Transformative Conservation in Social-Ecological Systems

Discussion paper for the 2021 World Conservation Congress

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- Rethinks the relationships between nature, society, individuals, and risk in light of nature's contributions to people, equity and justice, and sustainable development goals;
- Restructures systems to create durable change at large geographic, ecological, political-economic, and demographic scales; and
- Ultimately conserves biodiversity while justly transitioning to net negative emissions economies and securing the sustainable and regenerative use of natural resources.

Executive Summary

This discussion paper explores how the transformation of ecosystems profoundly threatens nature and human well-being, while providing equally powerful opportunities to restructure and improve how we live in the world. It aims to stimulate dialogue at the 2020 World Conservation Congress about the depth, breadth, and pace of work needed for **transformative conservation (TC) – conserving biodiversity while justly transitioning to net negative emissions economies and securing the sustainable and regenerative use of natural resources**. The paper represents one of the Commission on Ecosystem Management's (CEM) contributions to the Congress and advancement of Nature 2030, IUCN's One Programme for 2021-2024. As climate change alters ecosystems and strains the people that depend upon them, CEM seeks to improve how we prioritize, invest in, and practice conservation. Specifically, CEM seeks to increase IUCN's ability to accelerate and steer social-ecological transformations, and create synergy with the transformative change initiatives of peer institutions.

This paper first introduces the concept of TC. People talk increasingly about "transformation" because it characterizes the most severe impacts of our climate crisis. Altogether we are crossing planetary and social boundaries, increasing the risk of synchronous failures and abrupt collapse in our systems, and puncturing the social-ecological "doughnut" that is the safe and just space for humanity. The underlying concept of social-ecological transformation is rooted in the fields of systems thinking and resilience, which emphasize the complex, non-linear, self-organizing, and adaptive qualities of the world. When a system's dynamics exceed certain thresholds, its configuration will become untenable, and a new structure, set of functions and ecosystem services, and identity, will emerge and predominate. The discussion paper argues that today's conservation initiatives must combine societal transformations of the social and ecological relations, technologies, and institutions that bind local places to global networks, with personal transformations of people's values, identity, and behavior.

The paper then briefly maps our global systems using eight interlinked drivers of change: biological reproduction, material relations with nature, production and labor processes, social relations, cultural practices, institutional arrangements, technologies, and mental conceptions. **Seven short cases of TC follow, showing how people can catalyze, facilitate, empower, steer, or at least navigate TC without radical disruption to their lives.** These involve restoration, urban and rural agroecology, hydropower, forestry, and fisheries. The map and cases provide a starting point for examining the role of TC in implementing Nature 2030.

The penultimate section identifies where IUCN could advance TC in each of Nature 2030's programme priorities – people, land, water, oceans, and climate. Numerous leverage points ground theory in practice and provide references for readers to explore their own interests and applications. It identifies several risks posed by the normalizing, popular discourse around transformation in public policy and international development, such as climate gentrification and apartheid. It delves deeply into the novel approaches and mechanisms for conservation finance needed to minimize the impacts of business on biodiversity, and secure environmental gain from industry and infrastructure. It calls out the contradictions between an unfettered endorsement of the eighth Sustainable Development Goal – promote inclusive and sustainable economic growth – and a systems approach to biodiversity and resilience. It highlights the exceptional potential of nature-based solutions to help transform our countrysides and cities in ways that address multiple IUCN priorities.

Six recommendations to empower transformative conservation conclude the paper.

1. **Dramatically increase our familiarity with system transformation concepts,** such as the adaptive cycle of systems, panarchy, and transition design.
2. **Strongly link societal and personal transformations,** for example through interfaith conservation, indigenous environmental sciences, and contemporary ritual.
3. **Update how we plan for transformation,** including tools like decision-scaling, adaptation pathways, and shared socioeconomic pathways.
4. **Facilitate the shift from diagnosis to transformative action,** for example through peer mentoring networks, transformation labs, and transformative climate science.
5. **Improve our ability to adjust to transformation as it occurs,** using decision windows, horizoning work, and real-time climate services, among other things.
6. **Partner with political movements to achieve equitable and just transformation,** whether through participatory action research, indigenous just transitions, transformative climate politics, or other approaches to fomenting social-ecological change.

These recommendations for the practice of TC provide immediate examples of how IUCN could safeguard biodiversity and sustainable livelihoods while accelerating and steering a just transition to a fossil-free economy. In so doing, IUCN could provide global leadership and guidance that advances Nature 2030 and TC therein. Through its own complementary 2021-2024 Mandate, CEM looks forward to supporting this direction, and linking this work to parallel transformative change initiatives.

1. Introduction

This discussion paper explores how the transformation of ecosystems profoundly threatens nature and human well-being, while providing equally powerful opportunities to restructure and improve how we live in the world. It aims to stimulate dialogue at the 2020 World Conservation Congress about the depth, breadth, and pace of work needed for **transformative conservation (TC) – conserving biodiversity while justly transitioning to net negative emissions economies and securing the sustainable and regenerative use of natural resources.**[1] While the paper stems from dire circumstances, it is also optimistic that "if we can work together, we can make ourselves into whatever we are clever and courageous enough to imagine ourselves becoming."[2]

The paper represents one of the Commission on Ecosystem Management's (CEM) contributions to the Congress. CEM consists of a network of volunteer conservation scientists, experts, and managers that provide advice to the International Union for the Conservation of Nature (IUCN) regarding the management, restoration, and sustainable use of the world's ecosystems. **As climate change alters ecosystems and strains the people that depend upon them, CEM seeks to improve how we prioritize, invest in, and practice conservation.** The Convention on Biological Diversity's (CBD) Ecosystem Approach[3] provides the starting point for CEM's work, and links it to ecosystem-based adaptation (EbA),[4] systems thinking,[5] social-ecological resilience,[6] environmental equity and justice and governance,[7] nature-based solutions (NbS),[8] integrated landscape approaches,[9] and sustainability.

