

1-1-2021

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Recommended Citation





Mahajan, Shauna L.; Jagadish, Arundhati; Glew, Louise; Ahmadia, Gabby; Becker, Hannah; Fidler, Robert Y.; Jeha, Lena; Mills, Morena; Cox, Courtney; DeMello, Nicole; Harborne, Alastair R.; Masuda, Yuta J.; McKinnon, Madeleine C.; Painter, Michael; Wilkie, David; and Mascia, Michael B., "A theory-based framework for understanding the establishment, persistence, and diffusion of community-based conservation" (2021). *All Faculty*. 494.
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A theory-based framework for understanding the establishment, persistence, and diffusion of community-based conservation

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Funding information

Margaret A. Cargill Foundation

Abstract

Over decades, biodiversity conservation researchers and practitioners have developed theories and conceptual frameworks to inform the planning, implementation, and evaluation of community-based conservation (CBC). While a diversity of mechanisms for understanding and supporting CBC has helped tailor approaches to local needs and conditions, the absence of a unified lens to understand CBC has limited the capacity for integrating foundational theory into practice more systemically, and for learning across different projects, stakeholders, and institutions. We introduce a theory-based framework called “the CBC framework” that draws upon three foundational theories from sociology, economics, and political science to understand the establishment, persistence, and diffusion of CBC. Experience applying aspects of the framework within different conservation organizations demonstrates how this integrative approach can provide a gateway for practitioners to engage with social science theory to understand the status and context of CBC interventions and efforts.

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For practitioners, scientists, evaluators, and strategists, the framework can guide the design of CBC interventions and monitoring and evaluation systems to facilitate theory-based learning and enable evidence-informed decision-making. Approaches like the CBC framework that facilitate collaborative planning, evaluation, and research can help better integrate social science theory in conservation practice while increasing the capacity for conservation scientists, practitioners, and stakeholders to learn together and adaptively manage CBC to deliver positive results for both people and nature.

KEYWORDS

community-based conservation, community-based natural resource management, governance, monitoring, evaluation, and learning

1 | INTRODUCTION

Community-based conservation (CBC) emphasizes the critical role of communities in managing natural resources. In broad terms, CBC can be defined as a set of “principles and practices that argue that conservation goals should be pursued by strategies that emphasize the role of local residents in decision-making about natural resources” (Adams & Hulme, 2001). However, there has long been debate on which specific projects and programs are considered “CBC interventions” (see Barrow & Murphree, 2001). For example, projects that provide health services and enterprise training are often classified as CBC interventions when implemented with the intent of facilitating participation in resource governance by ensuring resource users and their communities have their basic needs met. Thus here, we broadly conceive CBC as the set of practices and interventions that range from facilitating the formalized devolution of rights to communities (community-based natural resource management, see Child & Barnes, 2010) to those that directly or indirectly enable the co-management of resources and co-learning among communities, state, and nonstate actors (Berkes, 2009).

Evidence shows that CBC can be a useful approach for delivering conservation results. For example, studies show that forest areas that are effectively community-managed or co-managed can better protect forest cover when compared with top-down management (Nepstad et al., 2006; Somanthan, Prabhakar, & Mehta, 2009). Other evidence suggests that places where land or management rights have been devolved to local communities are less likely to experience deforestation or have high carbon emissions (Rights and Resources Initiative, 2015; Stevens, Winterbottom, Springer, & Reytar, 2014; White & Martin, 2002). While there is no comprehensive inventory of all projects designed to enable and support CBC,

estimates suggest that CBC practices may exist on 3.7 million km² of land globally (Molnar, Scherr, & Khare, 2004). The significant size of community and indigenous managed lands (estimated to contain 40% of intact natural ecosystems; see Garnett et al., 2018) suggests CBC will be critical for achieving global sustainability goals (Convention on Biological Diversity, 2011).

The modern resurgence of CBC can be traced to the 1970s, as a response to the real and perceived failure of “top-down” or “fortress” conservation (Brockington, 2002) that excluded resource users from making decisions about natural resource access, use, and management (Brandon & Wells, 1992; Brockington & Igoe, 2006). There has also been extensive debate about the extent to which external actions to support CBC can or should be integrated with human development interventions and be designed to link conservation goals with human development and poverty alleviation (Berkes, 2004) and deliver outcomes for both people and nature (Cheng et al., 2019; Davies, Fazey, Cresswell, & Pettorelli, 2014; Pullin, 2015).

The scientific literature increasingly recognizes that, in practice, CBC is primarily a social process, nested in a broader set of complex social, economic, political, and environmental interactions (e.g., Alexander, Andrachuk, & Armitage, 2016). This process involves and is initiated by many actors, including community members, government officials, and nonprofit organizations with decisions and feedbacks often occurring across multiple scales (Berkes, 2007). Research on CBC is extensive, answering questions such as the enabling conditions for CBC (Ostrom, 1990), the conditions through which CBC delivers positive or negative outcomes for people and nature (e.g., Baggio et al., 2016; Brooks, Waylen, & Mulder, 2013), and fundamental questions like the validity and usefulness of CBC as a model (Blaikie, 2006; Shackleton, Willis, Brown, & Polunin, 2010). More

recently, research has focused on the spatial, temporal, and social dynamics that affect, or are affected by, CBC, including gender and wealth equity (Coleman & Mwangi, 2013; Cook, Grillos, & Andersson, 2019; Gill et al., 2019; Leisher et al., 2016; Mwangi, Meinzen-Dick, & Sun, 2011), as well as the critical role of both tenure form and security for delivering positive CBC outcomes (Robinson et al., 2018). In recent years, research has highlighted the emergence of CBC networks across biomes (e.g., Greiner, 2012; Mayol, 2013) demonstrating the growing importance and prevalence of CBC globally.

