XXXV CONFERENZA ITALIANA DI SCIENZE REGIONALI

OPEN SPACES IN PERI-URBAN AREAS AS RESOURCES FOR THE SUSTAINABLE DEVELOPMENT OF METROPOLITAN REGIONS: AN ECONOMIC PERSPECTIVE FOR THE DECISION MAKING

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SUMMARY

In the light of the increasing attention paid to the environmental, cultural and social quality of territories, the essay aims at identifying a multidisciplinary framework for a decision making approach where peri-urban open spaces could become opportunities for and key components of the wellbeing of communities. In peri-urban areas, increasing pressures can be observed coming from a persistent demand for new surfaces where to locate urban functions. An ongoing dynamic process where a multiplicity of different stakeholders, representing different interests and revenue goals, demand spaces for a huge variety of possible uses. A variety which calls for an interdisciplinary approach able to make decision makers understand the values and revenues embedded in the conservation and valorisation of open spaces in peri-urban areas and to integrate the critical importance of their availability and quality as a main goal in land use, governance and management. After a discussion around peri-urban open spaces as a fundamental territorial capital of key resources for the development of urban regions, a taxonomy of open spaces in per-urban areas is proposed, underlining the use of open spaces. An analysis outline is then introduced, in a cost-benefit perspective, to enlighten the contribution of the economic perspective in an interdisciplinary assessment framework to better integrate the values and benefits coming from the enhancement of sustainable uses of open spaces in peri-urban areas.

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1. Introduction

The crucial importance of green spaces as a part of a balanced sustainable development path seems, nowadays, to be a common and shared point in territorial governance and management, as the joint work of important international organizations like UN, OECD and UE demonstrates (Millennium Ecosystem Assessment, 2003). Still, moving from theory to practice, the influence of pure economic private interests on decision making remains predominant. This often drives land-use decision making to favour uses able to produce high financial, mostly private, revenues, leaving more sustainability sound uses in the background. Such dynamics appear particularly critical in peri-urban and urban areas, where green open spaces are besieged by urban uses as the income rents coming from these lasts are very high.

Actually, an increasing attention is being paid to environmental quality of land as a basis of health and wellbeing of urban and rural communities but the approach still seems defensive facing urban pressures and the weight of direct private economic and financial values. To better understand and manage spaces in peri-urban areas, two issues appear particularly important. First to identify approaches and tools able to influence land-use decision making in order to rebalance the weight of environmental, social and cultural values to cope with economic ones. Second to enhance more proactive processes where high quality peri-urban open spaces could become opportunities for and key resources of a more balanced territorial development. On the one hand, this implies the understanding of the mechanisms by which different territorial subjects try to influence decision making concerning land uses. On the other hand, this implies the capability to manage land, open natural spaces in particular, in order to prevent an excess in urbanization and land cover with buildings, physical infrastructures and so on.

Of course the protection and governance of open spaces depend on different policy approaches and action goals by different territorial subjects. Most of the conflicts around peri-urban open spaces (POS) seem to derive from a too sharp antithesis between the conservation of natural environment, seen as non productive from a private economic perspective, and any possible economic use of natural land, seen as non sustainable by definition (even agricultural activities as a whole) because attempting to the preservation of common/public ecological, social, health and intrinsic values. These dynamics are producing dangerous dichotomies. Territorial actors often tend to simplify the issue distinguishing good social and natural environment values and bad economic interests, while, especially in times of economic crisis, communities think they necessarily have to choose between economy and ecology, as the two elements seem to be completely opposing each other. Public planning, in such a perspective, sometimes acts as the defender of open spaces, facing stronger direct economic interest rising from more traditional territorial development interventions, like large infrastructural/material

and real estate projects covering still free soils. Some other times, public subjects just embrace the positions of the so called developers, because of the need to produce income and economic values. This, in many cases, without a real concern on who will be the earners: a few private subjects or a community? Concentrate in the short term or lasting in the medium-long period?

