



Frameworks for Biodiversity and Forests

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Abstract

This work reviews diverse definitions of biodiversity and forests used in different discourses as well as the most common conceptual frameworks that influence the understanding of the dynamics of forests and biodiversity. It presents the ways in which different frameworks (conservation biology, ecological economics, environmental policy, and collective action—institutional analysis theory) address issues of sustainability, diversity, and justice, themes commonly used as analytical dimensions and evaluative criteria of policies and programs aiming to avoid and/or revert socioenvironmental deterioration. It reflects on how these frameworks are driven by differences in normative and theoretical positions, and how these positions influence actions and outcomes. Examples are presented of programs that have conservation and sustainability goals in forest and other high-diversity systems. These cases illustrate how diverse framings and values approach issues of justice and governance and influence conservation and sustainable management programs.

To minimize conflicts and achieve more balanced actions and outcomes, it finds that value systems present in discourses and policies be recognized and that dialogue among them be enhanced. This is important not only for interdisciplinary work, but for dialogues aimed at integrating the questions, concerns, and tools of different frameworks to construct more holistic, inclusive, and effective approaches to socioecological realities.

Group photos (top left to bottom right) Leticia Merino-Pérez, Esther Mwangi, Georgina Mace, Peter Minang, Georgina Mace and Kent Redford, Unai Pascual and Victoria Reyes-García, Esther Mwangi, Leticia Merino-Pérez and Peter Minang, Unai Pascual and Victoria Reyes-García, Georgina Mace and Kent Redford, Ina Lehmann, Xuemei Bai and Ina Lehmann, Peter Minang and Gareth Edwards, Unai Pascual and Victoria Reyes-García, Kent Redford and Leticia Merino-Pérez, Unai Pascual, Ina Lehmann, Kent Redford, Esther Mwangi, Victoria Reyes-García, Georgina Mace

Introduction

The relationship between power and knowledge pervades the production of discourse and practice, including environmental knowledge and policies. The power–knowledge balance influences the construction of framings and frameworks¹ and shapes the definition of those discourses and practices regarded as legitimate. From the perspectives of various environmental framings and diverse academic fields, biodiversity and forests are regarded as key contemporary themes and intertwined issues. The ways in which they are perceived and the salience of their inherent dimensions and aspects varies according to the diverse representations of environment and society as well as to the optics of the diverse conceptual frameworks that are used to research and understand the processes under analysis.

While recognizing the relations among framings and frameworks in diverse realms of environmentalism, the systemic analysis of some of the most prominent contemporary environmental framings (Dauvergne 2016; Escobar 2008; Martinez-Alier 2011) and “environmentalities” (Agrawal 2006)² is outside the reach of this work. Our aim is more limited as we focus on the ways in which different environmental frameworks treat and regard biodiversity and forests, the questions and problems they raise, the concepts and models used to explain phenomena, and the prescriptions derived from these diverse frames.

Our main proposals are:

- Forests and other high-biodiversity regions are valued (and therefore sought to be conserved) for different reasons and values: intrinsic, instrumental (for a variety of benefits they provide at different scales), and relational.
- Definitions of “forest” (or “good forest”), “deforestation,” and especially “degradation” vary because the definers hold different values.
- Although conservation may be the dominant discourse for forests, discourses of sustainable use and of justice have also emerged significantly over the last few decades.
- Different disciplinary perspectives within academia are not only influenced by different values, they also involve different assumptions

¹ We understand framings as a set of concepts and perspectives based on how individuals, groups, and societies organize, perceive, and communicate about reality. It involves a social construction of social phenomena. Framing selects certain aspects of an issue and makes them more prominent so as to elicit certain interpretations and evaluations of an issue (Goffman 1974). In very general terms, a theoretical framework is regarded as a set of concepts, criteria, proposals, and assumptions that are relationally organized, together with their definitions and reference to relevant theory. Frameworks seek to explain the meaning, nature, and challenges associated with a phenomenon, often experienced but unexplained in social life, so that this knowledge and understanding enable more informed and effective actions.

² The concept of “environmentality,” as proposed by Agrawal (2006), refers to environmental policies that are dependent on the nature of constituting elements such as knowledge, politics, institutions, and identities.

about human behavior and hence about how forests and biodiversity should be governed.

We recognize that real-world “conservation” interventions vary in the amount of attention given to concerns for sustainable use and justice. They also vary in the assumptions made about human behavior. Although academic perspectives and implementation approaches may share common ground, implementation efforts must confront the diversity of values among stakeholders and face the need to become more inclusive over time.

We begin with a discussion of definitions and values attached to the concepts of biodiversity and forests. We address the primary challenges for biodiversity and forest sustainability and relate the definitions and policies to different value systems. Thereafter we review, from our perspective, the most relevant contemporary frameworks used in the understanding of problems related to biodiversity and forests, policy design, and social action. Using diverse cases of programs with conservation and/or sustainable management goals, we analyze the values that have impacted their design and implementation, and the type of governance systems in place.

Biodiversity and Forests: Definitions and Values

It is generally agreed that diversity of life is a key feature of planet Earth that should be preserved for the continuity of the presence and evolution of life. The meanings of biodiversity and conservation tend to be taken for granted, but in reality there are multiple understandings which differ in conceptual and technical approaches, value bases, and policy implications (Redford and Mace, this volume). The term “biodiversity” is a successor to the broad and polysemic notion of “nature,”³ in particular the post-1960 view of nature opposed to the idea of nature largely prevalent in the Western world as something that humans have to dominate. The term “biodiversity” was first used in the 1950s in American and British academic circles. Some years later it was adopted by international NGOs and U.S. government agencies and became central in conservation discourses and policies. As in the case of “nature,” the definition of the concept of biodiversity has proved complex to operationalize. The Convention on Biological Diversity (2014) defines biodiversity as “the variability among living organisms from all sources including, *inter alia*,

³ Whitehead (1920/2007) proposes to distinguish different meanings of “nature”: nature as the essence of a thing, nature as the “natural world” object of study of natural sciences, nature as opposed to artificial, nature as opposed to culture, nature as wilderness, and nature as expression of the divine. Whitehead (1920/2007) reviews the process of social construction of “nature,” distinguishing three related meanings: nature as a cultural construction, the cultural management of the environment, and the relations between humans, animals, and plants. More recently the Inter-Governmental Panel for Ecosystems and Biodiversity positions “nature” as a central category for diagnosis and policy making (Diaz et al. 2015).

terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” For conceptual, methodological, and policy purposes, this definition refers to variation of genes, species, and ecosystems occurring in local, regional, and global scales (see Redford and Mace, this volume).

