



## To what extent have the links between ecosystem services and human well-being been researched in Africa, Asia, and Latin America?



Gisella S. Cruz-García<sup>a,b,\*</sup>, Erwan Sachet<sup>a</sup>, Genowefa Blundo-Canto<sup>c,d</sup>, Martha Vanegas<sup>a</sup>, Marcela Quintero<sup>a</sup>

<sup>a</sup> Decision and Policy Analysis Research Area, International Center for Tropical Agriculture, Km 17 Recta Cali-Palmira, Apartado Aéreo 6713, Cali, Colombia

<sup>b</sup> Botanical Research Institute of Texas, 1700 University Drive, Fort Worth, TX 76107, USA

<sup>c</sup> Decision and Policy Analysis Research Area, International Center for Tropical Agriculture, Avenida La Molina 1895, La Molina, Apartado Postal 1558, Lima, Peru

<sup>d</sup> UMR Innovation, Centre de Coopération Internationale en Recherche Agronomique pour le Développement, 73 avenue Jean-François Breton, 34 398 Montpellier Cedex 5, France

### ARTICLE INFO

#### Article history:

Received 4 December 2016

Received in revised form 12 April 2017

Accepted 15 April 2017

#### Keywords:

Africa

Asia

Conceptual framework

Ecosystem services

Human well-being

Latin America

Systematic review

### ABSTRACT

Most studies to date assume that there are multiple relationships between ecosystem services and human well-being, but there are few studies that quantify these relationships. Our objectives were: (1) to investigate the trends and understudied areas within ecosystem services and well-being research; and (2) within these general trends, to analyze to what extent the linkages between ecosystem services and well-being presented in empirical research in Africa, Asia, and Latin America were part of a tested hypothesis, and to assess which conceptual frameworks were used in understanding this interface. The results of this study highlighted that most publications assumed that ecosystem services and well-being were interlinked but did not analyze their relationship as part of the hypothesis to test. While different frameworks on well-being were adopted by empirical research, only one out of the 29 post-Millennium Ecosystem Assessment (MEA) conceptual frameworks that illustrate the linkages between ecosystem services and well-being was documented, and most case studies adopted the MEA. Finally, trade-offs and synergies between ecosystem services and disaggregated well-being were understudied. Considering these knowledge gaps in future studies will help empirical ecosystem services research to simultaneously contribute to improved well-being and environmental sustainability when applied at multiple policy or institutional levels.

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\* Corresponding author at: CIAT, Km 17 Recta Cali-Palmira, Apartado Aéreo 6713, Cali, Colombia.

E-mail address: [g.s.cruz@cgiar.org](mailto:g.s.cruz@cgiar.org) (G.S. Cruz-García).

## 1. Introduction

Human well-being is a multidimensional concept with objective dimensions that include social and material attributes, and subjective dimensions that comprise a person's assessment of his or her own conditions (King et al., 2014; Summers et al., 2012). It includes different social, environmental, physical, spiritual, and emotional components associated with how people function and how they feel. Summers et al. (2012: 328) emphasized that in order to have well-being it is necessary that 'basic needs are met, that individuals have a sense of purpose, and that they feel able to achieve important personal goals and participate in the society.' Although there is a substantial body of literature on the indicators of human well-being (e.g. Cummins et al., 2003; Gasper, 2007; Prescott-Allen, 2001), the benefits that humans receive from the environment are not well understood within the well-being literature (Summers et al., 2012). However, the interconnectedness between well-being and the benefits provided by ecosystems to humans is increasingly gaining recognition among scientists, who are progressively exploring conceptual and methodological frameworks for conducting socio-ecological analysis (King et al., 2014).