In such a picture, actors involved in the decision making act as groups of stakeholders, which tend to simplify complexity of the real territorial elements and phenomena to obtain opinion sharing or to make communities accept particular solutions in land governance and management. What often happens in presence of an excess of simplification is a strongly conflicting environment, where opposite parts just defend very specific and individual interests. As a consequence, public policy making becomes itself unable to consider the territory as a unique and complex object and to observe open spaces as systems of elements and dynamics, multifunction components of a broader territorial area, characterized by interactions and relationships shaping it over time. This is why the reflection around POS started from the observation of conflicts and of the great difficulty in governance, regulation and planning of these spaces. This even if their high value is well recognized and shared at the research level and more and more visible at the public opinion level.

Aiming at overcoming the dichotomies mentioned above and to bring out possible key elements for a discussion around conflicts reduction, land uses and decision making, the essay explores two main issues. The first one regards open spaces as key components for sustainable development goals, not only by maintaining outdoor pursuits and improving territorial quality but also as resources able to produce values and revenues (even if not always quantifiable). The second is the design of a baseline for the development of an interdisciplinary and multi-scale assessment framework, able to highlight the multiple elements, functions, values and acting subjects around open spaces in peri-urban areas. The outcome is meant to be the basis for the development of an analysis and decision-making tool founded on a more balanced perception of the value of the values of POS. A tool able to enhance and enlarge the meaning itself of sustainability in the use of open spaces and to support public decision makers in the governance and management of land. In other words, a tool able to encourage, over time, the building of knowledge, expertise and capabilities to identify and promote solutions for consuming the less possible free soil and obtaining the best possible overall utility (results). A problem of optimal allocation in a sustainable development perspective, aiming at maximizing all expected values including environmental, social and cultural ones.

2. Open spaces in peri-urban areas as systems of resources

An effective conservation strategy for open spaces can produce a variety of environmental and socio-economic values for a community and some examples can be done. In the case of agricultural uses of peri-urban areas, for instance, the conservation of a non-built environment coincides with the production of economic revenues for farmers and with the supply of products for the local community at *zero kilometers* (Olivieret et al., 2007). Another example can be peri-urban and urban parks, where services can be offered to the community to better take advantage of the natural environment (Swanwick et al., 2003) and, at the same time, creating job opportunities and even social inclusion (Seeland et al., 2009). Given the *multi-sectoral* and *multi-resource* nature of open spaces (Koomen, Dekkers and van Dijk 2008), it follows the need for an outlining of all elements which characterize the special matter of open spaces in peri-urban regions, to better identify, introduce and discuss such elements and trying to understand the ways in which they are dealt with in different approaches. This leads to a reference framework where POS are systems of territorial resources and values which need to be better recognized, characterized and evaluated for their contribution to territorial sustainable development. A statement enhanced by the recent approach NEXUS – Water, Energy & Food Security (see NEXUS website), where land can be regarded as the physical reference unit for the production of the water, energy and food goods and services.

Here the economic approach becomes central to the discussion as a kind of preliminary key element itself. A disciplinary approach from which to derive analysis and assessment tools to observe, describe and interpret POS, assigning them *an idea of value* corresponding to certain uses and functions in a governance, planning and intervention perspective. What is interesting here is the *economic perspective*, which means to look at things from an effectiveness and efficiency point of view. That is to look at all territorial elements as resources, all essential to obtain goods and services needed by a community (Pesaro, 2012). Since communities are the expression of individuals and groups with their preference sets, the values and uses of territorial resources should be regarded as the outcomes of a system of decision making processes by different private and, more and more, public entities.

One of the basic dynamics which characterizes the POS is the increasing pressure produced by the demand for urban activities and the related need for still available/usable land (Caron and Torre, 2002 and Dumont and Hellier, 2010). Urban uses and users are always looking for new areas where to develop activities and the values of such areas vary because of: i) the distance from the center of urban settlements - the smaller the distance, the greater the market value (the distance measured in time and not in kilometers), ii) the quality of land and iii) according to the market laws, the balance between demand and supply for new spaces to set up built environments. On the other side there is the demand for productive activities like agriculture, forestry and leisure, together with the environmental and ecosystem functions and

services, finally recognized as needs for the life and welfare of people and communities (Vejre et al., 2010).

