A Perspective on Conservation and Development

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Abstract

Since the industrial revolution, the predominant model of economic development has involved economies of scale and unsustainable exploitation of natural resources, leading to environmental degradation and the ongoing mass extinction of species. The environmental impacts of this development-for(the sake of)-development model led to biodiversity conservation efforts that can be described as conservation-for (the sake of)-conservation approach involving protected areas maintained free of humans. This approach subsequently expanded to include development-for-conservation efforts that integrated local community welfare into conservation programs. These conservation approaches helped make socio-ecological gains, but have failed to address planetary environmental degradation. Here, we outline a development approach for the earth's last-remaining biodiversity rich areas, focusing on economies of value rather than scale, and relying on conservation of biodiversity and sustainable use of ecosystem services. This conservation-for-development model is an attempt to bring humanity and nature closer, and move away from nature–people dualism that has characterized economic development and biodiversity conservation so far.

Key words: Biodiversity, economic development, ecosystem services, nature-based

1.1 Introduction

The ongoing loss and conversion of vast stretches of natural habitats across the world's lands; the overexploitation of wild plants and animals on land and in the oceans; pollution, climate change, and the resultant degradation of ecosystem services have triggered a planetary environmental crisis and mass extinction of species (Dasgupta 2021). In the earlier mass extinctions, with the first one occurring between 490 to 443 million years ago, the earth lost 50 to 95% of its extant species (Sodhi et al. 2009). In the next few years, 25% of the estimated species on the planet face extinction. The current extinction wave is particularly extraordinary, having been brought about by the actions of a single species, and, over a relatively short duration of two centuries (IPBES 2019).

These changes have been precipitated by the predominant model of development that prioritizes economic growth at the expense of the environment. To arrest these changes, there is an urgent need for an approach that can promote economic development while also conserving biodiversity. In this perspective piece, we lay out a potentially transformative development model, which we term as *conservation-for-development*. We believe that this approach could have positive human well-being and biodiversity outcomes. We first describe the three different approaches to development and conservation that have been followed since the industrial revolution: *development-for (the sake of)-development*, *conservation-for (the sake of)-conservation*, and *development-for-conservation*. We outline the primary goals of these approaches and the general impacts that they have had on human well-being and biodiversity conservation. Following this, we describe the *conservation-for-development* model, that would rely on the sustainable use of ecosystem services and conservation of biodiversity for economic growth and human well-being.

2. Background

2.1 Economic development, biodiversity crisis, and biodiversity protectionism

Since the onset of the industrial revolution, which also marked the beginnings of the current biodiversity crisis, economic development has been the predominant societal goal in large parts of the world. Economic growth and wealth creation have been the main focus of this *development-for (the sake of)-development* approach. Economic development, rooted in neoclassical economics, may be defined as "rapid and sustained rise in real output per head and attendant shifts in production technology, factor input requirements, and the resource allocation of a nation" (Easterlin and Angelescu 2007, p. 113). It is often measured using indicators such as the gross domestic product (Acemoglu 2012). While this approach, rooted in capitalism and free markets, has led to unambiguous and largely desirable social and economic outcomes, these gains have been founded on remarkably high levels of overexploitation of the earth's finite natural resources, ecosystems, and ecosystem services (Table 1). These resources are either inherently non-renewable (such as minerals and fossil fuel), or have become scarce due to overexploitation and related tradeoffs (e.g., forest products, other ecosystem services such as fresh air, clean water, or pollination services). Indeed, of the seven planetary boundaries, four that have been measured so far (biosphere integrity, climate change, biogeochemical flows, and land-system change) are already transgressed in pursuit of economic development (Steffan et al. 2015).

In response to the environmental and biodiversity crisis that began with the industrial revolution, there was a strong push for the creation of legally protected areas to protect the remaining areas of high biodiversity or relatively intact ecosystems - an approach that we describe as *conservation-for (the sake of)-conservation* (Table 1). The main goal of this approach was the conservation of biodiversity and it largely focused on creating protected areas free from humans. As a response to and embedded in the global capitalist order, this protectionist conservation approach too, much like the post-industrial model

of economic development (*development-for-development*), was founded on the doctrine of nature-people dualism (Buscher and Fletcher 2020).

The pursuits of *development-for-development* and *conservation-for-conservation* had both positive and negative social impacts. On the one hand, with economic development, societal inequalities such as those of gender and caste have been challenged with a push for a more equal society (Kothari 2019). On the other hand, they have contributed to wealth inequality or class injustice, repression, marginalization, and, in some areas, have caused increased conflicts and unrest (Faber and Schlegel 2017; Linarelli 2018). Research on the impacts of other forms of social inequality based on aspects such as gender, class, caste, and race is scarce but studies suggest that social inequality can have strongly negative impacts on the environment (Hamann et al. 2018). Individual perceptions of fairness, aspirations, collaborations and market concentrations have been suggested as pathways of the connections between inequality and the environment (Hamann et al. 2018). Having focused primarily on exploiting nature's instrumental values, the *development-for-development* approach resulted in suppressing other values for nature, knowledge systems, and indigenous worldviews (Chan et al. 2016).

