Chapter 19
How Community-Led Action Can Advance the Development of Biodiversity Islands

Brett Levin

Abstract Community-led action can contribute to the development of biodiversity islands. Biodiversity islands constitute areas of high biodiversity nested within human-dominated landscapes. Community action towards the development of biodiversity islands may be longstanding within cultures or learned and applied from ethical, philosophical, scientific, cultural, or economic motivations. Land access and long-term decision-making power provide the basis for communities to maintain areas of high biodiversity within degraded landscapes on private, public, and indigenous lands. The legal system and governing process of the presiding people and culture determine the tools that can aid in the establishment and protection of these areas. Some useful legal and financial tools may include land trusts, conservation easements, supportive zoning, novel financial resource pooling, and strong indigenous land rights. Community-developed biodiversity islands may be governed through a vast array of methods. Management of biodiversity islands requires methods that enhance or maintain biodiversity outcomes through time. This can be achieved through a broad array of community land uses and techniques. Examples of grassroots community action for the advancement of biodiversity conservation practices are numerous, diverse, and worldwide. Indigenous, religious, governmental, nonprofit, and for-profit organizations are capable of further expanding community-led action for the development of biodiversity islands. Examples of community-led biodiversity islands are described, including spiritual and religious sites, public areas, agricultural systems, and beyond. No matter the governing and organizational approach, considerations of social and environmental justice remain an important factor in how biodiversity islands are recognized, developed, and managed through time.

Keywords Advocacy · Conservation easements · Governance · Indigenous management · Land trusts · Sacred sites

B. Levin (✉)
Dietrick Institute for Applied Insect Ecology, Ventura, CA, USA
e-mail: Brett.Levin@aya.yale.edu

F. Montagnini (ed.), *Biodiversity Islands: Strategies for Conservation in Human-Dominated Environments*, Topics in Biodiversity and Conservation 20,
https://doi.org/10.1007/978-3-030-92234-4_19

19.1 Introduction

Biodiversity islands are areas of high biodiversity nested within ecologically degraded, human-dominated landscapes (Montagnini et al. 2022). Community-led action can advance the development and perpetuity of biodiversity islands. Through the empowerment of traditional biodiversity conservation practices, grassroots community action, and the utilization of legal and financial tools, community-led management can protect intact sections of land where plants and animals can thrive without ecologically degenerative interference from human activity (Montagnini et al. 2022). Such areas of high biodiversity within otherwise degraded landscapes can be found in rural areas, for example, in agroforestry systems (Montagnini and del Fierro 2022) as well as in suburban and urban contexts such as in homegardens, residential gardens, and urban green infrastructure (Toensmeier 2022; Negret et al. 2022; Soler et al. 2022).

In many instances, traditional community-based approaches to landscape management include biodiversity enhancing outcomes which can be considered biodiversity islands. Examples include sacred sites, sacred groves, community forests, church forests, and other sites that are protected and managed by local communities (Bhagwat and Rutte 2006; Ceperley et al. 2010; Moeliono et al. 2015; Baez Schon et al. 2022). The term "biodiversity island" in many cases is used to refer to these indigenous and traditional biodiversity conservation practices, highlighting results and understandings around procedures that advance appreciation and empowerment of such systems.

This chapter highlights the commons, which are the cultural and environmental resources accessible to all members of a society, including ecological assets such as air, water, and ecosystem health. These resources are held in common and not privately owned. Emphasis is placed on advances in community-based conservation, as governance approaches that tend to appreciate social complexities, utilize democratic and inclusive decision-making processes, and advance pluralistic frameworks. Grassroots community action and legal tools such as conservation easements through partnerships with non-profit Land Trusts can also aid in the development of biodiversity islands. Examples of grassroots efforts for the advancement of conservation practices are numerous, diverse, and worldwide. Legal frameworks, methods of enforcement, modes of implementation, and levels of community engagement are site and context dependent, but through these efforts of community-led action, biodiversity islands may be protected and managed through time.

19.1.1 Community Defined

A community can be defined as a group of individuals living in the same area or who have a characteristic in common (Berkes 2004, 2017). The scale and scope of this

definition can encompass a significant range of variables dependent on culture and perspective, from humancentric to biocentric and animistic (Harvey 2005). Such an inclusive definition of community may naturally lead to sustainable uses of land which protect biodiversity and provide for human habitation through time. One such example includes the aboriginal people of Australia, where worship of nature and the abiotic features of the landscape leads to a great respect for conservation and the value nature holds. In Oaxaca, Mexico, low intensity forest use and traditional rotational agriculture are spurred by deep connections to the land. This creates a more diverse forest-agriculture mosaic where traditional forest management harmonizes livelihoods and sustained biodiversity conservation (Berkes 2017). The Kenyah Dayak people of Indonesia manage subsistence orchards as gifted foresters. Their gardens look wild but are carefully cultivated (Peters 2018). Such morally and spiritually motivated biocentric approaches towards landscape management are present within many indigenous groups around the world. When considering community-led action towards biodiversity, such varied perspectives produce interesting considerations; the relinquishment of humans as the main component of community to humans as listeners or collaborators; the shift from anthropocentrism to biocentrism; and pathways towards rights of nature in the dialogue for community conservation (Prieto Méndez 2013).

From a less metaphysical and more human centric perspective, one cannot deny the abiotic factors of climate, topography, geology, soil, and precipitation in determining the species present and historical development of humans in an area (Dunson et al. 1991). Patterns of settlement are interrelated with the presence or absence of natural resources. Transportation corridors tend to follow ease through topographies. Agriculture and cultivation are inextricably linked to soils, water resources, and climate. From this vantage point, biological and physical components of a place are inextricably linked with community, whether centrally focusing on the human dimensions or expanding into the biophysical.