In an economic perspective and in the light of public shared sustainable development goals, the allocation of uses of POS becomes a very important matter as demonstrates the rising of conflicts among potential users. Caron and Torre, in their essay (2002), describe the high direct and social costs for local communities due to such conflicts, distinguishing four possible function categories: economic, residential, ecological and cultural. Here a different tentative taxonomy of the uses of POS is introduced. This taxonomy is mainly based on the idea of natural and cultural capital subjected to the effects of positive and negative externalities and tries to identify the whole of the outcomes in terms of public and private cost and benefits arising from the many, sometimes overlapping, uses of the environment around the urban centers.

The proposed taxonomy of POS is based on the crossing of the quality of land and of the externalities produced by the most diffused and traditional use models. About qualities: i) physical and geomorphologic features, ii) natural environment quality or degradation, iii) landscape and cultural heritage quality. About uses, cover typologies and externalities: i) high environmental impact and soil consumption for urban uses demanding built areas and reducing permeability of soils, like housing, built infrastructures, production plants or commercial surfaces, ii) industrial agriculture, iii) sustainable agriculture, iv) production of renewable and non renewable raw materials, v) sustainable fruition activities with no soil and quality consumption, like recreational and cultural ones and vi) abandoned from previous activities (like abandoned agriculture surfaces). At present the uses of POS, enchaining different quality, uses and users, remain mainly traditional, even if ecosystem services and new environmentally sound functions start to be considered and become more important, as emerges from recent research projects like the already mentioned PLUREL. In a production perspective, POS may be identified as follows, making reference to P. James et al. (P. James et al., 2009 citing Swanwick et al., 2003) about the main difference between green and gray.

High quality Green POS for the production of environmental ecosystem services. The geographical dimensions, the geomorphologic features and continuity are here very important, in the light of a transition from the concept of green belt or green corridor to the concept of green infrastructure (Vejre, 2010 and Vandermeulen et al., 2011). The idea of green and ecological services as a good or service demanded by the near urban areas seems to be able to better motivate the protection and enhancement of green open spaces than the reference to margins and boundaries between urban and rural. Too often the idea of margin calls for a defensive approach, while the green POS themselves reveal to play an important role in providing services to the near city dwellers, where the distance, again, may make the difference.

High quality Green POS for activities based on environmental, cultural and landscape quality. Tourism, leisure, recreational activities, but also educational purposes are here considered, all based on the high quality of the natural and cultural environment and landscapes. The production of revenues comes from the protection and promotion of these resources, even if some trade-off may arise from the negative externalities caused by an excessive pressure by final users. Cultural and rural landscape in POS are more and more in danger and in some cases rare, residues of a rural tradition of the past, under the pressure of urban invasive uses of land (Serrano, 2005). The protection of the natural environment and of the rural traditions may become a tool to enhance the cultural heritage itself and the related goods and services, creating the conditions for new profiles of revenue (in a proactive and win-win perspective), like in the case of the so called agriculture services (Olivieret A, 2007) and of rural and cultural landscapes (Peyrache-Gadeau and Perron, 2010).

Green POS for the production of raw materials to be withdrawn. Here there is a direct use and consumption of natural resources, which can be renewable or non renewable ones, and, sometimes, of land itself, if withdrawals produce irreparable environmental damages. The problem is every time in the excess of use. This typology of uses matters a lot with the territorial offer of environmental and spatial quality. Negative effects can be produced by withdrawals of non renewable resources, normally compromising land quality and landscapes, or even by the selection of crops, because of the reduction of biological variety and the potential pressures caused by intensive agriculture. Moreover here the balance between costs and benefits among soil preservation and soil exploitation is more fragile, as demonstrate the case of the arising trade-offs concerning the production of renewable energy sources, looking at the production of biomasses. Agricultural uses of POS may nonetheless produce positive effects, like zero kilometers high quality sustainable goods and services, increasingly demanded by urban citizens, and site-specific landscapes like for vineyards or flower cultivations (Oliveret et al., 2007 and Peyrache-Gadeau and Perron, 2010) and vegetable gardens, looking at the distance like a quality itself of goods and services.

