

Review

Desperately Seeking Sustainable Human Well-Being: A Review of Indicators, Concepts, and Methods

Uma U. Baysal* and Paul C. Sutton

Department of Geography and the Environment, University of Denver, Denver, CO 80210, USA;
paul.sutton@du.edu (P.C.S.)

* Corresponding author. E-mail: uma.baysal@du.edu or uma@durusolutions.com (U.U.B.)

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ABSTRACT: Evaluating progress in human development and well-being is imperative for policymakers to assess the impact of their policies. Traditional measurement methods focus mostly on economic growth and socio-economic objectives, often neglecting vital components of the natural environment, particularly the ecological determinants essential for the sustainability of human well-being. The tension between *sustainability* and *development* becomes apparent as the recognition of the dependence of human well-being on the natural environment and ecosystem services is crucial for safeguarding the environment for present and future generations. This highlights the necessity for indicators that capture the intricate relationship between human well-being and environmental changes while addressing the challenges posed by the tension between sustainable practices and traditional development models. This paper presents a literature review examining the domains, dimensions, and indicators related to the sustainability of human well-being regarding economic, social, and natural environments. Emphasizing the multidimensional nature, this paper highlights the drawbacks of relying solely on socioeconomic indicators for assessment. The review explores diverse concepts and methodologies proposed to evaluate the components and multidimensional factors influencing the sustainability of human well-being. Ultimately it offers a holistic understanding serving as a foundation for further research and policy development.

Keywords: Human well-being; Sustainable development; Ecosystem services; Assessment; Indicators; GDP; Ecological Footprint



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1. Introduction

Scholars commonly describe well-being as a multidimensional phenomenon that relates to various aspects of life including; health, happiness, life satisfaction, financial independence, social cohesion, quality of life, personal development, and self-acceptance [1–8] Even though current assessment methods have made substantial progress in capturing a more comprehensive view of human development, and well-being, some scholars suggest that societies must consider integrating diverse economic and non-economic factors to ensure effectiveness [1,6,9,10]. A growing number of scholars emphasize the importance of incorporating indicators into assessments to capture the intricate linkages between human well-being, ecosystems, and resource management for more effective evaluations [9,11–14]. The focus is shifting to the inclusion of environmental indicators alongside economic, and social ones to gain a holistic understanding of the sustainability of human well-being [2,3,5].

This comprehensive literature review explores both traditional and contemporary methods of assessing human development and well-being. It examines alternative indicators introduced over the years and identifies key dimensions while also shedding light on the limitations of conventional indicators like Gross Domestic Product (GDP) and the Human Development Index (HDI). Acknowledging the imperative for measurement processes including indicators aligning with sustainability principles to capture the complex interdependencies between human and ecological well-being, this review further examines the methodologies surrounding well-being assessment in the context of sustainability and changes in ecosystem services.

2. Literature Review

The concept of human well-being as outlined in the literature encompasses the fundamental aspects of life such as physical and mental health, as well as more subjective dimensions, like happiness and satisfaction [2,4,5,8,15,16]. The World Health Organization defines the term well-being as a state of complete physical and mental health [17]. Additionally, scholars commonly associate well-being with social well-being that depends on interactions with others and the environment. [11,12,16,18]. Scholars make a crucial distinction between objective and subjective dimensions of human well-being, to explore its constituents [10,15,19,20]. Objective well-being is linked to the physical and socio-economic state of individuals. On the other hand, subjective well-being relates to an individual's quality of life, emotional responses, happiness, self-acceptance, finding purpose and meaning, and personal growth [4,8,21,22]. In essence, objective well-being is associated with tangible living conditions while subjective well-being is linked with how individuals perceive these conditions and evaluate their overall life quality [3,11,23–25].

As human well-being strongly depends on the level of interaction with the world, it is considered highly dynamic [10,11,24,26,27]. Scholars generally agree that high levels of well-being empower individuals to flourish in their personal, social, built, and natural environments [28,29]. Achieving a higher level of well-being can only be possible by building a harmonious relationship with other individuals and the environment, involving social interaction and adaptation to the conditions shaped by the built and natural surroundings [9,11,18].

The debate surrounding the evaluation and assessment of human well-being has become problematic among scholars. A growing body of research suggests evaluating well-being solely based on living standards and economic growth is inadequate. It is widely recommended that well-being assessments should consider critical dimensions of human development, including education, income, and health, and incorporate diverse indicators like quality of life, political voice and governance, social connections, and the environment [12,16,30–33]. Costanza et al. [11] emphasize the connection between robust economic development and a society's well-being. Similarly, Ivković [24] et al. regard societal economic development as a key dimension of human well-being.

