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Thinking about regeneration: a global vision for integral protected and conserved areas management

Pensando en regeneración: una visión global para la gestión integral de áreas protegidas y conservadas

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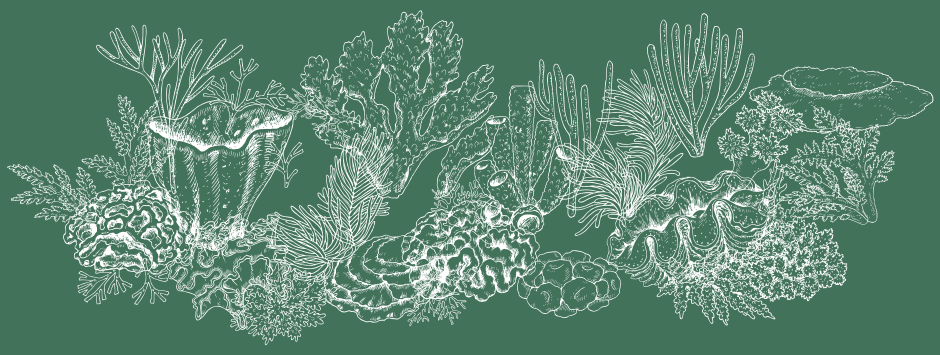

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Abstract - Protected and conserved areas represent one of the most prominent and critical conservation strategies to ensure biodiversity. Despite the increasing global coverage of protected areas, many challenges remain to be resolved, mainly concerning their management and the interface between areas dedicated to conservation and production. To preserve biodiversity and achieve global conservation goals, protected area management requires innovative and regenerative approaches that transform the relationship of human beings with the places where they live and interact in a context of permanent and dynamic change, thus restoring the balance and integrity of ecosystems. We review the current trends and propose an approach that gives a central and critical role to the human being in the recovery of the health of terrestrial and marine ecosystems to create functional regenerative landscapes.

Key words: functional landscape; regeneration; global targets; protected and conserved areas.

Resumen - Las áreas protegidas y conservadas representan una de las estrategias de conservación más prominentes y críticas para asegurar la biodiversidad. A pesar de la creciente cobertura global de las áreas protegidas, quedan muchos desafíos por resolver, principalmente en relación con su gestión, pero también en la interfaz entre las áreas dedicadas a la conservación y las áreas productivas. Para preservar la biodiversidad y alcanzar los objetivos de conservación global, la gestión de áreas protegidas requiere enfoques innovadores y regenerativos que transforme la relación de los seres humanos con los lugares donde habitan e interactúan en un contexto de cambio permanente y dinámico, y así restaurar el equilibrio y la integridad de los ecosistemas. Revisamos las aproximaciones actuales y proponemos un enfoque que otorga un papel central y clave al ser humano en la recuperación de la salud de los ecosistemas terrestres y marinos para crear paisajes funcionales regenerativos.

Palabras clave: paisaje funcional; regeneración; metas globales; áreas protegidas y conservadas.

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Introduction

The global trend of large-scale habitat destruction, fragmentation, and degradation (Crooks et al., 2017) have, in most regions of the world, created landscapes so anthropized that little room has been left for wild species, ecosystems, and the natural processes that sustain them (Liu et al., 2018). Marine environments have also been heavily altered and face multiple threats (Ripple et al., 2017).

In recent decades, global change has exacerbated challenges to the survival of many ecosystems and organisms, as well as to the benefits and values they provide to human societies (Leuzzinger et al., 2011).

Science has provided solid evidence that the Earth is experiencing its sixth wave of mass extinction (González-Maya et al., 2011); however, the global commitments made by countries to address this situation have failed to halt this process. Between 1970 and 2016 there has been a 68% loss of global biodiversity (WWF, 2020), which shows the deteriorating state of ecosystems and their services worldwide (IPBES, 2019). This alarming trend threatens societies' well-being, prosperity, and security (Diaz et al., 2006; Lawson & Nguyen-Van, 2020). Biodiversity integrity has been defined as one of the nine planetary boundaries that enable life on the planet and, simultaneously, the one that has been most impacted by human activities (Rockström et al., 2009). The loss of ecosystem services, exacerbated by climate change, limits the survival of the planet's species, including humans.

