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Francesca Abastante · Marta Bottero · Chiara D'Alpaos · Luisa Ingaramo · Alessandra Oppio · Paolo Rosato · Francesca Salvo *Editors*

Urban Regeneration Through Valuation Systems for Innovation

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Preface: At the Origin of Circularity

The planning of a "sustainable" development path for urban areas is a challenge both difficult and promising at the same time. In fact, heavily anthropized areas present the highest environmental and social criticalities and, nevertheless, are an ever-coveted source of opportunities and well-being.

Urban areas host most of the world's population, and United Nations predicts that in a few decades, 80% of the population will reside in urban areas both for incoming migratory flows and for the expansion of urban areas themselves.

This trend has been constant over time and has slowed down only during exceptional and contingent events, such as the Second World War.

More recently, the spread of telecommunication networks (ICT) and the COVID-19 pandemic seem to have slowed this trend, but it is not known whether it is a structural or contingent phenomenon.

Urban areas, strong generators of explicit and implicit knowledge, offer better job and income prospects, better social services, better schools, better health care, and much more; likewise, they are also the places of conflict and degradation where the expectations of immigrants, if disregarded, generate frustration and marginalization.

On the environmental level, cities are formidable sinks of raw materials and energy and, consequently, of pollution of all environmental matrices: soil, water, and atmosphere.

Cities are made up of fragile and obsolescent physical infrastructures which, if not properly maintained, easily degrade, triggering similar phenomena on a social level.

Urban systems are always in a dynamic equilibrium between development and degradation, according to the resources invested in them, both public and private, and even the objectives of the urban policies underlying these resources.

In this regard, the declared goal of the public decision-maker in recent decades is the design of a "circular city" capable of reabsorbing—in the broadest sense—the "toxins" produced by urban metabolism. This means not only ensuring correct management of material waste and technological externalities but also generating "value systems" capable of mobilizing the resources necessary for the regeneration of the most compromised areas.

But what are the basic principles of the circularity of economic systems in general and urban ones in particular?

Much has been written from many points of view, so much so that the concept risks are appearing elusive in its concrete application. To go back to the founding principles, it seems useful to recall scholars who at the end of the 1960s started a rethinking of the traditional economic approach based on the uncontrolled extraction of natural resources for production purposes: Kennet Boulding, John Krutilla, and Garret Hardin.

Boulding [1] theorizes the distinction between open (linear) and closed (circular) economic systems and distinguishes the systems (open or closed) according to the reference: matter, energy, and information. He advocates, with the need for the reuse of waste material, the construction of circular economic systems in a closed environment such as the earth ecosystem.

Krutilla [2] focuses his thought on the value of natural resources in a long-term perspective and points out that these resources have a "plus value" that transcends the mere use value and that is linked to the legacy for the future generations, the existence of all living beings, and to the future options of use (known and unknown) that may be exercised.

He highlights that the value of a resource (including cultural) changes according to the information acquired with its use (learning by doing).

Finally, he recognizes that technical progress can temper the effects of scarcity by improving resources use efficiency but points out that the effect of technical progress is asymmetrical with respect to the resources transformation function into public and private goods since it is the result of private investment. Technology tends to evolve towards forms that favour the production of private goods and services, often sacrificing public goods and services produced by environmental resources.

Hardin [3] addresses the problem of the long-term sustainability of population growth which can also be extended to the concentration of the urban population. He stresses that many properties of natural resources, such as the ability to assimilate waste and most of the "amenities", are "commons" for which the market is inefficient (unable) to achieve a socially optimal management. He also demonstrates that there is no optimal solution based on individual rationality but only a "moral" solution, anticipating Nobel Prize Elinor Ostrom's work [4] on the role of institutions in the management of common resources.

Finally, he poses the basic problem in the definition of the optimal social solution, of the "weighing" of private and public goods in the formation of well-being.

The basic principles theorized by these three authors have been extensively reworked and developed; however, they still remain an important theoretical and cultural reference for the generation of environmental economists of the last fifty years.

