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A Multidisciplinary Conceptualization of Conservation Opportunity

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Abstract: *An opportunity represents an advantageous combination of circumstances that allows goals to be achieved. We reviewed the nature of opportunity and how it manifests in different subsystems (e.g., biophysical, social, political, economic) as conceptualized in other bodies of literature, including behavior, adoption, entrepreneur, public policy, and resilience literature. We then developed a multidisciplinary conceptualization of conservation opportunity. We identified 3 types of conservation opportunity: potential, actors remove barriers to problem solving by identifying the capabilities within the system that can be manipulated to create support for conservation action; traction, actors identify windows of opportunity that arise from exogenous shocks, events, or changes that remove barriers to solving problems; and existing, everything is in place for conservation action (i.e., no barriers exist) and an actor takes advantage of the existing circumstances to solve problems. Different leverage points characterize each type of opportunity. Thus, unique stages of opportunity identification or creation and exploitation exist: characterizing the system and defining problems; identifying potential solutions; assessing the feasibility of solutions; identifying or creating opportunities; and taking advantage of opportunities. These stages can be undertaken independently or as part of a situational analysis and typically comprise the first stage, but they can also be conducted iteratively throughout a conservation planning process. Four types of entrepreneur can be identified (business, policy, social, and conservation), each possessing attributes that enable them to identify or create opportunities and take advantage of them. We examined how different types of conservation opportunity manifest in a social-ecological system (the Great Barrier Reef) and how they can be taken advantage of. Our multidisciplinary conceptualization of conservation opportunity strengthens and legitimizes the concept.*

Keywords: case studies, conservation actions, entrepreneur, opportunity exploitation, socio-ecological system, window of opportunity

Conceptualización Multidisciplinaria de una Oportunidad de Conservación

Resumen: *Una oportunidad representa una combinación ventajosa de circunstancias que permite que las metas sean obtenidas. Revisamos la naturaleza de la oportunidad y cómo se manifiesta en diferentes sub-sistemas (p. ej.: biofísico, social, político, económico) al conceptualizarse en otras literaturas, incluyendo las de comportamiento, adopción, empresarios, políticas públicas y de resiliencia. Después desarrollamos una conceptualización multidisciplinaria de las oportunidades de conservación. Identificamos tres tipos de oportunidades de conservación: potencial, donde los actores quitan las barreras de la solución de problemas al identificar las capacidades dentro del sistema que pueden ser manipuladas para crear apoyo para las acciones de conservación; tracción, donde los actores identifican ventanas de oportunidad que surjan de impactos exógenos, eventos o cambios que quiten las barreras a la solución de problemas; y existente, donde todo está preparado para las acciones de conservación (es decir, no hay barreras), y un actor toma ventaja de las circunstancias existentes para solucionar problemas. Diferentes puntos de influencia caracterizan a cada tipo de oportunidad. Así, existen estadios únicos de identificación de oportunidad o creación y explotación: caracterizar al sistema y definir problemas, identificar soluciones potenciales, evaluar la viabilidad de las soluciones, identificar o crear oportunidades y aprovechar las oportunidades. Estos estadios pueden ser emprendidos independientemente o como parte de un análisis situacional y son típicamente emprendidos como una primera fase, pero también pueden ser llevados iterativamente a lo largo del proceso de planeación de la conservación. Cada uno de los cuatro tipos de empresarios (negocios, político, social y conservación) poseen atributos que permiten identificar o crear oportunidades y que se aprovechen efectivamente. Examinamos cómo los diferentes tipos de oportunidades de conservación se manifiestan en un sistema socio-ecológico (el Arrecife de la Gran Barrera) y cómo se les puede aprovechar. Nuestra conceptualización multidisciplinaria de las oportunidades de conservación reforzó y validó el concepto.*

Palabras Clave: acciones de conservación, empresario, estudios de caso, oportunidad de explotación, sistema socio-ecológico, ventana de oportunidad

Introduction

The ongoing global loss of biodiversity and degradation of ecosystems has resulted in growing awareness that conservation actors need to refocus on more effective solutions and on identifying and cultivating opportunities for action (Balmford & Cowling 2006; Ehrlich & Pringle 2008). The effectiveness of conservation solutions depends upon social, political, and economic constraints and opportunities across institutions, individuals, and spatial and temporal scales (Cowling & Wilhelm-Reichmann 2007). The concept of conservation opportunity emerged to ensure that social factors necessary to implement conservation actions were included in conservation planning spatial prioritizations (Knight & Cowling 2007; Knight et al. 2010). Increasingly, conservation scientists recognize that an assessment of conservation opportunity, including assessments of return on investment (Murdoch et al. 2007; Underwood et al. 2008), can help bridge the knowledge-implementation gap in conservation planning (e.g., Pressey & Bottrill 2009; Game et al. 2011).

The development of an operationally useful conceptualization of conservation opportunity, however, is still in its infancy. In attempting to understand and define conservation opportunity, researchers have identified or assessed a multitude of factors, which can be broadly themed into ecological dimensions of conservation priority, including conservation value and vulnerability (Pressey 1997) and economic and social dimensions

of the feasibility of action and garnering support for action (e.g., Mills et al. 2013). The social characteristics that can enable the implementation of actions within a social-ecological system can vary widely, from the characteristics of the users of the resource (e.g., knowledge, goals) to those of the governance system in place (rules, how these rules were established) (Ostrom 2009). These characteristics are increasingly being considered in conservation initiatives and integrated into existing frameworks. For example, Ban et al. (2013) highlight the need to link existing understandings of social-ecological systems to the systematic conservation planning process. In monitoring and evaluation, Fox et al. (2014) used the social-ecological systems framework (Ostrom 2009) to understand the social and ecological effects of marine protected areas. Linking conservation initiatives to diagnostic tools, such as the social-ecological systems framework, increases conservation scientists' capacity to understand which characteristics of the system support conservation actions, leading to a more effective integration of social considerations in conservation initiatives.

