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Ecosystem Services and Human Wellbeing-Based Approaches Can Help Transform Our Economies

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Despite wider recognition of human interdependence with the rest of nature, our economies continue to fail to adequately value ecosystem services. This failure is largely attributed to the economic frameworks and related measures that focus on the production and consumption of marketed goods and services, but do not consider the other essential elements upon which our lives depend. This paper highlights how the Ecosystem Services approach can shift the focus to human wellbeing while remaining within biophysical planetary boundaries. An Ecosystem Services approach applies three fundamental principles of Ecological Economics: sustainable scale, efficient allocation, and fair distribution, which are vital for sustainable economies and societies. We provide case studies, from both a local and national scale, demonstrating how such an approach offers a holistic perspective of understanding what “development” actually means. Transforming our economies to appropriately consider planetary limits, overcome societal addictions, learn from Indigenous and local communities about ways of sustainable living, and realizing the importance of ecosystem services will contribute to developing economies that are resilient, and that enhance sustainable human wellbeing.

Keywords: human wellbeing, ecosystem services, development, Indigenous communities, Gross National Happiness index, Gross Domestic Product

INTRODUCTION

Over the past 50–60 years of extensive use and exploitation, natural resources have become severely limiting. Coupled with rapid climate change, the situation at present is alarming if we are to sustain modern economies at the same pace as has happened in recent decades (Daly, 1996, 2015; Costanza et al., 1997, 2014a; Millennium Ecosystem Assessment [MA], 2003, 2005 and various reports by the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) including a conceptual report in Intergovernmental Platform on Biodiversity and Ecosystem Services [IPBES], 2019a). Yet, our modern economies persist with their old tools and measures such as GDP, focusing on marketed production and consumption, with little consideration of degrading natural resources and related consequences for human health and wellbeing, and the mounting threats to the survival of civilization. The current settings have led us to operate within a very much “engineered economy”—based on GDP measures, which focuses on increasing choices of materials, while

excluding, disregarding, and exploiting the very foundation that delivers those materials (Costanza et al., 2014a), and ignoring the economic ethics for people and the planet (Sen, 1989, 1999a,b).

Many natural scientists, some progressive economists, and ecological economists (trans-disciplinary professionals who focus on linking nature and economies) have been calling for a transformation to reform modern economic approaches so that future policies and programs are designed to enhance human wellbeing, not utility, choices of materials, or production values. Human wellbeing, beyond income, materials, or resources, encompasses the fair, equitable, and ethical principles of a society, living sustainably and in harmony with nature (Sen, 1989; Daly, 1996). Costanza et al. (2014a) argued that GDP ignores those broader aspects of human wellbeing such as social costs and environmental impacts, leading to the continued destruction of natural resources on which all life on this planet depends. The authors further state that “GDP is dangerously inadequate as a measure of ‘quality of life’—the latter indeed should be the focus for our modern economies, not the utility values or production as is the case now.

The key question we face at present is: How to re-design and re-shape modern economies to appropriately incorporate the role of nature in supporting and developing sustainable, wellbeing-based economies? This is an essential mission so that future programs and policies focus on sustainable “development” that is within the ecological boundaries of planet earth. Addressing this issue of transforming modern economies further requires the comprehension of “development” beyond “increasing utility/materials choices.” The economics Nobel Laureate, Prof Amartya Sen says that development is about enabling people to lead the lives that they want to lead, with freedom and choice, i.e., enhancing overall human wellbeing, including social, natural, and other ethical considerations (Sen, 1989). The challenge is how to achieve development that is sustainable, equitable, and efficient.

Recently, with the COVID-19 pandemic, many local, regional, and national governments are considering reconstructing their economies. Some are using the opportunity to be innovative, and are investing in regenerative, green, circular economies, for example the European Union has drafted a circular economy strategy for recovery from COVID-19 related economic crisis (Material Economics, 2021), while many others, such as Australia, are still following the conventional approach with little changes, if any. This paper offers practical insights as to how such a transformation can be realized, i.e., by focusing on human wellbeing-based economies and applying ecosystem services (ES) approaches while acknowledging the planetary limits. It further demonstrates the application of proposed transformative economies at a local scale—a case study of Indigenous fire management in northern Australia; and at a national scale—the kingdom of Bhutan where the Gross National Happiness index is preferred over Gross Domestic Product to measure economic progress and that index is now playing a key role in determining country’s future policies and programs.

HOW TO TRANSFORM MODERN ECONOMIES?

A key factor for the continuity of conventional economies to date is the GDP against which countries compare each other’s progress. In recent years, some alternative metrics have been proposed for GDP which focus on 1. Adjusting GDP: for example, the Gross Progress Indicators which included all spending by individuals, volunteer work, etc. (Talberth et al., 2007; Kubiszewski et al., 2013); 2. Subjective measures of wellbeing: for example, the World Values Survey¹; and, 3. Composite measures: for example, the Inclusive Wealth Index including manufactured, human and natural capitals² (by the UNEP; United Nations University–International Human Dimensions Programme [UNU-IHDP] and United Nations Environment Programme [UNEP], 2014), or the Happy Planet Index which includes life satisfaction, expectancy and ecological impact³, or the System of Environmental-Economic (SEEA) Ecosystem Accounting which includes accounting for the ecological assets and ES (United Nations, 2021). These alternative measures are discussed by Costanza et al. (2014a), however, as the authors indicate, none of these measures is uniformly accepted as a clear alternative to GDP for reasons including bureaucracy, tendency of academics and government professionals to work in isolation, or a lack of acceptance of the diversity and complexity that exists among various human societies.

