBR is important for their identity and they value the way of life it supports. In other words, stakeholders in cluster 1 value the GBR from a distance; thus, we named this cluster the Armchair Enthusiast community. The second cluster ($n = 839$) is characterized by high values on all three dimensions of place attachment, and we therefore named it the Reef Connected community. Cluster 3 ($n = 1,096$), the Reef User community, is characterized by high levels of direct and indirect place dependence but low place identity. Place identity and indirect and direct place dependence are lowest for the fourth cluster ($n = 1,154$), which we labeled the Reef Disconnected community.

Members of each key community of use currently engaged by GBR managers (i.e., commercial fishers, residents, tourists, tourism operators, indigenous residents) are present in all four emergent communities of place attachment (Fig. 2). However, the distribution of stakeholders between attachment communities differed significantly between all communities of use [$\chi^2 (12, n = 5,403) = 567, P = 2.2e-16$], except commercial fishers and tourism operators (Table S1). Together, these results indicate that communities of use are heterogeneous in terms of attachment to the GBR but that some communities of attachment are more prevalent in some communities of use than others. For example, although commercial fishers and tourists are present in each of the attachment communities, the Reef Connected and Reef User communities account for most of the fishers interviewed (36% and 31%, respectively), while the majority of interviewed tourists are in the Armchair Enthusiast and Reef Disconnected communities (40% and 31%, respectively).

Members of each of the 14 communities of location that we examined (i.e., one international, one national, and 12 coastal regions adjacent to the GBR) are present in each emergent community of place attachment (Fig. 3). However, the distribution of stakeholders between clusters differed significantly by community of location [$\chi^2 (39, n = 5,403) = 625, P = 2.2e-16$], with pairwise comparisons revealing significant differences between almost all pairs of location communities that include

national and/or international communities (Table S2). These results indicate that perceptions of place do not differ between communities of location within the GBR region but that the prevalence of each community of place attachment differs between communities residing locally and those located further afield. As expected, a lower proportion of stakeholders residing outside the GBR region are located in the Reef Connected community than in the Reef Disconnected community. Nevertheless, almost 30% of international stakeholders and more than 47% of national stakeholders (residing far from the GBR) are in the Armchair Enthusiast community, which is characterized by the second highest level of place identity and indirect place dependence of all four place attachment communities.

Discussion

Prevailing conceptualizations of community in environmental policy and management, based on residential location or resource use, are limited with respect to their utility as surrogates for communities of shared environment-related interests and, in particular, the localist perspective of community they entail. Given current social and environmental change, particularly increasing connectedness, new approaches to community are critically needed to address contemporary sustainability challenges. We examined an alternative framing for community based on place attachment in the context of the highly threatened GBR. We identified four emergent communities that differed in the strength and nature of their attachment to the GBR and that spanned conventional communities of location and use. In this section, we discuss the four emergent attachment communities, the processes underpinning the formation of each type of attachment, and how this study contributes to advancing theory on place attachment. We then outline how this approach contributes to conceptualizations of community in environmental policy and provide explicit recommendations for how a place attachment framing to community may be used to strengthen public participation and stewardship.

Grouping of respondents in communities of place attachment reveals that people's bonds to the GBR manifest in four distinct types. Further, the distribution of communities of use and location between attachment communities suggests that multiple processes underpin the formation of those bonds. The Reef Connected community, which has the highest levels of attachment, contains the most commercial fishers and tourism operators and the least tourists of all attachment communities. This finding lends support to traditional perspectives on place attachment, which argue that attachment forms through ongoing direct (i.e., firsthand) experiential and interactive processes that may involve physical and social dimensions (e.g., refs. 32, 33). These processes reflect those that underpin the rationale of use and location framings of community, namely, that commonalities in how individuals use a resource leads to shared environment-related interests and values. Such perspectives on the formation of person-place bonds are further supported by the composition of the least attached community, the Reef Disconnected

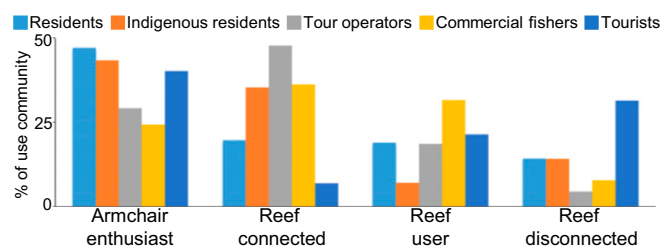


Fig. 2. Distribution of communities of use between emergent communities of place attachment identified in the cluster analysis.