Over the last half century, “conservation” has been understood in different ways:

- Conservation of nature, wilderness, and positions achieved mainly through protected areas
- Conservation oriented to prevent extinction, threats and threatened species, habitat loss, pollution, and overexploitation
- Through strategies such as logging bans and prohibition of extraction and commercialization of endangered species
- With an emphasis on ecosystems, ecosystem services, and economic values by promoting policies such as Payment for Ecosystem Services (PES), green taxes, and certification of sustainably produced goods
- In the context of environmental change, looking to build resilience and adaptability of socioecological systems, recurring to varied policy multiscale and multisectorial tools

Nevertheless, most nature conservationists and wildlife managers understand biodiversity as “all life on Earth” and/or as “species richness” (Redford and Mace, this volume). The concern for the loss of species, particularly in tropical forests, has been an important orientation of biodiversity conservation policies for a long time. From this perspective, the focus on “hotspots” (i.e., places with a high number of species and under significant threats) was regarded as a central problem and a priority for action (Vandermeer and Perfecto 2013). It remains a persistent feature of conservation policies. Other aspects, such as genetic and biocultural diversity, tend to receive much less attention. The complexity of this theme and the specialized knowledge it demands leads to the generalized perception that biodiversity is a field for scientists and conservation biology that is primarily science driven in spite of its highly normative approach.

Among the high-diversity ecosystems (e.g., deserts, grasslands, wetlands, and oceans), forests are particularly important as they host more than 80% of the terrestrial biological diversity (statistics from The World Bank). Thus, forest conservation is a main component of biodiversity conservation. The category of forests includes a wide variety of ecosystems. Different types of ecological communities with prevalence of perennial vegetation are currently classified as forests (humid tropical, dry tropical, temperate, boreal, and cloud forests). Vegetation in different conditions and successive stages (e.g., old growth forests, degraded forest, managed and secondary forests, and forest gardens) fall into this broad category. There are also various definitions of forest that incorporate factors such as tree density, tree height, land use, legal

standing, and ecological function (Convention on Biological Diversity 2014; UNEP 2010). The most widely used definition is the one provided by the Food and Agriculture Organization (FAO). It defines forests as areas with more than 0.5 ha and more than 10% of tree forest canopy, and trees as plants capable of growing more than 5 m (FAO 2015).

Deforestation is broadly understood as the disappearance of forest vegetation and is mostly used as a binary concept. The concept of degradation is more difficult to assess as it is related to losses of various environmental values, which are more difficult to capture and measure. In 1990 the FAO estimated that the world had 4128 million ha of forest (31.6% of the global land area). By 2015, twenty-five years later, forest extension had decreased to 3999 million ha (30.6%) (FAO 2016). From 2005–2015, the global deforestation rate halved in relation to the previous decade. Deforestation is a complex process with losses in some regions and gains in others. Forest recovery took place in much of the developed countries during the last decades of the nineteenth century and the beginning of the twentieth century. During the last decades, regions in developing countries have experienced processes of forest regrowth (Hecht et al. 2013).

Forests have been and are contested landscapes that bring to the fore tensions in values systems, economic goals, and social movements—tensions of environmentalisms that reflect justice, diversity, and sustainability issues. According to Hecht (2014), ideologies about forests, imagined histories, iconography, institutional arrangements, and competing knowledge systems structure the understanding of the social nature of forests. Forests—long regarded as remote areas, frontiers of civilization, wasteland, and unproductive lands—are home to local groups that are often externally or weakly controlled by central colonial powers. For the last 30 years, forests have been central to the framing of environmentalism: the isolation of forest ecosystems and forest dwellers has been associated with conservation of natural areas and biodiversity. Forests have also played a fundamental role in the debate on climate change, mitigation, and policy making.

Different stakeholders hold diverse instrumental, intrinsic, and relational values of forests and biodiversity. For local communities, forests are key providers of food, wood fuel, fodder, and medicines (Vira et al. 2016),⁴ and they are often a source of cultural identity. Forests provide important sources of revenue and raw materials for central authorities and corporations that largely control commercial extraction of timber⁵ and minerals from the mountainous subsoil of forest regions (Boyer 2015; Putz and Redford 2010; Scott

⁴ The United Nations estimated that 300 million people live in forests and 1.6 million people's livelihood depends on forest resources (UN 2011).

⁵ Trade in forest products was estimated at \$327 billion in 2004, most of this production comes from public forests under concessions to private firms, 80% of the world's forests are publicly owned (UN 2011).

1998). More recently, forests are valued as providers of various ecosystem services, including provisioning services already mentioned but also key supporting, regulating, and cultural services: soil formation, carbon sequestration, hydrological services, ecotourism, and so forth (Millennium Ecosystem Assessment 2005).