19.2 Motivations for Managing for Biodiversity Through Time

For numerous indigenous and traditional communities, the motivations for conserving and managing biodiversity through time are an integral part of the culture. Interactions with the landscape flora and fauna are learned and passed down over generations, which maintain or enhance biodiversity. These interactions form the basis of Traditional Ecological Knowledge (TEK) and become nested in culture (Gadgil et al. 1993; Inglis 1993). In ecologically degraded human-dominated landscapes, learning from, protecting, properly valuing, and/or restoring such community-led cultural practices may allow for areas of higher biodiversity, or biodiversity islands, to persist or emerge (Berkes 2017). This is not to advocate notions of the “noble savage” and attributes of romantic primitivism across all

traditional or indigenous cultures (Raymond 2007). Instead, here a focus on scientific findings, supported by historical ecology, demonstrate longstanding ethnoecological knowledge leads to improved biodiversity outcomes in numerous communities worldwide (Berke et al. 1994; Balée 1998).

Several cases exist where improved biodiversity outcomes result from expanded perspectives of community, inclusive of genetic diversity, habitat diversity, landscape diversity, and temporal diversity (Salick 2012). One such example is evidenced in Maranhão, Brazil, with landscape management of increased biodiversity by indigenous people focusing on sustainable extraction of specific forest products, and the nurturance of specific forest plant species (Balée 1993). The loss of such long-standing land-based culture may result in biological degradation, even when newly implemented management objectives are advanced to achieve 'conservation' or 'biodiversity goals' (Crosby 2004). Another example relates to the traditional agricultural management of Pima farmers in the Sonoran Desert. There, many emerged volunteer plant species were left in the field for a broad range of reasons including more diverse food yields, to host edible insect larvae, for protective hedges, and to provide shade and cycle nutrients. Such intensive and intentional practices have become a rarity in the now conventionally cultivated fields of the region (Nabhan et al. 1989). These examples highlight cultural practices which maintain or enhance biodiversity over time, and suggest that protecting and empowering such practices can play a key role in the development and expansion of biodiversity islands.

For other cultures and societies, learned ethical, scientific, philosophical or economic motivations may drive actions for community-led biodiversity conservation within a landscape. From a western perspective, there is a broad range of literature and media that has helped advance such notions. Books such as Aldo Leopold's *A Sand County Almanac* (1949), Rachel Carson's *Silent Spring* (1962), James Lovelock's *Gaia Hypothesis* (1979), E.O. Wilson's *Biophilia* (1984), and Murray Bookchin's *Ecology of Freedom* (1982) are just a few highlighted examples that will be described below.

19.2.1 Philosophical and Ethical Motivations

Aldo Leopold's "land ethic" brought forth an advancement in ethics as a process of ecological evolution through a moral responsibility for western humanity to care for the natural world (Leopold 1949). From this vantage point, the moral sense of right and wrong and how community is defined expanded beyond humans to include the soils, trees, grasses, and all species and biophysical components of the environment. Leopold's "community concept" argues true community-led action must then be built upon consideration of these human and non-human pieces. From this standpoint, where humans alter a landscape in ways that diminish non-human life through time, an ethical violation has occurred. Bringing this vantage point into the realm of western consciousness provides a foundation for people to come together towards

the protection of species where landscapes would otherwise become degraded. This learned ethical approach towards conservation, biodiversity, and their inherent values has helped shape the recommendations of community organizations, planning bodies, and governments. Throughout the United States, many recent conservation projects which may be recognized as biodiversity islands within a landscape can be attributed to the realization of the philosophical underpinnings of Aldo Leopolds' work. Today, his legacy continues through The Aldo Leopold Foundation (www.aldoleopold.org). Located on his home site in Baraboo, Wisconsin, the organization was founded in 1982 by his children as a non-profit organization to continue the practices incorporated by his land ethic. The foundation owns and manages his property to conduct education and outreach for land stewardship programs. There are also other academic and research institutions throughout the United States, run through the Forest Service, that function as centers of wilderness education, agriculture, and programs, celebrating Leopold's legacy and promoting his ideals and teachings towards a land ethic.

James Lovelock's Gaia Hypothesis, which proposed that the biosphere is a complex and self-regulating organism, advanced philosophical motivations towards conservation of biodiversity (Lovelock 1979). This hypothesis promulgated the notion that living matter on earth collectively determines and controls the material conditions necessary for the regulation of life. From this premise, philosophy regarding the role of humanity as part of Gaia permeated the realm of western environmental consciousness. Are the negative environmental impacts of humans a destabilizing force which will eventually be self-regulated? Can humans persist as part of a global community of living organisms in a fashion compatible and harmonious with self-regulation? Many of us are still seeking answers to these questions, though the notion of humans as a force within the planetary community towards improved biodiversity was advanced by Lovelock's work.

E.O. Wilson's *Biophilia* emphasized the philosophical underpinnings of the human compulsion and innate drive towards interactions with other forms of life. Wilson argued that "the connections that human beings subconsciously seek with the rest of life are inherent in our biology." It is argued that modern western society has disengaged the masses in recognizing and engaging with their love of life-giving systems. This mindset is responsible for ecological degradation and biodiversity loss (Wilson 1984). To reverse these outcomes, Wilson argues a philosophical motivation towards conservation of species through reconnecting with our inherent biophilic nature. Through this teaching and mindset, community groups and organizations have worked together to advance conservation projects, many of which may be considered biodiversity islands.