CEM's Mandate for 2021-2024 purposely aligns closely with IUCN's One Programme for the same period – Nature 2030: One Nature, One Future, which envisions a just world that values and conserves nature. CEM has put new emphasis on social-ecological resilience and transformation, along with NbS, ecosystem governance, cultural practices, restoration, and ecosystem risk assessment. **CEM seeks to increase IUCN's ability to accelerate and steer social-ecological transformations, and create synergy with the transformative change initiatives of peer institutions.** Namely, Nature 2030 will advance the package of Sustainable Development Goals (SDGs), the forthcoming Global Biodiversity Framework and post-Aichi Biodiversity Targets, the United Nations' 2030 Agenda on Sustainable Development and Decade on Ecosystem Restoration and Ocean Science, and the Paris Agreement on Climate Change; and respond directly to the threats identified in the IPBES Global Assessment Report on Biodiversity and Ecosystem Services, Global Outlooks, and the IPCC Special Reports on Climate Change and Land and on the Ocean and Cryosphere.

This paper first introduces the concept of TC, reviews its systemic drivers, and provides examples of success. It then identifies connections to Nature 2030, and concludes by recommending modifications to conservation practice. In sum, throughout this decade of action IUCN can provide global leadership by pioneering approaches to TC and developing programmatic guidance.

2. Why Transformative Conservation?

People talk increasingly about "transformation" because it characterizes the most severe impacts of our climate crisis.[10] Climate change is amplifying and hastening the contradictions inherent in our international systems of resource extraction, distribution, and consumption.[11] We risk losing a million species and entire ecosystems; the communities that depend on biodiversity for prosperity and resilience are suffering and retreating in the face of scarcity, conflict, displacement, and migration; and parts of our global trade networks are breaking down. **Altogether we are crossing planetary and social boundaries, increasing the risk of synchronous failures and abrupt collapse in our systems, and puncturing the "doughnut" that is the safe and just space for humanity** (see figure 1).[12] Witness a handful of recent news headlines:

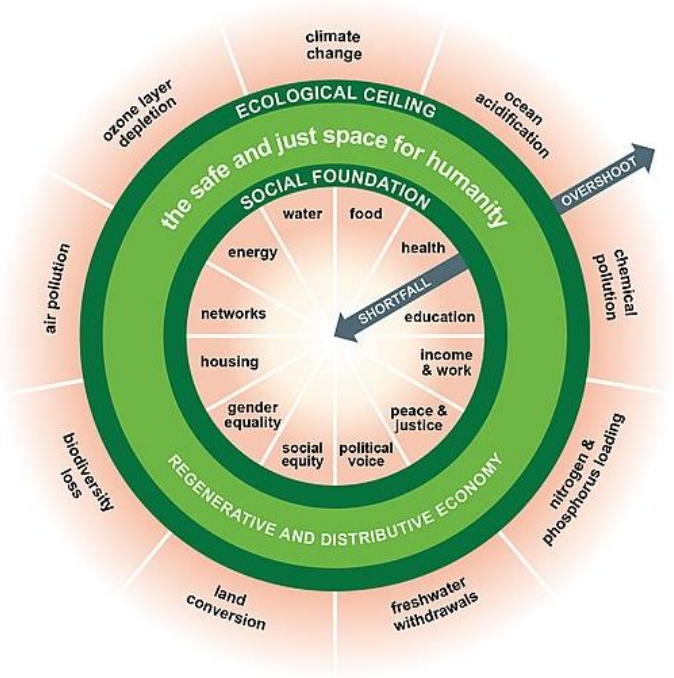
- The health of every child born today will be profoundly affected by climate change[13], billions face food and water shortages over the next 30 years[14], and over 140 million internal climate refugees are anticipated annually by 2050.[15]
- Permafrost is becoming a global carbon source instead of sink[16], large tracts of the Amazon are drying out – potentially irreversibly, avian biodiversity in the Gran Chaco verges on collapse[17], and fish, mollusks, and marine animals are disappearing twice as fast as those on land.[18]
- Food shocks are increasingly frequent and concurrent around the globe, farming communities are experiencing widespread mental health epidemics including suicide[19], cities like Cape Town and Chennai have had to shut off water supplies,[20] and coastal cities in the United States and United Kingdom are starting to succumb to sea level rise.[21]
- Investment analysis has failed to integrate climate science and created a mispricing phenomenon possibly larger than the mortgage credit bubble of the mid-2000s.[22]

The coronavirus disease (covid-19) pandemic has rapidly laid these frailties bare. Deforestation and increased interface with isolated rainforest species, the trade and consumption of exotic wildlife, industrial agri-food systems, global supply chains, just-in-time manufacturing, mistrust of science and expertise, the gig economy, privatized health care, thin or nonexistent welfare nets – coronavirus has illustrated how a complex system with a high degree of interdependence and low degree of redundancy can rapidly unwind. We have previewed the kind of catastrophic unraveling that climate change could force in coming years.

Today's conservation initiatives can no longer focus solely on nature if they are to reverse land degradation, the overexploitation and collapse of ecosystems, climate change, and the disempowerment of indigenous and other people. They must grapple with international commodity chains, vast inequality and vulnerability, political protest and violent resource control, people's disconnections from nature, and public and mental health crises. **Conservation must combine societal transformations of the social and ecological relations, technologies, and institutions that bind local places to global networks, with personal transformations of people's values, identity, and behavior.** This complex, contested terrain is the starting point for TC that restructures systems to create profound, long-lasting change at large geographic, ecological, financial, and demographic scales.