Despite decades of research on CBC, distilling practical insights on the successes and failures of CBC across different cases has been difficult given (a) the context-specific nature of the research and practice of CBC, and (b) the systemic issues that often prevent the uptake of scientific evidence in practice (e.g., Cook, Mascia, Schwartz, Possingham, & Fuller, 2013; Sutherland & Wordley, 2017). First, CBC and the interventions and programs designed to support CBC most often occur in geographically remote and marginalized communities (e.g., Bond, 2001; Nelson, Gardner, Igoe, & Williams, 2009) and strive to achieve both positive social and ecological outcomes (Berkes, 2004). As such, CBC programs are often complex and context-specific, typically involving bundles of interventions (e.g., institution building, community enterprises, resource management practices) designed to bolster or foster community empowerment, ownership, and engagement in natural resource governance in both direct and indirect ways. Most interventions require coordination and decision-making across multiple stakeholder groups, diverse scales, and varying institutional designs. As such, much of the research carried out on CBC distills lessons in these very context-specific environments, with insights highly dependent on local contextual factors. This makes translating lessons learned across diverse geographies challenging.

Second, the challenges with synthesizing insights across conservation programs to inform decision-making are not new; the importance of addressing them has been widely recognized for decades as a central pillar in the adaptive management of conservation programs (Redford, Hulvey, Williamson, & Schwartz, 2018; Schwartz et al., 2018). Despite this, evidence production and distribution are often perceived as poorly timed with decision-making needs, not communicated in ways that are understandable by decision-makers (Rose et al., 2018) or effectively synthesized across interventions and programs to inform conservation planning (Sutherland & Wordley, 2017). Barriers to integrating evidence into conservation decision-making at both the field and strategic level are numerous and systemic and include divergent opinions on what is considered salient knowledge for

decision-making both within academia (e.g., Adams & Sandbrook, 2013; Sutherland & Wordley, 2017) and conservation organizations (Cook et al., 2013); the context-specific nature of evidence generated at the field level; and the mismatched structures that incentivize behavior in academic research and conservation practice. An approach that effectively breaks down and communicates the complexity of CBC can provide a valuable mechanism for translating scientific theory into context-specific “diagnostics” to guide conservation practice (as per Ostrom, 2007). By making social science theory accessible, such an approach could help not only create consensus around what is considered salient knowledge for decision-making, but also encourage the generation of comparable evidence that enables sharing and learning across the conservation community. This can, in turn, foster evidence-informed decision-making and more effective CBC.

Here we introduce a theory-based framework for understanding the establishment, persistence, and diffusion of CBC, which we call the “CBC framework.” We propose that integrating multiple scientific theories into a unified framework can provide (a) a holistic diagnostic approach that allows practitioners to use theory to both better understand the current status and context of CBC and inform future programmatic efforts and (b) a mechanism for practitioners, scientists, evaluators, and strategists to carry out comparable theory-based monitoring and evaluation within sites, and contextualize insights on CBC successes and failures across sites to improve conservation decision-making. We illustrate this use case with examples from the Alliance for Conservation Evidence & Sustainability (ACES), a consortium of non-governmental organizations and academics committed to fostering evidence-informed decision-making in conservation. We conclude with comments on emerging opportunities and challenges for operationalizing the CBC framework to help ensure CBC can deliver results for both people and nature.

2 | A THEORY-BASED FRAMEWORK FOR PLANNING AND EVALUATING CBC

Following a review of social science theory and common interventions and programs designed to support CBC, we developed the “CBC framework”—a diagnostic framework for understanding and evaluating CBC that (a) recognizes three components of CBC (establish, persist, and diffuse) and (b) uses theory to explain the social processes driving each component. This framework links interventions and actions to theory and provides a

unified lens that focuses on the different social processes behind distinct but related components of CBC. The framework recognizes three conceptually distinct social processes: (a) the emergence and establishment of community-based governance systems; (b) the persistence of community-based governance systems and their impacts on ecosystems and people; and (c) the diffusion (uptake and spread) of community-based governance systems and/or conservation practices to other “adopters.” This three-part framework assumes that CBC systems are established or revitalized to govern resources—potentially emerging from an open access situation or complementing or replacing state and/or private governance systems (e.g., Nelson and Agrawal 2008; Dressler et al. 2010; Nelson 2012). Second, these governance systems shape human behavior in ways that lead to ecological and social outcomes (e.g., Berkes, 2004; Brooks, Waylen, & Mulder, 2012; Child & Barnes, 2010). Last, these governance systems diffuse, so that ecological and social outcomes accrue at larger spatial scales (e.g., Child & Barnes, 2010).

These three social processes are each commonly associated with distinct social theories. The emergence of CBC governance systems can be viewed through the theory and associated empirical literature on collective action (Olson, 1965; Ostrom, 1990). Theories of common-pool resource governance (Ostrom, 1990) are used to document the persistence of and explain the impacts of CBC governance systems through time. The uptake and spread, or diffusion, of CBC, has seldom been studied as a social process, but the diffusion of innovation theory (Rogers, 2003) holds promise for diagnosing and understanding how and why CBC diffuses across spatial scales (Figure 1).

2.1 | Component 1: The emergence of CBC

The enabling conditions and emergence of CBC have been researched extensively, contributing to a mature body of theory and empirical research. Olson (1965) lays the foundation for this scholarship by outlining the costs and benefits to individuals of working together and the factors that lead to social cohesion and that cause people to cooperate. Olson identifies five requisites for social cohesion that facilitate collective action (a) familiarity, (b) frequent interactions, (c) shared identity, (d) trust, and (e) reciprocity. Others have elaborated on how institutions evolve through social interactions that mediate those costs and benefits (see Chamberlin, 1974; Dasgupta & Beard, 2007; Gibson, McKean, & Ostrom, 2000). Researchers have continued to draw upon