Murray Bookchin's book "Ecology of Freedom" also advanced philosophical motivations towards community-led action towards greater biodiversity through the message of social ecology, linking human relationships within society to human relationships towards the land and natural systems (Bookchin 1982). In societies where domination and exploitation are the norm, one may recognize similar patterns imposed on the landscape. These outcomes may also manifest in a downtrodden psyche of the individual. It is suggested that societies built upon foundations of

mutual respect among people may materialize a more uplifted psyche of the individual and permeate into a more harmonious societal relationship with the landscape and natural resources. Though criticized as utopian by some, the greater message purveyed is that through such reciprocal positive mechanisms of right relationship between people to people and people to place, the individual spirit may be lifted, and greater freedom emerge. Through this philosophical concept, further motivations towards greater biodiversity outcomes have entered the western canon of environmental thought, in conjunction with advances in environmental ethics, as discussed in the previous section.

More recently, evolution in environmental philosophy and ethics advanced by Stephen Kellert, Mary Evelyn Tucker, and John Grimm, among others, has continued to shape a mindset towards a more interconnected worldview of community. In Mary Evelyn Tucker and Brian Swimme's "Journey of the Universe," the interconnection and interrelation of all beings brings a biophilic understanding towards the basis of community (Swimme and Tucker 2011). Stephen Kellert advanced an ethical imperative within design to incorporate both human and ecological considerations within any project (Kellert 2018). "The Value of Life" is an exploration of the actual and perceived importance of biological diversity for human beings and society (Kellert 1997). Stephen R. Kellert identifies ten basic values, which he describes as biologically based, inherent human tendencies that are greatly influenced and moderated by culture, learning, and experience. Drawing on 20 years of original research, he considers the universal basis for how humans value nature. Differences in those values vary by gender, age, ethnicity, occupation, and geographic location. He discusses how environment-related activities affect values, variation in values relating to different species, how values vary across cultures, and their policy and management implications. Throughout his book "Nature by design: The practice of biophilic design," Kellert argues that the preservation of biodiversity is fundamentally linked to human well-being in the largest sense, as he illustrates the importance of biological diversity to the human sociocultural and psychological condition (Kellert 2018).

19.2.2 Scientific Motivations

Rachel Carson advanced biological conservation and subsequent conservation projects through the scientific underpinnings of "Silent Spring" her famous book that pinpointed the environmental harms brought about by widespread and unregulated pesticide use (Carson 1962). Carson's effective and open communications of the loss of biological diversity brought regulation, ignited public discourse, bolstered the formation of the United States Environmental Protection Agency (EPA), and inspired a generation of environmentalists. This heightened awareness and profoundly shaped the western mindset regarding the environment.

Advances in conservation biology, regarding the measurement, distribution, abundance, and loss of species through time create another motivating factor for

conserving biodiversity (Hawksworth 1995). As it becomes clear that more habitat is lost due to deforestation and habitat destruction, science-based motivations for community-led efforts for biodiversity conservation grow (Hawksworth 2010a, b). As such, knowledge regarding inventories for understanding baseline terrestrial biodiversity for estimating both local and global species diversity can allow for both rapid assessment and comparison of species diversity across geographies (Colwell and Coddington 1994). Numerous textbooks, journals, and publications have been created to further advance knowledge in these realms (Hawksworth 2012). As it becomes clear that species loss is greater, motivations to implement practices for conservation are bolstered. In many instances, communities may advance and aid in the scientific understanding of conservation or utilize scientific methodology to implement best practices in biodiversity conservation.

Overall, there can be a strong motivation towards the advancement of biodiversity islands from the academic and scientific realm. Biodiversity islands are the subject of study from many different angles, from edge effect to island biogeography (Montagnini et al. 2022). Deepening the scientific understanding of forest patch dynamics also provides a motivation for conservation of such landscape features.

19.2.3 Grassroots Motivations

Other motivations for biodiversity conservation may arise from grassroots actions and through counterculture. In communities where, for a variety of reasons, institutional or governmental engagement has been ineffective, grassroots education and action may emerge to bring forth greater biological diversity through community efforts in degraded, human-dominated landscapes. This can be seen in various forms and is distinctly recognized through development of grassroots community gardening, urban agriculture, and in the permaculture movement worldwide (Veteto and Lockyer 2008; Ferguson and Lovell 2014).

Gardens are known to have the potential to foster significant diversity in cultural, biological, and agro-biological ways (Galluzzi et al. 2010; Goddard et al. 2010; Negret et al. 2022). In urban centers throughout the United States and beyond, community gardens have emerged, bringing forth both resilient food systems and positive biodiversity outcomes from grassroots formation (Clarke and Jenerette 2015; Di Pietro et al. 2018). Additionally, the permaculture movement is responsible for the development of thousands of projects throughout the globe which enhance biodiversity outcomes (Toensmeier 2022). Built upon ethical principles, permaculture and the training course known as a Permaculture Design Certificate (PDC) offer students a method for designing biologically diverse "permanent" agriculture systems and explore methods for sustained human habitation on a landscape (Mollison 1988). Similar local agroecological trainings, workshops, and community-led

courses provide a grassroots approach to such training, especially in those cases where institutional and formal education fails to provide this information.

19.2.4 Economic Motivations

Economic motivations may also drive community-led action towards the development of biodiversity islands. Although historically economic motivations have often led to exploitation and landscape degradation, such motivations can also be a force for conservation of biodiversity.

Examples of profitable biodiversity enhancing community enterprise models span a diverse range of geographies, cultures, products, and services offered (Hay-Edie and Halverson 2006). This includes sustainable ecotourism, where visitors pay to stay and engage with local cultures and traditions. Though complex and sometimes difficult to obtain, the biodiversity of ecotourism sites can be significantly higher than that of the surrounding human-dominated and degraded landscape (Gossling 1999; Chung et al. 2018). Examples of other community enterprises which support similar biodiversity outcomes have been shown to produce a broad range of products such as basketry, incense, herbal medicines, and teas (Jarrett et al. 2017; Rocha et al. 2017).

