Sustainable business models in cities based on ecosystem services

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Abstract

This study intended to determine how the potential of cities for the creation of sustainable business models based on urban ecosystem services can be evaluated, in addition to serving as a basis for future research on the assessment of the contribution of these businesses to sustainable development. With the city of Lisbon, the capital of Portugal, as the study area, this document presents, as the main results of the investigation, a set of categories that exemplify different motivations for the creation of businesses that take advantage of a city's biodiversity and ecosystem services. These categories include: cultural and recreational events in urban parks, zoological and/or botanical biodiversity hubs, sightseeing tours on the river, food kiosks in parks and gardens and growing grapes for wine production.

The research on these business models was complemented by an assessment of how they use the services and how they relate to the local environment.

As the main conclusion, it is recommended that the assessment of the potential for the creation of this type of business models should be based on a collection of information about the diversity of businesses that the city sustainably supports, the spaces available for its implementation and expansion, the conditions provided by these spaces, the environment of encouragement for the private investment and, finally, the social acceptance.

Keywords: Ecosystem services; business models; socio-ecological systems; sustainable development

1. Introduction

1.1 The context

Modern cities face great challenges. Global trends that indicate an evolution towards a more urbanized world have caused cities to spread like a "cartographic virus"[1], where the enormous pressures on the resource base lead to unprecedented degradation of ecosystems and the consequent loss of their functions and services (European Environment Agency [EEA], 2019). Sustainable urban development is, therefore, an objective that should be taken as a priority to ensure the quality of interactions established in socio-ecological systems and make cities more resilient.

In a simple way, sustainable development is an issue to be resolved that interrelates the environment, society and resources, and it is at the core of these three components that lies the problem of loss of quality and quantity of ecosystem services.

These services are the benefits to human well-being resulting from the characteristics, functions or processes of ecosystems, and their degradation is caused by changes in habitats, climate change, the introduction of invasive species, pollution and overexploitation of resources (Alcamo *et al*., 2003; Costanza *et al*., 2017). The rapid degradation of ecosystem services poses numerous risks to people and their activities. However, it is important to mention that companies can contribute to reducing the pressures that are at the origin of this problem by mitigating their impacts on biodiversity and ecosystems and recognizing in their analysis and decision instruments the importance of ecosystem services for their business (Bishop, 2012). In short therms, the integration of services provided by natural environments into the reality of business,

Abreviations: CICES, The Common International Classification of Ecosystem Services; CML, Câmara Municipal de Lisboa; CLC, CORINE Land Cover; DGT, Direção Geral do Território; MEA, Millennium Ecosystem Assessment; TEEB, Economics of Ecosystems and Biodiversity.

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[1] Expression used by Peter Hessler (2007, p. 24) in the article "*China, cidades instantâneas*", published in the volume 7, N.º 75, of the National Geographic Portugal magazine.

giving them value to the economy and ensuring their preservation, constitutes the great paradigm shift that the economy and also society, through their choices, will have to face in the near future.

In the economic context, this means changing the way companies do their business and the way they make use of the resources and ecosystem services on which they depend.

At this point, it is important to mention that cities are not self-sufficient but, at the same time, they are seen as the key to sustainable development (Rees & Wackernagel, 1996), and is in the cities that a revolution in the economy and in business models can start, based on the importance of ecosystem services and the preservation of biodiversity, always keeping the focus on the development and well-being of communities.

1.2 Background information

Ecosystem services

Ecosystem services are defined as "the ecological characteristics, functions, or processes that directly or indirectly contribute to human well-being: that is, the benefits that people derive from functioning ecosystems" (Costanza *et al*., 2017, p. 3). The ecosystems that provide the services can be referred to as natural capital (Costanza *et al*., 2017).

These services are essential for human well-being as they are associated with topics such as safety, basic materials for livelihood, health, good social relations and freedom of choice and actions. And it is from the combination of all these components, and the notion that they are intimately interconnected, that starts the assessment of the well-being of individuals and communities (Alcamo *et al*. 2003).