Concern about the global decline in biodiversity and the degradation of ecosystem services led to the Convention on Biological Diversity - CBD (United Nations, 1992) in 1992, which outlined the landscape approach. The landscape approach seeks to provide a holistic framework for action to manage natural resources and achieve social, economic, and environmental objectives in areas where productive land uses compete with conservation objectives (Ferraro et al., 2011; Sayer et al., 2013). The landscape approach has been refined in response to increasing environmental pressures in the last decade. In particular, there has been a shift from essentially conservation-oriented perspectives to greater integration of poverty alleviation objectives (Ferraro et al., 2011) and a regenerative approach based on six pillars: social, political, economic, spiritual, ecological, and cultural (Müller, 2016; Müller 2020). Principles supporting the implementation of a landscape approach emphasize adaptive management, stakeholder involvement, and multiple objectives. While protected and conserved areas are vital strategies for protecting biological resources, they vary considerably in their effectiveness. They are often reported to have negative impacts on local people. This has contributed to a divisive and still unresolved debate on the compatibility of socioeconomic development and environmental protection objectives (Oldekop et al., 2016). With increasing global challenges, such as population growth, climate change, and overconsumption of ecosystem services, it is becoming clear that greater integration of poverty reduction and biodiversity conservation agendas is required. The Millennium Development Goals (MDGs) and, subsequently, the Sustainable Development Goals (SDGs) endorsed by the United Nations are designed

to inspire efforts that target these new requirements to improve the living conditions of people, particularly those who interact daily with protected areas and other efficient conservation measures (Sachs et al., 2009). However, we have failed to meet the targets set by the CBD for 2020, and this lack of progress could well undermine the achievement of the SDGs by 2030 and poverty reduction in the long term.

Proponents of new conservation thinking advocate various positions on crucial conservation ideas, such as the importance of human-dominated landscapes and conservation engagement with economic development activities.

However, in the practice of professions associated with natural resource management, the current trend is to understand and favor the need for conservation practices that go hand in hand with poverty eradication but against large-scale economic development (Holmes et al., 2017).

Pro-poor conservation strategies are touted as a panacea for achieving biodiversity conservation and poverty reduction; however, evidence to demonstrate success in achieving these dual goals is still lacking (Davies et al., 2014). Although governments recognize that protected and conserved areas are essential for effective biodiversity conservation (CBD, 2010), as they are about to sign up to ambitious targets beyond Aichi with 30% of terrestrial and 30% of marine regions under some category of protected area by 2030, the continued growth of human populations and consumption habits have resulted in unsustainable exploitation of biodiversity. Effective conservation of biological diversity is essential for human survival and the maintenance of the ecological processes that sustain

Kompong Phluk, Cambodia. Photo: Olivier Chassot

it (O'Leary et al., 2016). Despite several examples of successful conservation cases (mainly at local scales; Koprowski et al., 2019) and growing public and governmental interest in living sustainably, biodiversity continues to decline at a rapid pace (Rands et al., 2010).

Protected areas cover practically 17% of the planet's terrestrial extent, in addition to which there is significant progress - although still considered a laggard - in ecosystem protection in the marine realm (8%) (UNEP-WCMC & IUCN, 2021). However, the constant increase in pressures on biodiversity, coupled with the challenges associated with the growth of protected areas, contribute to the maintenance of substantial gaps in global biodiversity protection coverage. This disparity has led to the current emphasis on the strategic expansion of the global network of protected areas, considering their limitations but striving for the best alternatives in terms of efficiency. However, because protected areas often lack the necessary resources in the face of external threats, efforts to expand their coverage must be complemented by adequate management of existing protected area systems (Le Saout et al., 2013).

Overall, there is no doubt that goals focused on improving the management of protected and conserved areas have focused on increasing operational effectiveness. However, little guidance has been generated on improving collective and articulated effectiveness to achieve global biodiversity conservation goals (WWF, 2020).

Even more worrying is the fact that only 7.5% of countries' land area is under some category of protection or other adequately connected conservation mechanisms, which corresponds to half of the total terrestrial protected area coverage (14.7%), and that only 30% of countries are achieving Aichi Target 11 (Saura et al., 2019).