Looking outside the conservation literature, varied theories and models of opportunity have been developed and applied across and within different biophysical, social, political, and economic subsystems (of the social-ecological system) and provide different perspectives on how opportunity can be created, discovered, or accessed to achieve conservation outcomes. Explorations of the concept of opportunity are prevalent in the behavior, adoption, business, entrepreneur, institutional, public

policy, resilience, uncertainty, and mainstreaming literature. Within these disciplines, the concept of opportunity is explored because it has been identified as crucial for achieving desirable outcomes or futures of a system. Each of these bodies of literature define, conceptualize, and operationalize opportunity in different ways, complementing the broader social-ecological systems theory, and ranging from opportunities that can be exploited for commercial gains in economic subsystems (Holcombe 2003) to opportunities to support individual actors to adopt innovations (Rogers 2003). They also seek to identify the characteristics of individuals (e.g., entrepreneurs) who are best placed to identify, create and exploit opportunities (e.g., Begley & Boyd 1987). To advance and maximize the utility of the concept of conservation opportunity, conservation scientists and practitioners need to identify, explain, and apply these different interpretations of opportunity within a conservation context.

We developed a multidisciplinary conceptualization of conservation opportunity through which to identify and harness conservation opportunity within complex social-ecological systems. Specifically, we identified how opportunities have been defined, conceptualized, and operationalized in different bodies of literature. From the literature, we identified 3 types of conservation opportunity; defined the skills and attributes of 4 types of entrepreneur who can create and harness opportunities; and identified a process to operationalize conservation opportunity.

The Concept of Opportunity

Behavior and Adoption

In behavioral theory, behavior is considered a product of both an opportunity and intent and is a function of relationships, processes, and drivers of behavior, including values, attitudes, worldviews, responsibility, moral commitment, place attachment, norms, habits, goals, affect, and demographic factors (Fishbein 1967; Gifford 2014). For example, the theory of planned behavior aims to understand the relationships between attitudes and behaviors (Fishbein & Ajzen 2005), where the strongest predictor of an individual's behavior is his or her intention to act, which is caused by attitudes, subjective norms, and perceived behavioral control (Schultz & Estrada-Hollenbeck 2008). This literature indicates that opportunities for conservation are more likely when the action is associated with a favorable cost-benefit analysis of adopting a behavior, greater perceived normative support for the behavior, and reduced perceptions of barriers to undertaking the behavior (Beedell & Rehman 1999; Fielding et al. 2005). Opportunities for conservation can also be influenced by the way in which conservation practices appeal

to a person's moral obligations, as explained by the norm activation model (Schwartz 1977) and value-belief-norm theory of environmental action (Stern et al. 1999). Recognition of opportunity relies on identifying these patterns of human behavior (Ray & Cardozo 1996).

In adoption theory (Rogers 2003), opportunities are sought for individual or institutional adoption of innovations such as products, technologies, or practices. Adoption has elements in common with the entrepreneur and business theory (see below) but specifically focuses on 3 aspects of adoption. The first aspect relates to the characteristics of the innovation: profitability, riskiness, and complexity. Of particular importance is the relative advantage of the innovation: the degree to which the innovation is perceived to be better than the product, technology, or practice that it replaces (Rogers 2003). The second aspect explores the characteristics of the potential adopter, including a person's emphasis on profit, attitude to risk and time commitments. Adoption theory is commonly used to understand individuals' willingness to adopt conservation or agricultural practices (Traoré et al. 1998; Kabii & Horwitz 2006; Sattler & Nagel 2010), including the behavioral models mentioned above. Modeling and forecasting of the diffusion of innovations indicates *heterogeneous innovation*, inferring innovators adopt a new innovation first, followed by the early adopters, early majority, the late majority, and the laggards (Rogers 2003). Inconsistencies surrounding the influence of individual attitudes and preferences on adoption, and an inability to predict the level of adoption of innovations at different stages of diffusion have been partly attributed to a lack of social data and a reluctance to report on model accuracy (Meade & Islam 2006; Pannell & Vanclay 2011; Lechner et al. 2014 [this issue]; Tulloch et al. 2014 [this issue]). The third aspect explores how the social, political and economic subsystems (e.g., laws, culture social norms, and ideologies) shape the environment where adoption takes place (Rogers 2003; Wejnert 2010). All of these aspects of adoption can contribute to time lags before full adoption, and in many cases lags can be long (decades).