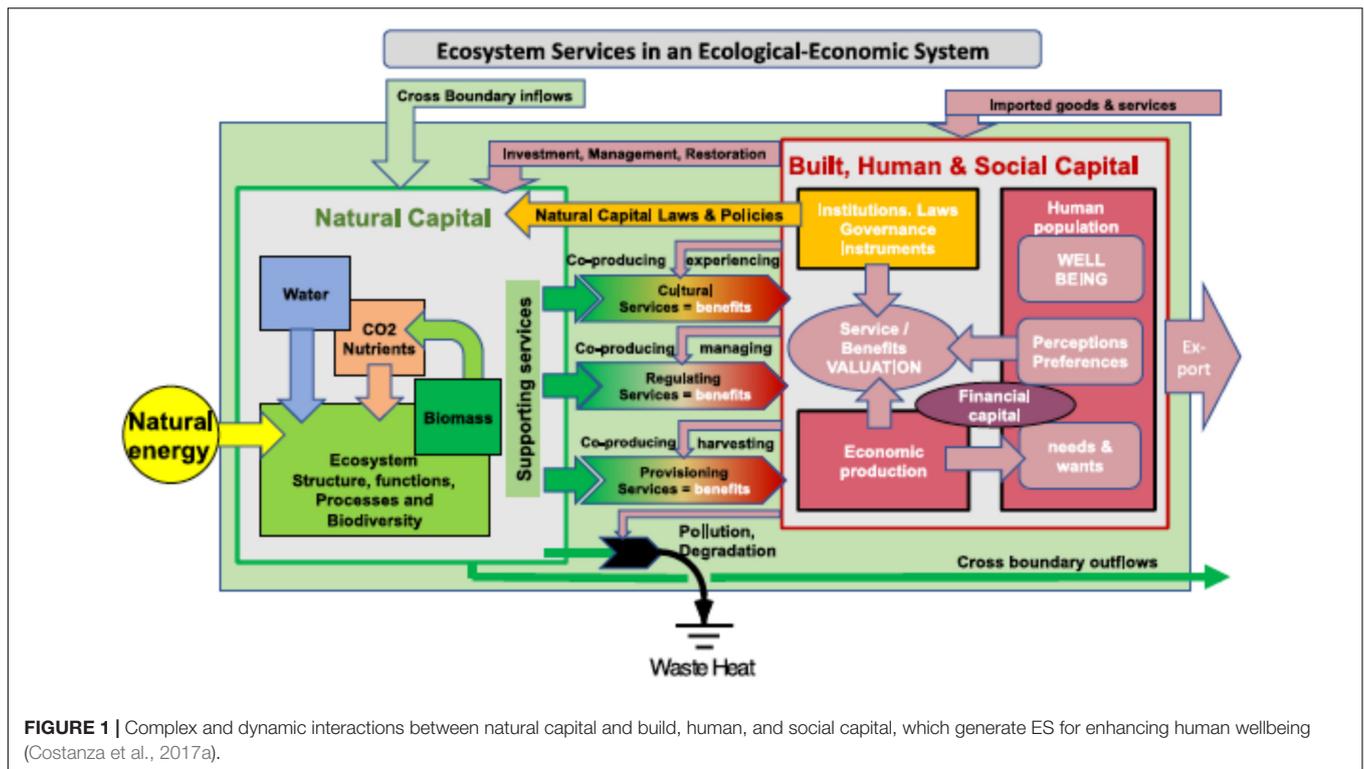
The role of nature for sustaining modern economies is now well recognized, including a recent report on “*the economics of biodiversity: the Dasgupta review*” (DasGupta, 2020) asking businesses to put biodiversity at the top of the ladder when developing business plans; the UN-led initiatives such as the Finance Initiative (since 1992); the Intergovernmental Platform on Biodiversity and Ecosystem Services (Intergovernmental Platform on Biodiversity and Ecosystem Services [IPBES], 2012 onward); and the Millennium Ecosystem Assessment (MA; 2000–2005). Many studies have demonstrated that human–nature connections enhance human wellbeing (Costanza et al., 1997, 2007, 2018; Millennium Ecosystem Assessment [MA], 2005; Intergovernmental Platform on Biodiversity and Ecosystem Services [IPBES], 2019b; many others). Some global institutions have recently formed a Taskforce on Nature-related Financial Disclosures (TNFD) which supports a shift, in global financial flows, from nature negative- to nature-positive outcomes by reducing the risk to natural assets⁴. To continue enhancing the wellbeing of people, nature and its resources need to be managed appropriately to ensure the delivery and flow of ecosystem services (ES)—the services and goods humans receive from functioning ecosystems (Costanza et al., 1997). These ES include direct and indirect contributions of nature toward human wellbeing. Including the role of ES in policy decision making is crucial at present, particularly for designing transformational