Green and Grey POS for activities that do not produce deep degradation or direct sealing but anyway have an impact on land and landscape quality. In POS, photovoltaic fields may be an example, also highlighting the problem of trade-offs among a variety of sustainable matters, which are likely to generate difficulties in decision making. Here again, the distance matters a lot because of the problem of energy dispersion along the distribution lines. The distance from the production field and the final demand should be minimized as much as possible.

Green and Gray POS for built activities that produce soil sealing. These are mainly due to the demand for built elements like residential buildings, production plants for goods and services, network infrastructures like mobility, energy supply and water management services, commercial sites and ancillary areas. This means direct physical consumption of the quantity and quality of ecosystems, natural environments and landscapes because they reduce the

availability of good quality land. The *coming back* to a more natural condition is not every time possible and, anyway, never comparable to the original natural status. Dynamics that normally produce long term trade-offs in the selection of uses. Actually, due to the increasing demand of urban functions, producing high direct economic revenues, also high quality green POS, especially when very near to already urbanized areas, are regarded as possible expansion territories with a deep negative collective cost-benefit balance.

Black POS still exploited by, mainly illegal, activities that produce soil depletion where no use should be located until reclaim. Different from the point above, this is of course the worst possible condition because there is not only a physical consumption of usable land but also a potential systemic chain-effect that could affect natural environment, people and activities over time and even far away from the affected sites. This is for instance the case of waste disposals and of industrial surfaces where polluting and poisoning substances have been used in the past and have not been reclaimed. Also agriculture may actually lead to such effects, even if at a different degree, due to an excess in use and accumulation of pesticides and other chemical substances. Such uses are nowadays prohibited by law but still, lack of control and behaviors detrimental to public health and interest leave them too much space, making it arise the crucial importance of an intervention from the public bodies.

All Green POS are environments to be regarded as a precious and scarce capital to be used *in the best possible* way, which is quite never a first best. That is, from an economic point of view, to locate activities to obtain the *best possible* overall utility (public and private) by *selecting the best possible* use for each typology of soil/land, *minimizing as much as possible environmental and social negative externalities*. Yet the *best possible* itself is most of the times difficult to reach, as the location of activities results from the interconnections and interactions of two dynamics: i) the autonomous choices from territorial subjects, following their private individual interest, and ii) the governance and management statements from public bodies, which should defend public interest.

Around urban areas, by the way, other kinds of open spaces can be found. These are the *unused open spaces*, often originating from production activities now closed. Spaces in which old industry and manufacturing sites where located, very often leaving depleted and contaminated soils and built ruins, or spaces left by agricultural activities no longer active, which have lost their original ecosystem and natural functions, even if they maintain a role with reference to eco-services like carbon capture and permeability of soils. The unused open spaces are normally not likely to be considered by the market as an interesting choice (otherwise they would be used), at least when other more suitable sites can be found, often in green open spaces. In such a view, the more environmentally sound uses, if not accompanied by the production of direct values clearly perceivable by territorial subjects, risk to be underestimated when not completely neglected, as the perception of the values of ecosystem services is still low compared to what should be necessary (Millennium Ecosystem

Assessment 2003). This is due to the fact that the natural environment and the cultural heritage are public resources and often *commons* (Hardin, 1968) with the consequence of a so great exploitation rate as to determine their exhaustion and disappearance. As values from eco-services and green uses are underestimated, without an intervention by public subjects allocation would continue to disadvantage uses where the collective interests are not evident even if fundamental (Turner et al., 1993). To rebalance the weight of green values of POS to cope with the direct economic ones, the negative impacts generated by uses must be underlined as negative externalities and public costs. Positive effects become, as well, positive externalities and public benefits. Public interventions may consist in the increase of the costs of accessibility and use of green areas by activities which can cause depletion and consumption or, the other way round, in selecting permitted uses. Of course, in the first case, subjects with a greater availability of economic resources are more likely to prevail, reducing the expected effect on optimal allocation of land uses in a sustainability perspective. As governance and capability to assign a *correct value* to green open spaces are so important, affective approaches and tools are needed to develop and encourage adequate accounting of the environmental, cultural and social values both of land itself and of the performances and impacts of different categories of uses. The problem then assumes huger boundaries than land cover and consumption *in a physical meaning*, which anyway remain as fundamental dynamics to be considered, concentrating on sustainable or non sustainable uses and on quality consumption.