Business, Entrepreneurs, and Institutions

In business, opportunities are sought for business development and economic change. Within the business literature, the concept of opportunity is pervasive (i.e., the belief that there is always an opportunity to do something better or different, irrespective of whether that opportunity is being exploited). More specifically, the entrepreneurship literature explores the operational aspects of opportunity (Shane & Venkataraman 2000) and reveals how opportunities are discovered, evaluated and exploited to introduce new markets, processes, raw materials, and goods and services that previously had not existed (Shane 2003). Opportunities are typically

discovered and exploited with the purpose of increasing profit. Entrepreneurial opportunity can be broadly grouped into opportunities that preexist outside the entrepreneur (perceived or recognized) and opportunities that are created and exploited by the entrepreneur (Short et al. 2010). Important aspects of entrepreneurial opportunity include the characteristics of individual entrepreneurs (e.g., Begley & Boyd 1987) that enable them to recognize and act upon opportunities successfully (Holcombe 2003; Shane 2003) and the characteristics of the subsystem within which opportunities manifest (e.g., market processes, exogenous shocks). The individual-opportunity nexus (ION) theory is particularly relevant to the conservation domain because it brings together the study of the individual characteristics of entrepreneurs, the sources of opportunity, and the processes of discovering opportunities (Shane 2003).

Following the ION framework, opportunity existence, discovery, evaluation, and exploitation occur in a sequential fashion (with potential feedbacks). Opportunities typically exist relative to specific and well-defined problem and solution pairs (Hsieh et al. 2007). Understanding the system in which the problem-solution pair exists is critical (Shane 2003) and usually exists as a function of the economic (e.g., does demand exist and can it be met at reasonable cost?) and social (e.g., who does the entrepreneur know/work with?) subsystems. Opportunity discovery relates to both the individual characteristics of entrepreneurs (e.g., prior knowledge, awareness, motivation) and the processes they undertake to discover opportunities (e.g., networking and scanning for new technological advances). The entrepreneur must then evaluate any discovered opportunity (i.e., assess the feasibility of exploiting the opportunity) and if feasible, exploit it.

Institutional change contributes to the creation of opportunities for entrepreneurial activity, whereby a change agent (trustworthy, credible, sincere, expert) acts to influence beliefs, attitudes, and ultimately behavior within an institution (Sine & David 2003). Much of the institutional change literature ties to human relationships, processes and behavior. For example, entrepreneurs can create opportunities by changing sets of socially constructed logics (i.e., values, beliefs, assumptions) that define behaviors, structures, and practices within an organization (Sine & David 2003) or, similarly, by changing opportunity sets, which include formal rules (e.g., laws, regulations), informal constraints, (e.g., norms, conventions) and enforcement characteristics in the economy (North 1995). The readiness of a system to change depends on the need for change (a discrepancy between the existing state and a desired state) and the perceived ability of (collections of) individuals to change (efficacy [Armenakis et al. 1993]). Individuals must agree that the end state is desirable and that change is necessary. To influence people, change agents adopt a

number of strategies: persuasive communication, active participation, and management of external sources of information. Programs can be designed according to the urgency of change (e.g., aggressive, crisis, maintenance, or rapid response).

Public Policy

In public policy, opportunities are sought for agenda change and can be explained by 3 dominant theories of policy development and evolution. Each of these theories considers the processes and drivers of the system in which policies are developed and which are amenable to change, and the characteristics of individuals and groups that seek to modify logics and opportunity sets. The theory of policy streams explains that infrequent and short-lived windows of opportunity open when the problem, policy, and politics streams of policy subsystems align and when new subjects of political attention can be placed on the agendas of governments and subsequently the agendas for decision making and action (Kingdon 1984). The theory of punctuated equilibrium explains that opportunities exist to interrupt the policy subsystem, which is comprised of policies that are not gradual and incremental but respond to external perturbations in disjointed and episodic ways (Baumgartner & Jones 1993). Advocacy coalition framework theory describes how coordinated groups with a shared belief (i.e., advocacy coalitions) can create significant policy changes by translating their beliefs into governmental programs or driving external changes (e.g., sociocultural values) that will influence the policy subsystem (Sabatier 1988).

Opportunity relates to the policy subsystem, which is composed of the problem, policy, and political streams (Kingdon 1984) and tends to be dominated by policy monopolies that favor privileged interest groups (e.g., advocacy coalitions) and ignore others (Baumgartner & Jones 1993). Like entrepreneurialism, opportunities to influence policy development rely on connecting clearly defined problems with feasible solutions (Kingdon 1984; Baumgartner & Jones 1993). Policy entrepreneurs seek to define problems in ways that ensure they receive political attention and promote particular solutions to increase their likelihood of adoption. Similarly, advocacy coalitions use peoples' deep core (e.g., basic philosophy, religion) and policy core (e.g., environmental protection vs. economic development) belief systems to change political agendas (Sabatier 1988).

Resilience and Uncertainty

Three different theories examine opportunity in the context of uncertain environments. Resilience thinking is used to scope problems from broad perspectives and multiple viewpoints to provide opportunities for actors to structure systems towards a desired trajectory (Fischer

et al. 2009; Polasky et al. 2011). Resilience thinking, coupled with scenario planning, examines the probabilities of different system states resulting from interventions and interactions, including states not currently identifiable or considered probable (Polasky et al. 2011). It also explores drivers of system change, system thresholds and alternative system states (Walker et al. 2002), seeking to reduce the risks of unforeseen events or unintended consequences, for example, attempting to control systems or reduce perceived risks that could lead to phase shifts (Fischer et al. 2009; Polasky et al. 2011). The aim of applying resilience thinking is to strengthen the capacity of a system to remain in, or be managed towards, a desired state along a desired trajectory (Walker et al. 2002). The resilience literature discusses windows of opportunity as those that can result in transformations in a system, which can be triggered by a resource crisis or a shift in social values (Walker et al. 2006), and that can support the development and implementation of novel policy solutions that were not previously possible (Folke et al. 2005).