In this scenario, a holistic approach that ensures not only the management of isolated and independent units but articulates such units with adjacent areas and ensures their integration and functionality with other areas through connected landscapes where humans are drivers of regeneration seems urgent. In such an approach, it is justified to consider the multiple scales, visions, and interests in the context of permanent and dynamic change.

This contribution aims to review current approaches from a critical perspective and propose a regenerative approach that adequately delineates scale, transcends the political boundaries of nations, and requires a collaborative approach to transform the relationship of humans with nature. This approach gives humans a central and critical role as the driving force for restoring connectivity between terrestrial and marine ecosystems in protected and conserved areas to recover functional regenerative landscapes.

State-of-the-art and current trends

In recent decades, the challenge of addressing this reality has led to a revolution in scientific thinking and conservation approaches. These new approaches emphasize the need to think beyond the protection of islands towards a systemic vision of conservation at the terrestrial (including freshwater) and integrated coastal-marine landscape level. In such a vision, it is sought that these spaces under different tenure regimes, jurisdictions, and uses, contribute to an integrated approach to natural resource management and where society as a whole participates in a strategic effort that benefits both human populations, ecosystems, and especially wildlife (Herrera et al., 2016). Currently, connectivity along rivers, coasts, deserts, and other vulnerable ecosystems is recognized as a need and a solution at a landscape, even continental, scale for biodiversity conservation in the face of climate change impacts. Thus, connectivity conservation is a 21st Century vision for the long-term conservation of biodiversity and its natural, cultural, economic, spiritual, and social assets. Connectivity conservation advocates linking "islands" of protected areas or terrestrial ecosystems in large-scale, connected mosaics of lands or seas that are jointly managed by many actors - national, state, and local governments, private land trusts, Indigenous Peoples, local communities, primary producers, and private companies (Chassot et al., 2018). This is the first step toward functional landscape management (Poiani & Richter, 2000). The concept has been emerging for many years and is known by many other names depending on the regions in which it is applied: landscape integration, ecosystem networks, biodiversity corridors, ecological corridors, and development corridors. The effort to conserve connectivity is a vital investment for the sustainability of ecosystem services of terrestrial and marine environments for the estimated 9,735,000,000,000 humans that will populate the Earth in 2050 (United Nations, 2019). In addition, connectivity conservation nicely reinforces the increasingly accepted concept of "other effective area-based conservation measures", more commonly referred to as "other effective conservation measures" (OECMs), which recognizes the conservation value of different types of geographic spaces located outside protected areas such as indigenous territories, private protected areas, and even wilderness areas that usually do not integrate national accounting relative to protected terrestrial or marine territories (IUCN-WCPA, 2019; Jonas & Jonas, 2019). In conclusion, multiple efforts have been made with diverse trends and some paradigm shifts in protected and conserved areas, without being able to reverse the trend of biodiversity loss.

Towards a regenerative proposal

Successful conservation approaches need to be strengthened and adequately funded, on a much larger scale than the current effort. Indeed, more radical changes are required that recognize biodiversity as a global public good; that integrate biodiversity conservation into policies and decision frameworks for resource production and consumption; and that focus on broad institutional and social changes to enable more effective implementation of ecosystem conservation policies (MacKinnon et al., 2020) with clear benefits for local human populations interacting in these spaces.

Protected areas and their connectivity landscapes are a natural solution to climate change, population pressure, and biodiversity loss (Dudley et al., 2010).

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They are key landscape elements for biodiversity conservation, hold multiple social, cultural, spiritual (Dudley et al., 2009), and economic values, support human well-being and livelihoods, and are critical as a strategy for responding to global challenges (MacKinnon et al., 2020). Protected and conserved areas maintain the integrity of ecosystems and essential ecosystem services, reduce the risks and impacts of extreme events, maintain breeding, feeding, and nursery sites for fish and wildlife, and mitigate the impacts of climate events (Worboys et al., 2015), and strengthen the resilience of human communities and ecosystems. The contributions of protected and conserved areas to humanity are innumerable and essential. They include pollination services, medicinal plants, agrobiodiversity, sources of production and recolonization of marine species, gene banks, clean water sources, hydroelectric power, reefs, mangroves, and wetlands for coastal protection. In short, protected and conserved areas are fundamental for the economy and regenerative development, as they represent both an avoided cost and a saving in mitigation and adaptation to climate change.

