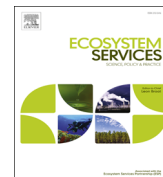




ELSEVIER

Contents lists available at ScienceDirect

Ecosystem Services

journal homepage: www.elsevier.com/locate/ecoser

Ecosystem services in new Zealand agro-ecosystems: A literature review

Marjan van den Belt*, Daniella Blake

Ecological Economics Research New Zealand, Massey University, Private Bag 11222, Palmerston North, New Zealand

ARTICLE INFO

Article history:

Received 15 October 2013

Received in revised form

8 May 2014

Accepted 19 May 2014

Keywords:

Ecosystem services

Agriculture

Valuation

Participation

Biodiversity

Adaptive management

ABSTRACT

In New Zealand (NZ), literatures on ecosystem services in agro-ecosystems has expanded in recent years as the impact of agriculture on the provision of services to meet public and private demand for ecosystem services are increasingly recognised. We review the NZ literature and analyze the scope of an ecosystem services approach in agro-ecosystems through the lens of four ecosystem service frameworks. Most of the literature is concerned with assessing the benefits that could be gained by changing land management practices. Some research assessed values of ecosystem services to the NZ public. Trade-offs in land-use decisions are highlighted. However, critical gaps in the literature could suggest the impediment of integration of the ecosystem concept into decision-making. The full range of ecosystem services, benefits, and beneficiaries had not been covered, and the scope of research is patchy, i.e. limited in spatial and temporal scale. In addition, there is a need to broaden the scope of research to include social and cultural aspects, and link the supply and demand for ecosystem services. Finally, research on the effectiveness of institutions that use an ecosystem services approach could enable better-informed decisions about trade-offs, including all the costs and benefits, across and between multiple scales.

© 2014 Elsevier B.V. All rights reserved.

Contents

1. Introduction	1
2. Methods	3
3. Results	4
3.1. Overview of literature on agro-ecology ecosystem services in NZ	4
3.2. Overview of the four ecosystem service frameworks used to assess agro-ecology ecosystem services in NZ	4
3.2.1. Millennium Ecosystem Assessment (MEA)	4
3.2.2. Ecosystem Services Partnership (ESP)	5
3.2.3. Haines-Young and Potschin (2010a,b) cascading framework	9
3.2.4. The Economics of Ecosystems and Biodiversity (TEEB)	9
3.3. Other themes linking into the ecosystem services concepts and frameworks	10
4. Future research suggestions for ecosystem services research in agro-ecosystems in NZ	10
4.1. Overcoming fragmentation with a consistent approach	12
4.2. Matching supply and demand for ecosystem services	12
4.3. Participatory approaches beyond monetary valuation	13
4.4. Addressing multiple scales in time and space	13
4.5. Institutionalising the ecosystem services concept	13
5. Conclusion	14
Acknowledgements	14
Appendix A	14
References	16

* Corresponding author. Tel.: +64 6 356 9099x81512; fax: +64 6 350 5789.

E-mail addresses: m.vandenbelt@massey.ac.nz, vandenbeltm@gmail.com (M. van den Belt).

1. Introduction

Ecosystem services are the benefits people obtain from ecosystems (Millennium Ecosystem Assessment, 2005). An ecosystem services framework is one way to highlight and demonstrate societal dependence on ecosystems for well-being; understand the linkages between biophysical structures, functions, and the resulting benefits people gain; assess and quantify the value of benefits in a common language; and fully integrate values of natural capital and ecosystem services into public and private decision-making (e.g. Daily et al., 2009; TEEB, 2010; Braat and de Groot, 2012). The Oxford Dictionary defines a framework as 'a basic structure underlying a system, concept, or text'. Several recently developed frameworks reflect on an ecosystem services approach and its underlying connection between natural and human systems. In essence, the ecosystem services concept highlights the dependency of human well-being on ecosystems. However, underlying worldviews on how human systems relate to ecosystems are particularly evident in the definitions of ecosystem services, e.g. ecological economists emphasize that human societies are a sub-set of ecosystems and as a consequence assume limited substitutability between built/manufactured and natural capital (van den Belt, 2011; Braat and de Groot, 2012; Daly and Farley, 2010; Farley, 2012). The assessment of ecosystems services is therefore mediated through the human sub-system (Costanza et al., 2014). As a result, some definitions of ecosystem services emphasize the functional aspects of ecosystems from which people derive benefits (Costanza et al., 1997; Daily, 1997), others put more emphasis on their utilitarian aspects and seek conformity with economic accounting (Boyd and Banzhaf, 2007), some emphasize human well-being (Fisher et al., 2009), and yet others emphasize values (TEEB, 2010).