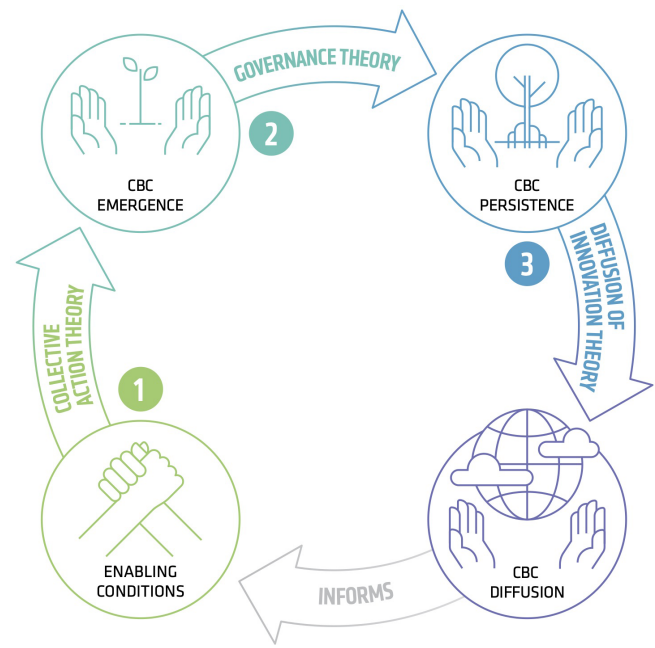


FIGURE 1 A collective framework for effective community-based conservation, or “the CBC framework.” The CBC framework is a diagnostic framework for understanding and evaluating community-based conservation. It draws on three bodies of theory to understand three distinct but related social processes: (1) the emergence and establishment of community-based governance systems; (2) the persistence of community-based governance systems and their impacts on ecosystems and people; and (3) the spread of community-based governance systems and/or conservation practices via “diffusion”

collective action theory to explain the emergence of systems (particularly common property) to govern common pool resources (see Ostrom, 1990; Pandey & Yadama, 1990; Wittayapak & Dearden, 1999). In particular, collective action for the governance of common-pool resources (e.g., forests, fisheries) appears tightly linked to the characteristics of the resource itself, characteristics of those who use the resource, and to the behavior of external actors (Ostrom, 2010).

Collective action theory (Olson, 1965; also see Ostrom, 2010, Biggs et al., 2019) posits that collective action is more likely when a distinct set of attributes are present for both the “appropriators,” or users of a resource, and for the resource itself (see Table 1). For collective action to occur, a group must be socially cohesive (Olson, 1965) and share a common purpose (Ostrom, 1990). Social and economic heterogeneity and mediating institutions also influence collective action processes (Agrawal & Gibson, 1999; Poteete & Ostrom, 2004). These factors enhance learning among users; enhance the flow of resource benefits to local users; reduce transaction costs associated with monitoring and enforcement;

TABLE 1 Factors that influence collective action (adapted from Olson, 1965, Ostrom, 1990)

Component	Attributes	Example conservation action that addresses component
Appropriator	A1. High salience (high livelihood dependence)	Assess people's dependence on natural resources for livelihood and well-being
	A2. Common understanding of the resource system, and how actors affect each other and resources	Provide learning arenas—for example, participatory mapping exercises
	A3. Low discount rate that individuals attach to future resource flows	Support development of diverse livelihood opportunities
	A4. High trust and reciprocity among users ^a	Facilitate arenas for conflict resolution
	A5. High autonomy—ability to self-organize	Support legislation that ensures local rights to organize; support capacity for self-organization
	A6. Prior organization experience and local leadership	Support local leadership and build on prior experiences of cooperation among people—for example, women's collectives, agricultural co-operatives
Resource	R1. Feasible improvements	Collaboratively assess existing resource conditions and identify steps for improvement—for example, participatory planning exercises
	R2. Indicators for resource condition exist at a low cost	Collaboratively identify effective and feasible indicators for monitoring the resources
	R3. Predictability of resource dynamics	Support education and training programs on natural resources sustainability
	R4. Spatial extent is sufficiently small for users to know boundaries and internal micro-environments	Support participatory mapping of resource boundaries and locations

^aOlson (1965) identified five requisites social cohesion that facilitate collective action, that relates to Ostrom's attribute (A4) on trust and reciprocity. These include: (a) familiarity; (b) frequent interactions; (c) shared identity; (d) trust; and (e) reciprocity.

enhance congruence between local users' knowledge and local resource conditions; and, ultimately, ensure that the perceived benefits to collective action outweigh the perceived costs (Ostrom, 1990, 2010).

Research on collective action in CBC has demonstrated that CBC emerges along a spectrum from “internally driven” (i.e., CBC initiated by resource users) to “externally driven” (i.e., CBC initiated by actors external to a community) processes (e.g., Brosius, Tsing, & Zerner, 1998). Together with the notion that communities are heterogeneous and socially complex (Berkes, 2004; Leach, Mearns, & Scoones, 1999), collective action research can help inform how external actors engage with resource users to establish CBC, for example, by encouraging practitioners to fully understand the complex dynamics of communities on-the-ground before identifying strategies to bolster collective action for resource management (Wilkie and Painter, in review; Pulhin & Tapia, 2002). At the same time, such insights can inform how practitioners can best support communities that face external threats to their continued ability to collectively act to manage resources. Investments that seek to foster or support collective action to govern

common-pool resources are a common component of CBC strategies and can include, for example, creating learning arenas that enable resource users to develop a common understanding of the resource system, or strengthening/reinforcing current levels of leadership and organizational capacity (see Table 1 for additional examples). While there is some overlap in the interventions that would support collective action and those that would support the enduring resource governance systems (introduced in Component 2 and Table 2) the factors deemed critical for collective action are, in theory, considered necessary “pre-conditions” for sustaining a governance system over time (Ostrom, 2010). Additional pre-conditions include the feasibility of improving the resource system, resource conditions, the predictability of resource dynamics, the spatial scale of the resource system, discount rates, and trust among users (Ostrom, 2010). Conceptually distinguishing the conditions that facilitate the emergence of CBC, and those that facilitate their persistence, helps provide structure to the often complex and dynamic relationship between emergence and persistence of CBC, and the actions used to support these phases.