Agricultural production may also play an important role in community enterprise development which supports biodiversity conservation within a broader degraded landscape (Badgley 2018). Sustainable agricultural models in which biodiversity islands are developed through collectives and community action include crops such as cacao, coffee, tea, yerba mate, dried fruits, and various other species (Erisman et al. 2016; Dudley and Alexander 2017; Hunter et al. 2017; Montagnini and del Fierro 2022). Sustainable timber production has also been a method of enterprise creation that can respect and support biodiversity conservation within degraded landscapes in addition to positive economic outcomes (Carey et al. 1999).

19.3 Land Access, Tenure, and Long-Term Control for Pockets of Biodiversity

For any community action towards the development of biodiversity islands to take place, long term control, tenure, and decision-making authority over the land base are paramount. Community land management without legal authority may prove difficult into posterity. This is documented in numerous case studies worldwide, from local government closure of community gardens on vacant urban land to the removal of indigenous people from ancestrally managed lands (Springer 2009; Holmes and Cavanagh 2016). Acquiring land title or the ability to manage lands in response to governmental territorial expansions may prove particularly

challenging for societies without robust property laws or in cultures without concepts of land ownership. In societies where property rights are recognized and biodiversity outcomes are a community objective, people can find innovative ways to engage with legal frameworks to gain and maintain land access and tenure through time. Examples of such methods include use of land trusts and conservation easements, supportive zoning, inventive financial resource pooling, robust laws supporting indigenous land rights, and the use of public lands which encourage community-led biodiversity conservation. These methods are discussed in the following section.

19.3.1 Conservation Easements and Community Land Trusts

Conservation easements are one tool that may be advocated for by a community for the development of biodiversity islands. Conservation easements are voluntary legal agreements between landowners and a land trust or government agency that protects conservation values on a property by permanently limiting uses of the land and offering tax incentives to the landowner. A land trust or community land trust is a non-profit organization that acquires land or conservation easements through support from donations or government funding. The opportunity for land trusts to maintain and protect biodiversity through such conservation easements is significant (Rissman et al. 2007; Wilson 2011). In many instances, a land trust acts as a conservation organization to help draft, implement, and ensure compliance with an easement while prioritizing community and conservation goals. Community land trusts are a subset of land trusts which specifically focus on the development and conservation of community assets for community benefit. Such a model may be particularly valuable towards the development of biodiversity islands. There are several examples around the world where conservation easements are used for the protection of biodiversity in the USA, Canada, Australia, Costa Rica, and other countries (Alexander and Hess 2012).

Conservation easements may include restrictions on development and land uses such as recreation, forestry, agroforestry, or agriculture. These easements, which provide conservation value in addition to opportunities for land-based revenue generation, are known as working land conservation easements. Throughout the world, communities can support and develop community land trusts to assist in the development of community-led biodiversity islands to transition private lands into long-term community conservation projects. In Chap. 1 (Montagnini et al. 2022) an example is shown of a Land Trust that received a donation from a family whose members preferred that their land was preserved and used for recreation instead of selling it. This is just one example where through land trusts and conservation easements community action provides protection of a biodiversity island and judicious management for posterity.

19.3.2 Innovative Financing for Biodiversity Islands

The use of innovative financing to acquire property is another method for long-term community-led land control which can support the development of biodiversity islands. A group of community members or a community organization may pool financial resources to acquire land outright through a cash purchase or a loan. This is seen in numerous countries throughout the world including lands and resources surrounding Juan Castro Blanco National Park in Costa Rica (Castro-Arce and Vanclay 2020). This community pooling of resources is also known as crowdsourcing. While there has been significant advancement and literature on the use of crowdsourced data collection in relation to biodiversity conservation, such as monitoring bird species and populations, there is much opportunity for the use of internet platforms as tools for further crowdsourced funding for the acquisition of property which may enhance biodiversity outcomes through time. The advent of multiple online platforms which allow for numerous smaller donations or investments to develop into projects, provides a groundwork for the advancement of crowdfunding towards biodiversity conservation (Gallo-Cajiao et al. 2018).

19.3.3 Indigenous Land Rights Protecting Biodiversity

Strong indigenous land rights can allow for biodiversity islands to emerge or persist throughout otherwise degraded landscapes. Dominion within current or historically inhabited and managed indigenous lands can support sovereignty, knowledge sharing, cultural empowerment, and positive biodiversity outcomes through time (Langton and Rhea 2005; Erikson 2008; Sobrevila 2008; Garnett 2018; Baldwin and Beazley 2019; Beller et al. 2020). Native title (Australia), Indian title (United States), Customary title (New Zealand) or Indigenous or Aboriginal title are common law doctrines which strengthen sovereignty of historical land rights through recognition by governments. While such rights may be powerful, many indigenous peoples emphasize indigenous rights that do not necessitate state sanctions to exist (Gilbert 2016).

Secure and long-term indigenous management of landscapes are worth highlighting in relation to community-led action toward the development of biodiversity islands. Research on this topic is steeped in complexity. Not all indigenously managed lands promote biodiversity, particularly in instances where resources were overexploited through time (Raymond 2007). Additionally, there are many examples where indigenous sovereignty has been withdrawn in the name of biodiversity conservation (Baldwin and Beazley 2019; Beller et al. 2020). With these considerations in mind, this section seeks to highlight the potential power and opportunity of indigenous land rights as a tool for community-led biodiversity islands to emerge and persist in otherwise degraded landscapes.

19.4 Governance and Management of Biodiversity Islands

Once land tenure is achieved, proper governance and subsequent management of biodiversity islands is essential for long term success. Such governance and management can increase biodiversity through time, allow community members to have a voice in decision-making, and avoid resource degradation, species loss, and a tragedy of the commons. Governance can take many varied forms across a range of scales depending on culture and context. Commonly, hierarchical decision making dominates organizational governance. While hierarchical governance is effective to achieve certain ends, alternative egalitarian governance structures may also be effective for community managed lands (Leventon et al. 2019). This chapter highlights three methods of land governance aligned with community-led action that may support high levels of biodiversity within a larger degraded landscape through commons, cooperatives, and community based conservation approaches.