Exploring TC requires a bit of basic theory. **As used in this paper, the underlying concept of social-ecological transformation is rooted in the fields of systems thinking and resilience, which emphasize the complex, non-linear, self-organizing, emergent, and adaptive qualities of the world.**[23] Ecosystems and society are understood as integrated and interdependent. Any system consists of variables, processes, and feedbacks, which determine its structure, functioning, and identity. Systems are inherently dynamic, and can absorb disturbances, adapt to external drivers and internal processes, and maintain themselves within given ranges. However, when a system's dynamics exceed certain

Figure 1. The doughnut economics framework for sustainable development (Raworth 2017).



thresholds, its configuration will become untenable, and the system will transform. A new structure, set of functions and ecosystem services, and identity, will emerge and predominate.[24]

3. A Systemic Understanding of Transformative Conservation

The transformative disruptions listed in the headlines above stem from interlinked forces. **Heuristically, one can map the trajectories of our global systems with eight drivers of change, each of which affects and responds to the others.**[25] While obstacles exist to redirecting these drivers to beneficial outcomes, people can also use leverage points to change system parameters, feedbacks, design, and intent.[26]

The following generalized system "map" provides a point of departure for exploring the role of TC in implementing Nature 2030.

1. Beginning with **biological reproduction**, people have basic needs for food and water, clothing, shelter, and procreation, as well as security, education, medicine, and employment. They develop their livelihood strategies, agri-food and fiber operations, and buildings and infrastructure accordingly, which are secondary drivers. The dire stakes of biological reproduction – literally life and death – generate intense emotions and protective instincts that can readily block transformation.
2. Our contemporary **material relations with nature** are structured to meet these needs largely through industrial and international production, distribution, and consumption systems, with secondary drivers consisting of land conversion, urbanization, warfare, and our water, energy, transportation, and information systems. In a reinforcing feedback loop, these systems and their networks of actors stimulate population growth and aggressively create new markets, thereby exponentially increasing the global circulation of raw and processed materials. This results in equally extensive habitat loss and introduction of non-native species; land, water, and air degradation, pollution, and toxicity; and alteration of global biogeochemical cycles.[27] The paradigm that requires perpetual economic "growth" for human prosperity cannot lead us out of our current crisis; it unavoidably destroys the material conditions necessary to reproduce nature and society.[28] Obstacles to transforming these relations include dissociation from nature (see below), deep value differences, territoriality (see below), and the scale, complexity, and inertia of existing systems. Conversely, a key leverage point is building carbon-neutral cities.[29]
3. **Production and labor processes** combine biological reproduction necessities with ego-based, limitless desires to accumulate wealth, material goods and services, status, and comfort.[30] While the details change with each century, exploitation unavoidably characterizes the relationship between those who own and reinvest land and capital, and those who sell their labor.[31] These processes are inseparable from the ongoing enclosure of common lands and waters, state subsidies and regulations, the household, and the markets that are embedded in society.[32] Since the 1970s neoliberal ideology has accelerated inequality by deifying free markets, deregulating finance, privatizing industry, and withdrawing state welfare.[33] They combine with social relations (the next driver), including gender, to exclude, marginalize, and disadvantage certain actors, and generate inequality.[34] Fundamental obstacles to transforming production include not only institutions (see below) and the use of force to maintain the status quo, but disregard for the prerequisite natural systems and resources, the capture of government and economic subsidies by corporations, and the invisibility of the labor that goes into creating a material good.[35]
4. **Social relations** also help shape our economies, politics, and relations with nature. Not limited to class or caste, these include race and ethnicity, indigeneity, gender, age, religion, nationality, and values, and give rise to complex cultural identities. Social differences, along with our neurological preference for binary thinking, lend themselves to stereotypes of "the Other",[36] and the politicization of identity strongly influences how people control territory and gain access to resources.[37] Social relations simultaneously give rise to the myriad social organizations that constitute community and civil society (e.g., unions, houses of worship, community non-profits). The exchange of knowledge and experiences, and joining together in political deliberation and protest, can provide profound leverage for transforming social relations.
5. **Cultural practices** draw from each of the other drivers and embody what people consider the norm for how a particular group lives in the world. They manifest in people's interaction with the land and sea, their views of nature, their family and social structures, their institutions, and the ways they employ technologies. The meaning imbued in these cultural practices is socially constructed and changes over time, even though people may claim the practices are immemorial.
6. **Institutional arrangements** provide the laws, policy, people, knowledge, resources, and procedures for governing and participating in society, and benefitting from nature. Institutions span markets and financial investment; political representation and participation; property rights; the creation and transmission of knowledge through discourse; and, crucially, environmental regulation and management. Obstacles to transformation include existing economic incentives and subsidies; the externalization of environmental impacts; financial discount rates that downplay the immediate value of degradation; a

lack of transparency and traceability; and equating prosperity with gross domestic product.[38] They also include unwillingness or inability to enforce laws or establish tenure; political disenfranchisement, lobbying, and corruption; denigration of government in favor of invisible hands and the magic of the market; and unwillingness to re-learn and think differently. Political movements that demand environmental and climate justice, and just and equitable transitions, provide a starting point for transformation.[39] Similarly, removing fossil-fuel subsidies, divesting from fossil-fuel assets, incentivizing decentralized energy generation, and disclosing information on greenhouse gas emission are essential leverage points.[40]

7. **Technologies** hasten the scope, scale, and pace at which people exploit nature, from the extraction of raw materials, to one-day shipping and global tourism, to fast fashion, planned obsolescence, and throw-away society. Technological innovation draws on science, engineering, and information management, and despite its potential to deepen problems, it will be necessary to catalyze transformation.[41] Mobile technologies and social media, for example, can spur resource degradation, and yet can also empower forensic zoology and citizen science that aid conservation.[42]
8. Finally, **mental conceptions** thread through everything. Our views of nature and bioethics give meaning to our relationships with the world around us, whether a sense of interconnectedness and humility, or a of dissociation and dominion. [43] They manifest in livelihood strategies, planetary boundaries, cultural identities, consumerism, and institutions and technologies. They also determine how we plan, design, and implement conservation, whether based on a mechanistic worldview of atomization and reductionism (an inherent obstacle to transformation), or on systems thinking. The ability to reflect upon and alter mental conceptions, and even paradigms, provides the greatest leverage in a system, and foregrounds the importance of personal transformations (see below). Specific examples include revealing the moral implications of fossil fuels, and strengthening climate education and engagement.[44]

