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Realized Ecosystem Services: Using Stakeholder Theory for Policy Development

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Abstract:
Because the realized ecosystem services directly contribute to human well-being, they are of great importance to policy-makers. Currently, a number of studies are focusing on distinguishing potential (used plus unused) and realized (used) ecosystem services. So far, we do not have information on who the specific users of realized ecosystem services are. In this article, we distinguish between the potential and realized ecosystem services for the Greenbelt, which is a green space that encircles the Greater Toronto Area and the surrounding population centers in Southern Ontario, Canada. We emphasize the value of applying a conceptual framework of stakeholder theory to systematically identify the various stakeholders that contribute, as well as exploit the ecosystem services. We suggest using the conceptual model of stakeholder identification and salience by Mitchell, Agle and Wood (1997) on the basis of power, legitimacy, and urgency. By laying this conceptual foundation, it is believed that better ecosystem services management could be established, with direct implications for policy making and the protection of realized ecosystem services.

Keywords **—Realized Ecosystem Services, Stakeholder Theory, Greenbelt, Policy-making**

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I. INTRODUCTION

Conventionally, ecosystem services have been defined in literature as the benefits that people receive from nature [1], [2]. Some definitions include the direct and indirect benefits derived by people [3], that is, the components of nature directly consumed and enjoyed by people [4], but also those aspects of ecosystems utilized for human well-being[5], and the direct and indirect contributions of ecosystems to human well-being [6], [7]. These definitions share the idea that an ecosystem service must definitely benefit people. In reality, even in the absence of people, ecosystems continue producingecosystem services. Similarly, in the ecosystem science literature, production of goods and services by ecosystems has been considered as ecosystem services regardless of their use by the people. For segregating used and unused portions, Aziz (2018) modified these definitions and redefined ecosystem services as the benefits from ecosystems that are at the disposal of people to use and benefit from (i.e., not only the benefits that people receive)[8]. The used plus the unused benefits are called the potential ecosystem services, whereas the used benefits only are called the realized ecosystem services [9]. The realized ecosystem services depend on potential ecosystem services, population density and infrastructure in the region [10].

It has long been an enigma to valuate the portion of ecosystem services actually used by the people, known as realized ecosystem services. Most of the provisioning services are easily quantifiable based on their actual use by people. Yet, the quantification of regulating, cultural and supporting

services based on their use is a complicated process. For example, it is easy to determine the number of people depending on a water supply from the watershed; but to locate the users of the carbon sequestration service provided by a forest stand is an ambiguous task because it is a global service. As the value of realized ecosystem services is directly proportional to the population density of a region, it will vary from region to region [11]. Because realized ecosystem services are actually used by the people, their value matters more to the users and policy-makers. As the idea of distinguishing potential and realized services gained traction (e.g., Fisher et al., 2008; Goldenberg et al., 2017; Syrbe and Walz, 2012), there has been an increase in the studies (mapping and valuation) which use this concept practically (e.g., Burkhard et al., 2012; Aziz and Van Cappellen, 2019). However, ecosystem services science has failed as yet to identify who the specific users of realized ecosystem services are in a society.

We argue that a stakeholder theoretic lens is instrumental in the identification of stakeholders of the realized ecosystem services. According to Freeman (1984), a stakeholder is "a group or individual who can affect or is affected by the achievement of an organization's objective" [15]. In the context of stakeholder theory, according to the literature review conducted by Hörisch and Schaltegger (2019), environment is considered as one of the major stakeholders because it can affect or be affected by an organization's objectives [16]. These could be defined in terms of economic or non-economic values. The stakeholder theory is considered to be a managerial theory that promotes creating value for all stakeholders by reducing or eliminating trade-offs. Typically, these stakeholders (in an organizational context) are the financiers, suppliers, consumers, communities, employees, and environment [17].

The stakeholder theory framework has vast applications. It has been used in various industries and different contexts. For instance, Shah and Guild (2017) used this framework in the exploration of technology sector firms in Ontario, Canada on how they create value for their different stakeholders and what implications that would have on policy making [18]. Vis-a-vis we believe that learning more about how much a stakeholder is benefitting from the realized ecosystem services would also have several policy related implications for the governments, businesses, civil societies, not-for-profit firms, communities, and others.

With the distinction of potential and realized services, there is a growing need to identify the beneficiaries of these realized services in human society. Here, based on Stakeholder Theory, we put forth the concept of identifying the stakeholders or users of realized ecosystem services for practical applications.