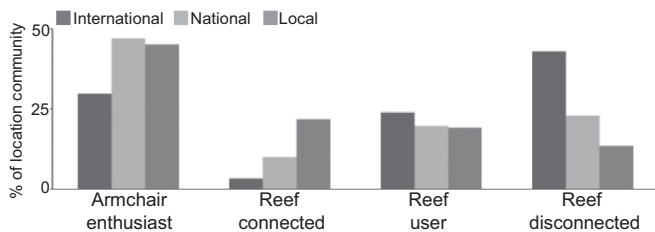


Fig. 3. Distribution of pooled location communities between emergent communities of place attachment identified in the cluster analysis. Given that the distribution of stakeholders between clusters does not significantly differ among the 12 local communities of location (Table S2), data were pooled to ease interpretation.

community, which contains the fewest local respondents and the most individuals residing overseas.

However, contrary to traditional perspectives on place attachment, our results also suggest that ongoing direct experience does not always lead to emotional bonds with place nor is it a prerequisite for the formation of such bonds. For example, more than 30% of commercial fishers in our sample were in the Reef User community, which was characterized by low place identity despite high levels of direct and indirect place dependence. Further, our findings point to additional processes underpinning person–place bonds that, rather than being driven by direct ongoing experience, are facilitated by mobility (including corporeal and that mediated by information and communication technology). The attachment community that is characterized by the second highest levels of place identity and indirect place dependence, the Armchair Enthusiasts, contains the most tourists and national residents, as well as almost 30% of international residents interviewed. This profile suggests that people can form emotional bonds with the GBR and assign instrumental value to it in terms of general well-being goals without ongoing firsthand experience and fulfillment of activity-specific functional goals (which was captured by our direct dependence indicator).

Our study therefore makes two important contributions to advancing the literature on place attachment. First, our study breaks new ground by examining attachment to a particular place among people residing locally, nationally, and internationally. Our results inform recurrent debates as to whether place attachment implies parochialism (10), showing, instead, that it can provide a means to transcend geographic and social boundaries. Second, our inductive approach (based on cluster analysis), which has had little application in the place literature (but ref. 30), revealed several types of attachment facilitated by mobility processes (e.g., Armchair Enthusiasts).

The multiple types of place attachment revealed by our analysis suggest that the nature of place attachment has evolved, whereby people without ongoing direct experience can form bonds with a place. Indeed, it is increasingly recognized that place attachment may form due to cultural and symbolic meanings that are not based only on experiential meanings but also wider sociocultural institutions and identities (34). The GBR is often described as possessing unique “Australianness” (35) and plays an important role in the individual identity of Australians despite their limited direct experience of it (36). The GBR is also of international significance and may resonate with other identities (e.g., tropical person, environmentalist) that are not related to the GBR as a specific place, but rather as a type of place. This form of generalized attachment to place type is suggested to be on the rise as society becomes increasingly mobile and connected across spatial scales (9, 34) and the factors influencing identity shift from “roots” in place to “routes” of expression (37). In other words, conceptualization of attachment has evolved from the emphasis on a single long-term place of residence to places

being “meaningful as expressions of a person’s individual trajectory and identity” (ref. 10, p. 39).