TABLE 2 Design principles for community-based natural resource management

Design principle	Original definition	Simplified principle	Example conservation action that addresses principle
1. Clearly defined boundaries	A: Individuals or households who have rights to withdraw resource units from the common-pool resource (CPR) must be clearly defined. B: The boundaries of the CPR must be well defined.	<i>Boundaries</i> are clearly defined for the resource and around who is permitted to use the resource	Support participatory mapping of resource boundary; post signs
2. Congruence between appropriation and provision rules and local conditions	A. Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions. B. The benefits obtained by users from a CPR, as determined by appropriation rules, are proportional to the amount of inputs required in the form of labor, material, or money, as determined by provision rules	<i>Rules</i> for resource use are tailored to the local conditions, and the benefits that individuals derive from resources are proportional to the costs they shoulder	Facilitate a forum to discuss and codify locally accepted rules for resource use with appropriate stakeholders
3. Collective-choice arrangements	Most individuals affected by the operational rules can participate in modifying the operational rules.	Those who are affected by the rules can <i>participate</i> in modifying the rules	Support the development of a transparent and democratic governance structure for community-based natural resource management grounded in traditional systems
4. Monitoring	A: Monitors are present and actively audit CPR conditions and appropriator behavior. B: Monitors are accountable to or are the appropriators.	<i>Monitoring</i> (often led by resource users) of the resource and its use exists and those who monitor resources and enforce rules are also held accountable by the resource users	For monitoring CPR, provide training in indicator selection; data collection, entry, analysis, disseminating information, and application of learning For accountability, establish and support community ranger program; establish ranger code of conduct and whistleblower system
5. Graduated sanctions	Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and context of the offense) by other appropriators, officials accountable to these appropriators, or both.	Punishments for breaking resource use rules are <i>proportional</i> to the severity of the crime	Facilitate the collaborative development of appropriate sanctions by stakeholders; support the development of enforcement procedures (in line with existing structures) to ensure sanctions are upheld.
6. Conflict-resolution mechanisms	Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials.	There are quick, low cost means for <i>resolving conflicts</i>	Train conflict mediators and facilitate the development of grievance mechanisms

TABLE 2 (Continued)

Design principle	Original definition	Simplified principle	Example conservation action that addresses principle
7. Minimal recognition of rights to organize	The rights of appropriators to devise their own institutions are not challenged by external governmental authorities.	Resource users can <i>organize</i> and make decisions that are respected	Advocate for legislation that enables resource management by communities Assist communities with implementing governance principles 1–6
8. Nested enterprises	Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.	Responsibility for governance is <i>aligned and mutually-reinforcing</i> —from the lowest level up to the highest	Facilitate dialogues between communities and other stakeholders (e.g., government, companies) to ensure governance is effective across scales

Note: We present the original definitions as defined by Ostrom (1990) in column 2, provide a simplified definition for each principle in column 3, and an example conservation action that could address the principle in column 4.

2.2 | Component 2: The persistence of CBC governance

CBC systems, by definition, seek to restructure the governance of natural resources typically through either devolution of rights to manage resources to local communities or users (Child & Barnes, 2010), or by strengthening pre-existing resource use rights held by traditional, indigenous, or local communities through deliberate, collaborative processes (Berkes, 2007). Common pool resource governance theory (developed by Ostrom and colleagues; e.g., Ostrom, 1990) distills eight design principles associated with enduring and effective common pool resource management systems (see Table 2), which have been widely applied to analyze common pool resource management systems and CBC (Ban et al., 2013; Brooks et al., 2013; Cox, Arnold, & Villamayor Tomas, 2010). Together, these design principles describe the characteristics of processes for establishing and adapting rules governing common pool resources (e.g., fisheries, forests, grasslands), characteristics of the rules themselves, and characteristics of the social systems for ensuring compliance with these rules. CBC governance systems consistent with these design principles, and the shifts in human behavior that follow, are hypothesized to enhance ecological integrity and human well-being through direct, indirect, and secondary (cascading) mechanisms.

While Ostrom and colleagues have demonstrated that common pool resource management can be efficient, resilient, and capable of governing the use of resources over long periods of time (e.g., Baggio et al., 2016), a number of other researchers have tested the links between the governance of CBC programs and their ecological and social outcomes. For example, participation in decision-making

(design principle 3: collective decision-making) has been linked to positive ecological outcomes in forest CBC (Brooks et al., 2012; Persha, Agrawal, & Chhatre, 2011). Similarly, Gill et al. (2017) find that management capacity and budget, which influence the implementation of a governance system, predict the ecological outcomes of marine protected areas. While these examples demonstrate the growing evidence that governance shapes ecological and social outcomes, much less is known about the relative importance of each design principle for these outcomes or whether thresholds of “effective” governance are context-specific or generalizable. Emerging insights suggest that the importance of the design principles varies with local context and the nature of the CBC resource, but those principles related to equity (i.e., Principle 2b: proportionality of costs and benefits) and adaptability (e.g., Principle 2a: congruence with local conditions) are important irrespective of context (Baggio et al., 2016).

2.3 | Component 3: The diffusion of CBC governance

The persistence of CBC governance institutions (and the likelihood of their emergence in the first place) depends on whether the scale at which local users have the authority and capacity to manage a resource is well-matched to the scale at which the social, political or environmental dynamics shaping the dynamics of the resource occur (Marshall, 2007), also known as “institutional fit” (Epstein et al., 2015). As a result, understanding how CBC governance systems can diffuse to operate at larger spatial scales is essential for ensuring both the institutional fit of CBC and that CBC governance can

meaningfully contribute to addressing global contemporary environmental crises (Turner et al., 2007).

Diffusion of innovation theory (Rogers, 2003; Wejnert, 2002) is prominent in the sociological and political science literatures and holds promise for understanding and accelerating the diffusion of CBC practices and governance systems among communities (Abernethy, Bodin, Olsson, Hilly, & Schwarz, 2014; Mascia & Mills, 2018). Diffusion is the process by which the “prior adoption of a trait or practice in a population alters the probability of adoption for the remaining nonadopters” (Strang, 1991). Rates and patterns of innovation diffusion are shaped by three key factors that influence the adoption process: characteristics of the innovation (such as community-based resource management, comanagement practices), adopters (individuals, communities), and context (Rogers, 2003; Wejnert, 2002). In particular, diffusion appears more rapid among simple innovations that are consistent with adopters’ beliefs and values, where innovation can be tried and tweaked to fit local contexts, and where the relative advantage of the innovation is substantial and readily observable (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Pannell et al., 2006; Rogers, 2003). Diffusion is also more likely where adopters are familiar with the innovation, are well-connected to the outside world and each other, and where there is competitive pressure to innovate (Rogers, 2003; Walker, 1969). Contextual factors also shape these dynamics: diffusion is more rapid where political enabling conditions exist to support the innovation, and where the geographic and cultural context are well-aligned with the innovation (Wejnert, 2002). Widespread diffusion of innovation is especially high in contexts where social action and policy change is voluntary or quasi-voluntary, such that behavior change flows “horizontally” (i.e., via social networks and information flow) rather than “vertically” (i.e., via top-down mandates).