Governance as commons, where land is held equally by all community members, allows for egalitarian ownership of a space. Common resources governed and adapted to local conditions with clear boundaries, measured outcomes, defined rules and mechanisms for conflict resolution, and self-determination prove resilient. Such governance allows for nested enterprises to emerge and common resource pools to persist through time. While some argue that community-owned resources degrade through time due to motivations of self-interest leading to overuse, deemed a tragedy of the commons, countless examples of long-term community managed resources refute such claims (Hardin 1968; Ostrom 1990). As applied to biodiversity islands, these governance strategies and other types of community governance are foundational support for management through time.

Cooperatives as an organizational approach can also provide a more egalitarian governance and management method to community-fostered biodiversity islands. In such approaches, ownership and decision making tend to be more equitably distributed throughout the organization, and outcomes, yields, and profits are then distributed accordingly. Globally, examples of agricultural cooperatives that value and incorporate agrobiodiversity into their cultivation practices are numerous (Méndez et al. 2007). Cooperative organizations which incorporate ethos of biodiversity conservation span many industries and both non-profit and for-profit ventures. Such systems can enhance social capital, which has shown to maintain positive biodiversity outcomes within degraded landscapes (Pretty and Smith 2004).

Advances in community-based conservation (CBC) may also provide the mechanisms toward effective development, governance, and management of biodiversity islands through time. CBC seeks to align development and conservation outcomes emergent from the community. Criticism of such methods of conservation have emerged due to the preponderance of linear thinking about development, often considering a single variable such as Gross Domestic Product (GDP) and situations where conservation and human habitation are seen as incompatible. Approaches that consider humans as part of the ecosystem and promote wide scale participation in ecosystem management provide a more feasible context from which CBC may

emerge (Otto et al. 2013). The integration of concepts of common property, traditional ecological knowledge, environmental ethics, political ecology, and environmental history can further support the longevity of projects, providing knowledge of the past, reflection of the present resources, opportunities among stakeholders, and a context for visioning future goals.

The importance of fluid and adaptive collaborative approaches which recognize multiple stakeholders and development goals may also contribute significant value to CBC projects (Berkes 2004). Participatory consent-driven decision making as exemplified by the frameworks of Holacracy,[1] provides an example of participatory governance which may be applied to further mature CBC (Robertson 2015). The examples of CBC projects throughout the world that have increased biodiversity within degraded landscapes are extensive (Otto et al. 2013). For this reason, it is important to note that CBC can provide a strong avenue for community-led action towards the development of biodiversity islands.

19.5 Community Engagement and Advocacy Towards Biodiversity Islands

Community engagement and advocacy are other important forces towards the development of biodiversity islands. Intercultural and interpersonal communication, education and political engagement which support the appreciation and values of biodiversity within a landscape are foundational. Interpersonal communication through talking and engaging with neighbors and community members and fostering good relationships is an essential first step in building community coalitions for biodiversity conservations. Once achieved, intercultural communication, with different belief systems, histories, stories, and relationships to landscape and place, can then build the foundations from which a more biodiverse landscape may arise within a community (Pretty et al. 2009).

Environmental education focused around topics of biodiversity are shown to be effective to engage, empower, and bridge science and social issues (Van Weelie and Wals 2002). When this knowledge is imparted on youth, a next generation may prioritize issues of biodiversity conservation. When this knowledge is shared with politicians through actions of lobbying and political engagement, innovative legal tools and frameworks may be adopted or developed by governments. Scheduling meetings with local, regional, and national representatives, attending governmental meetings, writing letters, and coalition building are strategic tactics for empowering government action.

[1] Holacracy is a method of decentralized management and organizational governance, in which authority and decision-making are distributed throughout self-organizing teams rather than being vested in a management hierarchy.

19.6 Examples of Community-Led Conservation Strategies

Examples of grassroots community action for the advancement of conservation practices are numerous, diverse, and worldwide (de Boef et al. 2013; Otto et al. 2013). Ancient traditional cases of biodiversity islands within the landscape are exemplified by religious and sacred sites worldwide. Other examples span urban and rural settings, agrarian and nomadic cultures, and incorporate various organizational approaches.

Sacred groves, or natural sites that are dedicated to ancestral and spiritual deities, are found throughout the world. These sites often harbor and protect greater biodiversity than surrounding degraded landscapes (Bhagwat and Rutte 2006; Khan et al. 2008). Church forests, ancient temples, and dedicated sections of rivers and waterways have been protected and maintained by cultures throughout the globe for religious purposes for millennia (Baez Schon et al. 2022). Deeply held intergenerational importance of such sites provides strong community incentive for conservation through time. Other examples of sacred sites that serve as biodiversity islands include the Mizorom sacred groves in Northeastern India, sacred pools called Íbú ódó protected by Tchabè communities along the Ouèmé and Okpara Rivers of Central Benin (West Africa), sacred cacao groves of the Maya, and other sacred groves in Zimbabwe, Ghana, Thailand, China, and Nepal (Gómez-Pompa et al. 1990; Gadgil et al. 1993; Bhagwat and Rutte 2006; Ceperley et al. 2010). These biodiversity islands share common outcomes where community action enhances and protects biodiversity through time in human-dominated landscapes. Although the original purpose in most cases is not to create biodiversity islands, biodiversity islands are a consequence of their actions. Other community-protected sites include the village forests in Indonesia, known as Hutan Desa, which are legally recognized for the ecosystem services and benefits to society they provide. Their management and protection are guided by traditional communal governance as well (Moeliono et al. 2015).