Our results challenge prevailing approaches to framing community in environmental policy and management, and suggest that categorization of stakeholders needs to go beyond location and use to also consider the nature of individuals’ attachment to place. Our findings, specifically that communities framed by location or use were highly heterogeneous in terms of individuals’ bonds to the GBR and that nonlocal stakeholders can form emotional and instrumental bonds with the GBR, support the localist critique of conventional conceptualizations of community, as well as the concern that these framings of community are ill-suited as proxies for groups with shared environment-related interests. Nevertheless, we are not advocating that use and location framings of community be abandoned. Indeed, these types of community are integral to on-ground management of proximate drivers (e.g., fishing, tourism, pollution) and will continue to be important entry points for public participation also because they are easily identifiable and often form political units. Rather, we suggest, together with current community scholars (5), that the multiple forms of community that are constituted across the varying ways in which people and nature relate are relevant to environmental policy. More specifically, we posit that managers and policymakers may simultaneously draw on use, location, and attachment framings of community, and that the role of each framing will depend on the purpose and nature of the public participation initiative.

The concept of communities of place attachment outlined here contributes to advancing theory on community in environmental policy, and may aid policymakers and managers in public participation and fostering environmental stewardship in three ways. First, directly ascertaining and accounting for communities of attachment may help managers understand and respond to the intangible, but supremely important, emotional, cognitive, and instrumental bonds people have with place. A more nuanced understanding of the importance of place may aid in predicting how people will react and be impacted by policy change (20), understanding why people participate or not in management (22), building trust with stakeholders, and communicating effectively (38). This would contribute to overcoming the critique that communities of use or location are ill-suited to serve as surrogates for groups with shared environment-related interests. In terms of communicating with relevant communities in the GBR region, for example, accounting for people’s bonds with the GBR could take the form of tailoring communication material to each of the four attachment communities. Tailoring communication material to the interests and values of specific audience segments increases the likelihood that the material will be read, understood, and recalled, and thus be effective in influencing attitudes and behavior (39). Although the benefits of targeting communication via audience segmentation are well recognized (40) and have long been used in business advertising and social marketing (particularly in the health sector), such approaches have yet to be widely applied in environmental management (41).

A second approach to using communities of place attachment in public participation involves policymakers and managers purposefully fostering attachment communities rather than just accounting for them. As suggested by Wynveen et al. (38), to generate broad civic support for management, managers can take an active role in contributing to conversations that help shape the thoughts and feelings that give rise to place attachment. Given that the communities of attachment we identified transcend use and location communities, individuals’ bonds with the GBR could provide a common ground with which to unite individuals who have previously been treated separately by GBR managers. This could be particularly important in regard to communities that have a history of conflict, for example, commercial fishers and tourism operators (e.g., ref. 42). Indeed, a number of studies advocate the utility of highlighting and fostering shared place attachment (9), as well as other subjective connections with nature, such as environmental values (e.g., ref. 12), for conflict resolution.

Lastly, fostering transnational communities of attachment could provide a means to engage and facilitate stewardship among nonlocal individuals who are strongly attached to the GBR (i.e., those belonging to the Reef Connected and Armchair Enthusiast communities). These communities of attachment would reflect “imagined communities” (43) and, more particularly, “imagined cosmopolitan communities of global risk,” Beck’s (44) development of Anderson’s seminal proposition that extends the concept from nations to transnational social constellations that form through shared awareness of global risk and responsibility. These communities are imagined in the sense that members “will never know most of their fellow-members, meet them, or even hear of them, yet in the minds of each, lives in the image of their communion” (ref. 43, p. 6). Sociocultural and political symbols play an important role in the construction of imagined communities and, consequently, these forms of community are reliant on “worldwide communications and mobility processes” (ref. 44, p. 1353).

Transnational imagined communities in relation to the GBR are already emerging online, in the form of Twitter communities (45) and various online advocacy groups, such as “Fight for the Reef” (fightforthereef.org/), which presently has over 250,000 members. In particular, the soon-to-be launched “Citizens of the GBR” initiative (<https://www.fightforourreef.org.au>), self-described as a “global social purpose movement founded to empower individuals from every place...to collectively...protect and enjoy our greatest natural inheritance, the GBR,” embodies the concept of transnational imagined communities of attachment to the GBR. Thus, GBR managers have an opportunity to foster transnational communities of attachment via social media and other forms of internet communication by using imagery and discourse targeted to appeal to people’s shared bonds to the GBR, particularly emotional bonds related to identity. Such an approach is likely to be particularly successful, given the major damage sustained to the GBR by recent coral bleaching (16); threats to identity are often an important catalyst for individuals to collectively organize and engage in actions to protect their shared identity (46).