2.1. Measuring Human Development and Well-Being

Measuring societal outcomes has long been a priority for governments, as it's considered a crucial input to ensure that the policies implemented to pursue economic development are compatible [11]. Over the last 60 years, Gross Domestic Product (GDP), associated with economic growth, has been considered a well-established indicator of social welfare [34–37]. Scholars often argue that GDP, designed for economic measurement fails to reflect the overall socioeconomic development and societal well-being [31,33,38,39]. The GDP theory does not cover all aspects of progress, focusing solely on the national income represented by the total monetary value of all the finished goods and services produced within a country's borders [35]. In a 1934 report to Congress the inventor of GDP, Simon Kuznets expressed that “The welfare of a nation can scarcely be inferred from a measure of national income,” emphasizing his concerns about policymakers relying on this indicator for shaping social policies [35,38].

Dietz and Rosa [9] argue that a significant drawback of GDP is its strict adherence to neo-classical economic theory, equating income and wealth with utility and correlating utility with well-being. Recent research [10,24,27,40–43] illuminated the limitations of GDP as the ultimate indicator for measuring societal progress in well-being. GDP offers limited evidence of the non-economic aspects of societal well-being; for instance, it neglects considerations of environmental quality (both built and natural), educational attainment, and health [11,23,41].

Moreover, while GDP has long been considered a measure of economic growth, and widely accepted as society's ultimate goal; research has revealed its inadequacy in capturing overall well-being [11,30,44]. *The Easterlin Paradox* [44] challenges the use of GDP as a well-being indicator, proposing that there is no significant relationship between a society's economic growth and the average level of happiness and satisfaction of its citizens. Stevenson et al. [31] argue that non-market goods overlooked by GDP such as; leisure time, social equity, environmental services, volunteer work, and unpaid housework, strongly affect the quality of life and human well-being. A growing number of scholars advocate for the idea that GDP is an inadequate indicator misrepresenting the quality of life of populations by ignoring these substantial factors [10,24,45,46].

Due to the limitations of GDP (and GDP/capita), there has been a shift in focus over the last couple of decades, towards non-market, non-economic, social, and environmental indicators, to better measure human well-being. United Nations Development Programme (UNDP) [47] study *A Survey of Composite Indices Measuring Country Performance* examines indicators that assess a state's performance covering aspects like competitiveness, government, social aspects, human rights, environment, security, and globalization. To illustrate the shift towards a variety of well-being indicators,

this study highlights a significant increase in the number of institutions suggesting non-economic well-being indicators since 1990 [47]. Despite the literature in this area being dynamic, only a few approaches have posed competition to GDP over the years. Notable examples include the Genuine Progress Indicator (GPI), Human Development Index (HDI), Better Life Index (BLI), Ecological Footprint (E.F.), and Happy Planet Index (HPI). The significance of these assessments lies in their attempt to incorporate, to some extent, significant social and environmental factors [41].

Navigating the Landscape: Current Socio-Economic Indicators

The Genuine Progress Indicator GPI¹ created in 1994 by a non-governmental organization Redefining Progress [48] quickly gained popularity and became a widely employed indicator in the USA. It has allowed national, regional, and sub-regional policymakers to measure their citizens' economic and social living conditions [49]. The GPI aims to assess societal well-being by considering not only monetary transactions but also the quality of life, based on various indicators [50]. Expanding beyond GDP, the GPI incorporates essential aspects of economic development accounting for the connection among local economic, social, and environmental drivers [48,49]. It differentiates between purchase maintenance, replacement costs, and consumption, including both positive and negative consequences. This approach helps recognize not only the economic transactions but also the broader implications of these economic activities that significantly impact human life. For instance, while increased clean-up and remediation costs resulting from an oil spill are considered an increase in GDP, the GPI takes them as a negative expenditure that does not improve well-being [39].

Moreover, the GPI covers essential categories that are omitted by GDP, such as environmental indicators, income inequality, unpaid work in households, higher education, volunteer work, and loss of free time [24]. In essence, the GPI offers a more nuanced and holistic understanding of economic well-being, recognizing the complexities in economic activities and their implications for society and the environment. This multidimensional perspective warrants a more comprehensive assessment [48,49]. Despite its comprehensive approach, the GPI has faced criticism for lacking a robust theoretical foundation, neglecting the benefits of indicators like political freedom, and ecosystem changes, and assuming that human-made capital substitutes for natural capital [39,51]. Furthermore, the inclusion of numerous subjective indicators with broad definitions in the GPI has been underlined as a significant problem potentially introducing bias and yielding arbitrary results when comparing groups [39,51,52].

One significant assessment, the Human Development Index (HDI) made its debut in The Human Development Report published by the United Nations Development Program (UNDP) in 1990 [27]. This report defines human development as “both the process of widening people's choices and the level of their achieved well-being” with the primary objective of ranking nations based on their progress in human development. The HDI quantifies the influence of economic and public policy on the quality of life, integrating education, income, and life expectancy as fundamental components of human development. Amartya Sen's Capability Approach [29] is embedded in the theoretical foundation of HDI which focuses on fostering enhanced capabilities, providing individuals with more choices and diverse opportunities in life. Sen emphasizes that assessments of human development should include indicators considering individuals' freedom, opportunities to participate in beneficial actions, and ways to achieve capabilities for reaching valuable states of well-being [28,29]. Despite being considered a successful indicator, the HDI falls short in areas beyond education, health, and income. Researchers have advocated for a more comprehensive assessment of various facets of life [26,53,54].