These eights drivers and their interactions can be used to characterize the structure, function, identity, scale, feedbacks, and complexity of our systems. They serve as a reference point when considering the breadth, depth, and pace of system transformation necessary to simultaneously conserve nature, justly transition away from fossil fuels, and secure the sustainable use of natural resources.[45]

Figures 2 and 3 provide systems views of the drivers and responses that make up Nature 2030, including their relationships to the SDGs.[46]

4. Transformative Conservation in Practice

There are many places where people have refused to remain complicit with the monumental degradation of earth's systems, and put into practice the dictum that action is the antidote for despair.[47] This section offers a handful of examples. Any attempt to describe a "success", however, requires humility and self-awareness. "Success" should not be understood as people controlling a complex social-ecological system, but rather as a variety of actors intentionally, dynamically engaging nature with a clear vision in mind and, on the whole, deriving desired benefits and avoiding detrimental impacts as the system evolves. **In this sense people can hope to catalyze, facilitate, empower, steer, or at least navigate TC without radical disruption to their lives.** Similarly, people have wide-ranging relationships with the environment and will contest the purpose, process, and outcomes of transformation; therefore, any characterization of "success" will necessarily be a partial perspective. The following examples must be read with these caveats in mind.

1. Several areas in the **South Island of New Zealand** have transitioned away from unconstrained hydropower, overfishing, clearcut logging, industrial dairying, and overgrazing, toward sustainability and local stewardship.[48] Through locally-driven, place-based, participatory processes, stakeholders negotiated agreements that restored habitat for fish and aquatic biota; restored wetlands and riparian areas; reduced flooding and sediment and nutrient pollution; protected rare plant communities; preserved iconic scenery; limited ecotourism; compensated indigenous people for the loss of traditional food resources; and established sustainable catch limits.
2. By the 1980s, deforestation and farming in the **Qianyanzhou Region of Jiangxi Province, southern China,** had led to severe soil erosion and the collapse of crop yields.[49]. Three decades of government-supported upland reforestation, citrus agroforestry on moderate slopes, and rice paddy agriculture in valley lowlands have transformed the landscape, including an increase from less than one percent to nearly 70 percent forest-cover. The mosaic of land uses includes optimized forest structure; a variety of microclimates; improved carbon, water, and nutrient cycling; increased biodiversity; stabilized ecosystem services and economic benefits; and increased incomes. The initiative has contributed significantly to Sustainable Development Goals 1 (no poverty), 6 (clean water and sanitation), 8 (decent work and economic growth), 12 (responsible consumption and production), and 15 (life on land), and the Bonn Challenge for forest restoration.
3. In **southern Sweden's lower Helgeå River catchment,** local stewardship associations partnered with local government to reconfigure governance and adaptively co-manage a wetland landscape.[50] The catchment includes shallow lakes, large beech forests, wet forests, sandy grasslands, and a variety of rare plants and red-listed fish, amphibians, birds, and bats. Concurrently the area constitutes one of Sweden's most productive grazing and haymaking landscapes and northern Europe's largest groundwater reserve, and provides unique cultural-historical values, fishing, and recreation. Cultural and ecological inventories, land use maps, and monitoring elucidated how agricultural practices had degraded wetlands and waterfowl populations. Convened by a local policy entrepreneur, a small group of diverse stakeholders created a new municipal organization to implement a vision of environmental protection, nature conservation, tourism, pedagogy, and education, including an outdoor museum. The organization has successfully partnered with existing institutions and farmers to use wetlands as nutrient filters, regularly adjust grazing pressure, reintroduce sensitive birds and fish while minimizing invasive species, restore river tributaries, manage floods, and increase regional landscape connectivity; overall, it has helped the catchment move significantly toward social-ecological resilience and sustainability.
4. Throughout the **urban and peri-urban metropolis of Rosario, Argentina**, farmers, residents, and civil society are partnering with technical institutes, businesses, and public agencies to create food-secure, resourceful, resilient neighborhoods.[51] This agroecological landscape transformation counteracts trends toward converting agricultural land, industrial soy production with high volumes of chemicals, dependency on long-distance imports, and loss of livelihoods, all of which undermine food safety, security, sovereignty, and justice. Within the city, communities are reclaiming vacant lands, securing tenure, and then designing and managing public spaces –

Figure 2. Nature 2030 System Drivers

Figure 3. Nature 2030 System Responses

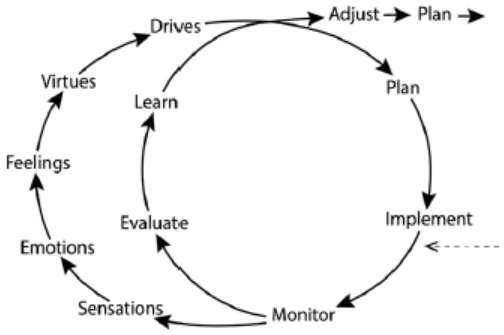
including in low income areas and slums – to create garden parks, green corridors, hospital and school gardens, a nursery, and centers for organic seed production, demonstration, and innovation. In the surrounding peri-urban greenbelt, two municipal ordinances and the metropolitan land use plan reserve land for food production and prohibit agrochemicals. Additional policy provides technical support; housing, health, and road infrastructure; commercial and retail spaces; and incentives for converting land to agroecology, monitoring product quality, and marketing under the provincial collective brand.