Problems arise when values held by different actors are not compatible when translated into actions toward nature that often diverge and conflict. Shifting cultivation is considered by some to be a sustainable management strategy that enables the presence of patches of vegetation in different successional stages; for others it is simply regarded as deforestation. Commercial forestry, which has largely been regarded as “rational” and “scientific,” is associated with the homogenization of forest systems. Strict conservation through restrictive protected areas are considered by many to be the best way to preserve forests and the biodiversity they host, whereas for others forest conservation should be achieved in the context of forest land-use planning and biocultural landscapes, which combine conservation with various forest uses.

Biodiversity and Forests through the Lens of Different Conceptual Frameworks

Over the last three decades, the conceptualization of forests and biodiversity has been enriched by insights and analytical tools from the ecological as well as social and economic sciences. In this section, we briefly describe the most relevant contemporary theoretical frameworks that we find useful to emphasize aspects of real problems and explain the main causes of forest and biodiversity losses or conservation, and build proposals aiming to revert environmental deterioration. We are fully aware that our review is far from exhaustive; however we hope that it will spur a more comprehensive reading of socioenvironmental realities. Following Lele and Kurien (2011), we review the perspectives of conservation biology, ecological economics, political ecology, and collective action theory. For each of these frameworks we reflect on their thematic/conceptual focus, their understanding of the causes and drivers of forest and biodiversity losses, and the general proposed prescriptions in terms of technical management and/or governance and the values explicitly or implicitly held. Thereafter, we review the extent and the ways in which these frameworks treat the themes of justice as well as biological and sociocultural diversity, which are increasingly relevant for conservation and sustainability movements and policies.

Conservation Biology

Conservation biology is the oldest and most established approach used to define biological diversity, and the natural sciences (biology, ecology, genetics)

are its primary contributors. This framework distinguishes different components of biodiversity—ecosystems, species, and genes (Redford and Richter 1999; Redford and Mace, this volume)—that are considered and evaluated in terms of composition (identity and variety of constituent elements), function (evolutionary and ecological processes acting among elements), and structure (physical organization pattern of elements). Different methodological and conceptual approaches are used to study biological diversity: Ecologists tend to focus on forms and functions of organisms in a given place, aiming to understand functions and dynamics of systems within communities and ecosystems. Evolutionary biologists focus on dynamics but with an emphasis on historic or inherited variations; that is, on genetic and phylogenetic attributes. Conservation biologists consider function and processes to be of primary concern for the preservation of species, genetic diversity, and to reach achievable solutions. Different metrics have been developed for the assessment of biodiversity in conservation planning; generally, all include attributes such as richness of species, intactness, native-ness, endemism, and risk of extinction.

Impacts of human activity (primarily implying redirection of matter, energy, and flows) in one or more biodiversity components are generally unknown and unappreciated (Redford et al. 2003). In terms of richness of species, the current rate of diversity loss is estimated to be 1000 times higher than the (naturally occurring) background extinction rate, and this is expected to continue to grow in the future. Another classification of biological diversity is the distinction between alpha diversity (the mean species diversity in sites or habitats at a local scale), beta diversity (the differentiation among those habitats), and gamma diversity (the total species diversity in a landscape). Given the wide variety of values, purposes, and contexts, there is no single simple measure of biodiversity. This complexity creates important challenges for the establishment of policy goals and targets.

The most relevant values from this framing are intrinsic (inherent) “from their uniqueness to their rights” (Pascual et al. 2016), making nature’s conservation justifiable and valuable in itself. Forests are intrinsically valued as high-diversity ecosystems whose preservation responds to the recognition of the rights of nonhuman species and to the importance of maintaining the evolution of life for which diversity is an integral dimension.

Biodiversity and forest losses are regarded as mainly consequences of “anthropogenic” behavior and activities. Social processes are conceptualized in a very general, homogenizing way, without systemic reflection on their structure and dynamics. “Anthropogenic presence” tends to be treated as a general analytical variable with negative impacts, leaving aside the role of societies in the protection and construction of natural landscapes and the complexity of the interactions between nature and societies. This framework distinguishes direct and indirect drivers of deterioration of natural systems. Direct drivers include

human activities⁶ and natural processes that interact with natural landscapes in ways defined as negative (Salfsky et al. 2008). Indirect drivers refer to a set of socioeconomic conditions (e.g., population growth, poverty, development) related to environmental performance based on overgeneralized, often ideological assumptions (e.g., population growth and poverty unavoidably lead to natural destruction). Explanations of environmental degradation lack a systemic approach that ignores fundamental social phenomena related in multiple ways to ecosystem conditions (e.g., production systems, power, heterogeneity–inequality, livelihoods, property, rights, governance, economic externalities, institutions, and knowledge systems).

Based on the notion of pristine nature as being distinctive and opposed to society and culture, proposals derived from this concept tend to recommend the reduction, ideally the absence, of human activities (even human presence) in areas of interest of biodiversity conservation. To achieve this purpose, this approach relies mostly on centralized governance schemes such as highly restrictive protected areas controlled by central governments (Dellas and Pattberg 2009; Mascia et al. 2014). Around the developing world, particularly in countries with tropical forests, the implementation of these policies carries severe social costs, often ignoring the rights of indigenous peoples and local communities. This approach is mostly held by global conservation agencies and national governments in conjunction with national academic conservation groups, but very rarely by local stakeholders (Hecht et al. 2013).

As discussed above, this framework has traditionally been concerned with the conservation of biological diversity: cultural and social diversity are usually external to its conceptual limits. The same is true for the consideration of justice. Nevertheless, the work of some conservationists in countries of the Global South, which has the largest share of global biodiversity, has led them to the recognition of local needs and of the necessity to embed them within conservation goals. In this sense, the scope of conservation biology within certain academic circles has started to include the understanding of local meanings and uses of nature, as well as the relational values that sustain the links of local societies with their natural surroundings.