To fulfill their role, protected and conserved areas must be effectively and equitably managed, ecologically representative, and well connected, and include other effective area-based conservation measures (Watson et al., 2016). In this sense, science must play a more prominent role and influence decision-making at local, national, and regional levels, establishing protected area objectives that make ecological sense and prioritizing important biodiversity areas to ensure adequate ecological representation. It is also necessary to establish and evaluate transparent and comparable performance indicators of ecological effectiveness to account for progress toward these objectives (Watson et al., 2016). Indeed, biodiversity conservation research

Komodo National Park, Indonesia. Foto: Olivier Chassot

and policy landscape are shifting towards a new vision (Reed, 2016). Protected areas are now expected to meet many objectives, including effective and equitable management. In this new landscape, organizations and governments are struggling to find ways to ensure that the rights of local and Indigenous Peoples are respected, while scientists have endorsed the need for platforms for research. In practice, however, the predominant anthropocentric bias in decision-making spaces most commonly affects the establishment of conservation objectives to the detriment of a short-term linear vision based essentially on socioeconomic considerations.

Conservation scientists must undoubtedly become more relevant and vital to the societies in which they live. To do so, they must generate answers, even when complete scientific knowledge is lacking, structure scientific research around policies and debates that influence what conservationists value, moving beyond the certainty of the natural sciences to the more contextual debates of the human and social sciences, addressing the question of how conservation can contribute to the improvement of human livelihoods (Robinson, 2016). The pro-growth norms of global society further foster timidity among conservation practitioners, orienting them toward conformity to the global economic agenda and away from recognition of what is ultimately needed to sustain life on Earth (Noss et al., 2012).

From a conservation perspective, the incidence of different zoonoses on human health (Andersen et al., 2020; Zhou et al., 2020) is but one of many manifestations of human damage to nature (Hockings et al., 2020). Based on current and emerging trends (connectivity conservation, other effective area-based conservation measures - OMEC, Indigenous and Community Conserved Territories and Areas - ICCAs, regenerative development), we propose a paradigm shift in the approach to work in protected and conserved areas towards the concept of "functional regenerative landscape". This broader conserved area paradigm embodies good governance, equity, and effective conservation outcomes and includes diverse contributions to conservation within and beyond protected areas (Jonas et al., 2021).

How the current pandemic is modifying our societies (Lippi et al., 2020) is evidence that we are under an inevitable obligation to redouble our efforts to achieve sustainable development objectives and to aim for more ambitious goals, including the maintenance and improvement of the health of ecosystems with protected and conserved areas as their fundamental pillar.

Regenerative development constitutes an additional step to sustainable development goals as they have been set since the Environment and Development Summit held in Rio de Janeiro in 1992. The international consensus on regenerative development has gained traction with the scientific evidence that humans are in the process of

crossing planetary boundaries (Rockström et al., 2009). Regenerative design is based on a deep understanding of the holistic and interdependent nature of living systems, providing viable management solutions for economies so as not to exceed ecosystems' environmental, social and economic carrying capacity (East, 2020). It is about transcending sustainable development goals, aiming for thriving and abundant living systems in which the health and well-being of the entire system (including all living things) continuously increase (Gibbons, 2020).

Regenerative development brings together a set of principles to transform the relationship of humans to the places where they inhabit and interact (Gibbons et al., 2018), thereby restoring balance to ecosystems (Müller, 2016; Müller 2020). Regeneration a) creates conditions conducive to life, b) recovers planetary capacity by restoring its diversity, complexity, and creativity, c) reconnects humans and nature, d) enables communities to develop a shared vision of the places where they live and work, e) strengthens the authenticity and essence of a place, and f) has a holistic and trans-disciplinary approach, building on the interrelationships that form living systems (Müller, 2016; Müller, 2020; Gibbons et al., 2018).

In an ideal world, protected areas *per se* should not be necessary, and the relationship of humans with nature should not affect planetary boundaries. As we argued above, nations are making efforts to increase the number of protected areas, with a global goal of 30% of the terrestrial and marine surface by 2030. However, few areas remain with undisturbed ecosystems.