3. Open spaces in peri-urban areas as systems of values

The POS *host* a variety of use typologies for a variety of demands for goods and services, including the green ones (ecosystem services, education, leisure, tourism, etc.). These give rise, as mentioned above, to a problem of allocation of scarce resources generating conflicts where uses are non compatible with each other, taking into consideration the whole of the resulting positive and negative externalities. In some cases uses are overlapping, contributing to the increase of the complexity faced by the system of supply and demand for spaces. The greater the extension of peri-urban areas, the higher is the risk for conflicts, for instance in regions where rural intersects and is interrupted by a variety of urban centers not so far away from each other. This is the case of polycentric areas (Benetti and Magnaghi, 2007) like, for instance, the Parco Sud Milano in the Lombardy Region, a continuum of open and built spaces. Again the need for decision making becomes central to the discussion, thus requiring analysis and knowledge building tools able to highlight, in a site-specific perspective, the whole of advantages and disadvantages inherent in every possible intervention scheme.

A possible key to enhance the building of adequate knowledge and the development of decision making processes in an integrated perspective is to look at POS as *complex systems*

of values. This taking into account all potential uses, the direct and indirect demand for such uses at public and private levels and the system of resulting outcomes in terms of costs and benefits, coupled with positive and negative externalities. Values to indicate not only the interaction between demand and supply of spaces and uses but also, in an increasing way, the crucial importance of the protection and enhancement of natural environment and ecosystem services for health and wellness of communities (Tzoulas et al., 2007) and for social inclusion (Seeland and Nicolè, 2006 and Seeland et al., 2009). Values which, even when not directly comparable because of different measure units or because assessed on a qualitative basis, may contribute to a better perception of the system of costs, benefits and externalities at stake in POS uses. Values to be integrated and processed in assessment procedures generating *value images* of POS. Finally, values as a knowledge basis for decision making processes looking at improving/maximizing the utility in the allocation of uses at the whole system level.

At present, in the real world, this means to work on *second and even third bests* but the value assessment of POS could represent a key to obtain two main results. First to enhance public and private perception of the quality of the commons and of public goods and services as crucial resources for territorial welfare and not only as constraints to action. Second to promote win-win strategies where the protection of natural environment, cultural heritage, social quality and community's health result to be productive of economic well-being and of territorial resources. Yet, it is important to underline the moving from *impact analysis* alone to the *analysis and assessment of the values* produced or consumed by different uses. A step forward needed to enhance the foundations for the integration of the defensive approach with the proactive one (see the second point above). A work to identify, analyze and assess such values thus follows.

In an economic perspective, the challenge is to try to assign clear and perceivable measure units and to compare values referring to a system composed by a so huge variety of elements and dynamics. A reference framework follows, aimed at promoting sustainable development, where environmental, social and cultural values are supposed to play a key role and the whole of the public interest tangible and intangible values should be highlighted.

From a more operational perspective, this implies a continuative research to enhance and integrate the numerous studies already available in the field of the value assessment of territorial resources, following different disciplinary approaches and tool boxes (from the more scientific-based to economic, social and cultural ones). Among these, greater attention should be paid to researches and methods to assess ecosystem services and other sustainable and environmentally sound uses, able to produce values – benefits, positive externalities – from the protection and the sustainable exploitation of POS without quantitative or qualitative consumption. For instance the values of green elements of open spaces near, or integrated in, built urban environments (among others Bullok, 2008), to enhance natural environment and ecosystem services as green infrastructures and to underline their values for the whole

territorial system (Vandermeulena et al., 2011). As Vejre et al. say (2010), the green infrastructures values are still difficult to assess, mainly referring to intangible or *soft* ecosystem services, such as aesthetics, the mere presence of open space, experience and cultural heritage. The same for the assessment methods, as in P. James et al. (2009).