As for the classification of these services, and based on the previous categorizations, the Millennium Ecosystem Assessment [MEA] initiative, a predominantly ecological project, grouped ecosystem services into four main categories: provisioning, regulation, support and cultural services. Subsequently, The Economics of Ecosystems and Biodiversity [TEEB] initiative, more focused on economic aspects, replaced support services with habitat services. The initiative The Common International Classification of Ecosystem Services [CICES] appears last with the purpose of standardizing the categorization and description of ecosystem services, facilitating the translation between different classification systems.

However, for ecosystem services generated in urban areas, it is necessary to adapt the more general classifications to the specificities of urbanized environments (Gómez-Baggethun *et al*., 2013).

Considering the urban ecosystems, Gómez-Baggethun *et al*. (2013) proposes the following types of services generated in a city: food supply, runoff mitigation, urban temperature regulation, noise reduction, air purification, moderation of environmental extremes, waste treatment, global climate regulation, pollination and seed dispersal, recreation, cognitive development, aesthetic benefits and habitat for biodiversity.

Business models and ecosystem services

A business model reflects how an organization creates, captures and delivers value (Osterwalder & Pigneur, 2011) or, simply, the development of organizational structures to realize a business opportunity (George & Bock, 2011). It can therefore describe the purpose of the business, the type of product or service, the method of production, the target audience, the strategy, the necessary infrastructure, the organizational structures, the sources of revenue, the business practices and operational processes, and also the organization's policy and its culture.

This demonstrates that the definition of business models is no longer limited to the way in which income is obtained and can include the set of interactions they establish in the market and in society. This means that ecosystem service-based business models in a city can also be distinguished by how they use those services and how they interact with their environment.

Regarding business based on biodiversity and ecosystem services, Lambooy e Levashova (2011) refer to three particular cases with the following motivations: the markets derived from mitigation mechanisms that lead to business involving the purchase and sale of environmental credits, where the business model consists of the rehabilitation or preservation of natural areas to profit from the generated credits; programs of payment for ecosystem services that lead to businesses to protect areas that generate the services, where the model defines an activity or the maintenance of a particular land use that preserves the availability of ecosystem services, thereby obtaining a financial return through the beneficiaries; and, finally, the implementation of businesses created with the aim of contributing to biodiversity and a sustainable use of ecosystem services, called pro-biodiversity businesses.

Apart from these three cases that represent businesses created for the protection of biodiversity, all other business models based on ecosystem

services arise in one of two ways: to make use of these services as resources (agriculture, fisheries or the production of bottled water, just to mention a few examples) or as a way of differentiating its offer (such as the business of organizing cultural and recreational events that take place outdoors).

1.3 Objectives

The study whose results are presented in this document aimed to answer the following question: How can a city's potential for creating sustainable business models based on ecosystem services be assessed?

For this, an investigation was carried out on sustainable business models in cities based on ecosystem services, in an approach that focuses on urban ecosystem services, those that actually occur in cities. Then it was evaluated how these businesses relate to the ecosystem services they use.

2. Methodology

The case study selected for the investigation of this work was the city of Lisbon, the capital of Portugal and the head ofice of the municipality of Lisbon, whose administrative limits coincide with those of the city. To produce results, businesses that take place in this city, in green areas or on the river, and which are based on ecosystem services generated within its boundaries, were investigated.

The interpretation of the socio-ecological system of the city of Lisbon was based on the model proposed by Ostrom (2009) and was used to define the context in which businesses based on urban ecosystem services identified as results for analysis in this work operate.

Through manipulation in the QGIS software program, version 3.8.3, the main types of land cover in the city of Lisbon were identified using data provided by a cartographic base in vector format of the CORINE Land Cover [CLC] inventory (Downloaded from the Copernicus, the European Union Observation Programme[2]). The cut to individualize the area of the city was made using another cartographic base in vector format and with information on attributes about the limits of the city's parishes. Specifically, it was used the 2020 version of *Carta Administrativa Oficial de Portugal* (CAOP2020), downloaded from the page of Direção Geral do Território [DGT][3].