We argue that functional regenerative landscapes can be territories in which humans interact with nature in such a way as to regenerate ecosystems through regenerative actions that focus on: increasing ecological connectivity, managing and restoring degraded areas, recovering the health of soils, water, and oceans, abandoning the use of agrochemicals and toxic substances by converting to the production of natural and organic inputs, and promoting regenerative food production (fishing, agriculture, livestock, mainly). These integral actions essentially involve the regeneration of human beings in their spiritual, cultural, political,

Shiprock, New Mexico, USA. Foto: Olivier Chassot

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educational, economic, and environmental spheres. These six principles must permeate human activities. They are functional, practical, and possible at any scale: individual, community, local, sub-national, national, regional, and global. Moreover, they make it possible to lower CO_2 emissions and sequester enormous amounts of carbon. A dialogue of knowledge is essential, where minority, ancestral, indigenous, and local voices are as important as the voices of the scientific community, the private sector, and governments at different levels. Only the awareness that the regenerative path is not only possible but that it is more sustainable and profitable than the current development model from the economic and social point of view will allow human beings to reverse the curve of biodiversity loss and recover the web of life.

Perspective

Many organizations and academic institutions have generated extensive knowledge on the vulnerabilities of fragmented ecosystems to climate change, as well as on connectivity management as a regional response strategy to this condition (Chassot & Monge-Arias, 2012; Herrera et al., 2016). However, in many cases, the knowledge is dispersed, and it is for this reason that the need arises to share and exchange experiences that allow, on the one hand, the symbiosis between solo efforts and, on the other hand, allow governments and private investors to make sound decisions regarding their environmental policies at least for the next 50 years. A multi- and trans-disciplinary approach is essential for this synergy to occur and for complex problems to be solved in an integrated manner.

The role of protected and conserved areas in climate change response strategies is recognized worldwide.

Furthermore, the need to strengthen this role in various ways has been identified, one of them being to extend their functions through a landscape approach, whose ecological, cultural, and socioeconomic diversity has the capacity to increase the resilience of ecosystems to climate change (González-Maya et al., 2011). This approach translates into benefits for human populations interacting with resources, in many cases even within protected areas. Many governments are still in the process of expanding and consolidating their protected

Puerto Baquerizo, Galápagos. Foto: Olivier Chassot

and conserved area systems, and the time is ripe to support the inclusion of the concept of connectivity conservation, other effective area-based conservation measures, and regenerative development in national, regional, and global agendas. Advocacy is possible only based on sound science, research, and case studies that demonstrate that the proposed connectivity management and regenerative development models can generate positive outcomes in response to current and future environmental conditions. Because the regenerative functional landscape approach based

on protected and conserved areas and connectivity conservation respond to a paradigm shift, support, and political will at all levels, local, sub-national, national, regional, and global are necessary. In addition, comprehensive funding programs must be unlocked globally to implement regenerative actions that support the well-being of all life forms.

There is significant evidence of the requirement for much more ambitious biodiversity conservation targets than those that were agreed upon by nations in Aichi Target 11, and that conserving at least 50% of the planet is a necessity to avoid the collapse of the planet's ecosystems (Dinerstein et al., 2017; Woodley et al., 2019). To achieve this ambitious goal, we must make a firm commitment, use a holistic approach to conservation management, shift paradigms and try other approaches, and be creative in responding to the challenges of global change. We need to change the mental frameworks that prevent us from moving forward, think big, and make qualitative and quantitative leaps in how we relate to nature.

Regenerative functional landscapes are the key to harmonizing productive activities with the recovery of ecosystems and biological diversity. They are the key to restoring ecological connectivity within landscapes, including production and urban areas. It is time for humans to reconnect intimately with nature, taking advantage of the benefits and services it provides to all living beings with whom we share our territories.

Given the enormous challenges facing humanity, mainly related to the massive loss of biodiversity and climate change (Ceballos et al., 2020), and exacerbated by the health emergency generated by SARS-CoV-2 (Andersen et al., 2020; Zhou et al., 2020), the need to ensure functional, connected and effectively regenerated landscapes represent a primary and urgent necessity to ensure even our survival. The planetary state of conservation is our guarantee to regenerate our living conditions and the insurance for an equitable future with the necessary conditions for the development and survival of our society.

We face the challenge of regenerating our planet's biological and social systems, but we also have a chance to unlock well-being, abundance, and justice for all life forms.

Playa Pelada, Guanacaste. Photo: Adriana Morales

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