In the field of risk assessment, opportunities are sought for positive outcomes from uncertain situations. Traditionally, the field has focused on evaluating and managing uncertainties with potentially negative effects on project objectives (Lewin 2002). Increasingly, uncertainty is being assessed in terms of its ability to deliver positive outcomes (Ney & Thompson 2000). The rationale for considering both positive and negative effects on a project, down-side (threats) and up-side (opportunities) risk respectively, in a risk assessment is that both can influence the success of a project (Ward & Chapman 2003). Risks and opportunities are rarely independent; the risks to a conservation project may exist only when they accompany a particular opportunity (Game et al. 2013). Considering down-side and up-side risks as part of the same process ensures that opportunities for positive outcomes are identified and acted on at the outset of any given process (Hillson 2002).

Information-gap decision theory (IGDT) (Ben-Haim 2006) is used to seek opportunities that exceed expected outcomes under severe uncertainty. This theory offers a nonprobabilistic approach to decision making when facing uncertainty, ignorance, or potential surprise about the values of parameters or shapes of functional relationships between variables (Hayes et al. 2013). The theory consists of a model of the system, a model of uncertainty, and a set of performance requirements for the potential solution to the problem, specified by the decision maker. Possible solutions to the problem, operationalized within biophysical, social, political, and economic subsystems, are identified based on their robustness and opportuneness. Robustness measures how wrong estimates of uncertain parameters of the model can be before the outcome of the solution to the problem falls below an acceptable level (Burgman et al. 2005). Opportune-

ness assesses the lowest amount of uncertainty at which better than anticipated outcomes (known as windfalls) can occur. In this context, opportunity is thought of as the likelihood that an outcome of a solution exceeds expectations (Regan et al. 2005).

Mainstreaming

The process of mainstreaming seeks opportunities to internalize specific goals into systems, policies, and programs and, ultimately, all human behavior (Huntley & Petersen 2005). Mainstreaming attempts to understand and engage with the complex and interacting dimensions of systems, as well as individuals' psychology. Mainstreaming is depicted through a conceptual framework that details prerequisite conditions, stimuli, and mechanisms that define a system state in which opportunities can be identified and created. Opportunity is acknowledged to be of fundamental importance in achieving goals through mainstreaming by, for example, responding to unexpected favorable conditions that emerge (e.g., a change in government policy), responding to a crisis that demands action (e.g., catastrophic decline of biodiversity), or attempting unsolicited intervention (e.g., assisting business to change their policies). Preempting the challenges of mainstreaming for manifesting conservation opportunity begins by identifying the elements of the system through which conservation opportunity can manifest (Clark 2002; Cowling & Wilhelm-Rechmann 2007).

In summary, opportunities are predominantly sought to create change of some kind, which relies on understanding the structure of institutions and human behavior. Different types of opportunities are possible, depending on (sub)system dynamics and individuals' characteristics; these dynamics can influence the nature of opportunities and the likelihood that they can and will be taken advantage of. For instance, some system changes and processes can be unpredictable whereas others are predictable; understanding patterns and processes of opportunity creation can increase their potential for exploitation. Some individuals possess entrepreneurial skill sets that enable them to rapidly identify and effectively exploit opportunities.

Types of Conservation Opportunity and Change Agents

We found 3 types of opportunity that can be taken advantage of in the bodies of literature we examined: potential, traction, and existing opportunities. Different leverage points characterize each of these opportunity types (Table 1). For example, potential opportunities can be leveraged from education, whereas traction opportunities can be leveraged from disease outbreaks.

Potential opportunities are available in (sub)systems that are not yet primed to support conservation actions.

Table 1. Leverage points for 3 different types of conservation opportunity in biophysical, social, political, and economic subsystems.

Subsystem	Conservation opportunity type		
	Traction	Potential	Existing
Biophysical	Scientific evidence, disease outbreaks, natural disasters	Scientific methods	Scientific evidence
Social	Public concern	Attitudes or perceptions, willingness, credibility education	Capacity, leadership
Political	Political support, political cycles	Access to policy-makers	Legislation, international agreements
Economic	Funding cycle	Funding proposal	Technology, resources

In other words, conservation action might not yet be feasible, and change agents must remove barriers to problem solving by identifying the capabilities within the system that can be manipulated to create support for conservation action (Armenakis et al. 1993). Potential opportunities, identified in the behavior, adoption, entrepreneur, resilience, risk, and mainstreaming bodies of literature, can pave the way for traction and existing opportunities. Potential opportunities occur in social, political and economic subsystems, within which barriers to solving problems typically reside (e.g., lack of political support or funding, low stakeholder willingness to participate in a conservation program).

Traction opportunities represent windows of opportunity that arise from exogenous shocks, events, or changes that can be used to draw the system toward a desired state (e.g., Kingdon 1984). Traction opportunities, defined in all bodies of literature, change across time and space. Large-scale perturbations or crises are usually visible (e.g., disease outbreaks, social revolutions, natural disasters), particularly to policy and conservation entrepreneurs (see below) who position themselves to capitalize on traction opportunities (Table 2), yet they are often unpredictable. Small-scale perturbations can be more predictable, such as changes in relation to supply-and-demand (e.g., oil and gas shortages) or changing conditions (e.g., a shift in a local community's perceptions of a conservation problem).