Similarly, while the *conservation-for-conservation* approach has contributed significantly to biodiversity conservation in specific areas, it has functioned largely in a top-down manner, and often involved forced evictions and injustices for the poor, and further curtailment of their access to resources (Mishra et al. 2017). Over time, the *de jure* sanctity of many protected areas from developmental pressures has also been violated to pave way for industrial scale exploitation of natural resources or for other economic and infrastructure interests (e.g. Menon et al. 2010, Leisher et al. 2013).

2.2 Poverty, conservation, and development

Poverty has been ascribed to be one of the root causes of environmental and biodiversity problems (Barett, Travis, and Dasgupta 2011). However, there are multiple views –and implications– of the

118 relationship between poverty alleviation and biodiversity conservation, ranging from them being
119 considered as belonging to separate policy realms at one extreme, to poverty alleviation being seen as a
120 necessary condition to achieve biodiversity conservation on the other (Adams et al. 2004, Howe et al.
121 2018). Conservationists have responded to this issue in two ways: (i) by focusing on the creation of
122 protected areas which exclude local communities following the *conservation-for-conservation* approach,
123 and (ii) working with local communities in biodiversity rich areas to promote conservation through social
124 welfare and livelihood enhancement of people (Adams et al. 2004), that we have called the *development-*
125 *for-conservation* approach (Table 1). Compared to the *development-for-development* approach that
126 focused on economy and wealth, or the *conservation-for-conservation* approach that focused exclusively
127 on biodiversity protection, the *development-for-conservation* approach, to some extent, took a relatively
128 more integrated view of nature and economic development.
129 The *development-for-conservation* approach has largely been implemented through the so-called
130 integrated conservation and development projects that try to enable conservation through incentives for
131 local people in shared decision making, employment, revenue sharing and assistance in basic
132 developmental parameters such as access, healthcare and education (Newmark and Hough 2000). This
133 sustainable development approach was subsequently expanded to include social justice, equity and
134 elimination of poverty amongst its goals (Adams et al. 2004). The *development-for-conservation* approach,
135 while having the potential to promote biodiversity conservation over relatively much larger landscapes
136 beyond protected areas, remained largely restricted to regions in and around protected areas. It arguably
137 has had mixed effectiveness. For example, a study reported that less than 16% of the examined (n=32)
138 World Bank funded projects aiming to address both biodiversity and poverty, resulted in significant gains
139 in both aspects (Tallis et al. 2008).
140

141 The idea of poverty being at the root of environmental degradation and biodiversity loss has been a simple
142 and a powerful one. Theoretical and experimental research has indicated that income inequality may
143 affect the willingness to pay (WTP) for environmental goods (Frank and Schlenker 2016; Baumgärtner et
144 al. 2017). A society with more equal income distribution is thought to likely have higher WTP for
145 environmental goods (Drupp et al. 2018). With income redistribution, the WTP of poorer households has
146 been reported to increase, while that of the richer household to decrease (Baumgärtner et al. 2017; Drupp
147 et al. 2018). High dependence of the poor on provisioning ecosystem services (Suich et al. 2015), and the
148 significant spatial overlap between areas of extreme poverty and those of high biodiversity (Fisher and
149 Christopher 2007), have presumably contributed to the notion of poverty being the main cause of
150 biodiversity loss, and economic development as the panacea. The evidence, however, is questionable
151 (Lambin et al. 2001, Barbier 2010, Kassa, Teferi, and Delelegn 2018), as is the associated environmental
152 Kuznet's hypothesis that posits an improvement in environmental indicators *after* economic development
153 has been achieved, indeed, at a significant cost to biodiversity and environment (Dinda 2004). Let alone
154 environmental improvement, poverty alleviation itself has proven to be a highly complex issue. In the past
155 50 years, the human population has doubled, the global economy has grown nearly 4 times and global
156 trade 10 times, and there is enough food produced today to meet humanity's needs. Yet, more than one
157 in 10 people around the world are currently undernourished (IPBES 2019).
158
159 ***2.3 Development at the cost of the environment and biodiversity***
160 Together, *conservation-for-conservation* and *development-for-conservation* efforts have constituted the
161 global conservation movement, with its efforts to limit and mitigate the impacts of the contemporary
162 economic system. They have contributed to protection of many species and habitats, and have helped
163 generate awareness regarding the ongoing environmental crisis. However, attempts to bridge
164 conservation and development have been complicated due to the wicked nature of conservation

problems. Much of environmental degradation is driven by the *development-for-development* approach, rooted in neoclassical economics. It puts pressure on natural resources, as most economic production relies on raw materials and energy derived from nature (Georgescu-Roegen 1971; Farley and Costanza 2010). For example, large-scale agriculture relies on the conversion of rangelands, forests or other natural ecosystems. The *development-for-development* approach involves economies of scale, relying on the over-exploitation of natural resources (Dasgupta 2021). Further, the costs and benefits of over-exploitation of resources tend to be 'ecologically unequal', with high-income countries having better access to natural resources and low-income countries facing greater social, ecological, and economic consequences of overexploitation (Dorninger et al. 2021). These inequities, largely driven by historical power asymmetries, continue to be perpetuated by the current economic development model (Mahutga 2014). Even the multi-billion-dollar global illegal wildlife trade is fuelled largely by the demands of the affluent rather than the needs of the rural poor (Graham-Rowe 2011), although the act of poaching itself may be undertaken by the poor as a source of livelihood or protein. Despite the ongoing environmental and biodiversity crises, and despite the negative effects of pollution and extreme climatic events on humans themselves, the *development-for-development* model continues to drive forward (Dinda 2004), threatening humans and the diversity of life on earth. The unprecedented social and economic disruption caused by the ongoing COVID-19 pandemic well-illustrates how ill-prepared humanity is to deal with catastrophes and the indirect effects of globalization and planetary change (Engler et al. 2021, Mishra et al. 2021).