There are multiple existing pathways through which nonlocal stakeholders belonging to transnational imagined communities of GBR attachment could be engaged in stewardship in relation to the GBR. In an era of globalization, proximate environmental drivers (e.g., fishing) are increasingly influenced by processes that operate beyond the local (e.g., international market demand), thus providing opportunities for nonlocal stakeholders to contribute to stewardship of distant places. These opportunities include the following: (i) sustainable individual consumption (e.g., reducing individual carbon emissions, buying sustainably sourced fish); (ii) lobbying national governments (e.g., in regard to climate change policy), international organizations (e.g., World Heritage Committee), or transnational corporations [e.g., in regard to corporate social responsibility (6)]; and (iii) supporting relevant non-government organizations that operate at local to global scales to, for example, monitor implementation and compliance with environmental commitments (14). However, engaging nonlocal stakeholders in public participation in relation to the GBR will require a transformation in governance. Indeed, it is increasingly recognized that addressing contemporary sustainability challenges requires establishing multilevel global institutions (e.g., ref. 47) that enable transnational public participation (e.g., ref. 48).

Redefining types of community relevant to a resource and enabling transnational public participation have important consequences for power dynamics in environmental decision making. Indeed, given the “all-affected principle” of deliberative democracy, that “all those people who are affected by a particular law, policy or decision ought to have a voice in making it” (ref. 49, p. 16), naming types of affected communities, in itself, represents an exercise in framing power (50). The very act of designating the GBR as a World Heritage Area is an example of framing power that makes claims to the importance of nonlocal

people’s values in managing the GBR. A particularly important consideration in extending the notion of community is the normative question of the appropriate balance between local and nonlocal stakeholders’ values, attachments, and power in decision making. While this is beyond the scope of our paper, it represents an important area of future research.

Conclusion

This research advances and integrates concepts of both place attachment and community public participation in environmental policy, with important implications for environmental management policy and practice. We examined how types of attachment to a particular place vary among people residing locally, nationally, and internationally, thus informing recurrent debates regarding how place attachment is affected by mobility and whether it implies parochialism. Our key findings, that ongoing direct experiential processes do not always lead to the formation of emotional bonds and that such bonds can form without ongoing firsthand experience, challenge traditional perspectives on place attachment that emphasize the central role of direct experience with a place. Our results suggest that as human–environment interactions change with increasing mobility and globalization, new types of people–place relations that span geographic and social boundaries are emerging.

While conventional framings of community according to use and location provide important entry points for public participation, we suggest that using a communities of attachment approach has the potential to strengthen public participation and promotion of stewardship. A place attachment framing of community provides a means through which to understand the critical and largely neglected non-material bonds people form with places and offers a common ground to unite members of traditionally separate communities of use and location, including, importantly, nonlocal stakeholders. Thus, a communities of attachment approach could contribute to overcoming the localist critique of prevailing conceptualizations of community in environmental policy, enabling policymakers and managers to better address many key drivers of current environmental change that require management, civic, and political action at scales beyond the local. In conclusion, using a place attachment framing to community in environmental policy and management offers opportunities to leverage local to global stewardship, which is critical to advancing global sustainability in our increasingly connected world.

Methods

The Great Barrier Reef. The GBR is the world’s largest coral reef system, spanning 2,300 km along the east coast of Queensland, Australia. However, this World Heritage Area is under threat from a myriad of drivers, including climate change, poor water quality, and fishing (16). In 2015, the GBR’s management body [the GBR Marine Park Authority (GBRMPPA)] released a 35-year management plan that highlighted the importance of understanding stakeholders’ values for the GBR and a strong reliance on stakeholder stewardship and management support. The GBRMPA tends to engage civil society via communities of location (e.g., local marine advisory committees, which are associated with 12 coastal regions) and communities of use (key groups include commercial fishers, tourism operators, and coastal residents). Although the value of the GBR to national and international residents is certainly recognized by the GBRMPA, these nonlocal stakeholders tend not to be the target of public participation activities.