Introduced by the Organization for Economic Co-operation and Development (OECD) in 2011, the OECD Better Life Index (BLI) offers an alternative method for assessing well-being through a multi-criteria evaluation framework. Operating on an interactive web platform, the BLI allows participants to customize indicator weights for personalized assessments through individual surveys [55,56]. Hence, the BLI's framework prioritizes the outcomes of well-being over inputs and outputs, incorporating both objective and subjective measures, as both capture crucial aspects of human well-being [57]. By incorporating two broad domains; material living conditions and quality of life, this index integrates 11 indicators to evaluate the well-being of the member nations, including housing, health, environment, life satisfaction, education, work-life balance, safety, job opportunities, community engagement, income, and civic involvement [55–57]. Despite its comprehensive range of indicators, the BLI's environmental aspect is limited as it lacks sustainability indicators, which may pose challenges in accurately measuring the long-term impacts of ecosystem service changes on human well-being [58–60]. However, its methodology remains dynamic, evolving in line with research and statistical practices, reflecting an ongoing discourse on the quality of life also allowing for the inclusion of sustainability indicators [57].

Some scholars argue that subjective indicators, particularly the ones measuring community perception of well-being through surveys may produce misleading information across populations [5,10,52,61]. Kahneman and Kruger [5] state that individuals' perceptions are limited and often biased when evaluating well-being. Building upon this, Costanza

et al. [61] emphasized the need for societies, in the interest of sustainability, to adopt methods of assessing the well-being of entire communities within and among nations. This involves considering assessments of benefits to individuals that may not be well-perceived, highlighting the importance of a comprehensive approach to well-being evaluation. Moreover, understanding the fundamental drivers and essential factors contributing to the sustainability of human well-being is crucial for accuracy. However, not all individuals possess sufficient knowledge to prioritize sustainability principles, ecosystem provisioning, Ecological Footprint, or a nation's freshwater supplies [5,39].

2.2. Exploring Sustainable Development and Human Well-Being

The natural environment plays a fundamental role in human life by providing ecosystem services that support human livelihoods. Consequently, achieving an optimal standard of human well-being is closely linked to the well-being of the natural environment [9,12,16,42,62–64]. Recent studies have outlined the impacts of ecosystem services on physical and mental health, influencing the overall quality of life [4,16,18]. Summers et al. [16] highlighted that enhanced physical and mental health facilitated by ecosystem provisioning significantly contributes to well-being, especially in childhood and cognitive development within education.

Moreover, as ecosystem services offer limited albeit potentially regenerative resources, it can be argued that the sustainability of these services is intricately tied to the sustainability of human well-being [12,16,62,65]. The theory of ecological economy advocates for the simultaneous improvement in human and ecological well-being as the ultimate goal for societies, identifying optimal ecological consumption as the ultimate means to achieve human well-being [66]. Supporting this notion Grouzet [18] defines well-being as "the harmonious relationship between people and their ecological system, which leads to successful management, distribution, and sustainability of environmental resources for current and future generations". Despite the substantial reliance on natural resources to maintain human well-being and recognizing that the economy depends entirely on ecological provisions [67], human well-being has not been adequately assessed for decades regarding its evident connection with the natural environment and its ecosystems [16].

Communities worldwide have increasingly been evaluating improvement through the lens of sustainable development principles [68,69]. Within the framework of sustainable development, the challenge lies in improving human well-being through the efficient management of resources provisioned by ecosystem services [23,63,66]. In the assessments, it is imperative to acknowledge human well-being as a definitive indicator and underscore the interdependence of humans on ecosystems. When evaluating human well-being, it becomes vital to shift the focus toward the impacts of the changes in ecosystem services [62]. Given the rapid increase in world population, continuous economic growth, and the effects of climate change, nations must take responsible actions to enhance the utilization of ecosystem services to ensure the sustainability of well-being for future generations [23,42,63,66,69].

Costanza et al [66] identify high levels of human well-being as one of the essential elements of sustainable development. According to Parris and Kates [70], sustainable development involves reducing poverty and hunger, meeting human needs, and preserving life support systems. Policies aimed at assessing and improving human well-being play a critical role in sustainable development processes [10]. Considering the tension between sustainability and development, achieving sustainable human development is challenging and strongly requires policies that delicately balance societal demands on the environment with the well-being of current and future generations [71,72]. Achieving sustainable development is not possible without a profound understanding and effective management of the interconnection between human well-being and ecological well-being [12,16]. The recent acknowledgment of this interconnection by policymakers is evident in various initiatives such as the Millennium Ecosystem Assessment [73], Sustainable Development Goals [74], Ecological Footprint [75], and Happy Planet Index [76].