To overcome such difficulties a variety of site-specific and use-specific case studies have been developed, using the economic approach to call attention to the whole of the results of public investments in specific actions and projects for a local community. Among others Carleyolsen et al. (2005), where authors develop a cost-benefit assessment of the establishment of a new urban park, and Riccioli and Scozzafava (2006), where a Contingent Valuation is proposed to assess the utility and value of an existing urban park. The challenge still remains the design of a more homogeneous and multipurpose assessment framework to sustain an action system where public costs and benefits might be enlightened and enhanced all together. A basis for the adoption of strategies that attempt to reduce environmental damage per unit of economic output (eco-efficiency of production activities), while encouraging an economic growth based on green development (green economy) and innovation (Yandle et al., 2004). The values of the cultural landscapes in rural areas might as well result enhanced, referring to the potential economic functions for recreation, leisure and tourism and to the social values related to traditional activities and land use models, history and customs (Serrano, 2005). These lead to land and landscape evaluation matters, in view of optimal allocation of uses of POS able to maximize the production of positive outcomes and to minimize the negative impacts when localizing activities (Vejre et al., 2009). Still, the integration between socio-economic and environmental-cultural dimensions should become a more stable element in value assessment of POS. This especially looking at the need for a better management and, possibly, a reduction of conflicts and related conflicts costs (Torre et al., 2010 and Jeanneaux, 2006).

As a consequence, economic valuations to assign comparable measure units to environmental, social and cultural tangible and intangible values become more and more significant (Vandermeulena et al. 2001). Among these, interdisciplinary studies should be promoted, to better identify and understand the cross effects of a variety of possible POS uses. A question arises: might economic valuation of public goods and services, like green infrastructures and ecosystem services produced by and in POS, really lead to a greater awareness and consensus sharing on the demand for conservation and the acknowledgement of ecosystem values? A pessimistic synthesis can be found in Vandermeulena et al. (2011): *"In Western Europe the level of urbanization increases by 0.2% each year […]. It seems that 'green' space has to give in to construction buildings, housing, industries and community services, although 'green' space does offer multiple benefits for human populations"*. On the other hand, is precisely for this reason that it is important for scientists not to give up and develop methods and tools to obtain greater attention on these matters.

From an operational and practical assessment point of view, a great detail level is needed to deal with POS elements, specificities and dynamics. That is *translate* theory and research results in *usable knowledge* (Lindblom and Cohen, 1979) for the local decision making processes. Again questions arise around public and private costs and benefit. For instance, how to deal with cases in which private interests seem not related to real needs, like in building for housing, commercial or industrial activities in absence of an explicit demand for (buildings which, in crisis period like this one, often remain empty)? That is, how to deal with a choice process still mainly driven by direct private returns on investments, even when these are not clear and certain, systematically undervaluing existing and evident public ecosystem services and values? Therefore, how to work on decision making to obtain an adequate integration of environmental, cultural and social values with the economic ones? And finally, in a decision making support perspective, how to include all needed assessment elements without producing a too high complexity?

4. A baseline for the development of a decision making scheme for POS uses in a sustainable development perspective

Entering such a path, first comes knowledge enhancement around the nature and features of Green POS and the potential performances and impacts of uses for private/public stakeholders. Which means to describe them from different disciplinary approaches, taking into account the different characteristics and emerging values, strength and weaknesses, evolutionary paths with their drivers and effects, governance and research methods and tools.
The description of the analyzed open spaces should consider all components and dynamics, on the basis of which identify, increase the attention on and assess the behaviors and interests of the territorial system. Elements like the geophysical structure and the ecosystem quality are relevant, as well as the spatial location in relation with urban settlements. The characteristics of the related urban areas, for what concerns availability of spatial and environmental resources, influences the results of the analysis, which call for very site-specific assessment criteria. A very scarce extension of urban green spaces, for instance, assigns a higher value to Green POS as additional resources for the urban community. Soil and natural environment quality also matter, distinguishing in particular green, gray and other unused open spaces, as defined above, with uses/users which could maximize the overall public and private utility at the system level. The questions herewith addressed could be: what uses of the good quality soil available in Green POS may maximize the overall territorial utility? Or, the other way round, which conditions of soils and environmental elements and qualities are more suitable for locating value added activities like agricultural ones? Which uses should prevail in case of very good soils, suitable for agriculture and ecosystem services, at increasing prices/values due to real estate developments (for instance the case of the Italian Pianura Padana, where

very fertile soils are besieged by urban activities)? Questions which should characterize governance and decision making models.