While many CBC projects are designed to drive change across scales, relatively few have explicit theories of change that articulate the processes by which efforts achieve outcomes at larger scales (Cheng et al., 2019). Many CBC programs adopt elements of diffusion theory, such as understanding the enabling conditions where the geographic and cultural context are well-aligned with the “innovation” (in this case, CBC; Abernethy et al., 2014), and many share a “slow-fast-slow” sigmoidal model (i.e., they start slowly and rapidly go to scale) of spread consistent with other innovations explored via diffusion models (Mills et al., 2019). However, there is still limited empirical evidence on the social processes that explain this spread. Drawing upon Rogers (2003) and others, Mascia and Mills (2018) highlight this challenge, addressing some of the attributes hypothesized as

necessary to achieve successful CBC adoption at scale (e.g., relative advantage of the innovation; observability of practice and impacts; flexibility in implementation of innovation; adopter’s social, economic, political, and cultural characteristics; facilitating links to markets; and policy to promote conservation and support community rights to resources). Understanding the factors that facilitate the diffusion of CBC may allow modification of existing interventions or development of new interventions that can scale faster or more widely, thereby having greater impact. We recognize that in comparison to collective action theory and common-pool resource governance theory, the use of diffusion of innovation theory to understand adoption and scaling of CBC is still an emerging frontier for conservation science and practice (Table 3).

Though conceptually distinct, the social processes of CBC establishment, persistence, and diffusion are interconnected and often nested within each other. The process by which CBC systems are established, for example, may shape the decision-making arrangements, resource use rights, monitoring and enforcement systems, and conflict resolution mechanisms in the established CBC governance system. CBC establishment could then, in turn, shape the ecological and social impacts of that governance system. Likewise, the structure and impacts of CBC systems may influence their diffusion: for example, the positive or negative impacts of CBC may affect the “relative advantage” of CBC with monitoring systems influencing the “observability” of their impacts. Moreover, with a CBC innovation, the diffusion process itself may result from recurring collective action.

3 | OPERATIONALIZING THE CBC FRAMEWORK

Planning and implementing a CBC intervention or program is often a complex, political process that involves negotiating trade-offs between the needs of communities, the natural environment, and the many organizations and actors who have a stake in a particular place or resource (Agrawal & Gibson, 1999; Brosius, Tsing, & Zerner, 2005). As a result, the specific intervention or programs that organizations invest in to support CBC take different forms in different places, driven by a mix of bottom-up need or desire, and top-down mandate or opportunity.

While many CBC programs use interventions that may have originally drawn inspiration from social science theory, it is rare for strategies and monitoring and evaluation plans to draw directly from theory to inform practice. The CBC framework thus offers a useful bridge between the reality of conservation practice and CBC theory by articulating three distinct components of CBC that

TABLE 3 Characteristics of innovation, adopter, and context that influences adoption of CBC (adapted from Rogers, 2003, Wejnert, 2002)

Component	Attribute	Definition	Example conservation action that addresses characteristic
Innovation/CBC (community governance and/or conservation) practices	Relative advantage	The expected net benefits of adopting an innovation compared to status quo.	Support design of CBC practices that have a relative advantage over status quo
	Compatibility	The degree to which the practice is perceived as consistent with existing values, existing actions, past experiences, and needs of potential adopters.	Support design and implementation of CBC practices in ways that is compatible with people's values, needs, and lived experiences
	Complexity	The degree to which the practice is perceived as difficult to understand and use.	Synthesize and mainstream information on CBC practices in a way that is simple to understand and implement
	Trialability	The degree to which the practice may be experimented with on a limited basis.	Support and encourage principles of experimentation and rapid prototyping in community-driven projects
	Observability	The degree to which the practice and the results of that practice are visible (observable or communicated) to others.	Enhance visibility of or encourage adopters to share information about CBC practices and their results to facilitate social learning
	Flexibility	The ability to transform the practice to something that aligns with the adopter's desires and constraints.	Support adaptation of CBC practices to suit adopter's individual needs.
Adopter/community	Social-economics	Social-economic characteristics that influence adopter's ability to learn or implement a new practice (economic well-being, education, social status)	Facilitate capacity-building workshops on for example, resource use rights, engagement in decision-making, livelihood opportunities or modify implementation strategy to suit status quo.
	Personality	Personality traits that influence an adopter's willingness to learn and implement new practices, such as risk orientation and competitiveness.	Facilitate inter-community learning exchange on natural resource management opportunities or modify implementation strategy to suit status quo.
	Knowledge	The degree to which the adopter is familiar with the innovation and innovation consequences.	
	Organizational innovativeness (when adopter is a group)	The degree to which the adopter is relatively open to adopting new ideas and practices compared to others in the social system.	Support capacity building of leaders, train resource management teams in organizational governance processes or modify implementation strategy to suit status quo.