The types of land cover were then grouped into classes to obtain the main urban ecosystems relevant for their size or function. In this stage, it was used the classification of ecosystem services generated in urban areas proposed by Gómez-Baggethun *et al*. (2013), which allowed to list the urban ecosystems services that are available to businesses that develop in the city.

A set of categories was then defined for illustrating different motivations for creating businesses in the context of taking advantage of biodiversity and urban ecosystem services.

As for the discussion of the results, a distinction was made between businesses by the way they interact with the services of urban ecosystems and their surroundings, and considerations were made to conclude on their sustainability and how they can contribute to the sustainability of the city where they are developed.

3. Results and Discussion

3.1 City ecosystems and their services

In this work, the model proposed by Ostrom (2009) is used to characterize the socio-ecological system of the selected study area, the city of Lisbon. Figure 1 proposes a simplification of the interpretation of the socio-ecological system of the city of Lisbon with the main subsystems that compose it.

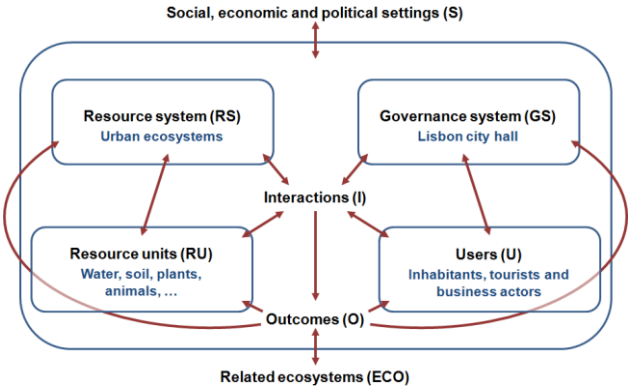

Figure 1 – Simplification of the interpretation of Lisbon's socio-ecological system. Based on the subsystems of the model by Ostrom (2009)

In Figure 1, it is defined that the resource system is composed of urban ecosystems. The components of ecosystems associated with the production of services, such as water, soil, plants and animals, are considered as resource units and, at the same time, passive actors in the socio-ecological system. The governance system is the Lisbon city hall, or *Câmara Municipal de Lisboa* [CML] in Portuguese, responsible for the administrative management of the city. Finally, users are the resident population, visitors, for work or leisure, and tourists. In a

[2] Available at https://land.copernicus.eu/pan-european/corine-land-cover/clc2018

[3] Available at https://www.dgterritorio.gov.pt/cartografia/cartografia

subdivision of users, the actors who participate, directly or indirectly, in the businesses that develop in the city and who make use of the services of urban ecosystems can also be identified.

In this interpretation, urban ecosystem services are part of the interactions and constitute the benefits that people derive from the resources of the proposed socio-ecological system.

The land cover map of the city of Lisbon (Figure 2) was obtained using the data provided by the CLC inventory and worked in the QGIS software program. This procedure allowed identifying 14 main types of land cover (as illustrated in the legend in Figure 2).

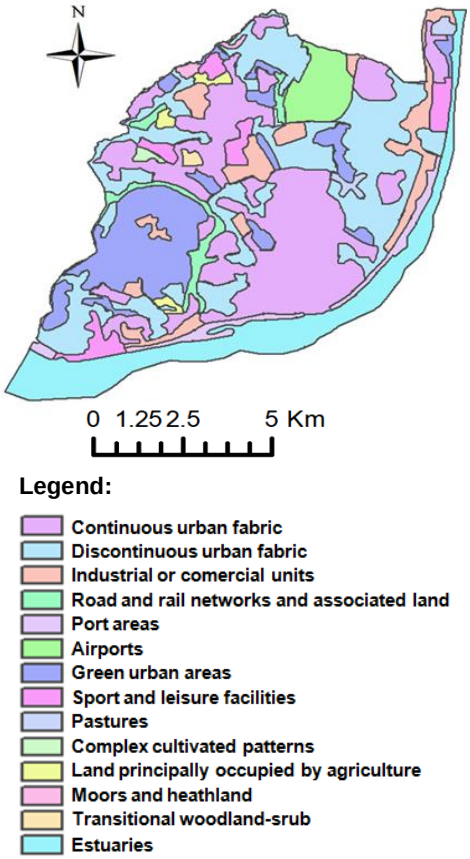

Figure 2 – Land cover map of the city of Lisbon. Adapted from CLC 2018 (2020)

Based on the analysis of information on land cover in the city of Lisbon (Figure 2), the identification of its ecosystems was carried out. The choice of classification fell on those that are most relevant for their size or function.