¹<https://www.worldvaluessurvey.org/wvs.jsp>

²http://www.managi-lab.com/iwp/iwp_iw.html

³<http://happyplanetindex.org>

⁴<https://tnfd.global/about/>



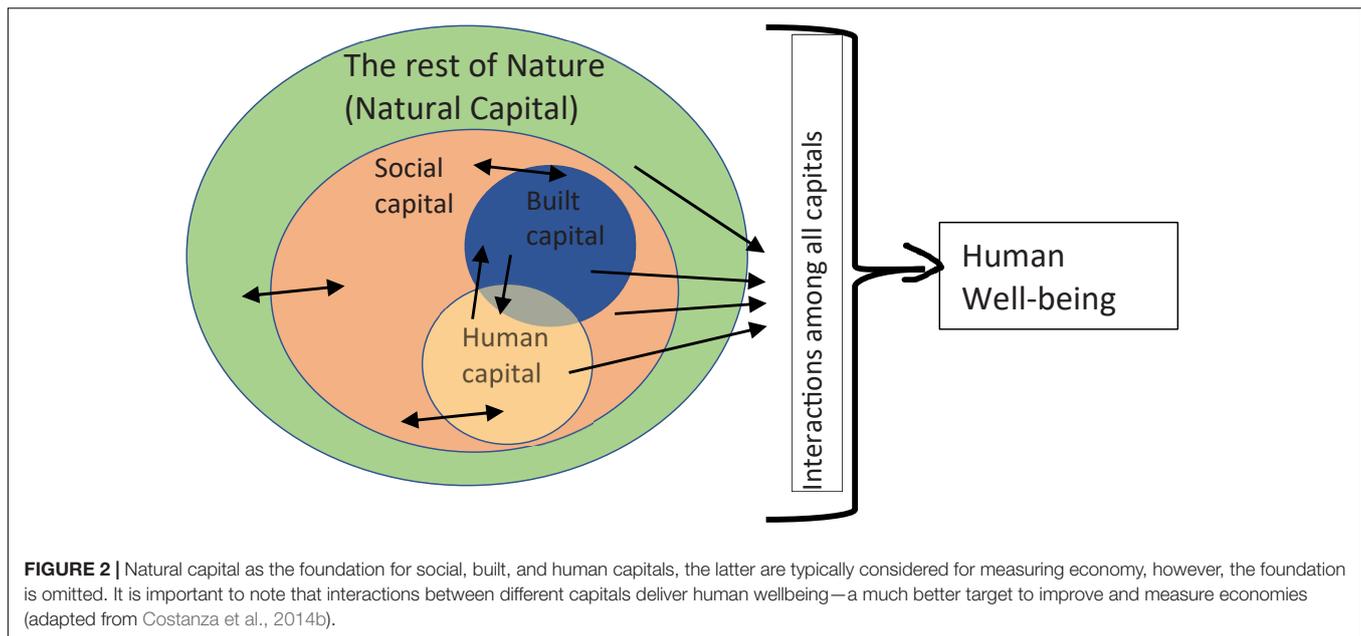
sustainable economies. We posit that the ES approach can assist in this transformation toward sustainable economies.

Understanding the importance of ES, their sources, limits, and levels of supply or flows, at a sustainable level, can help us plan for “development” for present and future generations, that operates within planetary boundaries, reduces the risks from climate change, natural hazards (cyclones, floods, storms, bushfires, sea-level rise, etc.), and contributes toward better-managed biodiversity, soil and water resources (Costanza et al., 2017a). However, we acknowledge that the connections between ES and human wellbeing are complex, dynamic, and require a pluralistic approach for measuring and/or understanding the interactions (Figure 1; Costanza et al., 2017a).

The Ecosystem Services approach provides us with a lens to view of how nature forms the foundation of the economy. Meadows et al. (1972) [The first “limits to growth” report], Daly (1973; 1991; 1996; 2005; 2015), Daly and Farley (2011), Costanza et al. (2014b, 2018); Costanza (2020), and others have suggested that our social, built, and human capitals are indeed embedded in the rest of nature or natural capital (Figure 2). The ES approach affords tools and techniques to understand the value of ecosystems and their services that support modern economies, for influencing policies, governments, and other organizations (for various valuation approaches, see Millennium Ecosystem Assessment [MA], 2003, 2005; Intergovernmental Platform on Biodiversity and Ecosystem Services [IPBES], 2019a,b; and many articles published in the journals of Ecological Economics, Ecosystem Services, and others). This approach has evolved significantly over the past 20 years since its inception and is effectively contributing to bridge the gap between economics and

ecology (Costanza et al., 2017a). Importantly, it has also been contributing to influence policy decision making at many local, national, and global scales. For example, at a local scale, the United States state of Vermont developed a “Common Assets Trust” which aims to sustainably use, manage, and protect State’s natural assets through establishing a Trust under eight key guiding governing principles (Farley et al., 2015; Costanza et al., 2021). At a broader national scale, several European countries have conducted their National Ecosystem Assessments to date, e.g., the United Kingdom, Spain, Portugal, Norway, Germany, the Netherlands, and Finland, which inform their policies to protect and sustain ES (Schröter et al., 2016). There are also targeted policies, applied at various national and global levels, such as REDD⁺ (Reducing Emissions from Deforestation and Forest Degradation).

A major global effort to apply the ES approach was the Millennium Ecosystem Assessment (MA) program from 2000 to 2005. The MA proposed a framework to assess and link the role of ES with human wellbeing (Millennium Ecosystem Assessment [MA], 2003). In 2010, the MA research was followed by IPBES, especially for connecting science with policy (Intergovernmental Platform on Biodiversity and Ecosystem Services [IPBES], 2019b). As of March 2022, 137 nations are signatories to the IPBES. The Platform particularly emphasizes the inclusion of nature and its resources in the public and economic policy domains through developing targeted policy documents and frameworks. However, none of these frameworks directly account for or extend the role of nature and its ES for the modern economy frameworks, which can be assisted by the ES approach. Transforming the existing economic frameworks, applying the



ES approach for appropriately incorporating and integrating the role of nature, considering planetary boundaries, for policy decision making and future development programs, can deliver this much needed change.

Overall, the ES approach:

1. Supports an integrated, long-term, perspective for including efficient allocation, equitable distribution, and sustainable use of resources, for enhancing human wellbeing;
2. Highlights and integrates the importance of nature and its services for policy decision making on economies and development; and,
3. Evaluates how nature and its services contribute toward human wellbeing which typically remain unaccounted for in the present economic frameworks.