Ecological Economics

Typically, markets fail to address forests and other high-diversity ecosystems as sources of marketable goods and nonmarketable services (positive externalities) essential for human life (Angelsen and Kaimowitz 1999; Doupe 2015). Economics and knowledge of ecosystem services are the scientific disciplines that contribute predominantly to the framework of ecological economics.

⁶ Mainly those that imply vegetation removal and pollution of ecosystems and natural resources (agriculture, cattle raising, urban development, etc.) and “natural” or socioenvironmental phenomena (e.g., climate change, forest fires and pests, ocean acidification).

Forest and biodiversity losses are considered to result from market failures: difficulties of markets to internalize the whole range of values provided by forests and biodiversity. These failures lead to the absence of incentives for the users and/or owners of natural resources to commit to the maintenance and protection of forests and other natural systems over time. Threats created by market failures are more sensible when preservation of natural systems implies high opportunity costs, defined as “the loss of potential gain from other alternatives when one alternative is chosen” (Buchanan 2008). This is often the case in contexts where actors have subsistence or developmental options that conflict with conservation of natural systems (Angelsen and Kaimowitz 1999; Geist and Lambin 2002; Muñoz-Piña et al. 2008).

Proposals influenced by ecological economics are directed to the creation of market-oriented conservation/sustainability tools and aim to “internalize” the value of environmental goods in the pricing of natural resources and services. These proposals and policies seek to create incentives for local users and landowners to commit to sustainable management and conservation measures. Because of the diversity of goods and services provided by forests as well as the global concerns associated with deforestation, most of these tools and practices have been applied primarily to forest ecosystems.

PES schemes represent one of the most common strategies derived from this approach. Their aim is to compensate landowners for the environmental services provided by their lands (mostly forests); in exchange, landowners must commit with management measures defined by the paying parties, which generally include the abandonment of production on the lands involved in the programs (Pagiola 2008; Wunder 2005, 2015).⁷ Despite the emphasis given to the need for environmental service markets, these markets have been difficult to create. To date, many instances of PES rely on government subsidies, not on real markets. Other cases, mostly those working on carbon sequestration and climate change, have engaged in the creation of international markets for this service with the participation of international agencies and banks, NGOs, and corporations. Other difficulties of PES programs relate to their additionality, effectiveness, and permanent impacts (Calvet-Mir et al. 2015).

Another mechanism oriented toward the creation of incentives for sustainable practices is the certification of forest products resulting from sustainable, nature-friendly production processes. These practices (e.g., the Forest Stewardship Council or Rainforest Alliance) are geared mostly to niche markets, where consumers agree to pay premium prices. For some forest products, certification can be difficult as the premium prices for sustainable forest producers in global markets are frequently hard to achieve (Molnar et al. 2003). Products destined for direct consumption (e.g., coffee, cacao) show more

⁷ PES covers mostly hydrological “services” provided by forests and carbon storage in forest biomass; biodiversity is considered to a lesser extent.

favorable tendencies. Other schemes involve the disappearance of subsidies to unsustainable activities.

Challenges that result from the implementation of some PES programs include local “sovereignty” issues of communities taking part in these programs, where people’s autonomy to decide about their lives and territories is increasingly challenged. Some interventions result in perverse incentives (e.g., paying people for what they are supposed to do, or paying them for doing nothing, crowding out prosocial behavior). These challenges may be related to the top-down, centralized nature of the policy design, implementation, and evaluation.

The values behind the environmental economics framework are predominantly instrumental and related to ecological efficiency: the maintenance of the flows of ecosystemic services and the provision of economic incentives for local users and/or landowners. Concerns about cultural diversity and justice generally fall outside the scope of this framework though recent critics expose the convenience and need to include considerations of equity into the reflection and practice of PES programs and certification initiatives (Calvet-Mir et al. 2015; Pascual 2010; Pascual et al. 2014). Stakeholders who sustain this approach are mostly international agencies working on sustainable development policies and national governments looking for alternative conservation tools for protected areas. Some NGOs and local businesses also take part in both PES and forest certification. In the search for viable policies to mitigate global climate change, this approach has gained in importance.

Political Ecology

Political ecology addresses the relationships between nature and society, and characterizes the human environment (as a social field) as a set of power relations involving confrontation, domination, and negotiation. The analytical framework of political ecology has been enriched by collaborations between political economists, ecologists, anthropologists, and historians. This transdisciplinary research field hosts different approaches that share central themes and concerns: questions about social marginality and unequal access to natural resources, the political causes and effects of resource allocation, the attention to the cultural, socioeconomic, and political contexts that shape human use and control of nature (Bryant and Bailey 1997). Blaikie and Brookfield (1987) suggest that political ecology “combines the concerns of ecology and a broadly defined political economy.” Focus on contentions and struggles over land and natural resources, power asymmetries, and social inequalities are critical points of departure. Analysis of capital accumulation and political economy provide the overall framework for understanding dispossession and displacement of local communities by global forces of state and market (Bengt 2015).

Over the last two decades, the field of political ecology has expanded considerably to include detailed examinations of politics as well as recurring

historical and ethnographic approaches. The adoption of a poststructuralist orientation⁸ (Escobar 2008; Peet and Watts 1996) has led to the recognition of different “environmentalisms” (representations, discourses, and practices), which result from different cultural and social experiences, as well as social positions that hold different, often incompatible, world views (Agrawal 2006; Dauvergne 2016; Hecht 2014; Martinez-Alier 2011). Hegemonic environmentalism justifies the prevalent distribution of costs and gains of different actors, and tends to reproduce political and economic inequalities both in national contexts and at the global level.