(Continues)

TABLE 3 (Continued)

Component	Attribute	Definition	Example conservation action that addresses characteristic
	Decision making	Decision-making arrangements specify the rights of individuals or groups to make choices regarding other aspects of conservation intervention design and management.	Support development of/reinforce traditional resource governance structures, and local leadership opportunities or modify implementation strategy to suit status quo.
Context/ enabling environment	Geographical settings	Physical features of the landscape/seascape, as well as spatial proximities to other adopters, markets, etc. that affect adoption by influencing the applicability of the innovation.	Support the implementation of legislation which enables the implementation of the conservation initiative. Some contextual characteristics can rarely be changed, so assess local ecological, cultural, and political conditions and applicability of the CBC practices in those conditions. Where possible, support identification of compatibility between CBC practices and context.
	Culture	Shared behaviors and ideas— Belief systems, traditionalism, and socialization of adopters— That influences adoption of innovations.	
	Political conditions	Character of political systems, along with the regulations and norms inherent in the legal systems that influence the potential adopters' behaviors.	
	Global uniformity	Diffusion is affected by the extent to which the adopter's context influences and is influenced by globally circulating ideas, norms, and practices related to the innovation.	

Abbreviation: CBC, community-based conservation.

are relevant to both theory and practice. The framework can help both diagnose the current status and context of CBC in specific geographies, and also help inform the design of evaluations that can enable the comparison of information across geographies and scales. Using five illustrative case examples, we demonstrate how the CBC framework can both simply and rapidly integrate theory and evidence into conservation through different “entry points” in the project management cycle, to support conservation planning, evaluation, and learning.

3.1 | Diagnosing the “establishment” and “persistence” of CBC in Madagascar and Tanzania

To inform the planning of marine CBC projects in Madagascar and Tanzania, World Wildlife Fund (hereafter,

WWF) and research partners used the CBC framework to inform a scoping study assessing the current status and context of marine CBC in the region (see Wosu et al., 2020). The framework helped to introduce social science theory to the interdisciplinary practitioner and research team leading the scoping process and gave the scoping study structure by rapidly identifying a clear set of questions the study could address that were both theory-driven and relevant to the adaptive management of CBC. The study explored (a) how marine CBC had been established across Madagascar and Tanzania, (b) what conditions helped CBC to be successful, (c) what factors hindered the success of CBC, (d) what the perceived social and ecological outcomes of CBC are, and finally (e) what possible actions stakeholders can take to strengthen CBC. These questions informed the design of two multi-stakeholder dialogues (including fishing community members, local and national government

members, and NGO staff) and qualitative field research (focus groups and key informant interviews with members of local fishing associations) that elevated the different perceptions on the emergence and persistence of CBC. Components 1 and 2 of the CBC framework were particularly relevant in this process and showed that the process for establishing marine CBC varied across the two countries (Green,).

The results of the scoping study showed that some, not all, of the principles of collective action and common-pool resource theory were present as CBC emerged and evolved over time in all places. The study found that three pre-conditions under Component 1 (a common understanding; trust and reciprocity; and prior organizational experience and local leadership) were most frequently cited as being critical for enabling the establishment of Community-based Natural Resource Management in certain locations, with the absence of these same conditions hindering success in other locations (Wosu et al., 2020). In Tanzania, the emergence of CBC was largely top-down, dependent on external finance, and relied little on collective action (Levine, 2007). The study revealed that variables deemed important for both establishing and ensuring that CBC persists over time (Ostrom, 2010) were not present in many communities in Tanzania, potentially posing a risk to the future persistence of CBC. While the scoping study did not focus on understanding diffusion (Component 3 of the framework), its presence in the framework helped keep the concept of diffusion in discussions with the interdisciplinary team coordinating the learning process.

The dialogues raised ideas for how stakeholders internal to the CBC system could continue to support CBC, and a series of recommendations based on the learning process provided insights on how external actors could best support CBC in both countries in the future (Wosu et al., 2020). One recommendation calls for the creation of a simple, user-friendly diagnostic tool focused on Component 1 of the CBC framework that could guide scoping in new project sites in Tanzania, recognizing that foundational elements of collective action were missing in some of the sites studied. Such an exercise could help practitioners better understand the pre-existing capacity for collective action and design interventions accordingly, especially in a context where the implementation of CBC has historically been top-down (Wosu et al., 2020). At the time of writing, the recommendations from the learning process are informing discussions with potential partners, donors, and as well as organizational strategic planning for CBC. Future phases will involve monitoring perceived changes in governance over time (Component 2) and expand the application of the CBC framework to specifically investigate diffusion (Component 3), once priorities

shift beyond ensuring that CBC persists in pre-existing project sites and moves to enabling scaling.

3.2 | Looking back to understand “establishment” and “persistence” of CBC in forest ecosystems

To help large-scale portfolio managers understand the impact of different investments, the Wildlife Conservation Society (WCS) used the CBC framework to inform a research effort that (a) identified which factors lead people to cooperate (Component 1 of the framework) and (b) explored how features of governance institutions influenced social and ecological outcomes (Component 2 of the framework) within community forestry initiatives in eight countries (see Wilkie and Painter, in review). The research showed that, as Component 1 suggests (namely Olson, 1965), social cohesion is a common factor in successful community forestry efforts. However, the results also suggested that shared identity is the most important factor in determining whether the necessary cohesion exists, and that this can occur in the absence of the kinds of regular, positive face-to-face interactions that Olson suggests are necessary. The need for local resource users to collaborate to address an external threat (e.g., corporate appropriation of a common pool resource) was a sufficient basis of shared identity for people to collectively secure resource rights in all of the cases studied. Following this initial decision to act collectively, issues of fairness sometimes arose regarding transparency and accountability of decision-making and equity in the distribution of the costs and benefits of participation. Such issues were generally addressed through the application of CBC governance principles (see Component 2), which help ensure that working within the CBC system would be fairer compared to no system or an externally driven system. Findings also suggest that principles under Component 2 of the framework are manifest by successful community forestry efforts. While recognition of community rights to self-determination was reported to be essential, it was also considered insufficient without timely and competent support by national authorities to help communities exercise their rights when faced with threats from economically and politically more powerful external actors.