The ES approach can be applied in a stepwise process. The first step is a state or local scale economic assessment for evaluating the status of ecosystems and their services. The second step integrates that ecosystem assessment into built, human, and social economies, including embedding the cost of polluting, extracting, and mining natural resources. And the last step re-designs economies by incorporating ES assessments and containing each sector within the limits of ecological boundaries. This ensures the development of circular, desirable, and sustainable economies. Currently, several European countries (e.g., the United Kingdom, Scotland, Spain, Finland) and others have conducted the assessments of ecosystems and their services, following the Millennium Ecosystem Assessment [MA] (2003) [various MAES (Mapping and Assessment of ES) reports by the European Commission since 2005, e.g., Maes et al., 2012; URL: <https://biodiversity.europa.eu>, with a recent report published in 2018]. However, integration of ES assessments with the state economies is still

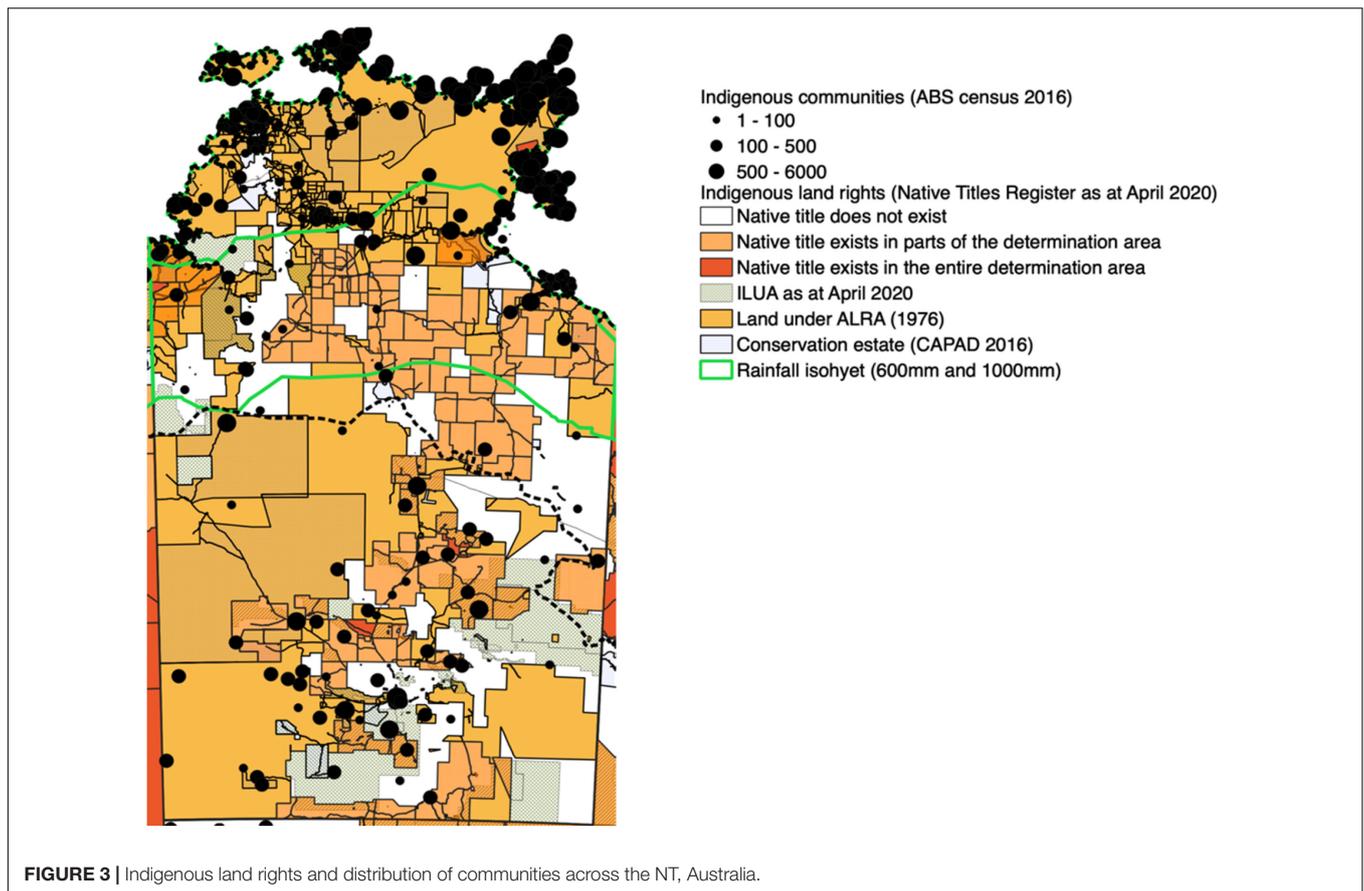
lacking which can inform the type, extent, and expansion of different economic activities in each sector i.e., built, social, human, and natural systems.

CASE STUDIES DEMONSTRATING ES-BASED SUSTAINABLE ECONOMIES

Application of the Ecosystem Services Approach to Understand Indigenous Peoples and Local Communities' Economies

Many Indigenous peoples and local communities (IPLCs), across the globe, directly depend on nature and its services for a range of their economic and livelihoods activities. However, most of their economic activities flow outside the standard market mechanisms and remain unrecognized and unaccounted for in formal economic approaches and frameworks. Thus, the value of people's local economies and their role in affording wellbeing is largely overlooked when planning for policies or programs, especially in developed countries.

In Australia, Indigenous peoples' connections with *country* (i.e., traditional or clan land with which people have familial connections), and associated benefits for wellbeing are well documented (Grieves, 2007; Russell-Smith et al., 2009, 2013, 2015; Altman et al., 2011; Sangha et al., 2011, 2017, 2021). Yet, various state/territory and federal government agencies fail to incorporate these connections in Indigenous welfare, health, education, and employment policies (Grieves, 2007; Sangha et al., 2019). We here present the value and importance of these connections for Indigenous peoples living in the Northern Territory, Australia. We further illustrate how understanding such connections can create economically viable, culturally



appropriate, *country*-based, sustainable economies that enhance Indigenous peoples' wellbeing as well as maintain the flow of ES that contribute toward the wellbeing of wider Australian and global public.