That said, the city of Lisbon has four main ecosystems:

- **Ecological systems integrated in urban fabric** (groups the following categories of city land cover: continuous urban fabric, discontinuous urban fabric, industrial or commercial units, road and rail networks and associated land, port areas, airports and sport and leisure facilities);
- **Agricultural and horticultural ecosystems** (represented by the following city land cover category: land principally occupied by agriculture);
- **Forests and other wooded or vegetated areas** (groups the following city land cover categories: urban green areas, pastures, complex cultivated patterns, moors and heathland, transitional woodland-scrub);
- **Marine ecosystems** (represented by the following city land cover category: estuaries).

Figure 3 presents the mapping of these urban ecosystems in the city.

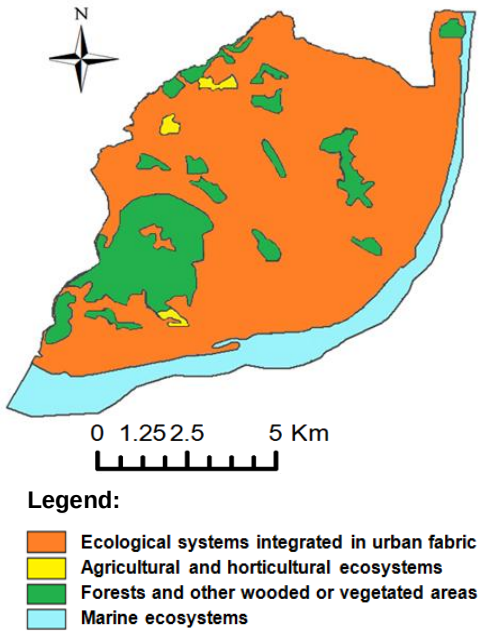

Figure 3 – Map with the main ecosystems of the city of Lisbon. Adapted from CLC 2018 (2020)

In Figure 3, it can be seen that agricultural and horticultural ecosystems appear to be insignificant, given their size. However, its introduction in this analysis is due to the relevance of the role that these ecosystems play for a city like Lisbon.

These agricultural production areas not only allow the effective production of food in the city, supporting the local economy of the most disadvantaged social groups, but they are also places for recreation, leisure and knowledge sharing that bring multiple benefits to the well-being of communities.

Once the main ecosystems of the city have been identified, it is now proposed to identify its services. Focusing only on the classification of ecosystem services provided in urban areas proposed by Gómez-Baggethun *et al*. (2013), Table 1 groups the main ecosystems of the city of Lisbon and their services.

Table 1 – Urban ecosystem services associated with the main ecosystems of the city of Lisbon. Based on the classification proposed by Gómez-Baggethun *et al*. (2013)

Main ecosystems of the city of Lisbon	urban ecosystem services
Ecological systems integrated in urban fabric	· Recreation · Cognitive development · Aesthetic benefits · Habitat for biodiversity
Agricultural and horticultural ecosystems	· Food supply · Runoff mitigation · Urban temperature regulation · Noise reduction · Air purification · Moderation of environmental extremes · Waste treatment · Global climate regulation · Pollination and seed dispersal · Recreation · Cognitive development · Aesthetic benefits · Habitat for biodiversity
Forests and other wooded or vegetated areas	· Runoff mitigation · Urban temperature regulation · Noise reduction · Air purification · Moderation of environmental extremes · Waste treatment · Global climate regulation · Pollination and seed dispersal · Recreation · Cognitive development · Aesthetic benefits · Habitat for biodiversity
Marine ecosystems	· Food supply · Urban temperature regulation · Recreation · Desenvolvimento cognitivo · Aesthetic benefits · Habitat for biodiversity

Table 1 lists the ecosystem services available to businesses that develop in the city, where the presence of a river represents the multiplication of the offer of ecosystem services and a greater diversity of businesses that exploit them.