As mentioned earlier, the identification of concrete solutions for the construction of circular urban systems passes through the recognition of a coherent system of values and adequate evaluation tools.

This book collects contributions on evaluation models in decision-making processes for the construction of circular urban systems in the digital era, with particular attention to the improvement of social and individual well-being.

The book is organized into three sections, reflecting the main topics.

Part One, entitled "Models and Metrics for Social Impact Assessment", presents some experiences in evaluating private and public assets in Italian cities, investigates the formation of value in urban regeneration projects, and tackles the problem of evaluating public and private advantages in urban planning choices.

Part Two includes eight contributions under the subtitle "Decision Making for Circular Cities" and addresses the problem of the transition between linear and circular systems in various fields: mining, social housing, and in the construction of architecture. It also presents some insights on the topic of sustainability with reference to the social, economic, and environmental dimensions.

Part Three faces the topic of "The Value of Spaces in the Digital Revolution" through five papers. The contributions focus, in particular, on the use of new technologies, such as webGIS and BIM, in economic and environmental assessment processes.

The book is addressed to experts and scholars working on urban regeneration and aims to encourage a multidisciplinary dialogue for shaping sustainable urban areas in the next future.

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Contents

The Economic Evaluation of Urban Ecosystem Services into Policy-Making Processes

Francesco Sica, Pierluigi Morano, Maria Rosaria Guarini, and Francesco Tajani

Abstract In view of the uncontrolled cities urbanization, climate change and, last but not least, the pandemic crisis from COVID-19, there is the need to implement intervention practices at the territorial scale by an integrated sustainable approach. This to consolidate the different aspects of the design system made by interacting elements in the respect of the environmental, social and economic dimension. To this, the ecosystem services are of international interest with regard to the functional link between the environment and sustainable development, so as to identify methodological and operational issues at the basis of the most current research in the economic evaluation field. With this contribution it is intended to provide an evaluation framework to support public–private decision-makers in establishing the most significant initiatives of sustainable urban development, taking into account the impacts that they would generate on the reference urban context in terms of ecosystem services supply. The proposed framework is developed in a win–win logic capable of merging the different interests of the stakeholders, as well as the purpose of supporting the ecological transition and environmental protection of urban ecosystems according to an integrated-multidimensional pathway. The proposed evaluation process took note of the theoretical, methodological, and operational issues underlying the economic valuation of urban ecosystem services and their addition into policy-making processes.

Author Contribution: F.S., P.M., M.R.G., F.T. have conceived, structured and written the article in equal part, as well as they have deepened review and editing the proposed article.

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The economic policy implications by the proposed framework will be emphasized in the concluding section along with research perspectives.

Keywords Ecosystem services · Policy-making processes · Economic evaluation · Integrated framework

1 Introduction

Since the end of the XX century there was a shared interest in international scientific research on the relationship between nature-city. This in: (*i*) defining the multiple effects by ecosystems on urban settelments (*ecosystem services*); (*ii*) identifying methods and tools to estimate them in urban areas; (*iii*) implementing economic models focused on the effects that natural environment produces on the socio-economic conditions at territorial scale [6]. The aims are favouring reflections on an alternative conceptualization of the link between built-natural environment, society and economy. Not based only on standardized design rules, but also on the effects produced by the design solution on the territory in terms of ecosystem services [19, 20].

Mooney and Ehrlich [39] link the ecosystem services knowledge to the work *Man and Nature* by George Perkins Marsh of 1864. In Marsh's 1864 contribution a scientific perspective is offered about the interdependence between anthropogenic and natural system. The authors highlighted the functionality of the territorial-social frame to the ecosystem development and its change [39].