The Northern Territory (NT) is the only place in Australia where Indigenous peoples have legal rights to freehold land, and hence have been able to maintain and continue their cultural practices and knowledges over generations, despite experiencing the impacts of colonization since the 1850s (Garde et al., 2009; Ritchie, 2009). The Indigenous population comprises 30% (i.e., 74,546 people) of the total NT population (246,500; Australian Bureau of Statistics [ABS], 2016, Census 2016), with legal rights to > 60% of the land (Sangha et al., 2019). Out of that Indigenous population, 77% (~58,000) of people live in remote areas, and 16,300 of them live on homelands/outstations—out in the bush typically in a shed, far away from a town (Australian Bureau of Statistics [ABS], 2012–13). About 40,000 Indigenous peoples feel proud of their connections to country—a valuable, but unrecognized, aspect of Indigenous living that supports our thesis that an area of ~650,000 km² Indigenous-owned land in the NT (Figure 3) offers a suitable, enabling environment for people to utilize their country-related capabilities, and to advance economic enterprises which can contribute substantially toward peoples' wellbeing.

There are only few opportunities for Indigenous peoples to work in conventional economic settings that exist in remote

communities, but peoples' traditional knowledges and skills help them to manage the vast, highly fire-prone landscape in the NT, covering an area of 1.34 M km² (Russell-Smith et al., 2013; Russell-Smith and Sangha, 2018; Sangha et al., 2021). The wildfires alone emit > 16,000 G tons of greenhouse gases (GHG) per year across northern Australia. Managing this vast, fiery, sparsely populated (0.16 people/km² or 1 person/6 km²) area is a challenge for the territory and federal governments.

In 2007, Australia ratified the Kyoto Protocol, confirming its commitment to reduce GHG emissions, and wildfires in the north became a logical target. With this, a new opportunity emerged for Indigenous communities, across northern Australia, to apply their knowledges and skills of fire management to abate GHG emissions, leading to a world recognized "Savanna Burning Methodology" under which Indigenous Australians could claim carbon credits for managing their country (details in Russell-Smith et al., 2013, 2015; Sangha, 2020). As a result, more than a quarter of land is now managed across the north for wildfires, abating more than seven million tons of GHG emissions per annum (Sangha et al., 2021).

We assessed the value of ES from 103,263 km², i.e., less than one-tenth area of the total NT landscape that is managed for wildfires by the Indigenous peoples, just for the abatement of GHG emissions alone (i.e., 3.45 million tons). The value of GHG emissions abatement is worth > USD 6 million over the past 6 years since the beginning of the program funded by the

Australian Government under Savanna Burning methodology (for details see Sangha et al., 2021). For a bundle of ES from the same fire-managed area [following The Economics of Ecosystems and Biodiversity (TEEB) database developed by van der Ploeg and de Groot, 2010; Sangha et al., 2017], we applied the commonly used Basic Value Transfer technique (using local and regionally relevant values), and the value of ES was estimated at USD 5,361 million per year (Sangha et al., 2021). If the Indigenous peoples, in remote communities, were offered the opportunities to manage their land following traditional practices, the value of ES flowing from managing their 650,000 km² will be multi-fold.

Moreover, managing the landscape for ES delivers many socio-cultural and wellbeing benefits for the Indigenous communities. The cost savings for the government for three key wellbeing components, i.e., safe, and supportive communities, creating economic opportunities, and healthy lives, were estimated at USD 81 million per year for involving 25% of the eligible workforce in the NT (Sangha et al., 2021). This value is much greater when considering the entire Indigenous estate for maintaining the flow of ES, for the local and greater public good.

This ES assessment case study, from Indigenously managed lands in the NT, indicates the role of ES in welfare and emerging economies such as carbon which is expected to expand to include carbon sequestration and other socio-cultural benefits (Sangha et al., 2021). Assessing this value, for less than one-tenth part of the NT landscape, is just a first step. Understanding Indigenous wellbeing values in relation to nature is the second step that our case study demonstrated. But, integrating these values into the economic model that currently dominates the NT economy is a difficult and much needed step, yet to do, for which transformational thinking, across different economic sectors, is essential to appropriately comprehend connections between *country*-based non-market economy and people's wellbeing.

National Scale: “Economies-in-Society-in-Nature” – Integrating Ethics, Economics, and Societal Values

To develop national economies that are embedded in society, which is itself embedded in natural systems we need in-depth understanding of each interaction between economy, society, and nature (Costanza et al., 2012). As Ruskin et al. (2002) says, developing “economies-in-society-in-nature” is the pragmatic necessity. We offer a case study on how to develop such economies that help achieve sustainable wellbeing which includes protecting and restoring nature, achieving societal and intergenerational fairness, and recognizing nature's contributions to our economies.

A small country, the kingdom of Bhutan, with 754,000 people living across 38,000 km² of land, sets an example to the rest of world demonstrating how sustainable economies-in-society-in-nature operate. The foundation for Bhutan's economy is people's wellbeing and nature. The measure for such an economy is Bhutan's unique Gross National Happiness (GNH) index, not GDP as for many countries across the globe. The fourth King, King Jigme Singye Wangchuck, in 1972 indeed