Sampling. We collected data on place attachment in regard to the GBR through semistructured surveys with 5,403 individuals. Our respondents could be designated as belonging to one of five key communities of use that the GBRMPA identifies and engages with, including the following: coastal residents of the GBR region ($n = 2,693$), indigenous coastal residents ($n = 99$), tourists (domestic and international who reside outside the GBR region) to the GBR marine park ($n = 2,305$), GBR tourism operators ($n = 113$), and fishers with a commercial license to operate in the GBR ($n = 193$). Further details are provided in *SI Sampling*. This sampling protocol was reviewed and approved by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Social Science Human Research Ethics Committee. All respondents gave informed consent to participate in the voluntary survey.

Place Attachment Indicators. We operationalized place attachment to the GBR with three indicators relating to the two key dimensions of place attachment that are commonly identified, namely, place identity and place dependence (e.g., ref. 18). Our three indicators of place attachment were represented by 10-point Likert scale statements. Place identity was represented by the following statement: "The GBR is part of my identity." Place dependence was operationalized using two statements to capture both indirect and direct types of dependence; these were: "I value the GBR because it supports a desirable and active way of life" (indirect) and "There are many other places that are better than the GBR for the recreational activities I enjoy" (direct). Direct place dependence was tailored to capture the specific activity through which each community of use directly engaged with the GBR. Thus, "recreational activities" was replaced by "commercial fishing" and "tourism operations" for commercial fishers and tourism operators, respectively. The indicator was reverse-coded. Further details are provided in *SI Place Attachment Indicators*.

Data Analyses. To identify emergent communities based on multiple dimensions of place attachment, we conducted an agglomerative cluster analysis based on our respondents' reported levels of place identity: direct and indirect place dependence (*SI Data Analysis*). We used χ^2 analyses to compare communities of use, location, and place attachment. All analyses were conducted in R (version 3.1.3).

ACKNOWLEDGMENTS. We thank colleagues from the GBRMPA, University of Exeter, and CSIRO for input during the Interdisciplinary Science of Environmental Change workshop; and J. Cinner, J. Álvarez Romero, and our reviewers for helpful comments that improved the manuscript. This study was supported by the Australian Government's National Environmental Research Program, Australian Research Council Centre of Excellence for Coral Reef Studies, Great Barrier Reef Marine Park Authority; University of Exeter; and Commonwealth Scientific and Industrial Research Agency.