Existing opportunities occur when everything is in place for conservation action and an entrepreneur only needs to take advantage of the existing circumstances (e.g., Chandra et al. 2009). Existing opportunities relate to opportunity discovery as discussed in the entrepreneurial and adoption literature. They also relate to upside risk, defined in the risk literature, where in situations of high uncertainty, they can be perceived as threats, reducing the likelihood that an individual, group, or institution will exploit the opportunity (Ward & Chapman 2003). Alternatively, opportunities might not be taken advantage of because no one has attempted to identify them or because they are not readily identifiable (e.g., an opportunity may differ subtly

from existing properties of the system and so only the most alert entrepreneur can identify it [Holcombe 2003]).

Different types of change agent can operate from an internal and or external position to solve conservation problems (Armenakis & Bedeian 1999). Entrepreneurs represent one type of change agent (see Rudel [2006] for examples of other types of change agents), and they possess a unique set of skills that allow them to identify, create, and exploit opportunities successfully. The literature describes entrepreneurs as having strong leadership skills, a tolerance for ambiguity and high self-efficacy, and a tendency to be efficient and effective at identifying opportunities (Gaglio & Katz 2001). Typically, entrepreneurs discover opportunities, bear the risk involved in exploiting an opportunity, and have skills to assemble or coordinate a team to take advantage of an opportunity (Acs & Audretsch 2010).

We identified 4 different types of entrepreneurs relevant to conservation: business, policy, social, and conservation entrepreneurs (Table 2). Business entrepreneurs act as change agents of markets, largely within the economic subsystem, by creating new businesses or products (e.g., ecocertification) (Eckhardt & Shane 2010). Policy entrepreneurs act as change agents of policy, operating primarily within the policy subsystem (Mintrom & Vergari 1996). Social entrepreneurs work within the social subsystem to change people's lives by providing social support (Thompson 2002). For instance, a social entrepreneur could work to develop social networks that enable individual landholders to work collectively to meet conservation goals. Conservation entrepreneurs can influence different aspects of the social-ecological system by working collaboratively to generate support for conservation action (Seidl et al. 2003). Often, individual entrepreneurs, other types of change agents, and collectives (e.g., organizations), either with a common goal or complementary skill sets, will need to partner with one another to develop and take advantage of the opportunity (see Take Advantage of Opportunity below). For example, a policy entrepreneur could seek ongoing funding and political support for a conservation program,

Table 2. Types of actors involved in identifying, creating, and exploiting conservation opportunities and their dominant characteristics and roles.

<i>Actor</i>	<i>Characteristic</i>	<i>Role</i>
Business entrepreneur (Eckhardt & Shane 2010)	Entrepreneurial skills: strong management skills and team building ability; awareness of the economic subsystem; connected to a network of business and market peers Personal attributes: tolerance for ambiguity; high need for achievement; high self-efficacy	Focus on creating and exploiting new business opportunities; aim to earn return on investment
Policy entrepreneur (Mintrom & Vergari 1996)	Entrepreneurial skills: strong negotiating skills; awareness of the policy subsystem; visible in policy making circles; action oriented; abundance of organizational and personal resources Personal attributes: persistent; persuasive; influential	Make popular new policy ideas; sell ideas to create dynamic policy change; define policy problems in attractive ways with appropriate policy responses for a defined audience; shape the terms of the policy debate; build and support coalitions to support policy ideas
Social entrepreneur (Thompson 2002)	Entrepreneurial skills: action oriented or passive; leader or follower; donator; volunteer or business oriented Personal attributes: altruistic; caring; helpful; concerned	Create social capital; seek to improve people's lives; recruit and motivate others; secure resources; listen to and respond to community needs
Conservation entrepreneur (e.g., government, NGO, individuals) (Seidl et al. 2003)	Entrepreneurial skills: high capacity to manage and coordinate; contextual knowledge of local or regional needs; adaptable; encouraging and supportive; understanding of social-ecological system and processes Personal attributes: creative; dedicated; tenacious	Adopt business principles in the context of conservation; develop niche markets or businesses for biodiversity conservation and ecosystem service provision; integrate people, groups, and subsystems; generate new combinations of resources; create and promote products

an economist could develop the incentive payment structure, and a conservation practitioner could engage landholders to participate.

Operationalizing Conservation Opportunity

Opportunities for conservation can materialize and vaporize very quickly, sometimes in a matter of hours. From the literature, we identified stages of successful opportunity identification or creation and exploitation, a priori knowledge of which will enable actors, including entrepreneurs, to generate the most effective conservation outcomes (Fig. 1). Several of these stages have been identified by other authors with regards to formulating and adaptively managing conservation projects (e.g., [Salafsky et al. 2002](#); [Larson et al. 2013](#)). However, we isolated and offer these stages as critical precursors to the clear identification of conservation opportunities, which can form part of a situational analysis, typically undertaken as a first stage, but also iteratively, throughout a conservation planning process ([Larson et al. 2013](#)). Situational analyses are commonly aimed at identifying both the strengths and weaknesses of a conservation plan or strategy, and we expanded on these considerations to integrate the elements needed specifically to identify opportunities. Revisiting these stages throughout the planning process would contribute to the adaptive process of most con-

servation planning frameworks ([Pressey & Bottrill 2009](#); [Larson et al. 2013](#)). Due to the ephemeral nature of some opportunities, it might not always be possible for an actor to consider all stages.