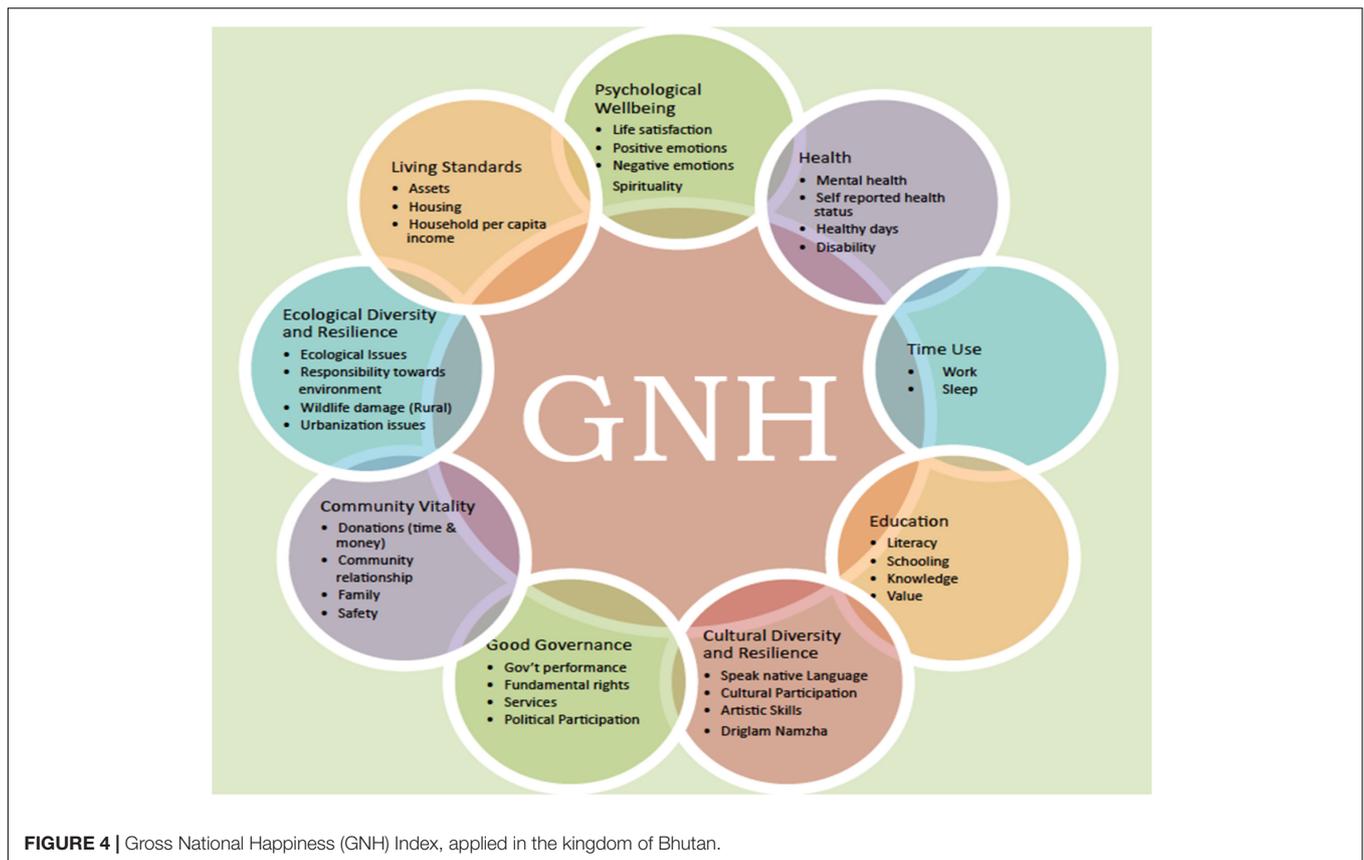
declared that the GNH index is more important to his kingdom than GDP (Revkin, 2005; Centre for Bhutan Studies and GNH Research, 2016). Since then, the GNH index has laid the foundation, and philosophical background, to determine the developmental foci for the kingdom, which emphasizes people's wellbeing and biodiversity as the core. Unlike the exclusive socio-economic indicators applied by many developed and developing countries, the GNH index has nine domains (**Figure 4**), including Ecological Diversity and Resilience, Cultural Diversity and Resilience, which focus on balancing the physical world with mental health, the material wealth with spirituality, within a safe and stable environment, with the purpose of realizing happiness. Each domain has a set of indicators (Thinley and Hartz-Karp, 2019):

1. Psychological wellbeing: Life satisfaction, Positive emotions, Negative emotions, and Spirituality;
2. Health: Self-reported health, Healthy days, Disability, and Mental health;
3. Time Use: Work and Sleep;
4. Education: Literacy, Schooling, Knowledge, and Value;
5. Cultural Diversity and Resilience: Community skills and Cultural participation;
6. Good Governance: Political participation, Services, Government performance, and Fundamental rights;
7. Community vitality: Donation (time and money), Safety, Community relationship, Family;
8. Ecological Vitality and Resilience: Wildlife damage, Urban issues, Responsibility toward environment, Ecological issues; and,
9. Living standard: Per capita income, Assets, and Housing.

This index serves as a tool to inform various public and welfare policies in Bhutan (Centre for Bhutan Studies and GNH Research, 2016), so that the purpose of happiness is achieved for each Bhutanese through promoting conditions of equity and sustainability (Thinley and Hartz-Karp, 2019). Overall, the GNH framework enables government to exercise authority, develop plans, rules and processes that focus on people's wellbeing and nature, and provides a clear sense of purpose what to be achieved, with a degree of accountability.

Bhutan's economy is driven by nature and biodiversity—people value the abundance of nature's resources not just for agriculture, traditional food, but also for culture, traditions, and spirituality. People's livelihoods, ethics and morale to respect nature is deeply influenced by their Buddhist traditions. Importantly, these values are protected through Bhutanese legislation, i.e., protect 60% of its forest, remain carbon neutral, and pursue environmentally sustainable development.

Hydropower, agriculture, and ecotourism are key components of Bhutan's economy which have contributed to rapid economic growth in the last decade, especially through foreign investment, export earnings, and contributions to the national budget in hydropower (the 11th and the 12th Five Year Plans by the Gross National Happiness Commission, 2013, 2019). The 11th and 12th Plans focus specifically on the diversification of income generation, particularly from hydropower, on “Self



Reliance and Inclusive Green Socio-economic Development” (11th Plan), and on creating a “Just, harmonious and sustainable society,” targeting marginalized population, decentralization, and creating right job opportunities. Nature-based initiatives such as Payments for Ecosystem Services (PES), Biodiversity Finance (BIOFIN), and REDD⁺ are promising for a state like Bhutan where protection of biodiversity is legally and culturally enshrined.