- Smith LG (1983) *Impact Assessment and Sustainable Resource Management* (Longman, Harlow, UK).
- Arnstein SR (1969) A ladder of citizen participation. *J Am Plann Assoc* 35:216–224.
- Secretariat of the Convention on Biological Diversity (2008) *Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet* (Secretariat of the Convention on Biological Diversity, Montreal).
- Ascher W (1995) *Communities and Sustainable Forestry in Developing Countries* (Institute for Contemporary Studies Press, San Francisco).
- Harrington C, Curtis A, Black R (2008) Locating communities in natural resource management. *J Environ Policy Plann* 10:199–215.
- Ojha HR, et al. (2016) Delocalizing communities: Changing forms of community engagement in natural resources governance. *World Dev* 87:274–290.
- Agrawal A, Gibson CC (1999) Enchantment and disenchantment: The role of community in natural resource conservation. *World Dev* 27:629–649.
- Waylen KA, Fischer A, McGowan PJ, Milner-Gulland EJ (2013) Deconstructing community for conservation: Why simple assumptions are not sufficient. *Hum Ecol Interdiscip J* 41:575–585.
- Chapin FS, Knapp CN (2015) Sense of place: A process for identifying and negotiating potentially contested visions of sustainability. *Environ Sci Policy* 53:38–46.
- Gustafson P (2014) Place attachment in an age of mobility. *Place Attachment: Advances in Theory, Methods and Applications*, eds Manzo LC, Devine-Wright P (Routledge, London), pp 37–48.
- Gurney GG, Pressey R, Cinner J, Pollnac R, Campbell S (2015) Integrated conservation and development: Evaluating a community-based marine protected area for equality of socioeconomic impacts. *Philos Trans R Soc Lond B Biol Sci* 370:20140277.
- Colvin RM, Witt GB, Lacey J (2015) Strange bedfellows or an aligning of values? Exploration of stakeholder values in an alliance of concerned citizens against coal seam gas mining. *Land Use Policy* 42:392–399.
- Liu J, et al. (2013) Framing sustainability in a telecoupled world. *Ecol Soc* 18:26.
- Lemos MC, Agrawal A (2006) Environmental governance. *Annu Rev Environ Resour* 31:297–325.
- Webber M (1963) Order in diversity: Community without propinquity. *Cities and Space*, ed Wirigo L (Johns Hopkins Univ Press, Baltimore).
- Hughes TP, et al. (2017) Global warming and recurrent mass bleaching of corals. *Nature* 543:373–377.
- Altman I, Low SM (1992) *Place Attachment* (Plenum, New York).
- Williams DR, Vaske JJ (2002) The measurement of place attachment: Validity and generalizability of a psychometric approach. *For Sci* 49:830–840.
- DeMiglio L, Williams A (2008) A sense of place, a sense of well-being. *Sense of Place, Health and Quality of Life*, eds Eyles J, Williams A (Ashgate, Aldershot, UK), pp 15–30.
- Devine-Wright P (2009) Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *J Community Appl Soc Psychol* 19:426–441.
- Stedman RC (2002) Toward a social psychology of place predicting behavior from place-based cognitions, attitude, and identity. *Environ Behav* 34:561–581.
- Manzo LC, Perkins DD (2006) Finding common ground: The importance of place attachment to community participation and planning. *J Plann Lit* 20:335–350.
- Lewicka M (2011) Place attachment: How far have we come in the last 40 years? *J Environ Psychol* 31:207–230.
- Devine-Wright P, Price J, Leviston Z (2015) My country or my planet? Exploring the influence of multiple place attachments and ideological beliefs upon climate change attitudes and opinions. *Glob Environ Change* 30:68–79.
- Gustafson P (2009) More cosmopolitan, no less local: The orientations of international travellers. *Eur Soc* 11:25–47.
- Stedman RC (2006) Understanding place attachment among second home owners. *Am Behav Sci* 50:187–205.
- Kaltenborn BP, Williams DR (2002) The meaning of place: Attachments to Femundsmarka National Park, Norway, among tourists and locals. *Nor Geogr Tidsskr* 56:189–198.
- Kil N, Holland SM, Stein TV (2015) Experiential benefits, place meanings, and environmental setting preferences between proximate and distant visitors to a national scenic trail. *Environ Manage* 55:1109–1123.
- Hummon D (1992) Community attachment: Local sentiment and sense of place. *Place Attachment*, eds Altman I, Low SM (Plenum, New York).
- Lewicka M (2011) On the varieties of people's relationships with places: Hummon's typology revisited. *Environ Behav* 43:676–709.