WCS supports the efforts of Indigenous Peoples in over 200 communities and over 1,000 local communities around the world to govern land, water, wildlife, and other natural resources effectively as a core element in its approach to conservation. Given the large magnitude and global scope of this work, applying the CBC framework to community forest conservation experiences provided

an important opportunity to bring different social science theories to the forefront of strategic planning conversations at WCS. The research, which integrated Components 1 and 2 of the framework, helped to underscore the importance of devolving governance to local levels where those responsible for social and political decisions have the most direct interest in ensuring governance is fair and effective. These lessons are being shared through internal presentations, conversations, and email exchanges and are currently informing the design of regional initiatives to implement CBC across biologically and politically significant areas in the Amazon, Melanesia, Central Africa, and the Western Indian Ocean. WCS expects that these initiatives will highlight the importance of helping build sound grassroots natural resource governance if global conservation objectives are to be achieved.

3.3 | Understanding the “persistence” of CBC in Mozambique and its impacts on people

To inform the design of a program evaluation on CBC and development interventions, WWF and Care International used the CBC framework to understand the social impacts of their joint program. The CBC framework helped situate the program-specific evaluation question within social science theory and helped efficiently narrow the framing of the evaluation to focus on how interventions changed the natural resource governance system, and in turn, how these changes impacted different groups of people (see Skinner et al., 2019). The framework's grounding in theory also helped spark discussion and integration on related bodies of social science theory that could help frame the evaluation, such as theory on human well-being. Finally, using the CBC framework allowed the study to build off of a prior monitoring and evaluation protocol that used the same theory-based approach to understand Component 2 (see Glew, Mascia, & Pakiding, 2012).

The CBC framework also helped facilitate the coproduction of the evaluation by creating a common language for the evaluation team (composed of program staff based in both the United States and Mozambique and conservation scientists) to discuss the phases of CBC, and how the interventions under evaluation linked to these phases. This kind of codesign between scientists and practitioners has been shown to increase the likelihood that evaluation findings inform decision-making (Cook et al., 2013). Finally, the fact the CBC framework did not prescribe any specific methods for the evaluation allowed the team to use methods

appropriate for the evaluation questions and resources available. In this case, it meant taking a mixed-methods approach, drawing on pre-existing data, and working within the confines of the logistical and financial constraints of the program.

3.4 | Exchanging knowledge about “diffusing” CBC

To facilitate knowledge exchange between conservation practitioners, WWF used the CBC framework to inform the design of a workshop that brought together conservation practitioners from 15 countries. The workshop focused predominantly on sharing lessons on scaling CBC and identifying what actions and interventions conservation practitioners could employ based on experience elsewhere to help scale CBC. Early in the workshop, participants emphasized how the process of scaling CBC is highly context-specific, and that it is not possible to find commonalities across CBC projects in different geographic and political contexts. Participants were subsequently introduced to and asked to reflect on which elements related to the diffusion of innovation theory (Component 3 of the CBC framework) were important for diffusing CBC.

Throughout the workshop, the CBC framework—particularly Component 3—became the common language for participants to understand each other's experiences and translate those insights into ideas for interventions in their own countries. Many participants identified one or more components as relevant to their experience, many noting the “observability” of community-based governance systems by community members, and the four characteristics of “early adopters” as particularly novel ways of understanding their efforts in supporting and scaling CBC. The discussion then led to possible strategies to take on in their respective countries, specifically how to intentionally engage “early adopters” in CBC as an explicit approach to diffusing CBC.

Feedback from participants during the workshop showed that in particular, the three components (the innovation itself, the adopter, and the context) were helpful concepts for overcoming the perceived barrier for learning across different geographic contexts. Recognizing that diffusion theory offers value to understanding CBC, participants were interested in understanding more about the other CBC theories embedded in the framework, leading to side conversations about common-pool resource governance theory and its relevance to practice. Following the workshop, there was increased interest by project managers in using the CBC framework to inform future monitoring and evaluation efforts on CBC, in

closer partnerships with social scientists and academic organizations.

3.5 | Using the CBC framework for ambient monitoring in the Northern Great Plains

WWF scientists and practitioners used the CBC framework to facilitate a program's reflection on their pre-existing ambient monitoring indicators. The program, working to support CBC in the American Northern Great Plains, had together with partners, developed a list of over 100 indicators to monitor the ecological, economic, and social outcomes of their work. To help prioritize and reflect on the indicators, the team mapped their current list of indicators to the CBC framework (see Table 4 for examples). Each indicator was mapped to one or several of the three phases of CBC and was categorized according to the broad concepts (known as domains) that are embedded within the CBC framework (see Appendix S1 for the ACES indicator framework). When complete, the team discussed the spread of indicators across the framework and the different domains.

The discussions helped uncover that the current set of indicators that the team had proposed were tracking domains like social and institutional capacity, but few were tracking governance. This helped trigger a discussion on this gap in the current set of indicators, as well as a discussion on how and why to prioritize certain indicators over others to ensure that indicators tracked are both scientifically relevant and useful to practice. The discussions also helped uncover that certain indicators could be used to represent different "domains"—for example, measures on bison herd health could serve as both an ecological outcome indicator for the conservation team, as well as a cultural ecosystem service indicator for some of their project partners.

4 | MOVING FORWARD

The examples above demonstrate that there are multiple entry points for using the CBC framework in practice. With its flexible, theory-based approach, the CBC framework enables conservation scientists and practitioners to collaboratively use social science theory to inform CBC planning and evaluation in ways that are fit for the complex environments and organizations that conservation practitioners operate within. The framework responds to growing calls to consider the dynamic nature of systems in conservation (e.g., Ban et al., 2013; Knight et al., 2019; Mahajan et al., 2019), by integrating foundational social-ecological systems theory (e.g., Ostrom, 2010),

TABLE 4 Illustrative indicators for the community-based conservation (CBC) framework

Domain	Subdomain	Illustrative indicator
Context	Demographic	Households per settlement
Governance	Monitoring and enforcement systems	Presence of incentives to enhance or restore resource
Resource systems and units	Ecosystem	Acres of grassland cover
Human well-being	Economic well-being	Proportion of county population with ranching as primary income
Human capital	Skills	No. of participants applying training in sustainable practices on ranches
Social capital	Social groups and networks	No. of participants in community-led programs
Institutional capacity	Sustainability	Changes in budget of community led organizations