5. Reversing four decades of government-subsidized conversion for industrial farming of exotic trees, a partnership in **northern Scotland's Flow Country** is removing millions of exotic trees and restoring 170,000 hectares of bogs as part of a global peatland-restoration movement.[52] Peat ecosystems – the planet's most carbon-rich – cover more than 20 percent of the country, and retain about 75 percent of the carbon in its soils and vegetation. In additional to carbon sequestration, the transformation is restoring hydrology and water chemistry, reducing erosion, increasing native plant, insect, and migratory bird abundance and diversity. The country aims to restore an additional 250,000 hectares by 2030.
6. Bison historically played a significant role in shaping the **Great Plains of the American West** (covering 129 million hectares).[53] By 1890, hunting by settlers – designed partly to deprive Native Americans of an essential source of food, clothing and shelter – had reduced bison populations from tens of millions to fewer than 1,000. Beginning in 1993, the reintroduction of half a million bison has transformed tallgrass prairies at thousands of public, private, and indigenous locations. Their grazing and migratory behavior removes woody vegetation, spreads nutrients, creates a mosaic of habitats, and gives rise to higher plant, bird, and insect diversity. A new generation of ranchers has begun to reform their industry based on ethical and sustainable principles.
7. In the **"wheat and sheep belt" of New South Wales, Australia,** farmers are deliberately, consciously transforming from conventional to regenerative agricultural systems.[54] Often prompted by a crisis and then guided by holistic management mentors, individuals are reexamining their mental frames and worldviews of agriculture in light of their values, life goals, and nascent biophilic emotions. Their cognitive and paradigm shifts in the "personal sphere" ripple through multiple systems – their fields, households, communities, and beyond to the "practical" and "political" spheres (see figure 4). Along the way they engage people, institutions, and peer networks that pressure them to stop what they're doing, or support their behavioral changes, and shape their transformation trajectory. The regenerative approaches are based on social-ecological systems thinking, day-to-day monitoring of ecological processes, and creative responses to dynamic configurations of lifeforms; they result in improved soil conditions and resilience to drought and floods.

5. Transformative Conservation and Nature 2030

It is possible to anticipate, navigate, and even steer climate-driven TC in ways that conserve nature.[55] Nature 2030 includes five general pathways for transformative change, including Recognizing global crises and the roles of diverse actors; Retaining biodiversity and heritage; Restoring species and ecosystems; Resourcing these efforts with finance, capacity, and knowledge; and Reconnecting people with nature and each other.

Figure 4. Integration of personal, practical, and political spheres of transformation (Gosnell 2019)



The programme also provides numerous, more specific opportunities to develop cutting-edge guidance, improve conservation practice, and provide global leadership. **This section of the paper identifies where IUCN could advance TC in each Nature 2030 programme priority.** Recognizing the diversity of IUCN initiatives and members, the section introduces numerous branches of work and provides corresponding references; the reader is invited to examine the notes and explore their own interests and applications.

5.1 People Programme Priority

This priority foregrounds several political issues at the heart of TC.[56] These include the recognition of traditional tenure systems, and the rights of people – especially women, indigenous, local community, youth, poor stakeholders, and farmers – to participate in and contribute knowledge to transparent public policy and international conservation and development decision-making. Along with inclusion, these issues span the substantive outcomes of policy and management, including government accountability, access to independent judicial institutions and justice, the enforcement of criminal standards and laws, and the protection of environmental defenders.

- Gender equality encompasses half the world's population and provides correspondingly enormous leverage for transforming the material relations of communities and nations with nature.[57]
- A resurgence of activism, collaboration, and scholarship highlights the pivotal role of indigenous people in TC.[58] Despite conserving nearly 2 billion hectares of land and forests and associated biodiversity, their contributions often go unrecognized, their rights remain limited, grievance or reconciliation processes do not function, and they face killing, eviction, and loss of livelihood and identity.[59]
- Youth – with around 15 percent of the world's population aged between 15 and 24 years old[60] – have mobilized behind visions for a zero-carbon future that seek a radical rupture with the present world order, whether Fridays for Future or the Sunrise Movement.
- Farmers mediate between conservation and the human consumption of nature. Starting from principles of stewardship, equity, and solidarity, agroecological movements link urban and agrarian struggles to dismantle neoliberal, capitalist mechanisms for controlling land, water, labor, and markets, and to re-localize production. They re-value and de-commodify food, bio-cultural diversity, and more-than-human relationships; place soil care at the center of land policy; stop substituting machines and food science for people and plants; promote local control over social reproduction; build infrastructure that

empowers communities; reinvent collective arrangements and spaces; and re-educate and re-skill people.[61]
- In all cases, climate-driven increases in human displacement and migration increase each year, are creating crises within nation-states and across national borders, and are moving to the front of politics and diplomacy.[62]

Fundamentally, equitable and effective governance must couple the Global Biodiversity Framework with the Sustainable Development Goals. IUCN can continue to lead such work through its Natural Resource Governance Framework and recent World Declaration on the Environmental Rule of Law, as well as its Green List Standard for Protected and Conserved Areas.

At the same time, the normalizing, popular discourse around transformation in public policy and international development poses several risks against which IUCN must guard. These include:
- endorsing the concept to maintain the status quo of power relations
- marginalizing resistance
- shifting burdens to the vulnerable instead of to industries and governments
- destroying livelihoods[63]
- generating climate apartheid where the rich escape impacts while the poor suffer[64]
- encouraging profiteering through disaster capitalism,[65] and
- climate gentrification in urban areas – displacing marginalized populations as climate change makes their property more valuable.[66]

To minimize these risks, making decisions about whether and how to facilitate TC requires partnering with the people involved or affected to identify desired outcomes; assess risks and tradeoffs; design the process; mobilize resources; and provide ongoing feedback and correction.[67] One must start by squarely addressing the question, transformation of what to what for whom?[68] Clearly-defined principles for public participation, and process maps identifying the critical activities and considerations at each phase, would improve the governance of TC and collective action.