Justice is a central concern, treated as the search for (a) equity, recognition, and fair procedures in socioenvironmental realities and (b) fairness in the distribution of environmental assets, gains, and costs of economic activities and consumption patterns. The proposals of some political ecologists give prominence to the recognition and devolution of rights over forest lands and access to natural resources to marginalized and disempowered actors (notably indigenous groups, local rural communities, and dwellers of poor urban neighborhoods), emphasizing the need for decentralization and empowerment of local governments and actors as a possible means to revert exclusion and environmental deterioration (Ribot 2009; Ribot et al. 2006; White and Martin 2002). Values embedded in this framework can be characterized as “relational,” given the importance of the relations of local communities with nature in contexts of equity and justice.

Forests and other high-diversity ecosystems are regarded as places of significant human action. Complex institutions, ecologies, and economies have transformed these landscapes in the past and continue to shape them in the present (Hecht et al. 2013). These landscapes are often contested, subject to different and even conflicting meanings and claims, objects of struggle over appropriation among opposed stakeholders.

Environmental deterioration and environmental conflicts are seen as closely related (Boyer 2015; Merino 2004, 2016). The central causes are the absence of internalization of the enormous environmental impacts and costs of contemporary production processes (including high impact activities such as mining, fracking, and industrial agriculture); consumption patterns with high ecological footprint; and the political capacity of corporations, governments, and national elites to impose these costs on those with weaker political voices (i.e., vast numbers of people who live in developing countries as well as future generations) (Dauvergne 2010, 2016). Over the last decade, environmental injustice and deterioration have worsened under the global schemes of land grabbing and neo-extractivism. These harmful activities are enabled through

⁸ A new relation between agency and structures, and an attention to different knowledge systems and their influence in theoretical reading of socioenvironmental processes. Focus has expanded from rural issues to include environmental politics in urban settings and addresses contemporary questions: climate change, genetically modified organisms, food industries, pollution, city planning, and infrastructure development.

economic incentives: governments of developing countries rely on the fiscal revenues received from extractive transnational corporations working in their countries (Campodónico 2007).

A frequent critique to political ecology points out its rather limited focus on the analysis of conflicts and denouncement of environmental injustice. In addition, not enough attention is given to the construction of sustainable socioenvironmental strategies and policies, neglecting the comprehension of ecological dynamics and viable governance schemes engaged in fair and sustainable management.

Stakeholders that use this framework tend to be some international and national NGOs and groups advocating for human rights and traditional rights of indigenous people, federations of indigenous groups, local rural communities, as well as groups of those affected by the environmental impacts of industrial agriculture and extractive activities. Currently, an increasing amount of scholarship is studying local stakeholders' notions of environmental justice in conservation interventions (Sikor et al. 2014). This is an important way forward in understanding where problems of justice arise.

Collective Action and Institutional Analysis Theory

The framework based on collective action and institutional analysis theory is strongly influenced by contributions from political science, natural resource economics, and experimental economics. Its focus is on themes such as collective action (coordination and cooperation), property rights, governance, social capital, and institutions (understood as rules in use) involved in shared resources, as natural resources tend to be. This conceptual proposal gained broad international attention in the early 1990s, when Elinor Ostrom, the lead proponent in this field, responded to proposal ofset forth in the "*Tragedy of the Commons*" (Hardin 1968), which was widely accepted in the conservation and development fields. Hardin proposed that this tragedy was a universal and unavoidable destiny of common goods characterized, in his view, by unrestrained access to natural resources. One of Ostrom's main arguments held that Hardin confused community property/management and open access to natural resources effectively associated with the deterioration of the resource systems. Based on ample empirical evidence, including cases of community property/management of pastures, rivers, irrigation, forests, and fisheries, Ostrom and colleagues demonstrated that when collective users were able to communicate, self-organize, and had control over the natural resources upon which they depend, they often created rules that enabled cooperation and sustained use of common resources (Ostrom 1991).

Ostrom's findings refuted the universality of the "*Tragedy of the Commons*" without denying its reality. She recognized that these tragedies were present in many cases and proposed that they were caused by the inability to collaborate around common purposes and shared resources: this inability to cooperate and

coordinate around use and management of common environmental resources was the root of environmental deterioration. Adequate responses to these challenges of shared resources face dilemmas concerning collective action—this refers to a wide range of situations with conflict between individual short-term profits and collective long-term benefits (Cardenas 2009; Ostrom 2005). Lack of information and understanding of the resource system, absence of communication and trust, elite capture, and weak or null incentives to cooperate are all obstacles to collective action. Key conditions enabling collective users to self-organize successfully and sustain their *commons* include the existence of meaningful levels of autonomy, local participation in rule making, monitoring systems accountable to local users, shared understanding of the resource systems, and trust among group members.

Sustainable use of resources requires addressing appropriation and provision needs: the first refers to the sustainability of harvesting, and more generally use practices; the second to the investments (of work, time, knowledge or money) needed to maintain resource systems. Ostrom's well-known typology of goods permits an understanding of the types and levels of pressures deriving from the conditions of excludability and subtractability/rivalry. Private goods with high subtractability and high excludability face potential appropriation problems and provision needs, but no collective action challenges. Pressures for club goods tend to be low because rivalry is low and excludability is high. Public goods are those with low excludability and low subtractability. Even if, in principle, the use of these resources faces limited appropriation problems, their maintenance poses provision needs that are difficult to address as collective action dilemmas among often anonymous actors (the public). Finally, common-pool resources (CPRs)⁹ have high rivalry and low excludability: they face important appropriation and provision challenges as well as collective action dilemmas that need to be resolved by communities and user groups whose members often share rights and duties (in regard to the commons) and frequently know each other. Because of these pressures and challenges, the need for agreements and rules is particularly important for the sustainability of CPRs.