Notes: Indicators listed below are example indicators from a community-based conservation program in the Midwestern United States, and are illustrative of things that could be measured in an evaluation using the CBC framework. Each indicator is nested within an indicator framework (see Appendix S1), which is a tiered system of measures that allows for broader categories, called domains, to represent discrete components of the CBC framework. These domains can also be aligned with programmatic and operational targets or objectives. Domains match to multiple components of the CBC model, and form the basis for selection and categorization of indicators (further organized by subcategories) that can measure and track intermediate and long-term intended and unintended outcomes.

recognizing the complex dynamics across time and space, and the dual importance of social and ecological outcomes. The CBC framework also joins a collection of collaboratively developed conceptual frameworks that can help guide and inform context-appropriate conservation practice (as proposed by Schwartz et al., 2018). And finally, applying the CBC framework in practice encourages the codesign of research and evaluation between practitioners and scientists, demonstrating the relevance of the framework to applied conservation (as advocated for by Dicks, Walsh, & Sutherland, 2014; Walsh, Dicks, Raymond, & Sutherland, 2019; Masuda et al., 2020). In summary, the CBC framework provides a base for

(a) integrating social science theory into the planning and evaluation of CBC (b) enabling conservation managers to test assumptions about CBC establishment, persistence, and diffusion in a manner that can support their own adaptive management and advance the broader evidence base, and (c) facilitating meaningful knowledge cocreation and sharing between scientists and practitioners.

It is important to note that the implicit assumption that integrating these three distinct bodies of theory in a singular framework offers greater practical value than could be gleaned from the use of a single theory alone requires further testing. The CBC framework is also subject to the same critiques of the theory it draws upon. For example, Ostrom's theory of common-pool resource governance has been critiqued for being agnostic to power (e.g., Epstein, Nenadovic, & Boustany, 2014; Singleton, 2017); and the diffusion of innovation theory for being agnostic to political and economic histories (see Brosius et al., 2005, p. 6). Emerging research can offer useful complements and allow the framework to evolve and address these critiques: For example, a new framework for scaling social innovation emphasizes scaling "up, out, and deep," adding a useful complement to understanding diffusion (scaling out) by including pathways to scale that involve policy and legal actions (scaling up—e.g., through legalizing land tenure rights) and focusing on values, cultural practices, and relationships (scaling deep) (Moore, Riddell, & Vocisano, 2015). And with accelerating global change and increased risks from climate change, insights from resilience theory could offer a complementary lens to help guide the adaptation of CBC governance over time (Berkes, 2004). Finally, growing evidence also suggests that integrating theory from behavioral science and social marketing research can improve CBC interventions (Green,), potentially complementing all components of the CBC model.

The CBC framework does not prescribe specific methodologies for generating or synthesizing evidence: This intentionally allows for (a) the use of different scientific methods, tailored to different contexts, needs, and practical constraints, and (b) the integration of different knowledge types and ways of knowing, with the intent that the framework could be used to understand CBC in any context. While this flexibility is useful and essential for a CBC context, summarizing lessons about CBC to support strategic decision-making is still a challenge to be addressed.

4.1 | From evidence to action

To ensure that the CBC framework is relevant to conservation, learning how to effectively translate evidence

into action will be critical and challenging (Cairney, 2016; Cook et al., 2013; Mayne et al., 2018; Tanner et al., 2020). Tangible decision support systems for integrating different types of knowledge into conservation interventions are rare (Dicks et al., 2014). While integrating approaches from sectors like medicine has been promoted and tested (Pullin & Knight, 2003; Segan, Bottrill, Baxter, & Possingham, 2011), these have been somewhat insufficient at accounting for complexity and uncertainty in the social-ecological systems conservation operates within (Mahajan et al., 2019). Evidence also may mean different things to different people in a sustainability and conservation context (Adams & Sandbrook, 2013; Game et al., 2018; Tengo et al., 2017). Issues around what counts as credible evidence in a given context, transparency around how evidence is generated, and participation in evidence generation and use will all be challenges requiring continued attention (Cook et al., 2013; Schwartz et al., 2018). Yet we contend that with its theoretical base and inherent flexibility, the CBC framework can be a useful addition to the suite of conservation tools and approaches that strive to enable effective conservation practice by fostering better decision-making.

We invite conservation scientists and practitioners to use the CBC framework to support the adaptive management of CBC. Collaborative CBC planning, practice, and evaluation will increase the capacity for conservation scientists, practitioners, and stakeholders to learn together to deliver results for both people and nature.

ACKNOWLEDGMENTS

This is a contribution from the Alliance for Conservation Evidence and Sustainability (ACES), a collaborative comprised of Conservation International, Fauna & Flora International, Florida International University, Imperial College of London, The Nature Conservancy, Rare, Wildlife Conservation Society, and the World Wildlife Fund. We thank Helen E. Fox and Emily S. Darling for their valuable contributions to ACES. We also thank project teams and partners working on the Northern Mozambique Channel initiative, the WWF-CARE Alliance, and WWF's Northern Great Plains program for allowing us to learn with you. We acknowledge the Margaret A. Cargill Philanthropies for their support to ACES. This is contribution #218 from the Coastlines and Oceans Division in the Institute of Environment at Florida International University, and contribution #3 from the "Insights for Catalyzing Conservation at Scale" initiative. We thank the editor and two anonymous reviewers for their thoughtful and helpful comments.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

Shauna L. Mahajan, Arundhati Jagadish, and Louise Glew drafted manuscript outline and initial draft. Gabby Ahmadi, Hannah Becker, Robert Y. Fidler, Lena Jeha, and Morena Mills contributed case examples and experience from practice. CBC framework conceived by Michael B. Mascia. All coauthors wrote, edited, and revised the manuscript.

DATA AVAILABILITY STATEMENT

No datasets were generated for this manuscript: Case examples presented were drawn from published reports and/or author experience.

ETHICS STATEMENT

No ethics review was required for this manuscript as no primary data was collected.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

How to cite this article: Mahajan SL, Jagadish A, Glew L, et al. A theory-based framework for understanding the establishment, persistence, and diffusion of community-based conservation. *Conservation Science and Practice*. 2021;3:e299. <https://doi.org/10.1111/csp2.299>