From a GDP perspective, Bhutan’s GDP is worth USD 2.535 billion, with agriculture comprising only 16.2% of the total GDP while employing 51% of the workforce (Royal Monetary Authority of Bhutan, 2020). The industry and service sectors constitute 42% each, employing 23 and 35% of the workforce. The unemployment rate, amongst a population of 771,000 people, is less than 2.45% (which is significantly lower than Bhutan’s neighbors such as India and Bangladesh). Notably, 51% of the total workforce being employed in agriculture also indicates that agriculture is a vital sector, however, its contribution toward main economy is often not measured appropriately due to the lack of tools and measures (The Economics of Ecosystems and Biodiversity [TEEB], 2018).

Overall, the Bhutan economy—the first of its kind in the world with minimal exposure to the outside economic forces, and driven by the paradigm of sustainable, just, and happy societal values—demonstrates new ways of fostering human wellbeing to the rest of the world. To measure the total value of such

an economy requires innovative tools and techniques that are beyond the GDP measures.

Key overarching principles for building such an economy-in-society-in-nature from ecological economic perspectives essentially include: 1. Sustainable scale of economies; 2. Efficient allocation of resources so that these are used, protected, and restored to meet the planetary limits for supporting sustainable living; and 3. Fair distribution of resources among the present and future generations, i.e., intergenerational equity. Bhutan’s comprehensive approach demonstrates how these principles could be embedded in the overall economic framework to inform policy decision making, for which political will and governance are the critical elements. The unique and deep understanding that the King of Bhutan has demonstrated for adopting the GNH index over GDP should inspire wealthy nations to transform their economies for environmental sustainability and enhanced wellbeing, much beyond the materialistic choices.

DISCUSSION

The wellbeing of humans is well beyond materials comforts, yet economic progress measures continue to rely on GDP to inform development paradigms, policies, and related programs. Consequently, in developed countries, despite people having access to materials and services over the recent decades, social, mental, and emotional issues are rapidly emerging (Organisation

for Economic Co-operation and Development [OECD], 2021). In key OECD countries such as the US, UK, Portugal, Australia, and others, increasing income inequity is leading to social problems (Costanza et al., 2012; Organisation for Economic Co-operation and Development [OECD], 2017, 2019). As the past Secretary-General of the OECD, Angel Gurría, warned “high levels of inequality generate high costs for society, dampening social mobility, undermining the labor market prospects of vulnerable social groups, and creating social unrest” (cited in Keeley, 2015). The consequences of modern economic development focusing on GDP growth, large scale investments and monetary returns while imperiling the livelihoods of world’s rural populations, are socially, environmentally, and politically devastating.

Understanding and highlighting the role of ecosystems and their ES for our modern economies and human wellbeing is an important task that will help inform policy decision makers. We acknowledge that our ES values presented in **Table 1** may not represent an exact figure, but these do suggest the importance of Indigenous land management for delivering many benefits that are not traded in the conventional market. Such ES assessments can inform future policy developments and programs to invest in supporting Indigenous and local community efforts. There are many successful examples of PES across the globe such as Costa Rica’s PES program, UN’s REDD+, various global Biodiversity offsets and credits programs, and the Reef Credits program in Australia (some of these examples can be found on The Economics for Ecosystems and Biodiversity webpage: <http://teebweb.org/publications/>).

To support efficient allocation of resources, we acknowledge that the ES approach should be considered in conjunction with sustainable use of resources (a key principle of ecological economics). Embedding the long-term availability of ES into policy decision making, can help sustain the ecological assets that provide these services (Bennett and Chaplin-Kramer, 2016). Our case studies also indirectly provide insights on how these transformed economies contribute toward the equitable distribution of resources for supporting marginalized communities to manage their natural resources and enhance local economies (Sangha et al., 2021).

The word “*development*” requires re-evaluation for its correct understanding, particularly among the political and policy domains. It is often applied in economics to suggest the advancement or betterment in material standards. “Development Economics” particularly deals with advancing fiscal capacity of a state to accelerate the rate of growth of per capita income, mainly to meet the set material standards (Sangha, 2018). Changing this contemporary widespread perception of *development* to embrace human wellbeing perspectives, well beyond material standards, is crucial if we want our future generations to continue to enjoy access to clean water, air, and healthy food. This includes transforming existing economic frameworks and policies, as has been done in Bhutan, and taking the lead, mainly for the state agencies to develop policies that focus on enhancing human wellbeing (Costanza et al., 2014a). Extending development to emphasize and advance human wellbeing (both qualitative and quantitative standards) should be the focus if we want to really *develop* and improve people’s quality of life (Costanza et al., 2007, 2017b).

An integrated, modernized concept of development, that considers planetary boundaries and enables people to lead their lives sustainably, within resource limits is essential, as advocated by Sen (1999a; 1999b) and Costanza et al. (2014a; 2014b). But to facilitate this paradigm, key reforms are required. First, we need a new vision for development where people’s freedoms and rights, suitable opportunities, local governance, and better social justice are warranted (Sen, 1999a). Second, the notion of development needs to be linked with the supplier of fundamental services supporting our living—nature, by incorporating the principles of sustainable scale, efficient allocation, and fair distribution of resources (Daly, 1996). Linking development with the state and use of natural resources can help us develop the ideal integrated framework to improve both human wellbeing and the state of nature’s resources, while staying within the planetary boundaries.

Informing and changing societal attitudes to understand the urgency and adjusting material standards and related resource use within the planetary limits is equally essential (Costanza et al., 2017a, 2014b). Along with changes in policy areas,

TABLE 1 | The value of GHG emission abatement, ES, and wellbeing benefits from Indigenously managed land in the NT, Australia.