The distinction between types of goods, property regimes (attentive to the nature of the resource holders), and property rights has a heuristic value for this framework. Property rights are regarded as “bundles of rights”: use rights (withdrawal, access) and control rights (exclusion, management, and alienation) (Schlager and Ostrom 1992). From an institutional perspective, property rights are important for sustainability as they provide incentives for rights holders to commit to the use and maintenance of the resources based on long-term perspectives, and to participate in the construction of governance systems that are capable of responding to sustainability challenges (Dietz et

⁹ Ostrom rarely referred to the term “commons,” instead she used the more technical concepts of CPRs and public goods when referring to shared resources.

al. 2002). As the distribution of rights varies within the frames of property regimes (private, collective, or public) and different agents (owners or not) can hold diverse property rights, no property regime constitutes an environmental or social panacea. The distribution of property rights among different social actors, rather than the property regime, is weighted more for collective action and sustainability. The concentration of property rights and imposition of private, public, or even collective property regimes as panaceas may lead to misuse and deterioration of natural systems and resources. From the perspective of this framework, forests and other high-diversity ecosystems (e.g., prairies, wetlands, costal zones) are CPRs with important appropriation and provision problems under public, private, and public property. The diverse distribution of use and control rights involved create incentives and disincentives for different actors to engage in sustainability.¹⁰

One frequent criticism of this framework is that while focusing on the construction of collective action and governance, institutional analysis neglects the themes of conflict, power, and inequality. In fact, Ostrom and colleagues aimed to develop and follow comprehensive analytical frames such as the institutional analysis and development framework and the social-ecological systems framework, which attempts to integrate different theories and categories (e.g., actors, contextual socioeconomic conditions, institutional arrangements, governance systems, and interactions) (McGinnis and Ostrom 2014; Ostrom 2005; Poteete et al. 2009).

As in the case of political ecology, the proposals derived from collective action and institutional analysis underline the importance of recognizing the rights of local communities to use and manage natural resources. The analysis of the relations and asymmetries among different actors with stakes in use or conservation of the resources is considered fundamental for environmental governance. Procedural justice—the fair access to political decision making—is a prominent concern, as participation of local communities in rule making has a prominent role in robust governance systems. Nevertheless, local control, stewardship, or community property are not regarded or proposed as panaceas. Collective action is costly to achieve, and sustainable management of natural resources is a complex task that requires local governance capacities nested in polycentric governance systems¹¹ as well as the use of different knowledge systems (traditional and local knowledge as well as scientific understanding and recommendations). The values assigned to nature by this framework can

¹⁰ White and Martin (2002) document that the vast majority of the forests in the world are public property under concessions to transnational corporations which have acquired use and management rights, and whose incentives are mostly oriented to maximize short-term profits. Traditional property rights over forests are denied in conditions of public property, particularly in forests under concession. Local people often lose incentives to invest in provision measures and to follow appropriation rules that limit their access to important means for livelihoods.

¹¹ Polycentricity is understood as governance systems based on multiple decision-making centers operating at multiple scales (Aligicia and Tarko 2012).

be instrumental, scientific, and relational: individuals engage in cooperation for sustainable use of nature when they depend on natural goods, but it is also acknowledged that the sense of sacredness, belonging, identity, and knowledge that people develop in relation to nature and landscapes provides powerful incentives for conservation and uses based on long-term horizons (Berkes 1999). Finally, the relationships that people establish with territories and between themselves create a sense of community and identity.

Important challenges for conservation, sustainability, and justice signaled by research oriented within this framework include uncertainty over property rights as well as incomplete or fragmented property rights. This includes countries where communities lose their rights to minerals but have rights to lands, forest, and trees, or governments that hold rights over minerals and gas in the subsoil.

This framework has largely remained in academic circles. However, since 2000, a vast array of groups demanding democratization of environmental, urban, and knowledge governance in developed and developing countries have increasingly adopted the idea of the commons (Bollier and Helfrich 2012; Capra and Mattei 2015; CAPRI 2010; Hess 2008; Iaione 2013), as a result of social mobilization and often social creation.

Conservation Programs, Framings, and Values

To enhance our understanding of the values and frameworks present in different environmentalisms (influenced by values and frameworks), we selected and analyzed a set of eight initiatives from the field that represent different approaches to biodiversity conservation (Table 4.1). Our analysis has three objectives: (a) to understand what kinds of normative concerns drive these initiatives, (b) to explore ways in which interaction of different frameworks and different values interrelate in concrete cases, and (c) to analyze how these diverse conceptual and ethical framings relate with the main challenges faced by initiatives seeking conservation and/or sustainability.

Conservation biology is the dominant paradigm for the oldest initiatives as well as for those with conservation purposes created by externally driven interventions (Yellowstone, Monarch Butterfly Biosphere Reserve, and The Gulf of Mannar Biosphere Reserve). Intrinsic values related to the preservation of nature tend to be predominant in these cases. Local appreciation of natural systems involved in these cases depends largely on the livelihoods that local residents are able to obtain from them. Conflict between local and external values is common, and is enhanced in national contexts characterized by power and economic asymmetries, lack of communication, and trust. Conflicts are acute in cases where there is a high concentration of decision-making capacities in the hands of agencies external to local populations. The criticisms of protected areas often emanate from the perspective of political ecology and collective

Table 4.1 Description of the conservation initiatives.