As far as in the 1970 Massachusetts Institute of Technology (MIT) report entitled *Report of Study of Critical Environmental Problems* the impact of human activities on global climate and terrestrial ecological systems was analyzed [57]. Wasteman in *How much are nature's services worth?* (1977) addressed not only the society's dependence by ecosystems, but also the need for an economic evaluation of their services. The ecologist Wasteman illustrated some examples of evaluation exercises, making a distinction between multiple benefits typoligies. The researcher dealt with natural «goods» and «services». With «goods» Wastemann meant the resources necessary for the material sustenance of society, i.e. the tangible benefits that nature offers mankind. Instead, with «services» he related to intangible benefits supporting social welfare and local economic development (Wasteman 1977). In the work of Wasteman (1977) some of the main issues regarding ecosystem services assessment were highlighted. Namely the: (*i*) assignment of an economic value to natural services; (*ii*) refinition of techniques for ecosystem assessments; (*iii*) recognition of ecosystem services as a component to be estimated also in the economic project evaluations.

The Environmental Economics movement (1992) offers an interpretation of the relationship between economy and environment based on human economic processes impacts on nature and quality of social life. Compared to the neo-classical economics focused on the analysis and description of the economic-productive

system in managerial terms, the Environmental Economy (1997) formalize the interdependencies between the environment with the production sector, society and economy.

In it, the concept of ecosystem services begins to be considered in a perspective not only sectoral, or of natural sciences and economics compartments, but in the perspective to distinguish alternative forms of contamination with other knowledges.

Through the environmental economy the discussion on «types» services have taken off, especially in relation to the spread of sustainable development issues and the need to act in the urban areas in a systemic way under multiple objectives.

In the contribution *The value of the world's ecosystem services and natural capital* by Costanza et al. [10] a monetary evaluation of urban ecosystem services with explicit reference to forestry projects was carry out. The authors included the evaluations of the effects that the natural system together with the anthropic system produce at local scale. These with the aim to involve the ecosystem services assessment in economic analyses. The work of [10] represent the background to the publication of many other scientific contributions concerning the elaboration of conceptual models of reference to support the integration of ecosystem services assessment in the transformative change of the landscape, urbanized or not [4, 9, 14, 21, 32].

In addition to the theoretical contributions found in the reference literature, the logical-operational integration methods of ecosystem services assessment in decision-making systems for land development were also deepened in research projects at international and/or European level. Among these the URBES call (2011–2014), or the Urban Biodiversity and Ecosystem Services. It was promoted by BiodivERsA, i.e. the network promoting European research on biodiversity, ecosystem services and Nature-based solutions which «[…] focuses particularly on functional diversity, urban ecosystem services, institutions, economics, and resilience science. It strives to translate cross-disciplinary research insights into principles, land use scenarios, landscape designs and applications. This project is innovative in integrating monetary and non-monetary valuation techniques, focusing the attention on the implications on the governance of urban landscapes» (https://www.biodiversa.org/121, last accessed 07/02/2022). In 2012, it was also created an intergovernmental research network by the United Nations—the Intergovernmental Platform on Biodiversity and Ecosystem Services—which aimed to strengthen the interchange between science and decision-making in the field of biodiversity and the ecosystem services assessment [45].

The development of research projects of this type shows an interest to take account of ecosystem services in the territorial development practices [5, 25, 26, 29–31, 34, 43, 46, 48].

The study by Kremer et al. [34] who focus on the gap between eco-systemic service assessment and decision-making systems is meaningful. Kremer et al. [34] highlighted that the intergation of ecosystem service into policy-making processes:

- it can be a useful interpretative tool to express the dependence of the social and economic systems on the natural components;

- it supports to recognize, also in economic terms, the contribution of the environmental component to the improvement of living statements for human beings and to local economic development.

In addition, they highlight the lack of logical-operational translation of the ecosystem services study and the need to encourage the use of:

- tools to support design decisions and pro-gramming of interventions according to an eco-systemic approach;
- indicators for the estimation of eco-systemic services contextual to consolidated urban areas can be of sup-port to operate on the territory in relation to the project scale of interest and in compliance with the objectives of urban sustainability.