However, although the city of Lisbon is endowed with numerous services provided by the various urban environments identified, the impossibility of producing enough water and food for the population points to the fact that the city's sustainability inevitably depends on the importation of services from rural ecosystems that exist outside its boundaries.

This dependency is frequently discussed in the literature (as, for example, in Grimm *et al*., 2008, or in Rees & Wackernagel, 1996) and, in the case of businesses, the raw materials they use, water, many of the consumer goods and other requirements fit under this designation of ecosystem services imported from abroad.

The classification proposed by Gómez-Baggethun *et al*. (2013) is therefore useful to identify the main ecosystem services generated in a city, and this is enough for this work because it was the businesses that take advantage of urban ecosystem services that were analyzed, but do not capture the full range of services that the city and business depend. A large percentage of these services have to be imported from abroad.

3.2 Business models based on ecosystem services in the city of Lisbon

Cultural and recreational events in urban parks

Cultural and recreational events in large and easily accessible places and with an associated environmental component, such as urban parks, and where the concentration of a large number of people stands out, constitutes, in itself, a business for companies that organize the event but also enables the development of a business hub where other companies are involved. This is because there is a need to make available complementary products and services, such as food and security.

It is the advantages provided by the ecosystem services of the city's parks that constitute the great differentiating element for visitors, to the point where the event itself is associated with the park where it takes place and vice versa. More specifically, this business model in the culture and entertainment sector is characterized by making a direct and effective use of urban ecosystem services for the purpose of differentiating its offer. Local temperature regulation services, noise reduction, especially from vehicles, and air purification (regulation services) contribute to creating pleasant conditions so that customers can make the best use of the business offer. In turn, recreation services and aesthetic benefits (cultural services) can be used as a complement to this offer.

Two examples of this business model are the *Feira do Livro de Lisboa* ant the Rock in Rio Lisboa.

Zoological and/or botanical biodiversity hubs

Zoological and/or botanical biodiversity hubs are spaces in the city where a concentration of species of fauna and/or flora (in greater number and spatial density than in other parts of the city) are artificially maintained in a delimited area. They can be of two types: Zoos, also considering the variant of educational farms, and botanical gardens.

When entry is not free, there is direct monetization of biodiversity as people pay to visit the space.

Examples of this business model are the *Jardim Zoológico de Lisboa*, the *Estufa Fria*, the *Jardim Botânico de Lisboa*, the *Jardim Botânico Tropical* and the *Quinta Pedagógica dos Olivais*.

Sightseeing tours on the river

The increase in tourism in the city has motivated a greater variety in the offer of services in the areas of leisure and recreation and that is where tour operators who manage boat trips on the Tagus River fit in. The views over the city and some of its most emblematic points are the great attraction.

In this model, there is a monetization of the landscape as a service provided by the urban ecosystem, where the ecosystem services provided by the river and by the green areas that can be seen in the city are combined with the value of the distinct elements of the city's horizon. The landscape becomes an asset for business development where customers are willing to pay for its access, that is, a common or public good acquires characteristics of a private or tradable good.

An example of this use of the landscape as a business is the company HIPPOtrip.

Food kiosks in parks and gardens

The installation of a kiosk in an urban park or garden, functioning as a small independent catering unit or part of a franchise, is in itself a business and a leisure opportunity for customers who take advantage of the cultural and regulatory services of the urban ecosystems.

Growing grapes for wine production

Food production in the city has been growing a lot because of public initiatives such as the creation of urban horticultural parks. However, given the space limitations in the city, there is hardly any possibility to create businesses with the opportunity to grow in scale. However, this type of production helps to generate savings for families, to develop the community and to promote opportunities to increase solidarity.