The recognition and development of an opportunity is an iterative and often nonlinear process that can involve taking advantage of multiple opportunities associated with a problem-solution pair to achieve the primed system or desired system state (Fig. 1). Often the system will need to be primed to respond to a very specific problem (e.g., changing attitudes towards a species). The readiness of the system is relative to a problem, so a primed or desired system state can end up back at a primed state for a new problem or can end up in an unprimed state relative to a new problem. The desired system state is not necessarily an end point. The position of an actor in this process is relative to some problem.

Characterize the System and Define Problems

The opportunity to conserve will be determined by the unique characteristics of the spatially and temporally bound system from which it emerges. A variety of tools, including the policy sciences framework (e.g., [Clark 2002](#)), resilience assessment ([Resilience-Alliance 2010](#)), and logic and conceptual models (e.g., applying a theory of change [[Bradach et al. 2008](#)]) can assist

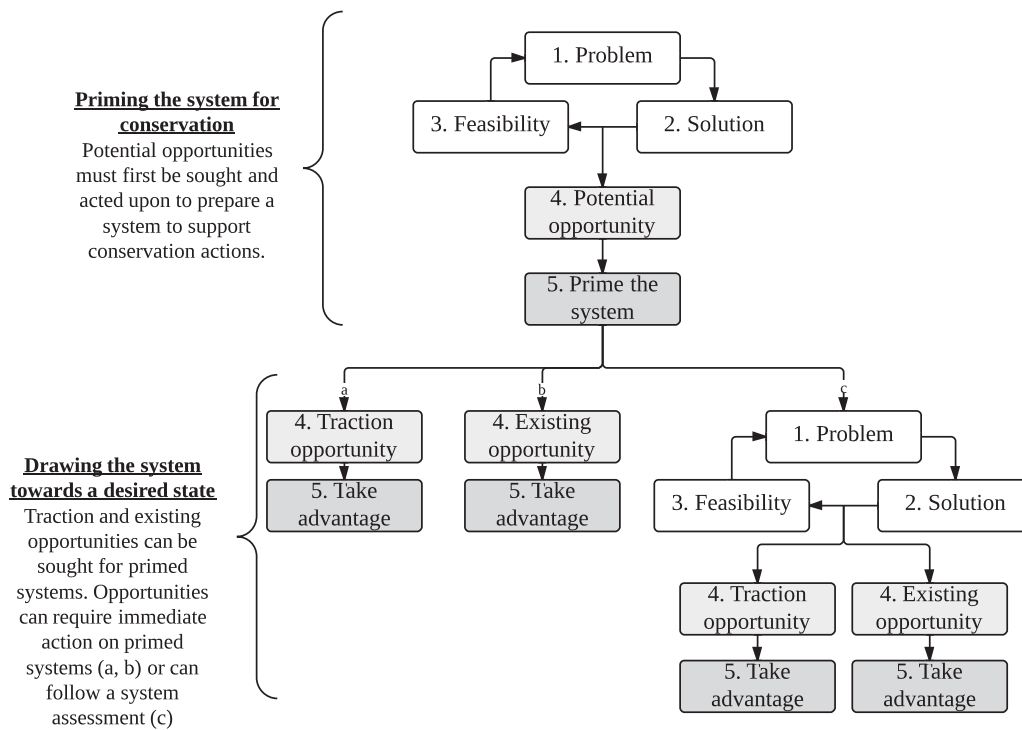


Figure 1. The 5 stages of conservation opportunity identification or creation as they relate to priming a system for a problem response and achieving the desired system state (1, characterize the system and define problems; 2, identify potential solutions; 3, assess feasibility; 4, identify or create the opportunity [traction, potential, existing]; 5, take advantage of the opportunity).

in characterizing the system. Only once the system is characterized can problems be accurately defined because problems in themselves can involve complex systems and processes that relate to an extensive number of decisions that interact in complicated ways; a problem is the “entrepreneurial unit of analysis” (Hsieh et al. 2007). Defining a problem is an important part of identifying possible solutions and involves defining the scope and nature of the problem, clarifying the goals and expectations of affected people or groups, and understanding individuals’ standpoints and biases (Clark 2002).

Identify Solutions

Once problems are well-defined, solutions can be developed, ideally with all relevant stakeholders. Actors can search the solution landscape for viable, cost-effective solutions in several ways. They can engage, for example, in directional searching through a process of experimental trial-and-error between choices or by developing mental models (i.e., cognitive maps) that use heuristics or theories about the unseen solution landscape to discover opportunities (Hsieh et al. 2007). Agreement on a solution and desired future state can be achieved through participatory objective setting, sharing mental models, and visioning processes (e.g., Walker et al. 2002; Biggs et

al. 2011). For example, visioning processes could involve setting qualitative goals, which reveal biophysical, social, and economic data sets that need to be collected, leading to defined quantitative conservation objectives (i.e., solutions) (Pressey & Bottrill 2009). In some instances, a set of solutions could be necessary to solve one problem or one solution could solve a set of problems (Hsieh et al. 2007).

Assess the Feasibility

Typically, a range of alternative solutions are proposed and explored before one or more are implemented; implemented solutions are those that are deemed most feasible and likely to succeed (Kingdon 1984). Several bodies of literature included feasibility as an important characteristic of opportunity that would indicate whether it would be worthwhile to invest resources to exploit the opportunity. Feasibility can be defined as the ability of a proposed combination of resources to achieve a specified value or goal (Ardichvili et al. 2003). In selecting the most feasible solution, a range of factors can and have been considered, including economic costs and relative advantage (e.g., Pannell et al. 2006); individual and collective factors that influence decision making (e.g., Armenakis et al. 1993); governance arrangements, policies, and political subsystems that regulate resource use (e.g., Mills et al. 2013); and up-side

and down-side risks, including uncertainty in decision making and action (e.g., Ward & Chapman 2003). Spatial assessments can be used to map some of these factors to identify physical locations in which opportunities for conservation are most likely (Knight et al. 2010).