- Rivlin LG (1982) Group membership and place meanings in an urban neighborhood. *J Soc Issues* 38:75–93.
- Sampson RJ (1988) Local friendship ties and community attachment in mass society: a multilevel systemic model. *Am Sociol Rev* 53:766–779.
- Tönnies F (1957) *Community and Society* (Michigan State Univ Press, East Lansing, MI).
- Lin C, Lockwood M (2014) Assessing sense of place in natural settings: A mixed-method approach. *J Environ Plann Manage* 57:1441–1464.
- Phillips T, Smith P (2000) What is 'Australian'? Knowledge and attitudes among a gallery of contemporary Australians. *Aust J Polit Sci* 35:203–224.
- Goldberg J, et al. (2016) Climate change, the Great Barrier Reef and the response of Australians. *Palgrave Communications* 2:1–8.
- Gustafson P (2001) Roots and routes exploring the relationship between place attachment and mobility. *Environ Behav* 33:667–686.
- Wynveen CJ, Kyle GT, Sutton SG (2013) Environmental worldview, place attachment, and awareness of environmental impacts in a marine environment. *Environ Behav* 46:993–1017.
- Kolter P, Marvier M (2011) *Social Marketing: Influencing Behaviors for the Good* (Sage Publications, Thousand Oaks, CA).
- Grier S, Bryant CA (2005) Social marketing in public health. *Annu Rev Public Health* 26:319–339.
- Novacek MJ (2008) Colloquium paper: Engaging the public in biodiversity issues. *Proc Natl Acad Sci USA* 105:11571–11578.
- Lédée EJ, Sutton SG, Tobin RC, De Freitas DM (2012) Responses and adaptation strategies of commercial and charter fishers to zoning changes in the Great Barrier Reef Marine Park. *Mar Policy* 36:226–234.
- Anderson B (1991) *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (Verso, London, UK).
- Beck U (2011) Cosmopolitanism as imagined communities of global risk. *Am Behav Sci* 55:1346–1361.
- Jung K, No W, Kim J (2014) Who leads nonprofit advocacy through social media? Some evidence from the Australian Marine Conservation Society's Twitter networks. *Journal of Contemporary Eastern Asia* 13:69–81.
- Polletta F, Jasper JM (2001) Collective identity and social movements. *Annu Rev Sociol* 27:283–305.
- Walker B, et al. (2009) Environment. Looming global-scale failures and missing institutions. *Science* 325:1345–1346.
- Biermann F, et al. (2012) Science and government. Navigating the anthropocene: Improving Earth system governance. *Science* 335:1306–1307.
- Whelan FG (1983) Democratic theory and the boundary problem. *Liberal Democracy*, eds Pennrock JR, Chapman JW (New York Univ Press, New York), pp 13–48.
- Morrison TH, et al. (June 28, 2017) Mitigation and adaptation in polycentric systems: Sources of power in the pursuit of collective goals. *WIREs Climate Change*, 10.1002/wcc.479.
- Kyle G, Graefe A, Manning R, Bacon J (2004) Effects of place attachment on users' perceptions of social and environmental conditions in a natural setting. *J Environ Psychol* 24:213–225.
- Loo R (2002) A caveat on using single-item versus multiple-item scales. *J Manag Psychol* 17:68–75.
- Hinojosa L, Lambin EF, Mzoughi N, Napoléone C (2016) Place attachment as a factor of mountain farming permanence: A survey in the French Southern Alps. *Ecol Econ* 130:308–315.
- Brown BB, Perkins DD, Brown G (2004) Incivilities, place attachment and crime: Block and individual effects. *J Environ Psychol* 24:359–371.
- Buta N, Holland SM, Kaplanidou K (2014) Local communities and protected areas: The mediating role of place attachment for pro-environmental civic engagement. *Journal of Outdoor Recreation and Tourism* 5:1–10.
- Hernández B, Hidalgo MC, Ruiz C (2014) Theoretical and methodological aspects of research on place attachment. *Place Attachment: Advances in Theory, Methods and Applications*, eds Manzo LC, Devine-Wright P (Routledge, London), pp 37–48.
- Dallago L, et al. (2009) Adolescent place attachment, social capital, and perceived safety: A comparison of 13 countries. *Am J Community Psychol* 44:148–160.
- Everitt B, Landau S, Leese M, Stahl D (2011) *Cluster Analysis* (Wiley, West Sussex, UK).
- Cuddy AJ, et al. (2009) Stereotype content model across cultures: Towards universal similarities and some differences. *Br J Soc Psychol* 48:1–33.
- Fiske ST, Dupree C (2014) Gaining trust as well as respect in communicating to motivated audiences about science topics. *Proc Natl Acad Sci USA* 111:13593–13597.
- Müllner D (2013) fastcluster: Fast hierarchical, agglomerative clustering routines for R and python. *J Stat Softw* 53:1–18.