Currently, only the cultivation of grapes for wine production, given the particularities of demand associated with this product, has achieved the potential to grow as a big business.

The example of this model is the wine production *"Corvos de Lisboa"* (*Casa Santos Lima*), from a small vineyard near Lisbon airport. This business in the agriculture and food sector that takes advantage of the regulation, habitat and cultural services of the urban ecosystems (the cultural services are associated with tourist visits to the vineyard that involve an educational component).

3.3 general analysis

Distinction of how businesses use urban ecosystem services

The business categories described as results of this work show different approaches for a sustainable use of ecosystem services in a city. There are cases in which businesses are based on the services of urban ecosystems and others in which businesses make use of the services due to the circumstances of the places where they are developed, this is done to differentiate the offer in benefit of the customers' experience and to obtain gains in terms of competitive advantage in the market.

Origin of ecosystem services used by businesses

The distinction in the use of urban ecosystem services is also related to the origin of these services. At this point, businesses that create their own area to generate services that will benefit them, such as the biodiversity hubs, are distinguished from the others that only take advantage of existing services.

Businesses that implement biodiversity elements in a given area whose processes will generate services that are beneficial to people and economic activities, such as biodiversity hubs, then have a direct impact on increasing the value of those services. This contribution increases the offer of ecosystem services provided by the city.

The remaining businesses are either neutral in relation to the creation of ecosystem services or cause a decrease in the value of those services associated with the negative environmental impacts caused by them. In this regard, these businesses only contribute positively when they adopt environmental and social measures to promote ecological quality levels in the surrounding area and improve the well-being of local communities.

In this issue of the origin of services, it is important to recall one of the conclusions of the analysis of ecosystem services in the city of Lisbon

(Section 3.1). The city is endowed with numerous services provided by its various urban ecosystems, in sufficient quantity and quality to benefit various businesses, but there is a dependence on importing services from abroad. There is the inexistence of a condition of self-sustainability, which is in line with the work of Grimm *et al*. (2008) or the work of Rees and Wackernagel (1996), for example. The city's sustainability therefore depends on the services provided by rural ecosystems that exist outside its boundaries.

However, the preservation of natural environments or with rural characteristics within the city, and ensuring the maintenance of its services that are so important to human well-being, contribute, in a decisive way, to the people living in the city acquiring knowledge about the origin the services they depend on, the contribution of these services to their quality of life and the importance of the rural environment for the city's livelihood. All this so that in the future they will be able to make more informed decisions regarding the management and protection of these ecosystems.

This possible contribution of cities to the preservation of ecosystems abroad, in addition to being business hubs that can undergo an evolution towards a more sustainable economy, is one of the aspects that leads Rees and Wackernagel (1996) to identify cities as the key to sustainable development.

Available space

An indirect way to assess the potential of a city and its services for creating business models based on ecosystem services is to analyze the diversity of businesses that these services are able to sustainably support. This analysis was not made in this work, and it is one of the recommendations left for future studies, but, obviously, it is inseparable from the consideration of the available space, which, in an urban context, is always limited.

The space in a city is limited for the emergence of new businesses and it is also limited for the expansion of existing businesses.

Relationship with local communities

In cases where businesses persist, it is reasonable to conclude that their models subsist in an economically sustainable way, although this subsistence is also dependent on the relationship with local communities. This is because, in the context of the social impacts of business in an urban context, it is relevant to assess the acceptance of the city's inhabitants regarding business and corporate behavior. This is in accordance with what is stated in Hanson et al. (2008).

Customers, and the population in general, may start boycotting businesses if they represent products or services associated with ecologically unsustainable practices, or even if the activities behind these businesses disturb too much the normal daily life of the city. This fact puts people at the center of the analysis of the negative environmental impacts of economic activities, which is justifiable when it comes to businesses operating in a city where the relationship with people is closer.

This dependence on good relations with local communities confirms the conclusions of Lambooy and Levashova (2011) and is linked to the need to establish collaborations and issues such as business legitimacy or the company's reputation.