The feasibility of actions will often depend on the extent to which individuals or groups are willing to collaborate or change, which reflects the importance of understanding influences on human behavior in achieving conservation outcomes. Armenakis et al. (1993) explain that change requires convincing a collection of socially interacting individuals to change their beliefs, attitudes, and behavioral intentions. When the feasibility of conservation actions relies on involving individuals and communities to collaborate or change, assessments of individual, and collective readiness to engage in a conservation action can be conducted to assess people's interpretation of the need for the solution/s and their willingness to engage with them. Assessments of readiness and urgency can help define the type of approach that is necessary. Feasibility is also influenced by a variety of technical and administrative factors, including the level of uncertainty associated with the assessment (Lechner et al. 2014), the spatial grain size at which biological and social data are integrated (Sutton & Armsworth 2014 [this issue]) and the cost of social data collection (Tulloch et al. 2014).

Identify the Type of Opportunity

Once feasibility has been assessed, one of the 3 types of opportunities to implement the solution can be sought, including a process of screening to isolate inappropriate opportunities (Ehrlich & Pringle 2008). An important initial question to ask in this step is, For what is an opportunity being sought (Walker et al. 2002)? Recognizing and exploiting opportunities effectively and efficiently depends to a large extent on the answer to this question, primarily because it keeps the focus on the problems and solutions of the system (Walker et al. 2002). Exercises such as scenario planning, horizon scanning, and foresighting (e.g., Walker et al. 2002; Bradach et al. 2008; Polasky et al. 2011) can be used to identify possible opportunities (and threats), particularly potential and traction opportunities. Cook et al. (2014 [this issue]) provide a comprehensive review of foresight tools for recognizing and realizing conservation opportunities. Risk assessments and IGDT can be used determine the probability of an opportunity occurring and the certainty of that probability; these methods can be useful for traction and existing opportunities. Strategic structuring of teams to improve their entrepreneurial capacity to identify different types of opportunities can contribute to successful opportunity identification and exploitation.

We draw on a well-known conservation example, the conservation and management of the Great Barrier Reef

(GBR), to illustrate the 3 different types of opportunities for conservation. We examined the progression of conservation actions as they related to 2 major outcomes for the protection and management of the GBR that have followed similar timelines over 30 years: the rezoning of the marine park (rezoning) and the long-term management to reduce drivers of water quality (WQ) decline (Fig. 2). In the 1970s, public concern about potential mining around the GBR indicated a need to improve the protection of biodiversity (traction opportunity: increased public awareness and concern). This traction opportunity led to the establishment of the marine park and initial zoning both of which were essential to future opportunities for improved WQ management and increased protection. Both rezoning and WQ outcomes required a long-term management approach in which a series of potential opportunities were identified and exploited to shift the system to a more desirable state (Fig. 2). Public perceptions that the existing management was ineffective enabled the GBR Marine Park Authority to initiate the rezoning process (e.g., public perceptions & Fig. 2) (Fernandes et al. 2005). Similarly, building the base of scientific evidence on the effects of degrading WQ and communicating these findings to the public and politicians created public awareness and support for the problem (e.g., education & Fig. 2) (Brodie et al. 2012). Throughout the 30 years, traction opportunities (public concern and political cycle & Fig. 2) have been critical for implementing both the 2003 Reef Plan and 2004 rezoning. The implementation of the 2003 Reef Plan and marine park rezoning has leveraged existing opportunities (e.g., resources & Fig. 2) such as the Reef Rescue Initiative and Communication and Awareness Program (Brodie et al. 2012; Day & Dobbs 2013). The monitoring and evaluation of these programs has also resulted in potential opportunities to document emerging problems and report to policy makers new management recommendations (e.g., Fig. 2) (Day & Dobbs 2013).

Take Advantage of Opportunity

Once an opportunity is identified, it must be successfully taken advantage of, changing the system dynamics. In the case of potential opportunities, the system can be changed such that it is primed for other traction or existing opportunities to be identified and exploited (Fig. 1). Entrepreneurs realize opportunities through a process of recognition, evaluation and development. This process can often be cyclical and iterative, requiring multiple evaluations at different stages of development and resulting in changes to solutions and/or development of additional opportunities (Ardichvili et al. 2003). Successful exploitation of an opportunity may require the collaboration of different types of entrepreneurs as discussed above.