2 Work Aim

The notes by Kremer et al. [34] provide the conceptual basis on which the methodological-operational considerations developed in the following chapters are structured. To define an evaluative framework aimed at interventions designed through an integrated ecosystem approach, namely the main content of the current contribution, we intend to bring, at first, a survey of the methodologies and tools most widely used in the literature for ecosystem services estimation in urban areas. The phase of reconnaissance is preparatory to the description of the proposed evaluation framework with which we want to support the planning phases and interventions programming in the cities on the basis of the multiple benefits that the inclusion and/or conservation of natural elements is able to source on the territory. From the recognition exercise of the reference literature the priciple aspects and the corresponding operative steps caracterizing the proposed evalutiona framework were taken out.

The structure of the work is organized as follows. In Sect. 3, after an introduction to methods and tools review, the main evaluation approaches (3.1) and the tools used as a means of integrating the evaluation of ecosystem services in decision-making processes at the territorial and urban scale (3.2) are described. The Sect. 4 illustrates the phases characterizing the proposed evaluation framework aimed at supporting the formulation of convenience judgments by public/private subjects, taking into account the economic and non-economic value of urban ecosystem services. Finally, in Sect. 5 the conclusions of the work are outlined, highlighting the political and economic implications arising from the use of the proposed methodological framework, as well as future research perspectives.

3 Material and Methods

The gap between ecosystem services and the corresponding operability is substantiated as one of the key issue of the scientific debate on the evaluation of ecosystem services and their integration into the decision-making processes at the basis of urban

transformation. It has been highlighted in the scientific literature of reference that the rationale for the emergence of ecosystem services must be linked to the objective of directing public operators to operate on own territory in order to preserve the natural heritage while ensuring a good level of life quality of the people and the development of the territorial economic system.

The transposition of the evaluation mechanisms of ecosystem services in the political-planning framework according to a systemic logic is articulated and complex [5, 12, 13, 17, 21, 23, 35, 45]. This is due principally to:

i. difficulty in defining the meaning of «ecosystem service» that can be generally recognized by the scientific community;
ii. lack of shared methods and uniform scientific databases through which to measure and extrapolate data on the provision of ecosystem services;
iii. inability to appreciate the benefits that natural resources generate on the land in the short-medium analysis period [21, 35].

Alongside these, other reasons pertain to the still weak relationship between scientific knowledge about ecosystem services and their functional relationship with the planning and design mechanisms, especially in urban settings [11, 44, 46].

In order to compile with these issues, via the scientific panel of reference it is possible to trace multiple tools to support the analysis of ecosystem services and their usefulness in the evaluation of urban transformation projects.

For the characterization of the main tools to support the analysis and integration of ecosystem services in urban economic analysis, a briefly review is made. A search query is conducted (on 16/01/2022) on exploration engines, e.g. Scopus, by typing, at first time, the «ecosystem services analysis» and in a second one «ecosystem services decision-making tools». By the review research in Scopus based on the previous keywords, in the following sub-pragraphs we will address in detail the most common approaches, as well as the main tools supporting decision-making systems linked with the ecosystem services assessment.

3.1 Methodolodigical Approaches for Assessing Urban Ecosystem Services

In light of the bibliographic references collected (1316 articles with reviews), it appears that 16% of the papers address the issue of geo-referenced estimation of ecosystem services at the urban level, emphasizing the importance of having a spatially explicit informative set describing spatially sevaral ecosystem services.

Among the methodologies for estimating ecosystem services in relation to the reference context most frequently used in the case studies examined it appears the value transfer method. This procedure of geo-localization of the values of ecosystem services is based on the assumption of taking as reference the results of analysis on ecosystem services relating to sites of investigation that from the environmental,

social, economic and demographic point of view are comparable to the territorial context of study.

Other surveying procedures are based only on the possibility of using some proxy variables (for example, but not limited to, Night lights, types of land use, population density) as «filter-data» to support the processes of ecosystem services estimation. Through the use of proxy variable, it is possible to express the geo-referenced value of multiple variables representative of the socio-economic and environmental system of the territory.