In the face of this aggravating planetary crisis, there are calls for transformative economic, political and technological change to help meet international environmental and societal goals, such as those in the 2030 agenda for sustainable development, or in the Aichi Biodiversity Targets (IPBES 2019). Indeed, considering the current course of the state of the environment and biodiversity, and of the nature and impacts of economic growth, it is clear that without transformative change, there is little hope for

189 preservation of the planet's fast dwindling diversity of life, or for a human society living in wellness and
190 harmony with nature.
191 Recognizing the importance of nature for human survival, and the reality that the current models of
192 development have breached planetary boundaries, different disciplines have offered a range of lenses to
193 address environmental and conservation issues. For example, the field of ecological economics explores
194 ideas of distributive and environmental justice and trade-offs in relation to the environment (Martínez-
195 Alier 1997; Pelletier 2010); conservation biology offers ideas of resilience and ecological tipping points
196 (Gunderson 2000), and philosophy offers understanding worldviews and human-nature values
197 (Knippenberg et al 2018). Based on these ideas from multiple disciplines, alternative approaches to more
198 sustainable use of nature have been proposed. Some also recognize the cultural linkages that humans
199 have with nature, thereby moving away from nature-people dualism (Table 2).
200
201 Table 1. Main characteristics of the predominant approaches to economic development and biodiversity
202 conservation
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	Development-for-development	Conservation-for-conservation	Development-for-conservation	Conservation-for-development
Goal	● Economic development and wealth creation	● Conservation of biodiversity	● Conservation of biodiversity	● Economic development and conservation of biodiversity
Approach	● Nature-people dualism rooted in capitalism	● Nature-people dualism rooted in capitalism	● Nature-people dualism to some extent, rooted in capitalism	● Nature-people integration
	● Free markets, unsustainable exploitation of natural resources	● Spatially explicit protected areas for conservation	● Poverty alleviation, improvement in living standards and livelihoods for enhanced biodiversity conservation.	● Spatially explicit landscape planning for ecosystem services-based economic development and biodiversity conservation

	● Economies of scale	● Minimal or limited human use of ecosystem services in protected areas	● Spatially explicit protected areas and surrounding regions	● Economies of value bounded by conservation imperatives
			● Sustainable human use of ecosystem services	

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206 Table 2: A sample of alternative development models proposed in literature

Development Model	Description	Economic components	Social components	Ecological components	Critique	References
Green economy	Address economic and ecological issues and alleviate poverty through a low-carbon production process, resource efficiency, green investment, technological innovations, recycling, greenjobs, poverty eradication, and social inclusion	Sustainable consumption and production, green businesses and tax reforms	Social inclusion	Decouple growth from natural capital depletion by reducing resource use and increasing resource efficiency	Focus on growth, which can result in a material increase in resource extraction for the production of goods and services. Measured in money and serves the logic of profits and capital accumulation. Doesn't solve environmental problems, displaces them. It does not counter capital-intensive mining, large-scale climate change resilient infrastrucuture, or emission trading	Bina 2013; Loiseau 2016
Circular economy	Reduce the use of raw materials in order to reverse the extractive model of the current economic system; boost reuse practices, avoid discarding patterns for matters that still have use value for different actors in society; increase recyclability of goods by implementing	Focus on economic growth	No social aspect	Reduces pressure on the ecosystem by reusing materials	Focus on growth and accumulation. Becoming wealthier does not ease pressure on natural resources	D'Alisa 2019

	effective market arrangements					

Nature-based solutions (NbS)	Nature-based Solutions are actions that work with and enhance nature to help address societal challenges. The concept is grounded in the knowledge that healthy natural and managed ecosystems produce a diverse range of services on which human well being depends. It is an 'umbrella concept' for other established nature-based approaches such as ecosystem-based adaptation (EbA) and mitigation (EbM), eco-disaster risk reduction (eco-DRR), Green and climate change resilient Infrastructure (GI) and natural climate solutions (NCS).	Nature provides economic benefits. Protecting nature prevents economic losses. Economic crises can be averted by natural solutions.	Nature provides societal benefits	Nature is needed for resilience and economic and societal benefits	Effectiveness has not been rigorously assessed. There are concerns over reliability and cost-effectiveness compared to engineered alternatives, and their resilience to climate change. Trade-offs can arise if climate mitigation policy encourages NbS with low biodiversity value, such as afforestation with non-native monocultures. This can result in maladaptation, especially in a rapidly changing world where biodiversity-based resilience and multi-functional landscapes are key.	Cohen-Sachem 2016