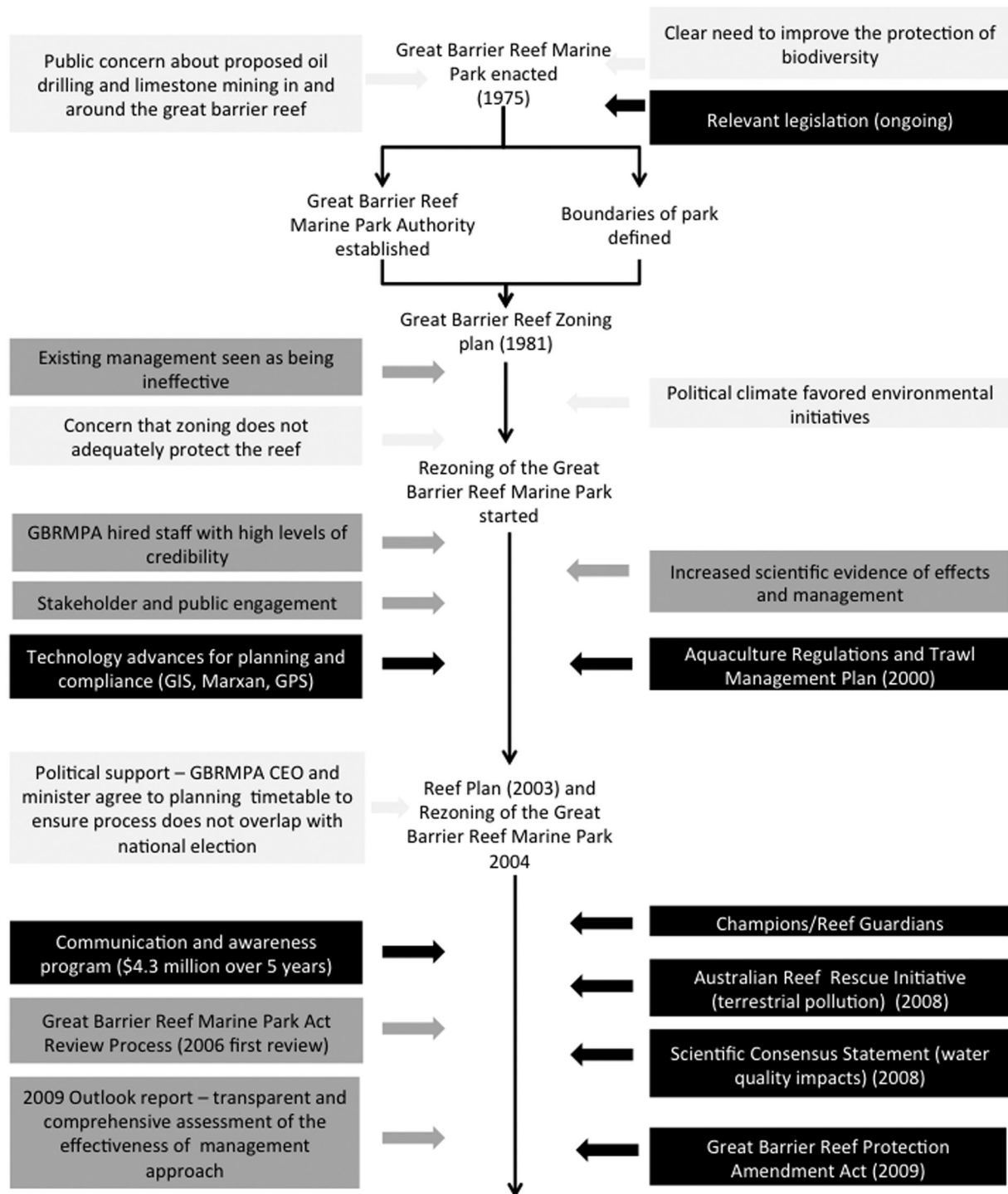


Figure 2. A time line of conservation opportunity and action on the Great Barrier Reef from the 1970s to current day (conservation opportunities: light grey, traction [actors identify windows of opportunity that arise from exogenous shocks, events, or changes that remove barriers to solving problems]; dark grey, potential [actors remove barriers to problem solving by identifying the capabilities within the system that can be manipulated to create support for conservation action]; black, existing [everything is in place for conservation action, i.e., no barriers exist]; an actor takes advantage of the existing circumstances to solve problems).

Capitalizing on Conservation Opportunities

Without an opportunity, there is no conservation action (Short et al. 2010). Identifying opportunities for conservation is therefore crucial to achieve conservation goals. We have used existing disciplinary conceptualizations of opportunity to redefine *conservation opportunity*. In doing so, we identified 3 different types of opportunity, each characterized by different leverage points, which can be exploited in the pursuit of conservation objectives, and 4 different types of entrepreneur, who are skilled at recognizing and taking advantage of opportunities. Our multidisciplinary conceptualization includes a framework for operationalizing conservation opportunity, the main intention of which is to encourage researchers, practitioners, and other interested individuals and groups to consider how they can most effectively bring about the change required to support their conservation objectives. To increase the value of this framework, we believe research is necessary in 4 areas: categorizing spatial and temporal characteristics of the subsystems in which conservation opportunities can manifest to optimize conservation investment across systems; defining the underlying processes that explain and influence human behavior and thus conservation action; identifying the attributes of the different types of conservation opportunities, including new types so they can be clearly recognized by entrepreneurs; and exploring the nature of different entrepreneurs to ensure that the most appropriate skill sets can be engaged in conservation teams. This research will advance the capacity of the conservation community to succeed in securing, maximizing the benefit of, and increasing the proportion of resources that are available for conservation.

Acknowledgments

This research was supported by funding from the ARC Centre of Excellence for Environmental Decisions and the NERP Environmental Decisions Hub. S.J.H. acknowledges funding from the National Science Foundation Coupled Natural-Human Systems Program and DEB-1115025. K.M. acknowledges financial support from the University of Canberra. We thank L. Botterill, D. Ireland, D. Pannell, B. Wintle, and Y. Ben-Haim for their reviews and 4 anonymous reviewers for helpful comments.

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