With regard to Night lights, since the beginning of the twentieth century, Night-time light data are useful for economic, social and environmental analysis. It has been shown that night lights can provide indications on the level of productivity of an area. Doll et al. [15] analyzing the night images of eleven European cities have shown the significant interdependence between the amount of lights and the corresponding nominal GDP. Sutton et al. [51] come to the same conclusion by taking as object some cities of the United States, India, China and Turkey, and comparing the corresponding values of GDP with the levels of brightness. Other applications in the economic field concern investigations aimed at establishing the level of correlation between the intensity of light and the Community Housing Prices (CHP). Experiments of this type are conducted by Li et al. [7] in Whuan City (China). The study by Li et al. proves the existence of correlation between Night-time light data and Community Housing Prices. In addition to being a proxy variable for the level of land wealth, light emission can provide significant information on human settlements. Sutton [50] demonstrates the interdependence between number of lights and housing density. This is done by comparing population data, taken from the U.S. Census, and satellite imagery depicting lights at night in some cities. The Gridded Population of the World (GPW), the most widely used database on global population density for the development of analyses of global population growth, is constructed using night-time light data as a proxy variable for the housing capacity of a territory.

Other applications of night-light emissions relate to the mapping and measurement of urban boundaries within which cities develop. Imhoff et al. [27] study the correlation between night-time light data and urban growth. At last, night-time lights allow to highlight and quantify the different energy consumption of the cities. Elvidge et al. [16] attest the existence of strong correlation between night-time lighting and energy consumption in some American cities. Similar studies are conducted in India [33], Brazil [2] and Japan [36]. In the field of ecological-environmental studies, there is also an increase in research in which nighttime lighting data are used to ensure that air quality levels are monitored based on the concentration of pollutants in the atmosphere [37].

3.2 Decision-Making Tools

On the other hand, the 84% of the total articles and reviews deal with decision-making tools to support the planning processes and interventions programming on the territory in ecosystem services perspective.

From the survey some decision-making tools, such as the Toolkit for Ecosystem Services Site-based Assessment or i-Tree Software, allow the operator to measure the ecosystem services related to the improvement of environmental quality as a function of the existing tree cover; others, such as Artificial Intelligence for Ecosystem Services, allow to estimate the value of recreational services due to the presence of urban parks.

Some, like the Co$ting Nature, Natural Capital Planning Tool (NCPT) and/or logical-mathematical tools, as the A Mathematical Programming Language (AMPL), which allow the resolution of optimization models in Operations Research, integrate the evaluation of ecosystem services with the socio-economic characteristics of the urban context through the construction of functional relationships between variables of interest. With regard to evaluation problems referred specifically to urban forestry projects, we also note the widespread use of multicriteria analysis tools [28] including the: Analytic Hierarchy Processes (AHP) for the selection among diverse urban forestry management options [49], Techniques for Order of Preference by Similarity to Ideal Solution (TOPSIS [8], and Goal Programming.

The Natural Capital Planning (NCPT) tool, created in March 2018 by the Consultancy for Environmental Economics and Policy (CEEP) is an outlier. This is based on the calculation of the environmental net-gain by the generic urban transformation project.

The tools proposed by Operations Research are also particularly useful as they allow to solve evaluation problems through the use of logical-mathematical paradigms able to provide an optimal solution to the question posed. In particular, it is possible to solve many evaluation problems by structuring mathematical models of multi-objective optimization based on principles of both Continuous Linear Programming (CLP) and Discrete Linear Programming (DLP) [55]. Specifically, CLP can be an effective tool to solve cases in which it is necessary to define the amount of monetary resources to be allocated among forestry projects [22]. Instead, DLP allows to solve both cases of selection among urban areas that are better suited to be redeveloped with forestation [40], and cases related, for example, to the composition of the best portfolio of investment projects evaluated by means of urban sustainability criteria [41], again multi-site land-use allocation problems solved also by resorting to GIS instrumentation [1]. The linear programming models, both continuous and discrete, can be implemented through specific mathematical programming computer tools, such as, for example, MatLab, A Mathematical Programming Language (AMPL, Excel, Lingo, Lindo. The selection of the software to be used is a function of the parameters number the number of winning conditions characterizing the evaluation problem to be solved. Specifically, the AMPL software relates to a

mathematic language used to describe and solve optimization problems [47], particularly those of scheduling. This language is well suited to modeling decision cases of urban redevelopment projects according to an eco-systemic logic [3].