Traditional methods of community-based biodiversity conservation which can maintain or build biodiversity islands may also include agrarian and nomadic cultures. The Yanesha at the headwaters of the Amazon basin in Central Peru have hunted, gathered, and farmed sustainably for thousands of years with little evidence of biodiversity degradation (Salick 1989). As deforestation and unsustainable development expand, community-led traditional landscape management provides the opportunity for biodiversity islands to emerge. In some instances, levels of biodiversity within traditional communities can increase through agricultural production as documented throughout Amazonia (Erikson 2008). Community-fostered swidden systems from Southwest China to the Ecuadorian Amazon to Madagascar can be managed in accordance with biodiversity enhancing outcomes (Rerkasem et al. 2009; Xu et al. 2009). In other examples, such as in the Southwestern-United States, species composition of agricultural plots is actively managed to embrace diversity and complexity in both production species and management of surrounding habitat (Nabhan 2000).

Moreover, community-led biodiversity islands exist in highly varied geographies catalyzed by diverse organizational structures. Rural community action from Zapatistas in southern Mexico to community restoration projects in Northern Ethiopia to the newly developing global concept of Ecosystem Restoration Camps, all seek to enhance biodiversity outcomes in rural settings through community efforts (https://www.ecosystemrestorationcamps.org/, Sigman 2022). Non-profit organizations such as Eco-agriculture Partners and The Forest Dialogue also aim to help engage community action for biodiversity in rural settings through methods of community engagement within integrated landscape management (https://ecoagriculture.org/, https://theforestsdialogue.org/). In suburban settings homegardens, community garden projects, and ecovillages act as biodiversity islands in the fragmented landscape (Negret et al. 2022; Toensmeier 2022). Enterprises such as Permaculture Artisans, a California-based landscaping company, develop properties into productive gardens, creating biodiversity islands on the suburban landscape (www.permacultureartisans.com). In the urban context, the rise of urban forestry, urban community gardens, and educational centers which support these ends continue to grow in popularity (Soler et al. 2022). These examples in varied scales of population density, diverse cultures, and various locations, provide excellent lessons for community-led action advancing the creation, establishment, and maintenance of biodiversity islands.

19.7 Conclusion

Community-led action towards the development of biodiversity islands demands looking beyond just the human factors of place to include all living beings and biophysical components that make up the community. Motivations for biodiversity conservation are diverse across cultures. In many instances, historical ecology and indigenous and traditional philosophies of the region may empower decision making and cultural practices towards the development and preservation of biodiversity islands. When empowered, communities across a range of contexts may effectively mobilize towards protecting, creating, and expanding islands of biodiversity. Land access and long-term decision-making authority become essential in the longevity of such pockets of biodiversity. Various legal and financial strategies such as conservation easements, community land trusts, and novel methods of crowdsourced funding can further aid in successful outcomes. Once biodiversity islands emerge within a landscape, egalitarian management and governance approaches have proven effective through time. Community advocacy may further bolster related positive outcomes. By employing these tactics, community-led biodiversity islands can rapidly multiply and continue to span the globe, as protected pockets of biodiversity.

References

Alexander L, Hess GR (2012) Land trust evaluation of progress toward conservation goals. Conserv Biol 26(1):7–12

Badgley C (2018) Biodiversity and sustainable agriculture. Promoting biodiversity in food systems. In: Hawkins IW (ed) Promoting biodiversity in food systems. CRC Press, Boca Raton, pp 165–182

Baez Schon M, Woods CL, Cardelús CL (2022) Sacred church forests in northern Ethiopia: biodiversity and cultural Islands. In: Montagnini F (ed) Biodiversity islands: strategies for conservation in human-dominated environments. Springer, Cham, pp 531–549

Baldwin RF, Beazley KF (2019) Emerging paradigms for biodiversity and protected areas. Land 8(3). https://doi.org/10.3390/land8030043

Balée W (1993) Indigenous transformation of Amazonian forests: an example from Maranhão, Brazil. L'Homme 33:231–254

Balée W (1998) Advances in historical ecology. Columbia University Press, New York. 429pp

Beller EE, McClenachan L, Zavaleta ES, Larsen LG (2020) Past forward: recommendations from historical ecology for ecosystem management. Global Ecol Conserv 21. https://doi.org/10.1016/j.gecco.2019.e00836

Berkes F (2004) Rethinking community-based conservation. Conserv Biol 18(3):621–630

Berkes F (2017) Environmental governance for the Anthropocene? Social-ecological systems, resilience, and collaborative learning. Sustainability 9(7):1232. https://doi.org/10.3390/su9071232

Berkes F, Folke C, Gadgil M (1994) Traditional ecological knowledge, biodiversity, resilience and sustainability. In: Perrings CA, Mäler KG, Folke C, Holling CS, Jansson BO (eds) Biodiversity conservation. Springer, Switzerland AG, pp 269–287

Bhagwat SA, Rutte C (2006) Sacred groves: potential for biodiversity management. Front Ecol Environ 4(10):519–524

Bookchin M (1982) The ecology of freedom. Cheshire Books, Palo Alto, p 480

Carey AB, Lippke BR, Sessions J (1999) Intentional systems management: managing forests for biodiversity. J Sustain For 9(3–4):83–125

Carson R (1962) Silent Spring. Houghton Mifflin, Boston

Castro-Arce K, Vanclay F (2020) Transformative social innovation for sustainable rural development: an analytical framework to assist community-based initiatives. J Rural Studies 74:45–54

Ceperley N, Montagnini F, Natta A (2010) Significance of sacred sites for riparian forest conservation in Central Benin. Bois Forêts Tropiques 303:5–23

Chung MG, Dietz T, Liu J (2018) Global relationships between biodiversity and nature-based tourism in protected areas. Ecosyst Serv 34:11–23

Clarke LW, Jenerette G (2015) Biodiversity and direct ecosystem service regulation in the community gardens of Los Angeles, CA. Landsc Ecol 30(4):637–653