Initiative	Property regime, location, and extension	Type of intervention or action, date established	Values	Governance schemes
Yellowstone National Park (Schulley 2004; UNESCO 2012)	Public lands 9000 km ² in the Rocky Mountains, U.S.A.	Protected area, national park. Limited resource use, regulated tourism. Established in 1872.	<i>Intrinsic</i> : landscape conservation. <i>Relational</i> : public education and appreciation of nature. <i>Compatible local and external values</i> .	Centralized* decision making, centralized in the federal government.
Tsimane Indigenous Territory (Reyes-García et al. 2014)	Community property of 400,000 km ² in Beni Dept., Bolivia	Communal indigenous lands. Devolution of resource management rights to indigenous people in 1991; limited actions by nonindigenous (colonists, logging companies).	<i>Relational</i> : sense of identity and belonging through the recognition of traditional rights.	Decentralized local indigenous institutions are legally recognized but lack enforcement capacities.
PES program, Mexico (Alix-García et al. 2005)	Community and private forests in Mexico: 4000 km ²	PES program, run by the central government of Mexico. Payment to forest owners for the maintenance of forest cover. Established in 2004.	<i>Instrumental</i> : maintain flow of ecosystemic services (hydrological, carbon sequestration, conservation of biodiversity).	“Monocentric” decision making centralized in the federal (central) government.
Unión Zapoteco-Chinanteca (UZACHI) (Bray and Merino 2004; Chapela 2005)	Community property of 300 km ² in Oaxaca, Mexico	Fight against a forest concession to an external firm. Sustained community forestry and conservation. Initiated in 1991. Participatory land-use planning, sustainable-certified forestry, community conservation and ecotourism. Also PES	<i>Instrumental</i> : create incentives for local sustainable forest management and land-management practices. <i>Relational</i> : enhance local stewardship and appreciation of nature. <i>Compatible local and external values</i> .	“Polycentric” central and local decision-making capacities, often conflicting.
Monarch Butterfly Biosphere Reserve (Merino and Hernández 2003; Tucker 2004; UNESCO 2008)	Community property in Central Mexico: 562.5 km ²	Protected area, biosphere reserve. Established in 1996, extension more than doubled in 2000. PES (conservation) to some communities in 2001.	<i>Intrinsic</i> : conservation of the migration phenomena of the monarch butterfly through North America, by preserving its winter habitat. <i>Instrumental</i> : held by most community members within the biosphere reserve whose livelihoods depend on forest resources. <i>External and local values are often conflictive</i> .	“Monocentric” decision making centralized in the federal (central) government.

Table 4.1 (continued)

Initiative	Property regime, location, and extension	Type of intervention or action, date established	Values	Governance schemes
Gulf of Mannar Marine Biosphere Reserve (Kasim and Edwards 2013; Rajagopalan 2008)	Public property of 560 km ² in the Gulf of Mannar, Tamil Nadu, India	Marine biosphere reserve, conservation and development, created in 1986. Alternative livelihood activities for local fishing communities, planned and funded by the GEF, UNDP and the governments of India and Tamil Nadu	<i>Intrinsic:</i> restore and preserve marine ecosystems. <i>Instrumental:</i> maintain ecosystem services through support of local livelihoods, which depend on marine resources. <i>Conflict between local needs and external values has occurred.</i>	"Monocentric" decision making centralized in the federal (central) government.
Kasigau Corridor REDD+ Project (Chomba et al. 2016)	Large private holdings, national parks and communal lands; 1685 km ² in Kasigau, Coast, Kenya	REDD+ project, conservation corridor. Payment to locals for reduced shifting cultivation and charcoal production. Began in 2008.	<i>Instrumental:</i> maintain provision of ecosystem services (mainly carbon sequestration). <i>External and local values are sometimes conflictive.</i>	"Monocentric" decision making centralized in the federal (central) government.
Blanket Bog Restoration (2015)	Private lands in the Uplands of the Pennines, Dartmoor, Exmoor, Lake District, York, Border Moors, Cheviots, and Forest of Bowland, U.K.	Habitat restoration for biodiversity (nationally significant habitat) and ecosystem services (carbon, water regulation). Negotiations with landowners and managers, water companies, nature conservation organizations, and soil managers to block drainage, reduce grazing, restore peat bog. Began in 2014.	<i>Intrinsic:</i> conservation of biodiversity. <i>Instrumental:</i> maintain or restore provision of ecosystem services. <i>Relational:</i> promote involvement of local landowners in restoration activities. <i>Negotiated local and external values.</i>	"Polycentric" local capacities for decision making.

*Aligicia and Tarko (2012) distinguish monocentric strongly centralized governance systems, decentralized systems where decision-making capacities are transferred from national to local agencies, and polycentric systems with multiple interconnected decision-making centers.

action theory, underlining aspects of frequent undemocratic decision-making processes, disempowerment, and alienation of local communities.

In seeking to achieve sustainability through policy schemes with lesser political and social costs than traditional protected areas, more recent initiatives (e.g., National Parks and Biosphere Reserves) have found an important orientation in ecological economics. This framework attempts to achieve a sustained flow of ecosystem services while taking into account the incentives, needs, and instrumental values held by local actors. In many cases, these initiatives have failed to introduce context-specific elements in the design and implementation of PES programs, leaving aside critical aspects of elite capture, inequality, and poverty (e.g., lack of access to land property rights) that challenge the results of these interventions (Rodríguez and Merino 2017). PES and particularly REDD+ programs often rely on governance schemes that tend to re-centralize control rights in central governments. Participation of local stakeholders and marginalized groups in PES/REDD+ programs is limited or null, thus increasing the risks for conflict as these groups' values are poorly taken into account. It is rare for PES and REDD+ programs to incorporate elements of frameworks different to ecological economics that may enable more context-sensitive environmental policy schemes.

The perspective of actors involved in the only intervention driven by local actors considered in this work (UZACHI) has widened over time to include different values from those originally adopted. This intervention, which initiated opposition to a forest concession in communal lands, brought about sustainable forest logging, forest certification, diversification of forest uses, conservation, and the adoption of intrinsic and relational values.

The wide national program of PES in Mexico, with more than a decade of experience, has yielded mixed results that vary in different contexts: When applied in lands under protected areas, it has helped to support social costs of restrictions imposed on local communities. In other places, it has complemented the revenues that local communities obtain from commercial forestry, thus contributing to local livelihoods and stewardship of natural resources. Still in other cases, it has conflicted with local livelihoods and affected the most vulnerable groups. A similar process seems to be taking place in the new REDD+ project in Kasigau Corridor, Kenya.