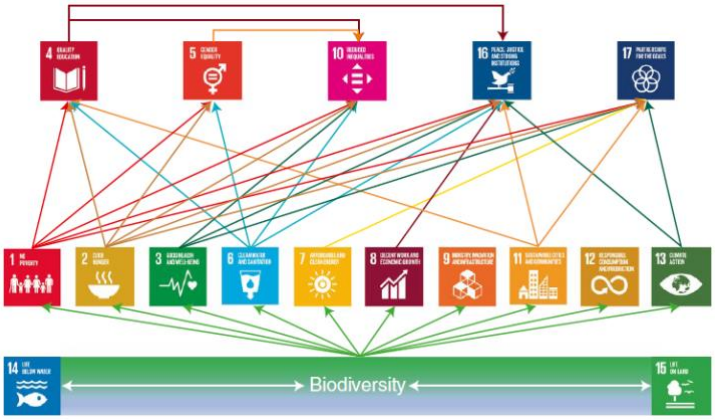
5.2 Lands, Water, and Oceans Programme Priorities

For decades IUCN has protected key areas of our biological world heritage, and Nature 2030 is poised to mobilize people and resources for TC. Several factors will shape the outcomes of this work.
- TC will require spending more time anticipating how patterns of biodiversity – including invasive species – are shifting across landscapes and jurisdictions. IUCN's renowned Red Lists of Threatened Species and Ecosystems, Green List of Protected and Conserved Areas, and similar knowledge products must incorporate scenario planning to maximize their value. Such analyses will unavoidably contribute to debates over the persistence of endangered species and their relationships with non-native species under climate change.[69]
- TC will also require stronger governance to stem overexploitation and secure the sustainable use of freshwater and marine resources, including across borders and on the high seas and seabeds, while avoiding "green grabbing" and "ocean grabbing" (coopting conservation for the purposes of neoliberal capitalism).[70]
- And TC will require extending further into several arenas, some entirely new. These include extending from wildernesses into production landscapes, where it overlaps with regenerative agriculture and permaculture[71]; into urban areas, where it overlaps with movements for fire-adapted communities, rewilding, urban resilience, NbS, and disaster risk reduction[72]; and into our industries and infrastructure – the next topic.

Securing environmental gain from industry and infrastructure, and minimizing the impacts of business on biodiversity, will require novel approaches and mechanisms for conservation finance. IUCN is already an accredited entity of the Green Climate Fund and an implementing agency of the Global Environment Facility. However, restructuring commerce to conserve nature and produce net negative emissions of its own accord will require even greater investments. Traditional conservation faces an estimated $250 to $350 billion (U.S. dollars) shortfall in annual global funding.[73]
- A key strategy is to use economic, scientific, and engineering data to highlight how ecosystem services, market risks and shocks, and human well-being depend upon natural capital, including biodiversity.[74] Biodiversity is the basis of social-ecological resilience (see figure 5). Improving and standardizing how businesses quantify, price, and account for risks – including the risks of depending on nature, impacting nature, and impacting society by destroying nature – is essential to demonstrating how local projects have global value, and to redirecting investment.[75] IUCN's Global Ecosystem Typology provides a basis for such analyses. In doing so, however, IUCN will have to assign value to nature's contributions to people without reducing them to commodities, and have to avoid harming indigenous and local communities with protected areas.[76]
- Additional promising approaches include disclosing the impact of investment on biodiversity,[77] instituting conservation finance reporting standards,[78] spreading risk through conservation portfolios,[79] deploying sustainable insurance for conservation investments and ecosystem services,[80] and possibly even insuring nature in and of itself.[81]
- Emerging financial mechanisms include environmental impact bonds[82], conservation equity bonds and taxes,[83] program-related investment loans,[84] the joint private-and-public creation of parks,[85] and the use of fees and taxes levied on industrial impacts to biodiversity to underwrite conservation.[86]
- Part and parcel of this work will be emerging approaches to prioritizing conservation. These include evidence-based conservation,[87] species richness,[88] species triage,[89] land conversion risk assessment,[90] management quality assessment,[91] and the mitigation hierarchy.[92] These also involve integrating species, ecosystem and landscape conservation, including habitat at the edge of species ranges, refugia and immigration spaces, and geodiversity.[93] The international movement toward providing animals, plants, and rivers with legal rights – environmental personhood – provides another avenue for TC in relation to business.[94]

The eighth SDG – promote inclusive and sustainable economic growth – is problematic when isolated from a systems approach to biodiversity and resilience. As Nature 2030 emphasizes, the conservation of life in the oceans and on land is the basis of human survival and the remaining goals, including poverty eradication, food security, and health. However, growth as a paradigm involves the perpetual increase in the consumption of natural resources and ecosystem services, and more fundamentally energy and carbon, as facilitated through the vast expansion of credit since moving off the

Figure 5. Biodiversity contributions to the SDGs (Blicharska et al 2019)



gold standard in 1971.[95] With the world having already exceeded several planetary thresholds, carbon emissions peaking in 2018 and 2019, and over 3 billion more people anticipated by 2100, the growth paradigm does not provide a credible foundation for the SDGs.[96] TC requires more than green new deals or aspirations to decouple resource use from growth (so-called "green growth").[97] It requires dismantling the growth and consumerism paradigm entirely, and replacing it with a decarbonized, steady-state economy and alternative understanding of human prosperity.[98] Such an economy would necessarily rely on science to establish a sustainable limit on resource flows including carbon, and rely on values to justly distribute energy and wealth.[99] Success with reducing production and consumption without reducing wellbeing – degrowth – is already occurring in Asia, South and North America, and Europe.[100]

5.3 Climate Programme Priority

Transformative conservation aligns with faster, larger, and more effective mitigation and adaptation. Reducing the risks that climate change poses to nature and people begins with IUCN's flagship assessments and knowledge products, which provide a starting point for thinking about how to redesign systems. This work overlaps with the aforementioned engagement with business, industry, and infrastructure, as well as debates over the promise and perils of geoengineering and negative emission technologies. Mitigation and adaptation also overlap with disaster risk reduction initiatives, including IUCN's Urban Nature Alliance, where communities build resilience to extreme events, including drought, flooding, heatwaves, wildfire, and the conjuncture of high tides and sea level rise. Many of these strands of conservation come together in NbS.

Nature-based solutions, including natural climate solutions, have exceptional potential to help transform our countrysides and cities in ways that address multiple IUCN priorities. These include slowing or stopping desertification, deforestation, and land degradation, as well as strengthening food security, improving water supply and water quality, sequestering carbon, and reducing the risk of disasters. NbS can also hasten attainment of the Nationally Determined Contributions and Long-Term Low Emission Development Strategies of the Paris Agreement.