Colwell RK, Coddington JA (1994) Estimating terrestrial biodiversity through extrapolation. Philos Trans R Soc Lond B Biol Sci 345(1311):101–118

Crosby AW (2004) Ecological imperialism: the biological expansion of Europe, 900–1900. Cambridge University Press, Cambridge

de Boef WS, Subedi A, Peroni N, Thijssen M, O'Keeffe E (eds) (2013) Community biodiversity management: promoting resilience and the conservation of plant genetic resources. Routledge, Abington

Di Pietro F, Mehdi L, Brun M, Tanguay C (2018) Community gardens and their potential for urban biodiversity. In: Gladtron S, Granchamp L (eds) The urban Garden City. Springer, New York, pp 131–151

Dudley N, Alexander S (2017) Agriculture and biodiversity: a review. Biodiversity 18(2–3):45–49

Dunson WA, Travis J (1991) The role of abiotic factors in community organization. Amer Nat 138(5):1067–1091

Erickson CL (2008) Amazonia: the historical ecology of a domesticated landscape. In: Isbell W (ed) Silverman H. The Handbook of South American Archaeology Springer, New York, pp 157–183
Erisman JW, van Eekeren N, de Wit J, Koopmans C, Cuijpers W, Oerlemans N, Koks BJ (2016) Agriculture and biodiversity: a better balance benefits both. Agric & Food 1(2):157–174
Ferguson RS, Lovell ST (2014) Permaculture for agroecology: design, movement, practice, and worldview. A review. Agron Sustain Dev 34(2):251–274
Gadgil M, Berkes F, Folke C (1993) Indigenous knowledge for biodiversity conservation. Ambio:151–156
Gallo-Cajiao E, Archibald C, Friedman R, Steven R, Fuller RA, Game ET, Morrison TH, Ritchie EG (2018) Crowdfunding biodiversity conservation. Conserv Biol 32(6):1426–1435
Galluzzi G, Eyzaguirre P, Negri V (2010) Home gardens: neglected hotspots of agro-biodiversity and cultural diversity. Biodivers Conserv 19(13):3635–3654
Garnett ST, Burgess ND, Fa JE, Fernández-Llamazares Á, Molnár Z, Robinson CJ, Watson JE, Zander KK, Austin B, Brondizio ES, Collier NF (2018) A spatial overview of the global importance of indigenous lands for conservation. Nat Sustain 1(7):369
Gilbert J (2016) Indigenous peoples' land rights. International Law Brill Publishers, Leiden
Goddard MA, Dougill AJ, Benton TG (2010) Scaling up from gardens: biodiversity conservation in urban environments. Trends Ecol Evol 25(2):90–98
Gómez-Pompa A, Flores JS, Fernández MA (1990) The sacred cacao groves of the Maya. Lat Amer Antiq 1(3):247–257
Gössling S (1999) Ecotourism: a means to safeguard biodiversity and ecosystem functions? Ecol Econ 29(2):303–320
Hardin G (1968) The tragedy of the commons. Science 162(3859):1243–1248
Harvey G (2005) Animism: respecting the living world. Wakefield Press, Adelaide
Hawksworth DL (ed) (1995) Biodiversity: measurement and estimation. Chapman and Hall, London
Hawksworth DL (ed) (2010a) Management and the conservation of biodiversity. Springer, New York
Hawksworth (ed) (2010b) Methods and practice in biodiversity conservation. Springer, New York
Hawksworth DL (2012) Books on biodiversity and conservation. Biodivers Conserv 21(14): 3745–3769
Hay-Edie T, Halverson E (2006) Community action to conserve biodiversity: linking biodiversity conservation with poverty reduction. GEF Small Grants Programme, UNDP, New York. sgp.undp.org
Holmes G, Cavanagh CJ (2016) A review of the social impacts of neoliberal conservation: formations, inequalities, contestations. Geoforum 75:199–209
Hunter D, Guarino L, Spillane C, McKeown PC (eds) (2017) Routledge handbook of agricultural biodiversity. Routledge, Abington
Inglis J (ed) (1993) Traditional ecological knowledge: concepts and cases. IDRC, Ottawa
Jarrett C, Cummins I, Logan-Hines E (2017) Adapting indigenous agroforestry systems for integrative landscape management and sustainable supply chain development in Napo, Ecuador. In: Integrating landscapes: agroforestry for biodiversity conservation and food sovereignty. Springer, Cham, pp 283–309
Kellert SR (1997) The value of life: biological diversity and human society. Island Press, Washington DC
Kellert SR (2018) Nature by design: the practice of biophilic design. Yale University Press, New Haven
Khan ML, Khumbongmayum AD, Tripathi RS (2008) The sacred groves and their significance in conserving biodiversity: an overview. Int J Ecol Environ Sci 34(3):277–291
Langton M, Rhea ZM (2005) Traditional indigenous biodiversity-related knowledge. Aust Acad & Res Libr 36(2):45–69

Leopold A (1949) A Sand County almanac, and sketches here and there. Oxford University Press, New York

Leventon J, Schaal T, Velten S, Loos J, Fischer J, Newig J (2019) Landscape-scale biodiversity governance: scenarios for reshaping spaces of governance. Environ Policy Gov 29(3):170–184

Lovelock J (1979) Gaia: a new look at life on earth. Oxford University Press, Oxford

Méndez V, Gliessman SR, Gilbert GS (2007) Tree biodiversity in farmer cooperatives of a shade coffee landscape in western El Salvador. Agric Ecosyst Environ 119(1–2):145–159

Moeliono M, Mulyana A, Adnan H, Manalu P, Yuliani L (2015) Village forests (hutan desa): empowerment, business or burden? World Agroforestry Centre-ICRAF, Southeast Asia Regional Office, Bogor

Mollison B (1988) Permaculture: a Designer's manual. Tagari Publications, Sisters Creek