The Millennium Ecosystem Assessment [62,65] marked a pioneering effort to establish a framework for exploring linkages between human well-being and ecosystems. Recognizing human well-being as inseparable from the natural environment, MEA is considered a groundbreaking assessment [16,73]. In addition to social, economic, and cultural factors, indicators of ecosystem changes have been given due consideration in assessing the sustainability of human well-being [73]. The purpose of the MEA report is to evaluate the contribution of ecosystem provisioning to human well-being providing policymakers with a reference for inclusion in their plans and actions [77].

The MEA report underlines that the changes in ecosystems intensely impact human well-being given the fundamental interconnectedness between humans and all components of ecosystems. This assessment introduced a classification for ecosystem services encompassing provisioning, regulating, cultural, and supporting services (Figure 1). This classification emphasizes the changes in these services primarily affect well-being across various constituents of life including security, health (in terms of clean air and water), and the basic materials of life (such as adequate

livelihoods, sufficient food, shelter, and access to goods) as well as social and cultural relations [16,62,65]. Sustaining ecosystem services is fundamental not only to human life and well-being but also to the economy [16,63,78]. The concept of a sustainable system involves avoiding the depletion of natural capital and safeguarding ecosystem services within the boundaries of the planet [79]. Exploiting resources at a rate faster than they can be regenerated, may result in a temporary increase in material well-being and help reduce short-term income inequalities, however, such practices are not sustainable and may even intensify social and environmental inequalities for future generations [16,62].

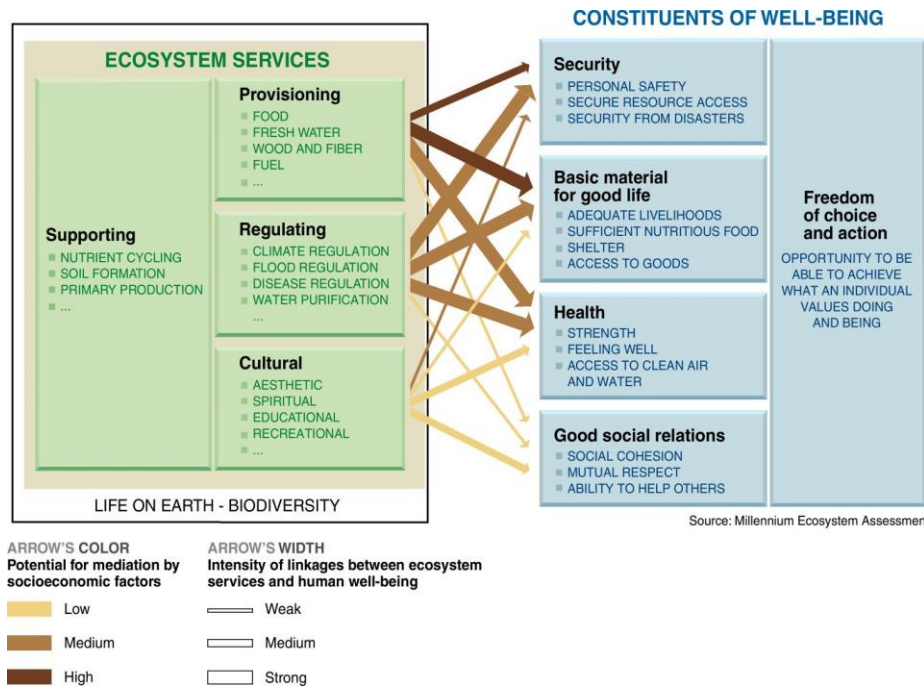


Figure 1. Ecosystem Services and the Constituents of Well-Being. Source: Millennium Ecosystem Assessment [65].

Despite an overall shift from economic growth to development, the lack of widely accepted indicator sets persists due to the inherent ambiguity of sustainable development and the confusion in terminology. In addressing the apparent paradox between sustainability and development, Parris and Kates [70] highlighted the crucial role of sustainable development measures in delineating what should be sustained and what should be developed, particularly in integrating the linkages between economy, development, and environmental factors. They categorized the measurement methods for sustainable development, highlighting that nature, life support systems (including ecosystem services), and communities (encompassing cultural diversity, livelihoods, and distinctive places) as the elements to be sustained. In contrast, they classified people, economy, and society as the categories to be developed based on their literature findings. Garnåsjordet et al. [80] underscored the subjectivity inherent in sustainable development indicators due to diverse perceptions, varying definitions, and measurement processes potentially leading to different assessments. Additionally, compiling indicators involves choices influenced by societal interests and implicit values. Costanza & Patten [81] suggest that governments cannot measure exact sustainability, however, there are ways to assess it, considering any measure of sustainability a form of prediction.

Dwyer [82] distinguishes between weak and strong sustainability paradigms, emphasizing the effective management of capital stocks to achieve sustainability goals. His research explores tourism development, highlighting its potential to stimulate economic growth, create job opportunities, and foster cultural exchange while also underlining its impact on resident well-being [83]. He argues that achieving sustainability in tourism development requires balancing various capital stocks—natural, human, social, and built—across present and future generations. While the weak sustainability perspective suggests that these capitals are interchangeable meaning declines in one type of capital can be compensated for by investments in others. In contrast, the strong sustainability view emphasizes that some forms of capital, particularly natural capital are irreplaceable and essential for long-term well-being. Understanding the trade-offs between different capital stocks is crucial for assessing their impacts on current and future well-being [82].