- Successful implementation of NbS, however, requires rigorous monitoring and accounting to verify the extent, durability, and additionality of benefits, as well as attention to sovereignty, inequality, and crediting.[101]
- Furthermore, science and systems-thinking need to guide NbS practice to avoid reductionist, mechanistic, or maladaptive outcomes,[102] such as sequestering carbon at the expense of multiple other ecosystem services. Unless such solutions are embedded in systemic initiatives to restructure our natural and working landscapes, cities, and economies, they are unlikely to advance TC.

Implementing IUCN's NbS standards would accelerate mitigation and adaptation. Areas for further development include issuing guidance on the deployment and maintenance of NbS in diverse systems, and negotiating not only quantitative but also qualitative performance measures.[103]

6. Recommendations to Empower Transformative Conservation

IUCN has sterling opportunities to integrate TC in Nature 2030 and thereby markedly help secure biodiversity, sustainable use, and just transitions in the face of climate change. CEM is committed to supporting IUCN in accelerating and steering this work, and has included the following recommendations in its 2021-2024 Mandate. As noted at the start, the Mandate emphasizes social-ecological resilience and transformation, coupled with NbS, ecosystem governance, cultural practices, restoration, and ecosystem risk assessment. Maximizing these opportunities requires IUCN to increase its expertise with TC, including the requisite advancement of data, knowledge, learning, innovation, communication, education, civic engagement, finance, and investments (the enabling factors identified in Nature 2030).

1. **Dramatically increase our familiarity with system transformation concepts.** Over 50 years of scholarship, with exponential growth in the past 30, provide a robust foundation for praxis. For example:
   - Empirical studies of social-ecological resilience identify an adaptive cycle of systems that moves from exponential growth to a long conservation phase, followed by rapid release, and renewal.[104]
   - Action occurs within and across multiple scales (i.e., panarchy) through slow and fast variables and feedback loops. Novelty can propagate upward from more limited to more extensive scales, while collapse can cascade downward.[105]
   - Phases of transformation may include preparation, navigation, and stabilization.[106]
   - Tension may exist between those parts of a system seeking (or being forced) to persist unchanged, to adapt within the current system, or to transform.[107]
   - Transformations vary by scale and pace, from quantum leaps (large and fast) to emergent (large yet slow), convergent (small yet fast), and gradual (small and slow).[108]
   - A series of deliberate, small-scale, niche transformations can avoid unintended large-scale disruptions, or hasten desired change.[109]

Harvesting these ontological, empirical, and epistemological advances in systems thinking is critical to improving IUCN's ability to facilitate TC. Corresponding pedagogy and intergenerational partnerships should combine a systems orientation and tools, inner transformation, and participatory methods.[110] The emerging field of transition design, for example, combines design with living systems theory, science, psychology, anthropology, and other disciplines to create material and mindset changes in societies and infrastructures.[111]

Through the PANORAMA partnership for learning and solutions, IUCN could offer an online training for its members that establishes basic knowledge of transformation-related fields, and facilitates re-learning in a collegial, supportive environment.[112] This would substantiate IUCN's value proposition of providing credible, trusted knowledge. Developing basic competence would then necessitate supporting IUCN practitioners as they apply the concepts to real world situations, reflect on their actions, and sharing their experiences.

2. **Strongly link societal and personal transformations.** Societal transformation hinges upon how tightly families, workplaces, communities, institutions, and government nurture individual transformations and transformative learning.[113] Conversely, despite noble intentions, personal transformation in one's religion and spirituality, worldviews, values, ethics, and behaviors will fail to systemically improve conservation results, unless one links such development to collective action that transforms our culture, political-economy, and institutions.[114] TC in the context of climate change depends on such "outer" (societal) and "inner" (personal) transformations supporting and reinforcing one another, and creating unprecedented ways of living within nature. Stepping into this middle ground, numerous organizations, social movements, and scholars are arguing that ecological degradation is a spiritual crisis that requires a commensurate response, and therefore coupling interfaith unity, ritual, and ceremony with environmental protection and climate justice.[115] The resulting self-empowerment and political action increase the capacity of people to cope with the emerging mental health pandemic around climate anxiety, climate grief, and solastalgia (the distress caused by environmental change while people remain directly connected to their home and territory).[116] IUCN could publicly endorse such complementary initiatives, and encourage the voluntary participation of its members therein.

3. **Update how we plan for transformation.** Systemic transformation inherently requires that planning can manage large degrees of complexity, uncertainty, and dynamism, along with multiple scales and jurisdictions, long time periods, and diverse stakeholder values, knowledge, and risk tolerance.[117] Several planning concepts and methods could provide insights that improve conservation outcomes.
   - Scale sensitivity, for example, matches spatial and temporal scales of governance, management, and markets to the scale of ecological processes.[118]
   - Starting from the bottom-up, decision-scaling integrates vulnerability and risk-based methods by coupling historical records, observed trends, and local hydrological data with climate projections to better assess climate impacts, breaking points, institutional capabilities, and investment choices.[119]
   - Multi-level perspectives look at how innovation moves between niches, regimes, and landscapes.[120]
   - Circular economies reuse the material components of consumer goods, rely on renewable energy, and eliminate waste through designing products with restoration or regeneration in mind.[121]
   - Adaptation pathways, meanwhile, emphasize inertia, power relations and agency, feedback loops, scale, emergent properties, and tipping points, and focus on a strategic vision rather than a linear outcome.[122] Such pathways combine incremental and transformative change during iterative cycles of action, evaluation, and adjustment, and provide flexibility to accommodate experimentation, disturbances, and mistakes.[123]
   - The Shared Socioeconomic Pathways selected for forthcoming IPCC assessments improve on Representative Concentration Pathways by integrating consistent socioeconomic, technological, and climate policy assumptions driving future greenhouse gas emissions. Risk-based scenarios that include social sciences, policymaking, finance, and industry would better account for the relative likelihood of different outcomes.[124]

   IUCN could support the professional development of its members by integrating such planning in PANORAMA and the aforementioned training, and supporting real-world applications and experimentation in IUCN initiatives.