Degrowth	Democratically led redistributive downscaling of production and consumption in industrialized countries as a means to achieve environmental sustainability, social justice, and well-being.	A societal project that implies escaping from the existing economy as a material reality. Considered a non-economic concept	Articulates principles of environmental justice and democracy, to formulate strategies including oppositional activism, grassroots alternatives, and institutional politics.	Recognizes that economic growth is not possible with environmental degradation. Therefore calls for a slowdown of economic growth to save nature.	It can increase unemployment, increase poverty, and decrease per capita income.	Kallis et al. 2012
Ecofeminism	Spell out historical, material, and ideological connections between the subjugation of women and the domination of nature. They speak to a diverse body of political theory, including feminist, decolonial, and environmental ethics, urging examination of how fundamental concepts are embedded in and corrupted by traditional sex-gendered assumptions	Complex class, ethinic, and sex-gendered characteristic of capatalist appropriation is challeneged. Connects the dots betwenn overconsumption in the global north, and taps and sinks in the global south	Articulates concerns about social equality by linking it to environmental justice and integrity.	Total reconstruction of relations between humans and nature, and men and women.	Criqued for the view that women are closer to nature or greater affected by environmental degradation.	Terreblanche 2019

Eco-Anarchism	Simpler lifestyles with less consumption and growth, small and highly sustainable local economies,built on values of frugality, self-sufficiency, giving, sharing and cooperating, and the rejection of acquisitiveness and competition.	Economy that has no growth, and is not driven by profit or market forces, and produces much less than the present economy	Focus on values such as frugality, self-sufficiency, giving, sharing and cooperating, and the rejection of acquisitiveness and competition. Small communities in charge of their own land	Lesser resource use, and decrease overall pressure on nature	Practical details on how this can be achieved are missing	Davidson 2009
Eco-swaraj	This approach respects the limits of the earth and the rights of other species, while pursuing the core values of social justice and equity. Seeks to empower every person to be a part of decision-making, and its holistic vision of human well-being encompasses physical, material, socio-cultural, intellectual and spiritual dimensions. Eco-swaraj places collectives and communities at the centre of governance and economy. Encompasses five spheres:	Local communities have control over their means of production, distribution, exchange, and markets. Localization is a key principle providing for all basic needs through the local regional economy	Focus on lives that are fulfilling and satisfactory physically, socially, culturally, and spiritually. Equity, responsibility across gender, class, caste, age,sexualities, and other divisions.	Includes the conservation and regenerative capacity of nature. Humans are a part of nature and the rest of nature has a right to survive		Kothari 2019

	ecological wisdom and resilience, social well-being and justice, direct or radical political democracy, economic democracy, and cultural knowledge and plurality.					

Beun vivir or the Good life	South American perspectives that question development and core components of modernity, while offering alternative. It includes different visions specific to each social, ecological, and historical context.	Rejects the idea of economic growth as a sign of progress. Relationships between communities extend beyond market linkages and utilitarianism and incorporate reciprocity, complementarity,, redistribution, etc.	Questions existing societal power structures and colonial history. Values interculturality, social inclusion, traditions of knowledge, and refound politics on plurinationality	There is no separation between humans and nature. All living being have a right to life and there are complex linkages between all living beings, including people	Critiqued for being a reflection of indegenous reductionism. They are a distraction from the true objective which is not alternatives to development, but alternatives to capitalism.	Acosta 2017

Biocivilization	The core guiding principle of biocivilization is caring for the ethics of both collective and individual responsibility, with regard to all relations and processes, in terms of economy and in terms of power, in science and in technology. The pillars of biocivilization are: doing the best that is possible locally; keeping the commons at the centre; creating decent work shared among all men and women; ensuring human rights, equality, freedom, happiness, and the fulfilment of peoples' potentialities, in all their diversity and according to their will.	Relationship with nature is the core of sustainability. Focus on developing local economies, and keeping economies local. Focus on caring, living together, and sharing	Social inclusion and equality. Environmental destruction viewed as an aspect of social inequality	All living beings have a fundamental right to exist	Failure to analyze the qualitative aspects of economic growth and its emphasis on the local economy without recognizing the urgency to address global anthropogenic change from a transnational political perspective.	Gryzbowski 2019

Doughnut economics	Based on the concept of planetary boundaries, which identifies nine planetary boundaries beyond which lie unacceptable environmental degradation and tipping points. Brings together social and environmental concerns in a single framework.	Economic growth must take place within the planetary boundaries. New metrics for defining and measuring economic growth	Social justice	Focused on environmental sustainability	Still a new and evolving concept	Haworth 2017
Ecomodernism	Human activity to be concentrated in dense pockets of cities and farms and leave more room for wildlife. The goal is to shrink humanity's total environmental impact and to achieve economic development for all. Technological solutions for environmental problems.	Focus on intense economic development in certain zones	No social component. Ecomodernism believes poor communities degrade their environment	Humans and nature decoupled with areas set aside for only wildlife	Ecomodernism actually leads to greater environmental damage, not lesser. It appeals to the dominant worldview, as they believe they can continue their current lifestyles of comfort if they invest in cleaner technologies, and "urbanize" the poor.	Asafu-Adjaye 2015

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3. An alternative approach: *conservation-for-development*

Global conservation efforts driven by protection and exclusion, and economic development driven by consumerism, and economies of scale, have been locked in an adversarial relationship with negative consequences for each other (Folks 2006). This is where an alternate approach to global development, that synergizes economy with ecology, has the potential to help humanity move towards a more sustainable planet. The field of ecological economics since its emergence in the 1980's has attempted to explicitly link human well-being and development with nature (eg. concept of natural capital; Costanza and Daly 1992, Millennium Ecosystem Assessment 2005), recognizing that development needs to occur within nature's limits, and coupling development and issues of justice, i.e "grounding economics in the moral and biophysical environment" (Daly and Farley 2011, p. 3)

Here we build on these ideas, and offer a simple development approach that is built on the conservation of biodiversity and the sustainable use of ecosystem services. Such an approach could ensure that harvest of natural resources stays within the limits of sustainability and planetary boundaries (Steffan et al. 2015). To contrast it with earlier paradigms including *development-for-development, conservation-for-conservation* or *development-for-conservation*, we call it the *conservation-for-development* approach. Rather than economies of scale, it focuses on economies of value, where premium commodity values are generated through their linkages with local ecosystems, cultures, sustainable use of ecosystem services, and contribution to biodiversity conservation.