4 Evaluation Framework Proposal

Although the usefulness of these tools and methods is clearly evident, in general there is a lack of use operational models, such as the NCPT, to support spatial planning and design in ecosystem perspective. This is due not only to the lack of knowledge and complexity found in the measurement of beneficial effects resulting from natural elements in urban contexts, but also to the interest of public operators to consider in the planning phase especially the financial effects of interventions in view of their available budget to be optimally allocated between investment projects for land development [24]. Haase et al. [24] note that:

i) the information and survey system on the types of ecosystem services in urban areas is lacking, at most produced mainly to solve scientific and disciplinary issues and not to support interventions for the integrated development of the city;
ii) there is no attitude for partnership practices between public and private subjects in establishing which strategy to adopt for the growth of the territory, respecting the existing natural component and reducing land consumption.

In the light of this evidence, therefore, it seems appropriate to be able to use mixed evaluation methodologies with which to:

i) address, manage and translate multiple design-assessment aspects taking into account their logical-functional relationships;
ii) create a multiscalar information system that gives evidence of socio-economic and environmental characteristics, as well as ecosystem effects due to the existing urban ecosystem and changes in the overall ecosystem value due to the effect of the project on the territory.

Therefore, it is intended to propose the description of an integrative assessment frame-work [24] to support assessment and design in urban settings based on an integrated ecosystem approach. The proposed assessment protocol allows for multi-dimensional assessments of initiatives for integrated sustainable urban development based on a «spatially explicit» multi-scalar information framework and economic accounting of ecosystem services [24]. In the following, the phases of the proposed framework are described.

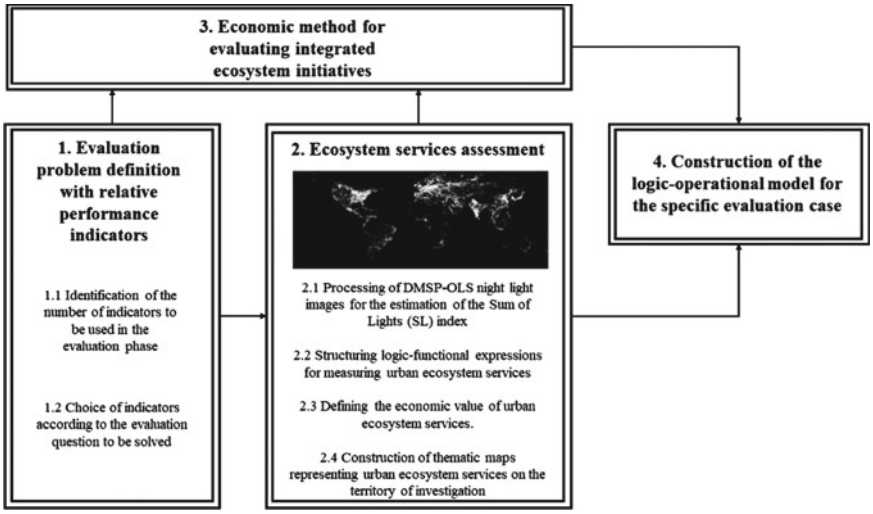

Fig. 1 Proposed evaluation framework of integrating ecosystem services assessment

4.1 Framework Steps

The proposed integrative ecosystem assessment framework consists of the four steps as in Fig. 1. To each one a relative description is done at follow.