2.2.1. Advancements in Measuring Sustainable Human Well-Being: An Overview of Indices

The World Conservation Union (IUCN) sponsored a composite index known as The Well-Being of Nations: A Country-by-country Index of Quality of Life and Environment [64] recognized as a pioneer study in assessing progress in sustainability. The conceptual framework demonstrated by The Egg of Wellbeing (Figure 2) reveals the terminology behind this index emphasizing a robust interdependence between ecosystem conditions and human well-being. According to this scheme a society can only be considered sustainable when both ecosystem and human conditions are good. The Well-being Index comprises two subindices; the human well-being index which includes indicators such as health, population, wealth, knowledge, and culture, and the ecosystem well-being index which includes indicators related to land, water, air, species, and genes totaling 88 indicators for 180 countries [64]. Parris and Kates [70] assert that this index strongly adheres to sustainable development guiding principles, however, it is driven by data availability, and it utilizes subjective methods allowing for flexibility in metrics of indicators, and computing an overall grade without associated units.

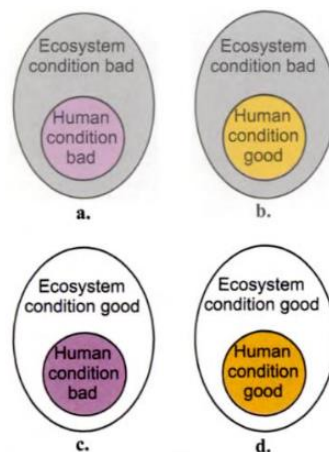


Figure 2. The Egg of Well-being: “A society is obviously unwell and unsustainable if people are suffering and the ecosystem is degraded (a); It is also unwell and unsustainable if either the ecosystem condition is bad (b) or the human condition is bad (c); Only condition (d) is sustainable.” Source: The Well-Being of Nations: A Country-by-country Index of Quality of Life and Environment [64]. The permission has been obtained.

The well-being literature has made a notable contribution by emphasizing the biophysical limits of nature [61,84–86]. Among the indicators addressing this concern, the Ecological Footprint has gained interest in discussions since the 1990s [87,88]. Developed by Mathis Wackernagel and William Rees [75,89] the Ecological Footprint has become a widely adopted metric for measuring environmental performance and monitoring progress toward sustainability [90]. Parris and Kates [70] suggest that while many indices face limitations in terms of subjectivity, aggregate indices like Ecological Footprint employ scientific methods and establish equivalencies to a common unit of measure, enabling more objective assessments.

An increasing number of scholars have approved the importance of utilizing natural resources within the Earth’s productive capacity [9,16,42,61,69,84–86]. Achieving sustainability necessitates the consumption of these resources at a pace no faster than the ecosystems can regenerate them. However, quantifying how much of nature has been utilized and how much remains poses a significant challenge [84–86]. In response to this challenge, the Ecological Footprint offers a science-based methodology capable of providing answers. It compares the annual consumption of ecosystem services by humanity with the biosphere’s annual regenerative capacity for these services [91]. The Ecological Footprint can be calculated at various scales, ranging from global, national, regional, or municipal levels to organizational and even individual levels.

The Happy Planet Index (HPI) [76] is a widely recognized well-being index that places significant emphasis on ecological consumption, incorporating the Ecological Footprint as one key indicator. The core principle of this index asserts that a thriving society that supports human well-being should not come at the expense of our planet. The HPI stands out as a successful global tool for evaluating well-being and maintaining an ongoing assessment of progress toward its objectives [92]. Operating within a distinctive framework, this index aims to gauge ecological efficiency in the pursuit of a fulfilling life [76]. The HPI evaluates several dimensions including health, positive life experience, life

expectancy, and the Ecological Footprint. Consistent reports from this tool underscore that humanity is still far from achieving sustainability in well-being [76,92].

Nonetheless, this Index incorporates an abstract measure of subjective well-being, assessing the quality of life as reported by individuals in each country. Residents provide ratings of their well-being on a scale ranging from 0 to 10, utilizing the Ladder of Life measure from the Gallup World Poll ². One notable criticism of the HPI is its reliance on subjective judgments, which may yield arbitrary results as it depends solely on the perceptions of the residents [5,93].

2.2.2. Exploring Perspectives on Measuring Sustainable Human Well-Being: Recent Methodological Proposals

Dietz and Rosa [9] introduced the Efficient Well-being Index (EWEB) aiming to assess how effectively a nation’s policies contribute to overall human well-being while managing economic, natural, and human resources sustainably. Unlike traditional sustainability models, EWEB focuses on evaluating a nation’s efficiency in generating human well-being. Drawing data from 135 nations, this model calculates environmental efficiency in well-being production and successfully demonstrates that improvements in well-being can occur without detrimental ecological impacts. Furthermore, the research highlights that numerous nations have the potential to enhance the efficient utilization of both their human and natural resources. Despite the limitations, such as relying heavily on life expectancy as a key well-being indicator, EWEB remains essential for emphasizing the connection between efficient resource consumption and human well-being while aligning with the goal of preserving the biosphere.