II. RESULTS AND DISCUSSION

Realized ecosystem services are the portion of services that matters to people; therefore, their distribution can result in informed decisions regarding land use planning [9]. Hence, a map of realized ecosystem services distribution is significant for policy makers to locate the hotspots for investments in natural infrastructure. To clearly demonstrate the link between potential and realized ecosystem services, we mapped the Greenbelt area (Figure 1), protected area surrounding the Greater Toronto Area and other Ontario's urban centers, which house more than nine million of the Canadian population. We employed the Co$ting Nature model that uses global datasets to assign a relative index between 0 and 1 to each ecosystem based on its potential for and use of a bundle of ecosystem services. For realized ecosystem services, model generates these indices by assessing 117 maps of input data on distribution of population and infrastructure [10]. The realized ecosystem services map reflects a higher dependence of people on the areas with high index values, opposite to the potential ecosystem services map which is only based on ecosystem types in an area.

The index values for realized ecosystem services (Figure 1) clearly demonstrate the percentage of potential ecosystem services actually used by the people. Because the realized ecosystem services are

a fraction of potential ecosystem services, their magnitude or value cannot exceed the potential ecosystem services in a certain area. In addition, mapping of realized ecosystem services allows depiction of the landscape not only producing but channelling the flows of ecosystem services to nearby populations.

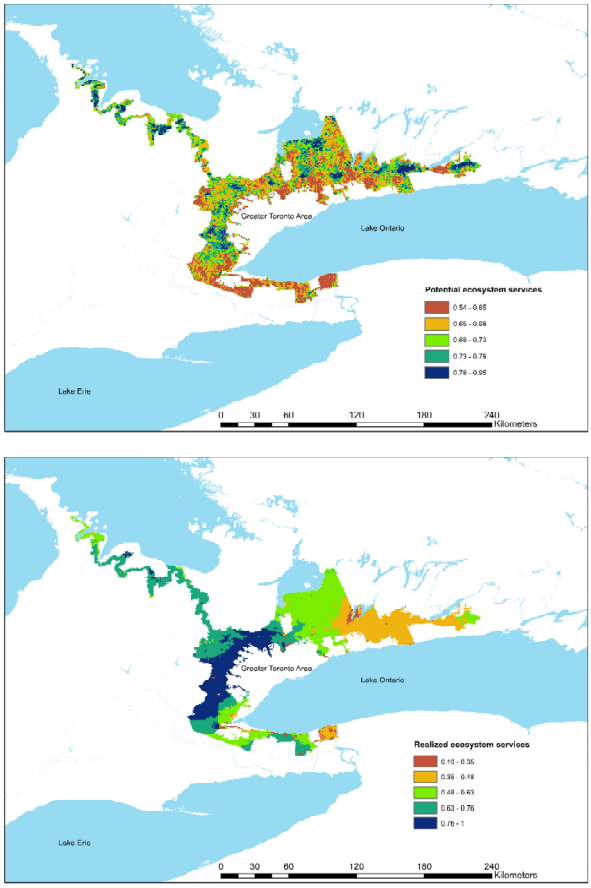

Fig.1: Mapping of potential (top) and realized (bottom) indices for a suite of six ecosystem services for the Greenbelt, Ontario, Canada

It has already been established in the literature that human well-being depends directly or indirectly on realized ecosystem services [9], [11]. As a consequence, identifying all different stakeholders of realized ecosystem services could enable us to better plan for the preservation of these services. Using the stakeholder identification and salience model proposed by Mitchell, Agle, and Wood (1997), we could identify the prime/direct and peripheral/indirect stakeholders by considering the relationship attributes of 'power' that is the influence on the realized eco-system service; 'legitimacy' that is the relationship with the eco-system service; and 'urgency' that is the claim on eco-system service [19]. To illustrate our point further, we draw an ecosystem services-stakeholder map (Figure 2), which is based on our assumption that stakeholder groups, such as, businesses, communities, governments, and not-for-profit organizations have power, legitimacy, and urgency in using these ecosystem services. This systematic approach offers potential for several other stakeholder groups to be added to this list. For instance, media, civil societies, scholars, and research centres could influence or be influenced by the realized ecosystem services. In future, after systematically identifying these stakeholders, we propose that empirical evaluation of these relationships would help us better plan future provisioning and preservation of ecosystem services. For instance, from the standpoint of taxation, legislators and law-enforcers could identify exactly how much of the realized ecosystem services has been utilized by the business versus non-business entities.

Fig.2: Realized Ecosystem Services-Stakeholder map

III. CONCLUSIONS

In this article we distinguished between the potential and realized ecosystem services by using an example of mapping the Greenbelt, which is a green space that encircles the Greater Toronto Area and peripheral areas in the Southern Ontario region

of Canada. For better ecosystem service management, we advocate using a stakeholder theoretic lens and applying a systematic approach to identify stakeholders based on their attributed power, legitimacy, and urgency. Specifically, this article provides a conceptual foundation for eliciting empirical evidence in identifying the stakeholders and the extent to which they use the realized ecosystem services. Doing this could have direct policy-related implications for governments, stewards of ecosystem services and their users.

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