Step 1. Evaluation problem definition with relative performance indicators.
It consists in the collection, cataloging and selection of performance indicators to be used for quantitatively and/or qualitatively measuring the effects expressed in terms of services generated and goods produced by both the existing natural compartment (*ex-ante* intervention) and the intervention to be implemented (*ex-post* intervention). Depending on whether evaluations are aimed at defining ecosystem performance levels before and/or after the transformation process, in consideration of the evaluation aims to achive, as well as the stakeholders involved in the initiative to be implemented, it is possible to establish quantities and types of indicators to be taken into account in the evaluation phase.

Step 2. Ecosystem services assessment.
The current step is based on the estimation of urban ecosystem services expressed with the indicators via Step 1. The measurement of each indicator is carried out by means of the night-time lights as possible proxy variable of environmental, social and economic parameters of a territory, as well as the ecosystem services values. The satellite maps of night-time lights can be used for the construction of thematic maps representing, where possible, the selected ecosystem services and their corresponding distribution on territorial/urban plot of analysis.

Step 3. Economic method for evaluating integrated ecosystem initiatives.
To address the logical-practical gap between the estimation of ecosystem services and the corresponding economic evaluation, an evaluation approach to support the assessment of an integrated ecosystem design must be individualized. The selection of the proper assessment method, of economic type, is function of stakeholder's interests involved in the assessment process, project type with its economic, social and environmental features, and of evaluation goals. Each one effect the finding of the economic method by that evaluate the project feasibility considering the ecosystem services values.

Telega [54] leads the evaluation problem at the basis of integrated ecosystem initiatives to the maximization of the *Overall Ecosystem Value* (OEV) concernig the area under change, i.e. to the maximization of economic, social and environmental benefits that the project including an appropriate amount of natural surface is able to produce in the urban context where the plot is located. The measurement of OEV is via an economic algorithm based on the economic and financial project features that can be expressed through linear relationships of mathematical type [54]. The computation of OEV index can be integrated with the use of proxy variable, i.e. the night light data, as driver for the economic assessment of urban ecosystem services. By means of this information we can put in economic evaluation practices most commonly used in the literature also the economic value of ecosystem services.

Step 4. Construction of the logic-operational model for the specific evaluation case.
The system of relationships that can characterize the theoretical frame of the economc algorithm represent basic elements for the construction of multicriteria evaluation models capable of solving multiple problems of planning/design in eco-systemic key.

These are mathematical models/systems that streamline algebraic expressions into parametric relationships with which to take into account aspects of an environmental, social and cultural nature either separately or jointly with those of a financial nature. Parametric relationships differ according to the evaluation question to solve.

The methodology to translate operationally what can characterize the economic algorithm is based on the stylistic features of linear programming of the Operational Research through which we can express the existing relationships between the elements of the basic model with linear parametric expressions.

5 Conclusions

The multi-scalar nature of the information frame on which to set up the integrated planning-evaluation of the city can vary according to the type of evaluation problem to be solved; the analysis to be carried out on the territory (aggregate and/or explicit); and, last but not least, the category and number of stakeholders (public and/or private) involved in the project initiative. The combination of these factors (type of evaluation

problem, territorial analysis and stakeholders involved) defines the degree of detail and accuracy of the evaluation, as well as the level of articulation of the information system supporting the resolution of the evaluation and project case of interest in ecosystemic perspective, also in response to sudden breakdown events [52, 53].

The structure of the assessment framework proposed has as new elements the writing of an assessment model with the alpha-numeric language of Operations Research to support the resolution of evaluative systems concerning the design of interventions in a multidimensional way; the potential use of night lights data to support the geo-referenced estimation phase of ecosystem services, as well as the socio-economic and environmental characteristics that portray the intervention area under analysis.

Future perspective will regard to test the framework at basis of the current work with concern case-study of design solutions in different urban contexts. Namely, the proposed framework will be tested on renewal cases of brownfields at neighborhood scale of investigation.

Significant attention will be on the deeping of economic evaluation alternative methods to estimate the economic value of ecosystem services. This last one in relation to the possible links between their supply with territorial features and development perspectives.

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