A foundational piece known as the Millennium Ecosystem Assessment (MEA, 2005) illustrates the multiple links between ecosystem services and human well-being. Indeed, ecosystems, through the benefits they provide, are essential for safeguarding the multiple dimensions of human well-being, such as the provision of goods and services (e.g., food, timber, fuelwood, freshwater provision) that are needed for human survival. Along with the rapid increase of ecosystem services literature after the publication of the MEA (Gómez-Baggethun et al., 2010), numerous frameworks have emerged that attempt to conceptualize the dynamics and complexity of the links between ecosystem services and human well-being (e.g. Díaz et al., 2015; EPA, 2012; Fisher et al., 2014; Rounsevell et al., 2010; TEEB, 2010). For instance, Blundo-Canto, Cruz-Garcia, Sachet and Vanegas (unpublished results) found a total of 29 frameworks describing the relationship between ecosystem services and human well-being that emerged after the publication of the MEA. Although these frameworks propose various economic, social, political, and ecological perspectives for understanding the interactions between these two concepts, it is unclear how far empirical research has advanced in demonstrating and measuring these theoretical linkages, combining perspectives from different disciplines and in different contexts. Exploring the connections between human well-being and ecosystem services at different scales and contexts, and using a systemic analysis where different perspectives (e.g. social justice, poverty eradication, environmental sustainability) and disciplines are combined, will help to identify the actions required to simultaneously enhance human well-being and ecological stability, which will contribute to achieving the Sustainable Development Goals (Balvanera et al., 2014; Carpenter et al., 2009; Duraiappah, 2011; Raworth, 2012; Reyers et al., 2010).

Although research on ecosystem services and human well-being is increasing exponentially, little is known about the extent to which empirical research has studied the nature of their linkages. For instance, 81% of the case studies on ecosystem services and food security (a component of human well-being) conducted in Africa, Asia and Latin America assumed they are linked, while few had tested their links empirically (Cruz-Garcia et al., 2016). There is no systematic review that examines to what extent the connection between ecosystem services and human well-being has been theoretically assumed as part of the study justification or empirically researched by including this connection as part of the study hypothesis. Such an analysis is necessary to provide useful directions for future empirical studies in the way that they con-

tribute to an understanding how trade-offs and synergies between ecosystem services and well-being can simultaneously ensure environmental sustainability and improved livelihoods. This is particularly important for Africa, Asia and Latin America, where improving social progress, economic and human development is imperative. They include countries where social progress indices range from very low to middle. Their lower social progress indices compared to North America, Europe and Australia, are not clearly correlated with country income; instead, they are related to low attainments in multiple dimensions of human well-being (including environmental indicators), basic need satisfaction and social opportunities (Porter et al., 2016). Such a socioeconomic challenging context is paired with growing environmental concerns. For instance, between 1990 and 2015, the greatest forest loss occurred in sub-Saharan Africa, South-Eastern Asia and Latin America, accounting for almost 16,000 thousand hectares (United Nations, 2016), whereas the highest threats to water security and biodiversity were concentrated in Africa, Asia, South America and the Caribbean (Vörösmarty et al., 2010).

The hypothesis underlying this study is that most of the many studies on ecosystem services and human well-being assume that there are multiple relationships between these two concepts, but there are few research studies that examine these relationships. This paper aims to evaluate to what extent these links have been empirically analyzed in scientific studies. The objectives were: (1) to investigate the trends and understudied areas within ecosystem services and human well-being research (temporally, spatially and by topic); and (2) within these general trends, to analyze to what extent the linkages between ecosystem services and human well-being presented in empirical research in Africa, Asia, and Latin America were part of a tested hypothesis or were assumed to be part of the study justification, and to assess which conceptual frameworks were used to understand this interface. This empirical evidence, when applied, will contribute to synergistically improve environmental sustainability and human well-being as part of policies, strategies and initiatives related to the attainment of the Sustainable Development Goals.

## 2. Methods

A systematic literature review was conducted using the methodological rules of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) designed for indexed publications. According to PRISMA, a systematic review is "a review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyze data from the studies that are included in the review" (Moher et al., 2010: 336).

All indexed peer reviewed publications including ecosystem services and human well-being (or wellbeing or well being) in title, abstract and keywords, published in English before 2015, were searched using the Scopus<sup>®</sup>, Web of Science<sup>™</sup> and ScienceDirect<sup>®</sup> databases. This review focused on scientific research based on a peer review process, which aims to ensure the scientific rigor of publications. The choice to omit gray literature was a response to the need to have a rigorous search of the established databases, systematic identification of scientific publications and eligibility criteria (procedures and standards). The Booleans AND, which ensures the presence of both terms, and OR, which allows the presence of either term (or both), were used using the keyword combination "ecosystem services" AND ("human well-being" OR "human well-being" OR "human well being") in the search. The keywords of the query were entered in Scopus' and ScienceDirect's 'title-abstr act-keywords' field option, where there is no difference between

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