The Sustainable Development Goals (SDGs), outlined in the U.N. 2030 Agenda for Sustainable Development [74], mark a substantial advancement on the Millennium Development Goals (MDGs) ³ [94]. Comprising 17 goals, 169 targets, and over 300 indicators the SDGs address the miscellaneous challenges to sustainable development encompassing social, economic, and environmental dimensions. Costanza et al. [66] highlighted a missing element in these shared goals: the articulation and measurement of the overarching goal, referred to as the *ultimate end* described as a “prosperous high quality of life that is equitably shared and sustainable”. SDGs serve as the intermediate means depicted on *the means and end spectrum* (Figure 3) guiding toward the *ultimate end* of sustainable human well-being, pursued within and among nations [66]. Recognizing the intrinsic link between human well-being and the well-being of nature this study highlights the efficient allocation (in terms of economy, technology, and politics), and fair distribution of resources (ensuring capabilities and flourishing) within planetary boundaries are pivotal means to achieve the ultimate end of sustainable well-being [66].



Figure 3. The *means-end* Spectrum: Three Elements of Sustainable Well-being (Efficient Allocation, Fair distribution, and Staying within Planetary Boundaries). Source: An overarching goal for the UN sustainable development goals [66]. The permission has been obtained.

In consolidating well-being indicators, Costanza et al. [23] proposed integrating SDGs into measurement processes through an *integrated dynamic systems modeling approach*. This approach is considered effective as it encompasses contributions from natural, social, human, and built capital assets. Building upon this suggestion the study group developed a hybrid measurement method known as The Sustainable Well-Being Index [23], which incorporates societal well-being, equity, economy, and nature. The Index integrates net economic contribution (social capital) and ecosystem services contribution (natural capital), recognizing them as non-linear, and where the absence of any would lead to a value of zero [23].

The underlying principle of this index posits that human well-being is intricately interconnected with the dynamic interplay among social, built, human, and natural capital. As depicted in the diagram (Figure 4) social capital envelopes both built and human capital, while natural capital encompasses the entirety of social capital within a society.

Furthermore, by providing ecosystem services, natural capital becomes an integral part of the intricate interaction between built and human capital forming social capital, and ultimately contributing to the generation of human well-being [63]. As a result, this diagram illustrates a robust need to address the role of ecosystem services in shaping human well-being, adopting a transdisciplinary perspective.

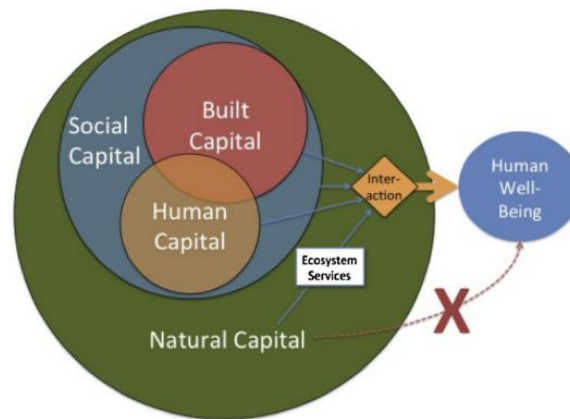


Figure 4. Interaction Between Built, Social Human, and Natural: Ecosystem services represented as relative contributions of natural capital to human well-being. Source: Changes in the global value of ecosystem services [63]. The permission has been obtained.

An insightful study by Zhang et al. [10] aimed to enhance the efficiency of transforming ecological consumption into human well-being. This research introduces the Index of Ecological Well-being Performance (IEWP), which assesses 82 countries with populations exceeding 10 million in 2012. The index is constructed based on two primary indicators; the Human Development Index and Ecological Footprint (E.F.), with EF incorporated as an indicator to account for the efficiency factor. The research demonstrates that the majority of G20 (Group of Twenty) countries, along with most other affluent nations with the world's largest economies, are not effective in enhancing their nation's human well-being. Exhibiting lower ecological efficiency, they fall short in their actions struggling to sustain their current status. Zhang et al. [10] suggested that the IEWP is considered valuable as it provides insights into the interconnection of efficient ecological consumption and human well-being. However, it should not be taken as the sole assessor of well-being, as one primary indicator of this study relies on; the Human Development Index (HDI) includes only a limited set of variables. Furthermore, the study group underlined the significance of conducting such analysis at a local scale, emphasizing this approach can produce more nuanced perspectives that are particularly relevant to local governance.