Dependence on local governance

The study developed by Lambooy and Levashova (2011) revealed that many businesses based on ecosystem services demonstrate dependence on public regulation. In analogy with the results of these authors, businesses based on urban ecosystem services depend on local governance entities in the sense that they benefit from land management and planning policies that ensure the quality of public places where most of the businesses analyzed as a result of this work are developed.

The importance of a good environment for private investment

As mentioned by Lambooy and Levashova (2011), for any private initiative it is always beneficial to have a good investment environment composed of laws, property rights and trustworthy institutions.

One of the characteristics of this good investment environment, and one that can encourage the creation of business models that make use of urban ecosystem services, is an appropriate legislation that focuses on requalifying, improving and expanding the city's green infrastructure, as this infrastructure accommodates many of these services.

In an urban context, an incentive to create businesses based on ecosystem services can simply be the creation of new areas suitable for their development, because, if this happens, and the implementation of business practices is allowed, there will soon be companies interested in taking advantage of this opportunity in a mechanism of occupation of niches.

Business environmental sustainability

Schulte (2013) states that the incorporation of ecosystem services into the reality of business is a

way to achieve greater efficiency in the use of resources. In the examples analyzed in the city of Lisbon, however, this efficiency is not the focus when it comes to taking advantage of these services. The use of the components of urban ecosystems as resources, and the benefits extracted from these ecosystems, is often applied in the differentiation of the business offer and these components are not seen as main resources.

An exception is the case of the biodiversity hubs that are responsible for creating the resources that will benefit their businesses. There is no resource extraction but rather an addition to the city's resource base or natural capital. The other exception is the example of the cultivation of grapes for wine production in a small vineyard near Lisbon airport. The use of provisioning services in such a small area dictates the condition of an efficient use of resources.

Generally, in cities, the most direct way to promote the environmental sustainability of businesses is through the conditions imposed in the on business licenses. Incentives for recycling or reducing the use of plastics are other factors to consider.

What the individual analysis of the investigated businesses also reveals is the great concern with social sustainability, which is closely linked to the legitimacy of the business in an urban environment where relationships with people are closer. At this point, and according to what Bishop (2012) defends, measures to support local communities and social solidarity are important positive impacts that come from the environmental sustainability of the businesses.

At last, an efficient way for these businesses to be sustainable at the local level is to increase the integration of the value of ecosystem services into their models. In this way, they provide an effective value to these services for the economy, which can motivate the preservation and improvement of the urban ecosystems responsible for them.

Contribution to the sustainability of the city

When it comes to evaluating the contribution to the city's sustainability and, specifically, with regard to the sustainable use of resources, the models presented as a result of this work may not even replace others that are less sustainable. What often happens is the exploitation of niches or gaps in the market, and so, with regard to resources, they don't contribute positively to the city's sustainability and only emerge as another form of exploration of services already in use or not economically exploited.

But the sustainability of a city is not only measured by how businesses use resources. It is also necessary to assess their impacts on ecosystems, direct and resulting from processes associated with production and distribution chains. In this perspective, the identification of the role of these business models in promoting a more sustainable city must be done with an analysis of the relationship between businesses and ecosystems with which they relate. This assumes that the good state of ecosystems is essential for the sustainability of cities, as already concluded in TEEB (2011).

5. Conclusions

From this study, it is concluded that the mechanisms for the implementation of businesses using the urban ecosystems services are generally based on the exploration of niches or voids, whether these refer to the market or to the physical spaces available in the city. That said, the motivations for creating these businesses do not depend so much on mitigation mechanisms or schemes of payment for ecosystem services, as in some cases referenced in the literature, but are inevitably linked to the occupation of underexploited spaces.

It was also possible to conclude that there are different approaches for a sustainable use of ecosystem services in a city. There are cases in which businesses are based on the urban ecosystems services, revealing, consequently, a greater dependence on these services, and others in which businesses make use of the services given the characteristics of the places where they are developed, mainly to differentiate the offer and for competitive advantage.