The *conservation-for-development* approach is built partly on the concept of ecosystem services (ES) and nature's contribution to people (NCP) (Millennium Ecosystem Assessment 2005, Pascual et al. 2017). The ES concept initially focused on human well-being and instrumental values, i.e., the use of nature as a means to a human end. The concept has been criticized for its anthropocentric perspective, promoting a potentially exploitative paradigm, and with limited focus on cultural ecosystem services (Schröter et al. 2014). The NCP framework expanded on the original ES concept to address these criticisms and

encompasses the multiple values and cultural relationships that people have with nature (Pascual et al. 2017). Both these concepts explicitly recognize that nature is essential for various aspects of human existence – biological, economic, and cultural. All of humanity and most other life on the planet relies on clean air and water; more than 2 billion people rely on fuelwood; 4 billion on natural medicines; 75% of global food crops rely on animal pollination; and terrestrial and marine ecosystems are responsible for sequestration of 60% of global carbon emissions (IPBES 2019). Such benefits from ecosystems can be valued in both monetary and non-monetary terms. Yet, in the *development-for-development* model of economic and industrial growth, these contributions or their sustainability concerns are usually unrecognized, unaccounted for, or undervalued, and, as a consequence, they continue to be rapidly lost or degraded. Here, while we use the more common term ecosystem services based on the assumption that citizens and policy-makers are more familiar with it, our scope is wider, encompasses NCP, and includes the multiple worldviews and values that people have for nature.

In suggesting the *conservation-for-development* approach, we draw partly from existing alternative development ideas (Table 2) and sketch out a spatially-explicit ES-based approach for conservation, entrepreneurship, social equity and economic development. Defining elements of *conservation-for-development* model include its spatially-explicit, landscape approach to development and conservation, and a move away from nature-people dualism (Table 1). The term conservation-for-development has been used previously in literature to highlight ideas such as nature being essential for human well-being (Folke 2006), protecting environmental integrity for ecologically and economically sound development (Åshuvud 1991), and conservation being considered a part of sustainable development (Green and Barborak 1987). In this perspective piece, we use the term *conservation-for-development* to specifically refer to an approach that is built on ideas outlined below.

In the *conservation-for-development* approach, we envision the designation of landscape scale 'Special Ecological Zones' that are segregated into land use categories ranging from protected 'Critical Wildlife

Zones' on the one hand, to 'Economic Development Zones' on the other, that focus on non-extractive industries and agriculture, with intermediate 'Ecosystem Harvest and Stock Zones' with low impact human activity (Fig. 1). A rigorous ES framework can be used to develop these land use plans in conjunction with the local communities and cultures.

The *conservation for development* approach is meant to be spatially and contextually specific, and it rests on five main pillars designed to safeguard biodiversity, culture, and economic well-being.

1. **Spatially explicit conservation framework** that sets the boundary conditions for the sustainable utilization of ecosystem services together with species and habitat conservation. This framework is designed to provide the foundation for regional environmental management and land use policy as well as the basis for guidelines and rules which the economic enterprises would need to comply with.
2. **Ecosystem services focus** where the landscape is viewed as a source of a wide range of provisioning, regulating, and cultural ecosystem services that are critical for human well-being (Millennium Ecosystem Assessment 2005).
3. **Sustainable value enterprise model** premised on the creation of a set of globally and locally viable enterprises focusing on economies of value over economies of scale, that are economically profitable and ecologically sustainable, and are driven by the regional ecological wealth, cultural heritage, and social capital.
4. **Socio-economic inclusion** across gender, class, and other social divisions.
5. **Wide-ranging partnerships** that bring together a combination of scientific knowledge, development expertise, conservation experience, business acumen, technology capabilities, and financial capital.

3.1 Spatially explicit conservation framework

In the *conservation-for-development* approach, the landscape of interest is designated as a special ecological zone and is mapped based on biodiversity values, ecosystem service stock and flows, land tenure and current human use. In partnership with local communities, relevant government authorities and other stakeholders, the landscape is categorized into four zones, somewhat along the lines of how protected area zonation is undertaken (Figure 1). A zone-specific mitigation hierarchy is designed to ensure a net gain in measures of biodiversity and ecosystem functioning while meeting the goals of economic growth.