Over the years, most initiatives have widened the framings and values that guide their actions, incorporating incentives, values, and sometimes the participation of local stakeholders (e.g., visitors in the case of Yellowstone Park): The management of Yellowstone has actively incorporated environmental education to increase public relational values of the Park. The English initiative of the restoration of Blanket Bog promotes conservation and restoration with a strong base of local civic actors. In addition, UZACHI has incorporated elements of collective action and institutional analysis theory, conservation biology, and ecological economics in the participatory land-use planning, community by-laws, and conservation strategy. This development has been made possible

through sustained community participation and the collaboration between national and international actors engaged in sustainable development programs.

The claims of the Tsimane people over their traditional lands and forests fall within the framework of political ecology. Nevertheless, the isolation of this group, which gained formal rights over an enormous territory, and the lack of governmental capacity to back up indigenous rights in the face of loggers abusing the forest and indigenous people, are key factors which threaten this initiative and restrain further socioenvironmental innovation.

The outcomes of these initiatives, in terms of ecological, economic, and social sustainability, varies: from the highly successful case of Yosemite National Park, to the fragile socioenvironmental conditions in the Tsimane Territory or the Monarch Butterfly Biosphere Reserve, which faces challenges of illegal logging, drug-trafficking, and crime. Some of the strongest challenges currently being faced derive from international, even global, expectations that conflict with local livelihoods and rights not considered when many of these initiatives were first implemented.

Conclusions

Frameworks are epistemic developments constructed and used to understand the world. Following Entman (1993), we assume that frameworks involve the selection of “some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, casual interpretation, moral evaluation and/or treatment recommendation.” Research questions and hypothesis, data collection and interpretation, as well as interventions and policy proposals are produced within the limits of particular frameworks. Disciplines provide paradigms, theories, and concepts that name, define, and explain certain dimensions of reality. Worldviews are always shaped by formalized, informal, explicit or implicit theories, understood as concepts related in systematic patterns. Theories spotlight phenomena viewed as valid and relevant, leaving aside other dimensions, receiving less importance or not even considered. This process of discursive delimitation and problem definition takes place within particular social and historical contexts and dynamics, where values and power relations play significant roles (Foucault 1969/2008; Piaget and Garcia 1982). Research methodologies and validation criteria are developed and established within the fields of particular disciplines, theories, and knowledge systems—modern Western science being just one of them (Foucault 1971; Poteete et al. 2009). In addition, theories are influenced directly or indirectly by the values and visions of different stakeholders, through various influences and mechanisms of prestige and funding (Fairhead et al. 2012), as well as those of the researchers themselves (Lele and Norgaard 2005).

Evaluation criteria utilized to evaluate the outcomes of conservation and sustainability policies and programs are also influenced from specific frameworks and framings. They are determined by academic traditions, disciplinary and theoretical perspectives, as well as values held by different stakeholders (Fairhead and Leach 1996; Foucault 1969/2008). Consequently, these criteria are generally limited, even subjective. Thus, researchers need to be conscious about the relativistic nature of their knowledge, not only of their strengths but also their limits, and their conceptual and policy implications (Fairhead and Leach 2006; Fairhead et al. 2012).

In academic and policy fields, we find different definitions of what biodiversity and forests are, a varying focus on socioenvironmental processes and understandings of what is being lost, and diverse ideas of what should be done to revert deterioration. Recognizing the different frameworks and values held by different stakeholders taking part in particular forest or biodiversity programs constitutes a first step in efforts to build more inclusive, potentially better accepted policies, minimizing conflict, and ultimately increasing the possibilities to achieve socioecological objectives.

Values are principles associated with a given worldview or cultural context, a preference someone has for something, and the importance of something for itself or for others (Pascual et al. 2016). The value of nature or biodiversity is a contested domain and a source of conflict over the way humans relate in and through nature (O'Neill et al. 2008). There is no conceptual agreement on the value of biodiversity. Values of biodiversity and nature (including forests) are commonly classified as intrinsic, instrumental, and relational. Thus, emphasis can be placed on the instrumental role of biodiversity to support a good quality of life through the capacity to provide material (e.g., food, fiber) and immaterial (e.g., recreation, mental health) benefits. Alternatively, emphasis can be on honoring Earth as sacred (Diaz et al. 2015). Sustainability, diversity, and justice are common values in the academic and policy approaches to forests and biodiversity. Such a wide spectrum of values is rarely taken into account in environmental decision making. Instead, a struggle over dominance regarding monistic worldviews over nature is a constant feature. This is often manifested in global conflicts over resources, a sense of environmental injustice, and unsustainable development (Pascual et al. 2016).

The struggles over worldviews and associated values and the resulting conflicts are a direct manifestation of environmental injustices perceived and felt by disempowered actors in society, such as those whose worldviews and values are dominated. Likewise, harmonization of social, environmental, and economic goals inherent in sustainability goals are hard to achieve if proper institutions are not designed and put in place to help resolve environmental conflicts and injustices over time. It is thus impossible to detach the issue of worldviews and associated values from institutions, understood as norms, rules, and strategies which determine the normative views on the appropriateness of policy interventions (Ostrom 1991).

Over the years, frameworks for biodiversity conservation have expanded substantially, shifting from diversity-based frameworks to integrating sustainability, including the human dimensions of well-being and livelihoods. This is in line with the realization—by way of contestation—that conservation can be undermined if local livelihoods, rights, and needs are not integrated into conservation and sustainable management programs. However, strategic issues such as participation, representation, and the distribution of benefits and burdens of conservation and sustainability are issues that deserve more discussion and recognition in policy making. If forests and other high-diversity ecosystems are to have a future, justice needs to be incorporated into biodiversity frameworks for a more holistic understanding of the social outcomes of conservation and, importantly, a more realistic design of actions for conserving biodiversity.

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