In the analysis of the business model of the sightseeing tours on the river, it was also demonstrated that it is possible to monetize the landscape as a service provided by the urban ecosystem, which is composed of its natural and built elements. The landscape can then be seen as a tradable good and this allows establishing a direct relationship with its value and an approximation to its monetary valuation.

Another distinction that can be made about the approaches for a sustainable use of ecosystem services in a city is between businesses that create the area that will generate ecosystem services and those that simply take advantage of existing services. In this issue of the origin of services, it is relevant to make clear that many of the ecosystem services used by businesses developed in an urban environment have an origin outside the city. This dependence on business coincides with the inexistence of a self-sustainable condition that is a

characteristic of cities.

In general, businesses that take advantage of urban ecosystem services benefit from a good relationship with local communities, largely for reasons related to their reputation and social acceptance, and depend on local governance entities in the sense that they benefit from territorial management and planning policies that ensure the quality of urban ecosystems and public places where many of these businesses are developed.

A good investment environment that is composed of laws, property rights and trustworthy institutions is another requirement for private investment in this type of business. One of the characteristics of this good investment environment is an appropriate legislation that focuses on the requalification, improvement and expansion of the city's green infrastructure, as this is the way to provide new areas that represent opportunities for the private sector and the creation of new businesses that make use of the urban ecosystems services.

In relation to the environmental sustainability of businesses, it is concluded that, in cities, the most direct way to promote this sustainability is through the conditions imposed in the business licenses. However, and now focusing on the private sector, increasing the integration of the value of ecosystem services into business models has the potential to provide effective value to these services for the economy, which can motivate the preservation and improvement of ecosystems responsible for them.

In response to the question that established the main objective of this study, that is, the question of how the potential of a city for the creation of sustainable business models based on ecosystem services can be evaluated, it is suggested that, for the realization of studies that aim to assess this potential, it is necessary to collect information about five main topics:

- The diversity of these businesses that the city sustainably supports;
- The spaces available for its implementation and expansion;
- The conditions provided by these spaces;
- The environment of encouragement for the private investment;
- Social acceptance linked to the legitimacy of new businesses and the response to the social and ecological performance of existing businesses.

In this reference to the application of the results obtained for future studies, it is important to remember that a study of this nature benefits from an approach centered in the context of socio-ecological systems. The reason is linked to the fact that the potential that is sought to measure is intrinsically linked to the ecological, social and economic aspects of the environment that encompasses the business, and the consideration of all these elements, and the relationships established between them, is fundamental for the quality of the response.

Following this work, it is also recommended for future studies:

- Investigate in greater detail the offer of urban ecosystems services in the city, distinguishing, by areas, the capacity to support business in a sustainable way;
- Compare, in terms of environmental sustainability, different examples of business implementation strategies in the city based on urban ecosystem services;
- Identify the interdependencies between businesses developed in the city and ecosystem services, both urban and those imported from abroad;
- Assess the degree of dependence of businesses in the city on imports of ecosystem services from abroad.

Directly or indirectly, and some more than others, all businesses have the capacity to influence the sustainability of the socio-ecological systems in which they operate. For this reason, it is important to know the mechanisms behind these influences in order to guarantee a positive contribution from the business and avoid reasons for destabilizing the entire system. That said, and as a last suggestion for future investigations, it is recommended to evaluate, sector by sector, the role of business for the sustainability of the city.

This assessment allows for a more rigorous understanding of the relationships stablished between businesses operating in an urban environment and the biodiversity and ecosystem services with which they relate, both urban and those imported from abroad, in order to be able to identify the most critical links that should be managed by private entities and governance entities as a contribution to preserving the sustainability of the urban socio-ecological system.

Important to emphasize here is the fact that cities are highly dependent on the import of ecosystem services, namely for critical aspects such as the supply of water and food for the population. Therefore, it is determined that, for these businesses to contribute to the sustainability of the city, it is not enough to preserve the environment at a local level, they have to be environmentally sustainable to also

preserve the ecosystems on which the city depends.

An evolution to more sustainable cities is a way to reduce the current pressures on ecosystems and resources on which cities, their communities and, ultimately, the economy and businesses so depend.

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