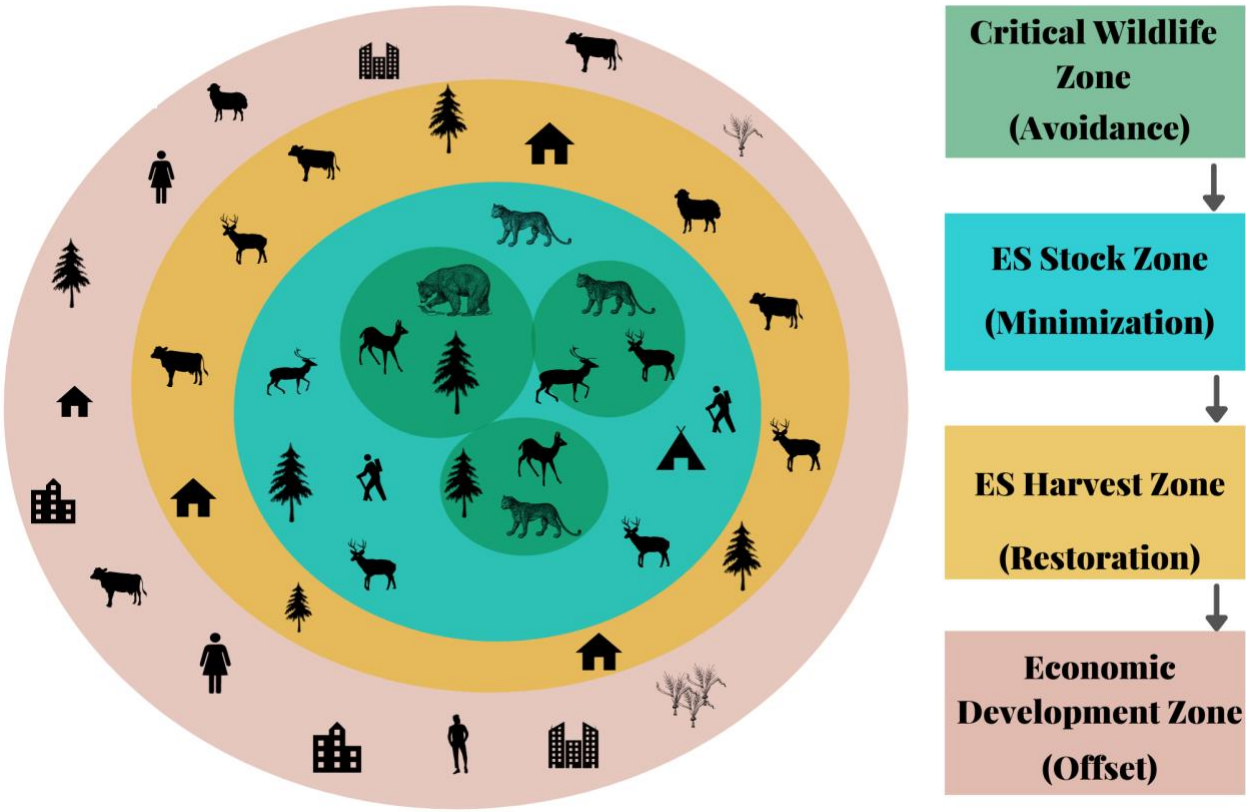
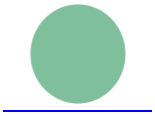
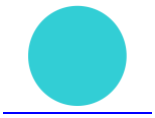


Figure 1: Mitigation hierarchy and zonation mapping of special ecological zones under the *conservation for development* model.

Critical Wildlife Zone - Priority: Biodiversity and Wildlife Conservation - Mitigation Hierarchy: AVOIDANCE - No permanent infrastructure or habitation - Research, monitoring and protection - Regulated visits, temporary camping for research - Very low intensity livestock grazing where necessary - Maintain wildlife populations (Nc) at carrying capacity (K) over the long-term, enable conditions where birth rates (bc) exceed rates of mortality (mc), and rates of emigration (ec) are considerably higher than immigration rates (ic) to enable spill-over effects: Nc ≈ K bc > mc ec >> I 	**Ecosystem Services Stock Zone** - Priority: Forest, Habitat and Ecosystem service Conservation - Mitigation Hierarchy: AVOIDANCE / MINIMIZATION - No activity that degrades or pollutes - Ecosystem service stocks identified and protected - Ecosystem services flow is ensured to downstream populations - Research, monitoring and protection - Sustainable, energy efficient infrastructure - Sustainable, low intensity livestock grazing - Maintain wildlife populations (Nes) close to carrying capacity (K) over the long-term, enable conditions where birth rates (bes) exceed rates of mortality (mes), and rates of emigration (ees) are higher than immigration rates (ies) to enable spill-over effects: - Nes ≈ K - bes > mes - ees > ies 

Ecosystem Services Harvest Zone - Priority: Ecosystem Services Harvest for Human Welfare - Mitigation Hierarchy: MINIMIZATION / RESTORATION - Livestock grazing, bee keeping, sustainable harvest of other ecosystem services such as clean water, etc. - Research, monitoring and protection - Low impact infrastructure in support of livelihoods - Estimate the desirable wildlife population size (Neh), which will be a function of the trade-off between conservation and ecosystem service harvest objectives – and ensure that populations are maintained around that level: - Neh = K – f(H) - beh + ieh ≥ meh + eeh - where f(H) is a function by which the wildlife population size is reduced below carrying capacity as a result of an acceptable level of harvest of provisioning ecosystem services.	**Economic Development Zone** - Priority: Industrial and Agricultural Production - Mitigation Hierarchy: OFFSET Agro-Processing and other industry, special economic zones.