Definitions for ecosystem services have evolved into frameworks to structure thinking, develop organizing principles, and build capacity to adaptively make visible and manage sustainable development. Some frameworks have a linear focus (e.g. for the purpose of accounting for ecosystem services), while others emphasize the reciprocity of human systems as a sub-system within ecosystems (e.g. biodiversity and cultural). With this approach there is a need to manage human behaviour actively within the capacity of ecosystems.

When using an ecosystem services approach to understand the dependency of human well-being on natural systems, much of the effort goes into making clear existing knowledge from different networks in a cohesive manner for policy and management decisions, as well as systemically developing knowledge about blind spots. The purpose of this literature review is to assess what we do and do not know, from an academic perspective, about the ecosystem services of agro-ecosystems in New Zealand (NZ). The approach used to assess the body of literature identified is through the lens of four ecosystem services frameworks. This way of assessing literature across multiple ecosystem service frameworks can also be used for other bodies of literature.

Agro-ecosystems are recognised in the international ecosystem services literature for their potential to contribute to the supply, of provisioning services, and also cultural, regulating and supporting services (Zhang et al., 2007; Power, 2010). How agro-ecosystems contribute to, or impact on, the supply of ecosystem services depends on the management of those systems (Foley et al., 2005).

Expansion and intensification of agriculture in New Zealand has accelerated since strong neo-liberal policy reforms were implemented in 1984 (MacLeod and Moller, 2006) and this intensification is projected to continue (Parliamentary Commissioner for the Environment, 2004); e.g. the irrigation acceleration fund of the NZ Ministry for Primary Industry (2014) has this explicit purpose. Agricultural intensification can have significant

negative impacts on the provision of ecosystem services for private and public use (Tilman et al., 2001, 2002; Foley et al., 2005; Millennium Ecosystem Assessment, 2005). To counteract this, 'ecological intensification' is proposed. This necessitates the maintenance and enhancement of ecological systems (i.e. natural capital) by implementing more productive and sustainable production systems. The perceived benefits are the savings on inputs into the production system and less harm done to surrounding systems. An emphasis on ecological intensification in relation to agricultural intensification implies having the potential to improve productivity and deliver a number of desirable ecosystem services (UNCTAD, 2013). In NZ as of June 2007, agro-ecosystems accounted for 54.8% of total land area (Statistics New Zealand, 2009). This presents a significant area that could be managed to maintain and enhance the provision of ecosystem services for public and private benefits.

In NZ agriculture and the national economy it supports are highly inter-dependent, and impact on natural capital and ecosystem services. Consequently, NZ has seen negative impacts on several ecosystem services as a result of agricultural practices (Parliamentary Commissioner for the Environment, 2004; Moller et al., 2008). Examples include the lack of provision of water of good quality and sufficient quantity (Ballantine et al., 2010; Schmidt et al., 2009), and the loss of flood and nutrient regulation services for wetlands (Myers et al., 2013).

Over the past decade there has been a substantial increase in the number of academic articles referring to the concept of ecosystem services in relation to agricultural land in NZ (Fig. 1). This increase in academic articles led us to investigate how the ecosystem service concept is applied in academic literature with regard to agro-ecosystems. We provide an overview of this growing body of literature through the lens of four ecosystem services frameworks developed over the past decade. To our knowledge no comprehensive review of journal-based literature has been carried out for agro-ecosystems in NZ, although a recent assessment of local ecosystem services in (Dymond, 2013) has provided an overview of various ecosystems and their services, with an emphasis on resource management.

Literature reviews have been carried out on the state of ecosystem service research and application in Latin America (Balvanera et al., 2012), China (Zhang et al., 2010), and the United States and Canada (Molnar and Kubiszewski, 2012). A general quantitative review of ecosystem service studies was also carried out by Seppelt et al. (2011). These reviews conclude that in the last two decades the science of assessment and valuation of ecosystem services has expanded rapidly in the United States, Canada, China, and Latin America, with some important shortcomings. These reviews conclude:

- In the United States and Canada solutions for accounting for ecosystem services have been mainly reached through adaptation of existing corporate and government policies. While the main Payments for Ecosystem Services schemes include wetland mitigation and water quality trading programmes, the focus has been on easily valued or marketable services. The authors recommend that new policies are needed so that accounting for ecosystem services are systematically included in decision-making (Molnar and Kubiszewski, 2012).
- Balvanera et al. (2012) conclude that in Latin America there is an imbalance in the attention paid to individual services, with some ecosystem services receiving more research attention than others. There is high variation in the availability of information about ecosystem research and in the amount of ecosystem research undertaken in various Latin American countries. This review showed that trade-offs exist between agricultural products, maintenance of ecosystem services, and

Download English Version:

<https://daneshyari.com/en/article/6556891>

Download Persian Version:

<https://daneshyari.com/article/6556891>

[Daneshyari.com](https://daneshyari.com)