2.2.3. Exploring Novel Approaches: Spatial and Local Indicators in Recent Studies

In addition to the overlooked human-nature linkage, many indices tend to neglect the local (subregional, subnational) and spatial characteristics, primarily focusing on data collected at a national or an international scale. These indices often falter in addressing challenges within specific geographical areas due to the exclusion of essential spatial and local demographic information from their indicator sets [27,95]. Different geographic, demographic, environmental, and socioeconomic contexts may lead to varying levels of human well-being at a lower scale. Cox et al., [95] suggested that the selection of the scale is crucial given its strong dependence on the distinctive local and spatial structures including, the built environment, socioeconomic conditions, and environmental factors, when evaluating human well-being. Consequently, incorporating local indicators in measurements allows for a more precise evaluation of how these local structures impact human well-being at the local scale [10,95].

Moreover, these indicators promoting citizen engagement provide valuable insights for local stakeholders in developing effective policies [27]. Concentrating on local information that effectively targets barriers to human well-being empowers policymakers to take corrective actions. It also enables community leaders to investigate the factors that contribute to the disparities between different groups, such as the socioeconomic inequalities arising from negative aspects of the local built and natural environments [27,95]. A local focus is influential in discovering opportunities for improvement and providing ideas for local investors. Technological tools allow for zooming in and out on a geography and assisting in data interpretation.

With a similar perspective, Smith et al. [69] proposed a core set of well-being domains to form the foundation for developing a local index for the U.S. These domains include health, social cohesion, education, safety, security, living standards, leisure time, spiritual and cultural fulfillment, life satisfaction and happiness, and connection to nature.

According to the research group, these domains are intricately linked with local ecosystem services while interacting with local economic, environmental, and societal well-being.

Recently, there has been a growing emphasis on grasping human development and well-being at the sub-national level in the United States through the integration of comparative indices. Numerous local studies enable precise assessments and subsequent feedback for policy-making processes. Environmental Defense Fund (EDF) created the U.S. Climate Vulnerability Index [96] ranking more than 70,000 census tracts across the country, utilizing indicators encompassing long-term health, social, environmental, and economic conditions of communities. This index serves as a valuable tool for understanding, prioritizing, and addressing climate change impacts at the regional and local levels, ultimately contributing to the nation's overall resilience and sustainability.

Another noteworthy study, the Environmental Justice Index (EJI) by the Agency for Toxic Substances and Disease Registry [97], ranks the cumulative impacts of environmental injustice on health across communities. The EJI categorizes census tracts according to environmental, social, and health factors, grouping them under three major modules: a social vulnerability module (including minority status, employment, and education), an environmental burden module (incorporating air pollution, interaction with toxic sites, and transportation), and a health vulnerability module (including indicators like asthma, cancer, high blood pressure, and diabetes). This index plays a crucial role in addressing environmental inequalities, promoting social justice, and advancing equitable and sustainable development. By highlighting the intersection of environmental issues with social, and economic factors, it helps create a more just and sustainable future for all communities across the nation.

3. Conclusions

Assessing progress in human development and well-being is essential for policy makers but its multidimensional nature turns it into a challenging task. Scholars have long explored the diverse dimensions of human well-being covering both subjective and objective characteristics [1,6,9,10]. The selection of indicators for assessment has given rise to various perspectives, encompassing economic, social, spatial, and environmental indicators such as health, happiness, life satisfaction, financial independence, social cohesion, quality of life, accessibility to services, personal development, self-acceptance, environmental quality, safety, and security [1–8].

Criticisms of established indices like Gross Domestic Product (GDP per capita, Gross National Income) highlight their shortcomings in capturing the diverse and complex indicators of human development and well-being [34–37]. Over the years, the growth-focused economic indicator (GDP) has become associated with more implications than originally envisioned [10,24,27,40–43]. On the other hand, a well-integrated measure like the Human Development Index (HDI) faces criticism for its limited scope encompassing only socioeconomic indicators [54,98]. Additionally, the Genuine Progress Indicator and Better Life Index, designed to offer a more comprehensive assessment than GDP by incorporating non-economic, social, environmental, and spatial factors have been criticized for subjectivity and the potential for biased results [39,51,55,56].

The focus on the complex relationship between human well-being and ecosystems has underscored the realization of limited resources in our alarmingly changing world [9,12–14,61]. With population growth, increased consumption trends due to improved livelihoods, accelerated environmental degradation, and ecosystem changes, the role of human well-being within sustainable development has attracted considerable attention in recent decades [12,16,65]. Sustainable development revolves around three key elements; reaching a high quality of life, fostering human well-being in an equitable society, and preserving a sustainable environment within planetary boundaries [42,63,66]. Sustainable development is essential to reduce poverty and hunger, meet human needs, and preserve life support systems [70]. However, achieving sustainable development is no simple task, especially due to the inherent tension between sustainability and development. This challenge requires policies that carefully navigate societal demands on the environment while considering the well-being of current and future generations [71,72]. Indices related to the assessment of ecological well-being and sustainability offer valuable insights, but these indices also present challenges as it is hard to establish indicator sets that are widely accepted due to the ambiguity of sustainable development and the confusion in terminology [70,81].