Area under Indigenous fire management in the NT (km ²)	The amount of GHG emissions abated from indigenously managed lands ^a (Australian Carbon Credit Units [ACCU] = 1 ton of GHG emissions abatement)	Value of abating GHG emissions in the market [using a nominal price of USD 10.4/ACCU since 2012 when the program started (USD)]	Value of ES from indigenously managed land for wildfires ^b (USD/yr.)	Wellbeing benefits from managing land for 25% of the indigenous workforce [i.e., 19,504 persons of age 20–65 years) in the NT ^c (USD per yr.)]
10,326	3,445,652	5,972,463	5,361,000,000	81,161,164

^aAverage GHG emissions (NO₂ and CH₄) were calculated using SavBat v3—a recognized tool by the Australian Government for measuring these emissions. The value was estimated applying recent C price (USD 10.4/ton) from Emission Reduction Fund (The Australian Government) auction in March 2020. ^bThe TEEB ES database van der Ploeg and de Groot (2010) and Sangha et al. (2017) values for ES were used to estimate the total value of ES from Indigenous managed land for wildfires in the NT. ^cThe average welfare benefits at AUD 44,886/person/yr (from the Indigenous expenditure report by the Steering Committee for the Review of Steering Committee for the Review of Government Service Provision [SCRGSP], 2017) were adjusted and updated for the selected three out of six welfare sectors. The AUD values were converted to USD using a conversion rate of 0.64 as on 19 May 2021. One-quarter of the eligible workforce in the NT was considered for estimating total benefits.

modern societies need to act fast to address the rapidly changing climate and the degradation of natural resources, to mitigate wide-ranging impacts on human populations (Millennium Ecosystem Assessment [MA], 2005; Intergovernmental Platform on Biodiversity and Ecosystem Services [IPBES], 2019b). Conducting community-based scenario planning meetings to inform people about how human actions impact on the human-nature system, can help people realize their dependence on natural resources, improve their attitudes toward nature, and to develop a collective plan for a desirable future which is sustainable, equitable, and enhances people's wellbeing.

Limiting human needs to the necessary materials for affording sustainable living, and applying integrated knowledge systems to manage and improve natural systems that supply those materials, is a much-needed approach at the individual and societal scales (Sangha, 2018). To do so, a radical change for how we value materials and nature, is absolutely required. As the 14th Dalai Lama says “*Human happiness and human satisfaction must ultimately come from within oneself. It is wrong to expect some final satisfaction to come from money (materials)...*” Satisfaction for materials “*fulfillment or gratification, just the right amount—lagom (in Swedish) or contentment—Santushti (in Hindi)*” is a key element of human ethics that can prove useful in transforming the paradigms of *development* and valuing nature, but how do we seek it?

Satisfaction or the *feeling of being well and contented* is linked to spirituality (Shiva, 2013). Spirituality, irrespective of religious beliefs, is a vital aspect of human life allowing the constant exploration of the meaning of our lives and striving to improve ourselves. Nature offers us this exceptional service and delivers multitude benefits such as health, resilience, compassion, self-esteem, and equitability. Spiritual experiences help us to habitually meditate on the entire vista and to explore the main purpose of our living while evoking the end of life. Consequently, such a day-to-day realization can help us inculcate a moral responsibility to look after nature.

Many traditional societies (Indigenous and local communities), who continue to apply their knowledges and skills to manage resources and lead their lives in harmony with nature, offer principles that could help the mainstream population to adopt sustainable ways of living. One of these principles is to be the custodians, not the owners, of land, as applies for Indigenous societies in Australia (Dodson, 1997; Grieves, 2009). The two-way relationship with the landscape, meaning if a person obtains a service/good from land then looking after that land is also mandatory, is another key ethic embedded in many traditional societies (Sangha and Russell-Smith, 2017). Such a two-way perspective is unique and highly valuable in the modern context where human activities mainly involve extraction from nature or using nature's resources, without considering any repay or duty of care.

Some examples of traditional societies, emphasizing living in harmony with nature and sustainable pathways, include the worldview of the Quechua peoples of the Andes, *sumak kawsay*—or *buen vivir* which means “good living” that is community centered, ecologically balanced, and culturally sensitive (Artaraz et al., 2021). Similarly, the *Pachamama* (Mother Earth) concept of the Indigenous peoples of Andes endorses how nature's processes sustain life on earth (Pacari, 2009). *Gaia* is another popular hypothesis that posits how nature, and its biological systems behave as a single entity—suggesting holistic approaches to manage and use the system (Lovelock and Margulis, 1974). Realization of our dependence on nature and how our wellbeing is linked to nature in its entirety is vital to sustain human and other beings living on planet earth.

We suggest that a much more integrated, dynamic, connected nature-human systems thinking is needed to radically transform the current economy and related frameworks. However, achieving an economy-in-society-in-nature is not feasible without applying sustainable governance (the Lisbon) principles which are critical to govern the common natural and social capital assets (Costanza et al., 1998). These principles include: 1. Responsibility; 2. Scale matching; 3. Precaution; 4. Adaptive management; 5. Full cost allocation; and 6. Participation (details in Costanza et al., 1998). Blending sustainable governance with *development*, and sustainable and efficient use of natural resources, can help us develop an ideal integrated framework to improve both human wellbeing and nature's resources which can help sustain human wellbeing.

In conclusion, transforming our economies while adjusting to the planetary boundaries at the local, national, and global scales, can lead to innovative enterprises. Such economies will also deliver almost all the Sustainable Development Goals which target a “*blueprint to achieve a better and more sustainable future for all*” by The United Nations [UN] (2015). With the recent COP26 Climate Change Conference in Glasgow (1–12 November), there is evidently much wider recognition of the need to transform economies now than ever before and many organizations are committing to follow that path.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

KS worked on the outline and framed the manuscript, which was followed up by IC and RC. IC and RC provided comments and feedback. All authors contributed to this article and online discussion about the outline and content of this manuscript, and discussed the final version together for submission.

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