This approach of zonation, use and mitigation hierarchy would serve as the basis for conservation efforts and land use planning. Together, the critical wildlife areas and ecosystem service stock zone, for example, effectively serve the purpose similar to what a protected area typically serves. The ecosystem service harvest zone allows for the sustainable use of natural resources, while the economic development zone is dedicated to infrastructure, production, housing and other needs of enterprises. All enterprises set up in this zone must comply with this spatially explicit conservation and ecosystem services framework, in addition to meeting other relevant sustainability standards and certification. Unlike existing land use

systems, however, in this model, the various zones and activities are typically linked and serve as resource catchments for each other.

3.2 Ecosystem services focus

In the *conservation-for-development* model, the focal landscapes are not viewed solely as engines for economic growth or sources of ecosystem services, nor are they envisioned to become inviolate areas for strict protection of biodiversity. Instead, they are viewed as coupled social-ecological systems where biodiversity as well as ES stocks must be preserved, and ES flows used sustainably for human welfare and economic growth (Figure 2).

The approach thus involves (i) developing a comprehensive understanding of society and land tenure, and an economic and socio-cultural valuation and mapping of the landscape's ES, (ii) creating a management system that optimizes the use of ES for welfare while conserving biodiversity, and increasing the resilience of the social-ecological systems, and (iii) setting up enterprises that comply with the management system and other sustainability and certification systems mandated and overseen by the governance and management bodies.

Figure 2: An ecosystem services based representation of the *conservation for development* model (EDZ: Economic Development Zone, ESHZ: Ecosystem Services Harvest Zone, ESSZ: Ecosystem Services Stock Zone, CWZ: Critical Wildlife Zone).

3.3 Sustainable value enterprise model

Central to the *conservation-for-development* approach would be a set of ecologically sustainable commercial enterprises that prioritize value over scale. For instance, local traditional strengths in agriculture can be combined with a range of innovative technologies and practices to develop a organic and environmentally less damaging products ranging from vegetables and fruits, fibre, to processed products (Fornandez et al. 2013). These products can tap into the rapidly expanding community of consumers in the global as well as growing regional markets (Rahmaniah et al. 2020). Local experience in livestock management, when combined with a range of meat or dairy packing, storage and transport technologies, can afford an alternative to industrial scale animal production, and allow for the possibility of developing niche businesses that offer a range of unique products (Jouzi et al. 2017; Ho et al. 2018). There will be a critical need for the development of a well-trained workforce with a diverse set of industry specific vocational skills, appreciation of sustainability science and more general technology expertise and business management capabilities. Enterprises set up to impart training in these skills, while generating value for the local communities, can also form a vital component of the economy.

3.4 Socio-economic equity

The *conservation-for-development* approach recognizes that social, economic, political, and ecological issues are interconnected. Socio-economic inequality can lead to increased environmental degradation. Critical in this approach is the inclusion of various sections of the local societies, across different societal barriers and power structures, and other relevant stakeholders.

3.5 Wide-ranging partnerships

Participation of international networks of experts and institutions is vital for the economy. In an increasingly globalized world, the transfer and application of technologies developed in one part of the

341 world to businesses in another part can often unlock synergies and value for local and global economies.
342 Local enterprises can benefit from obtaining access to specific technologies in soil, water and crop
343 management that have been developed in other country markets. Mutually beneficial commercial
344 partnerships with globally experienced companies can help local entrepreneurs introduce novel business
345 models and create unique value propositions for global and local customers.
346 Financial investments will be of utmost importance for growth of the enterprises. Recent times have seen
347 encouraging growth in the community of global conservation financers driven by the need to preserve
348 natural ecosystems while utilizing them for economic development. A range of innovative financial
349 instruments, that include debt, equity and grant funding have been employed (Berghöfer et al. 2017).
350 Such opportunities could help fulfil investment requirements of this green economy. Investors in this
351 community range from high-net-worth individuals to foundations and sovereign funds.
352 The short-term outcomes would be to garner political support for the *conservation-for-development*
353 approach; attract investors for resources and knowledge transfer; and motivate local communities and
354 entrepreneurs to participate and take ownership. Government support, global investors, and local
355 partnerships can lead to the longer term impact of protecting biodiversity while ensuring economic
356 development and improved human well-being in the landscapes of interest.
357 Several existing tools can be used for the on-ground implementation of this approach. The spatially explicit
358 framework, one of the cornerstones of the *conservation-for-development* approach, could be facilitated
359 through tools such as Systematic Conservation Planning (Marguels and Pressey 2000), which uses specific
360 protocols to identify priority areas for biodiversity. Governments could formally recognize spatially explicit
361 zones through legislations and tax benefits for investors and entrepreneurs, such as tax benefits provided
362 by the green economic policies in the Kyrgyz Republic (Hao et al. 2019).
363

Market instruments such as green bonds (Flammer 2021), payments for ecosystem services (Wunder 2007), auctions (Latacz-Lohmann and Van der Hamsvoort 1998), tradable permits (Hartig and Drechsler 2009), and conservation trust funds (Doinjashvili, Méral, and Andriamahefazafy 2021) could be operationalized to increase investments in ecosystem services and biodiversity following this approach (Flammer 2021). Certification schemes or similar concepts that provide additional market value can be used to increase income without increasing the use of ecosystem services for the sustainable enterprises (Gullison 2003). Newer ideas based on non-market instruments such as conservation basic income for individuals living close to conservation critical areas can also be explored to ensure sustainable use of ecosystem services and biodiversity, and for social inclusion and equity (Fletcher and Büscher 2020).