The Millennium Ecosystem Assessment pioneered the interdependence between human well-being and ecosystems, providing a comprehensive framework for policymakers revealing discouraging findings about widespread environmental degradation [16,73]. The Well-Being of Nations: A Country-by-country Index of Quality of Life and Environment [64] is a composite index that has a strong focus on sustainable development with a comprehensive set of indices, including both economic, social, and environmental, indicators; however, this work has faced criticism related

to applying subjective methods allowing for arbitrary results [70]. The Ecological Footprint serves as an essential indicator measuring ecological consumption and consequently, the ecological efficiency of human activities advocating for environmental sustainability [90]. The Happy Planet Index integrates the Ecological Footprint and emphasizes ecological efficiency in producing a fulfilling life, however, it also struggles with subjectivity in its assessments due to the broad inclusion of individual perceptions [76,92].

Moreover, some refined studies explored this intricate relationship between human and ecological well-being and suggested inspirational models, including Costanza et al.'s [23] Sustainable Well-Being Index model, which incorporates natural, social, human, and built capital thereby recognizing their non-linear contributions to the sustainability of human well-being. Their discussion also highlights the significance of Sustainable Development Goals (SDGs) [74] in offering a holistic approach to sustainable development underscoring the linkages between human well-being, social equity, and environmental sustainability. Similarly, Dietz and Rosa's Efficient Wellbeing Index [9] proposes a perspective by assessing the efficiency of nations in generating well-being through sustainable resource management. Furthermore, Zhang et al.'s [10] Index of Ecological Well-Being acknowledges the value of efficient ecological consumption in sustaining well-being, highlighting the need for a comprehensive analysis at a local scale.

The discussion on spatial and local indicators underscores the limitations of global indices in capturing nuances of human well-being at smaller scales. Local (applied at sub-national scales: census tracts, counties, cities) indices such as the U.S. Climate Vulnerability Index [96] and the Environmental Justice Index [97] offer targeted insights into specific communities promoting citizen engagement, investment, and effective policy-making by helping policymakers address local challenges and disparities [27].

Exploring the literature reveals that the indicator sets in these assessments can be categorized into six primary domains. These categories include economic and social factors, spatial characteristics (concerning the offerings and the quality of the built and natural environment), local applicability (assessing whether the method is applicable sub-nationally), environmental aspects (regarding the changes in ecosystems), and the differentiation between objective and subjective characteristics (Table 1).

Table 1. Profiling Indicators in Current Assessments and Indices.

Assessments/Indices	Economic	Social	Spatial (Built Environment)	Local (Sub-national Level)	Global (National Level)	Environmental	Objective/Subjective
Gross Domestic Product (GDP)	x			x	x		O
Genuine Progress Indicator (GPI)	x	x	x	x		x	O/S
Human Development Index (HDI)	x	x			x		O
Better Life Index (BLI)	x	x			x	x	O/S
Happy Planet Index (HPI)		x			x	x	S
Ecological Footprint (EF)			x	x	x	x	O
Millennium Ecosystem Assessment (MEA)	x	x	x		x	x	O
The Well-Being of Nations: A Country-by-country Index of Quality of Life and Environment (WBN)	x	x			x	x	O
The U.S. Climate Vulnerability Index (CVI)	x	x	x	x		x	O
The Environmental Justice Index (EJI)	x	x	x	x		x	O

Table 1 summarizes that most indices constructed in recent decades primarily focus on environmental factors. However, some either overlook certain economic, social, and spatial indicators or rely on subjective measures raising questions about their comprehensiveness. Most indices are applied at the national level and this top-down approach may not be deemed efficient in terms of promoting citizen engagement or facilitating targeted policy-making.

The discourse surrounding sustainable development highlights the intrinsic relationship between human well-being and the sustainability of our planet's resources. While there exists a tension between sustainability and development since economic progress that funds development is often perceived as in conflict with environmental sustainability, the imperative to harmonize these goals is evident. Assessment frameworks must adopt a transdisciplinary approach, integrating diverse indicators from economic, social, built, and natural environmental contexts to ensure a

comprehensive understanding of both human and ecological well-being. Moreover, incorporating objective indicators is crucial in guiding efforts toward achieving sustainability, recognizing that sustainable development must prioritize the long-term well-being of both present and future generations.

By recognizing the importance of ecosystem services in achieving human well-being and the vital linkage between natural capital and human capital, we pave the way for a more sustainable and equitable future for all.

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Footnotes

- ¹ See the Index of Sustainable Economic Welfare (ISEW) [99].
- ² The Gallup Organization conducted a World Poll in 2005 to track “the most important issues worldwide such as; food access, employment, leadership performance, and well-being” by using an identical questionnaire for a national sample of adults from 132 countries. Gallop World Poll relies on telephone surveys and face-to-face interviews to track individual perceptions following a customary survey methodology (www.gallup.com).
- ³ The United Nations Millennium Development Goals (MDGs) comprise 8 goals (addressing poverty, hunger, child and maternal mortality, combatting diseases, ensuring environmental sustainability, fostering global partnership) that were collectively committed by the 189 UN Member States in the year 2000 with the aim of accomplishment by 2015.

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