Montagnini F, del Fierro S (2022) Functions of agroforestry systems as biodiversity islands in productive landscapes. In: Montagnini F (ed) Biodiversity islands: strategies for conservation in human-dominated environments. Springer, Cham, pp 89–116

Montagnini F, Levin B, Berg KE (2022) Biodiversity Islands. Strategies for conservation in human-dominated environments. In: Montagnini F (ed) Biodiversity islands: strategies for conservation in human dominated environments. Springer, Cham, pp 1–35

Nabhan GP (2000) Native American management and conservation of biodiversity in the Sonoran Desert bioregion. In: Minnis PE, Elisens WJ (eds) Biodiversity and native America. University of Oklahoma Press, Norman, pp 29–44

Nabhan G, Hodgson W, Fellows F (1989) A meager living on lava and sand? Hia ced O'odham food resources and habitat diversity in oral and documentary histories. J Southwest:508–533

Negret HRC, Negret R, Montes-Londoño I (2022) Residential garden Design for Urban Biodiversity Conservation: Experience from Panama City, Panama. In: Montagnini F (ed) Biodiversity islands: strategies for conservation in human-dominated environments. Springer, Cham, pp 387–417

Ostrom E (1990) Governing the commons: the evolution of institutions for collective action. Cambridge University Press, Cambridge

Otto J, Zerner C, Robinson J, Donovan R, Lavelle M, Villarreal R, Salafsky N, Alcorn J, Seymour F, Kleyneyer C, Pearl M (2013) Natural connections: perspectives in community-based conservation. Island Press, Washington D.C

Peters CM (2018) Managing the wild: stories of people and plants and tropical forests. Yale University Press, New Haven

Pretty J, Smith D (2004) Social capital in biodiversity conservation and management. Conserv Biol 18(3):631–638

Pretty J, Adams B, Berkes F, de Athayde S, Dudley N, Hunn E, Maffi L, Milton K, Rapport D, Robbins P, Sterling E, Stolton S, Tsing A, Vintinnerk E, Pilgrim S (2009) The intersection of biological diversity and cultural diversity: towards intersection. Conserv Soc 7:100–112

Prieto Méndez JM (2013) Derechos de la naturaleza. Fundamento, contenido y exigibilidad jurisdiccional. Corte Constitucional del Ecuador, CEDEC, Quito. 280pp

Raymond H (2007) The ecologically noble savage debate. Ann Rev Anthropol 36:177–190

Rerkasem K, Lawrence D, Padoch C, Schmidt-Vogt D, Ziegler AD, Bruun TB (2009) Consequences of swidden transitions for crop and fallow biodiversity in Southeast Asia. Hum Ecol 37(3):347–360

Rissman AR, Lozier L, Comendant T, Kareiva P, Kiesecker JM, Shaw MR, Merenlender AM (2007) Conservation easements: biodiversity protection and private use. Conserv Biol 21(3): 709–718

Robertson BJ (2015) Holacracy: the new management system for a rapidly changing world. Henry Holt and Company, New York

Rocha P, Niella F, Keller H, Montagnini F, Metzel R, Eibl B, Kornel J, Romero F, López L, Araujo J, Barquinero J (2017) Ecological indigenous (EIK) and scientific (ESK) knowledge integration as tool for sustainable development in indigenous communities. Experience in Misiones, Argentina. In: Montagnini F (ed) Integrating landscapes: agroforestry for biodiversity conservation and food sovereignty, advances in agroforestry 12. Springer, Cham, pp 235–260

Salick J (1989) Ecological basis of Amuesha agriculture, Peruvian upper Amazon. Adv Econ Bot:189–212
Salick J (2012) Indigenous peoples conserving, managing, and creating biodiversity. In: Harlan JR, Gepts P, Famula TR, Bettinger RL, Brush SB, Damania AB, McGuire PE, Qualset CO (eds) Biodiversity in agriculture: domestication, evolution, and sustainability. Cambridge University Press, Cambridge, pp 426–445
Sigman E (2022) Safeguarding the benefits of biodiversity islands in northern Ethiopia in the midst of political change. In: Montagnini F (ed) Biodiversity islands: strategies for conservation in human-dominated environments. Springer, Cham, pp 647–674
Sobrevila C (2008) The role of indigenous peoples in biodiversity conservation World Bank, Washington D.C.
Soler R, Benítez J, Solá F, Lencinas MV (2022) Biodiversity islands at the world's southernmost city: plant, bird and insect conservation in urban forests and peatlands of Ushuaia, Argentina. In: Montagnini F (ed) Biodiversity islands: strategies for conservation in human-dominated environments. Springer, Cham, pp 419–437
Springer J (2009) Addressing the social impacts of conservation. Conserv Soc 7(1):26–29
Swimme B, Tucker ME (2011) Journey of the universe. Yale University Press, New Haven
Toensmeier E (2022) Paradise lot: a temperate urban multistrata agroforestry island of biodiversity. In: Montagnini F (ed) Biodiversity islands: strategies for conservation in human-dominated environments. Springer, Cham, pp 439–459
Van Weelie D, Wals A (2002) Making biodiversity meaningful through environmental education. Int JSci science Edu 24(11):1143–1156
Veteto JR, Lockyer J (2008) Environmental anthropology engaging permaculture: moving theory and practice toward sustainability. Cult Agric 30(1–2):47–58
Wilson EO (1984) Biophilia. Harvard University Press, Cambridge MA
Wilson R (2011) Documenting and protecting biodiversity on land trust projects. Land Trust Alliance, Washington DC
Xu J, Lebel L, Sturgeon J (2009) Functional links between biodiversity, livelihoods, and culture in a Hani swidden landscape in Southwest China. Ecol Soc 14(2). https://doi.org/10.5751/ES-02916-140220