Approaches such as the Partners Principles for community engagement for conservation can be followed to ensure that the local communities and other stakeholders are engaged ethically and beneficially through the process (Mishra et al. 2017).

Many of the above-mentioned tools can have varying outcomes for biodiversity conservation and social well-being based on the context and implementation. Market based instruments, in particular, can potentially lead to the *crowding-out* of intrinsic motivations for conservation (Rode, Gómez-Baggethun, and Krause 2015). However, there is also research to support *crowding-in* and increasing motivation for conservation (Rodríguez-Sickert, Guzmán, and Cardenas, 2008). Careful review and contextual planning will be important for the implementation of these tools. Continuous monitoring and evaluation of the programmes can ensure that they help meet biodiversity and human well-being outcomes.

3.6 Limitations of the *conservation-for-development* model

There are several potential limitations of the *conservation-for-development* model. Its application requires the involvement of multiple stakeholders with different visions, values, and interests for any landscape. Aligning these differing values and interests for a common goal can be a challenge, especially

as value trade-offs may also need to be addressed. Managing power imbalances in these situations can be a challenge. The model requires a landscape perspective, which can be expensive and cumbersome to implement. For this model to be attractive, the economic benefits from sustainable enterprises must eventually compete with benefits from other enterprises. The benefits provided by nature and ecosystem services are often hard to measure or articulate, so these might not be directly visible to the stakeholders or to the consumers.

5. Conclusion

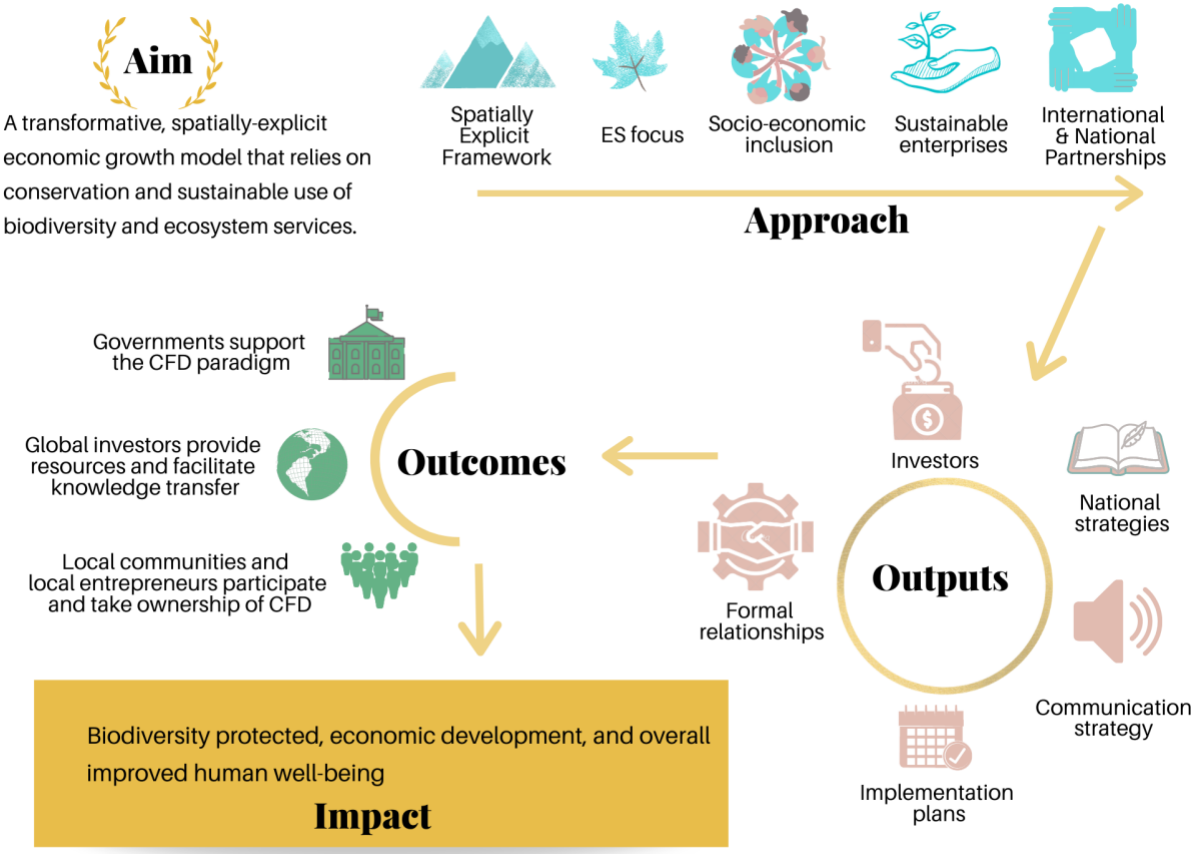


Figure 3: A simplified theory of change for the *conservation-for-development* approach showing the strategic vision, the approach, the outcomes, and the overall impact expected.

The vision of the *conservation-for-development* approach is to create a transformative, spatially-explicit development model that relies on conservation and sustainable use of biodiversity and ecosystem services (Figure 3). The approach could assist in nature conservation and economic development, bring people and nature closer, and move away from human-nature dualism that has so far characterized both economic development and biodiversity conservation efforts.

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