4. **Facilitate the shift from diagnosis to transformative action.** Vulnerability assessments, policy revisions, adaptation plans, and funding sources are essential prerequisites – but not replacements – for action in the field.[125] Actors in places that already have these capacities can hasten TC by pioneering innovative projects, information and monitoring systems, and technologies, and then sharing their experiences widely. Crucially, they can help improve our fledgling ability to identify the thresholds and processes by which we can proactively, deliberately initiate transformation, rather than being forced into it.[126] Peer mentoring networks, transformation labs, and other safe spaces are needed to cultivate reflective practice and co-create transdisciplinary knowledge, and then disseminate this wisdom to support practitioners at different phases of TC.[127] Transformative climate science and science for climate action employ social learning experiments to produce and apply solutions-oriented knowledge that links adaptation, mitigation, and sustainable development.[128] IUCN could establish standing venues for such exchange, both in-person and virtual, through its existing commission and committee structure, 50 offices, and the PANORAMA platform. This would substantiate several of IUCN's value propositions, including combining knowledge, policy, and action for common objectives; building multi-stakeholder partnerships for action; and spurring innovation through global networks of volunteer experts.

5. **Improve our ability to adjust to transformation as it occurs.** Recognizing that actual observed climate change frequently outpaces modeled projections, TC must incorporate procedures for readily adjusting project implementation and maintenance plans (i.e., adaptive management). Prior to action, this involves clarifying conceptual models and accounting for uncertainty, establishing the steps by which parties will jointly make adjustments, and maximizing opportunities for learning and improving. The critical step is comparing modeled projections with monitored field conditions and identifying divergences. Once again, the state of practice provides several entrée points for IUCN.
   - Decision windows, for example, can clarify the threshold conditions beyond which incremental adjustments no longer suffice, and when multiple actors are likely to align around the need for transformation.[129]
   - Horizoning work, similarly, is an approach to forecasting that relies on local, practical research and abrupt change science to bring an unknown or runaway future into the present as something that can be known and intervened in.[130]
   - Adaptive design combines static and dynamic elements of infrastructure to increase adaptive capacity and keep pace with change over decades.[131]

- The field of environmental conflict resolution provides numerous examples of collaborative adaptive management protocols.[132]
- Climate services use meteorological and socio-economic data, analyses, maps, assessments, projections, and scenarios to improve real-time climate decision-making.[133] Urban observatories have pioneered such work.[134]

Overall, empowering people to facilitate TC requires greater experience with noticing novel properties and structures in systems as they emerge.[135] And it requires adaptive governance – a willingness and ability of our law and institutions to accommodate shifting environmental conditions while maintaining sufficient psychological, social, and economic stability and predictability.[136] The aforementioned online course, support of real-work experimentation, and standing venues for peer exchange would provide options for IUCN members to advance their knowledge and skills. This would substantiate IUCN's value proposition of setting impartial practices.

6. **Partner with political movements to achieve equitable and just transformation.** One cannot separate TC from politics, whether formal electoral processes and institutions, or the everyday operation of interpersonal influence. This entanglement necessitates methods that involve, rather than ignore, youth, indigenous people, women, and all manner of marginalized or disadvantaged actors in struggles for justice, equity, sustainable development, and the sustainable use of nature and biodiversity. Example methods include:
   - Participatory action research, for example, applies the scientific method to changing power relations, norms, and institutions through participation, negotiation, experimentation, and communication.[137] Growing branches of action research focus squarely on accelerating climate change transformations.[138]
   - Indigenous principles of just transition affirm lifeways based on harmony with nature and respect for the sacred; indigenous rights, law, self-determination, and territorial and food sovereignty; indigenous languages as the vehicle for knowledge and wisdom; rejection of toxic industries and nature as a commodity in favor of regenerative economies; and physical, psychological, emotional, and spiritual decolonization as part of healing historical trauma.[139]
   - Work in critical geography, meanwhile, examines how successful political movements agitate and move between labor relations, biological reproduction, relations with nature, broader social relations, institutions, technologies, and mental concepts (recall the global system mapping at the start of this paper).[140] Among other things, such studies illustrate the contradiction that a growth paradigm creates between ever-increasing resource consumption and human prosperity, with the former invariably undermining the latter (sometimes referred to as "metabolic rift").[141]
   - And work in political science on transformative climate politics argues for people using the soil to both reclaim where they live, and to attach themselves uniquely to the global network of humanity.[142]

Each of these offers insightful strategies for catalyzing TC while not losing sight of people and livelihoods. Without somehow engaging political debates or movements, TC cannot occur. IUCN could further this work by convening conversations with activists, advocates, and elected officials, and helping forge customized partnership for specific initiatives. This would substantiate IUCN's value proposition of linking the local and global in two-way, mutually beneficial partnerships.

7. Conclusion

These recommendations for the practice of TC provide immediate examples of how IUCN could safeguard biodiversity and sustainable livelihoods while accelerating and steering a just transition to fossil-free economy. In so doing, IUCN could provide global leadership and guidance that advances Nature 2030 and TC therein. Through its own complementary 2021-2024 Mandate, CEM looks forward to supporting this direction, and linking this work to parallel transformative change initiatives.

8. Endnotes

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- The Religion, Spirituality, Environmental Conservation and Climate Justice specialist group within IUCN's Commission on Environmental, Economic, and Social Policy (https://www.iucn.org/commissions/commission-environmental-economic-and-social-policy/our-work/culture-spirituality-and-conservation and therein https://www.iucn.org/commissions/commission-environmental-economic-and-social-policy/our-work/religion-spirituality-environmental-conservation-and-climate-justice).
- Faiths for Forests links faith-based organizations, networks, and places of worship around the world to end rainforest destruction and advocate for climate justice, see https://faithsforforests.com including the video introductions by Inger Andersen and Jane Goodall.

- The mission of Courage of Care http://courageofcare.org/ is "to empower both personal and social transformation by providing deep contemplative training coupled with powerful tools for systemic change," and draws on "transition discourses on post-development, eco-socialism, social anarchism, degrowth, the commons, transition towns, and ecovillages."
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