Table 1– A first synthesis scheme of the analysis framework

POS typology	Analysis elements	Utility setting for different stakeholder typologies	Intersections / tradeoffs with other uses and users	Typologies of values produced	Positive and negative externalities	Final value assessment
Public and private stakeholder typologies						
Possible land uses and land cover models						
Links / interactions with urban areas						

The multiple nature of POS, already discussed above, is one of the crucial elements in analysis because of the need for a multidimensional approach: multiple stakeholders, multiple functions, multi scale at temporal and territorial level. All elements have to be considered with their system of cross effects, impacts and interactions and, as pieces of a puzzle, the entire image cannot be complete if all knowledge pieces have not been collected, analyzed and integrated. This does not directly affect the decision making of private subjects about localization, uses and investments, which remain addressed by direct individual interest. Yet, in the best possible world, should be central to public decision making in order to protect and promote public uses and values.

From all what discussed above, some other elements come to light and contribute to the analysis framework, underlining the nature of POS as a part of a greater territorial system (Dumont and Hellier, 2010). Components of a complex system of resources, subjects and decision making processes, driven by different cycles of demand and offer. All these lead to a knowledge tool, supporting the decision making, where to highlight the multiple knowledge components required to maximize the benefits deriving from the good allocation of POS among uses and users at the whole territorial system level (see table 1 for a first scheme proposal).

5. Towards a an economic approach for the enhancement of sustainability in POS allocation decision making

As seen in the above discussion, many research works can be found on individual components in the scheme (see table 1) but only a few regarding the special matter of POS and addressing the multilayer dimension of the decision making framework. Moreover, if the different components are so much different, a multidisciplinary approach should be carefully considered, even if difficult to develop, because, as James et al. (2009) suggest writing about the transdisciplinary approach and urban green spaces, "*is one where an individual or group uses knowledge from a number of disciplines to see new connections and gain new insights*", bridging ecology, natural sciences, land engineering and management, geography, social sciences, health sciences, culture, planning, architecture, agriculture, economy, production sciences, public policy, public decision making, etc..

From an operational point of view, interdisciplinary work requires huge research teams involved in a common work, where the capability and willingness to understand each other's language, disciplinary basic assumptions and tool box become crucial. In a so complex world this could represent a way to produce more adequate and usable knowledge to enhance scientific understanding and support public/ private decision making activities on the ground. In particular, facing a problem of optimal allocation among uses in a sustainable development perspective, the integration of the economic rationale (as a tool and not as a goal) into local governance, planning and projects may result as an important step focusing on POS and, in particular, on the protection and enhancement of Green POS.

The economic perspective, moreover, may contribute to the systemic approach feasibility as values associated to different components offer some important contributions to the decision making: i) underlines the existence of the system of conflicting uses demanding for land and producing resource exploitation and negative externalities, ii) gives signals of scarcity of land and land quality available for uses as well as soil consumption risks, iii) underlines the values of sustainability and resilience matters, iv) allows for the accounting of benefits as the starting point to diffuse "new values" and giving weight to the setting of a new wellbeing system of indicators and v) represents a way to make different elements comparable assigning possible homogeneous measure units (not necessarily monetary) also to the so called *non-marketable values*.

Looking at the enhancement of the feasibility of interventions enhancing and producing environmental and cultural values in peri-urban areas, it seems meaningful to invest in developing systems of uses, able to make it *economically interesting* for actors to choose for sustainability: an effective complement to laws enforcement. Interventions on stakeholders may refer to knowledge enhancement and communication tools able to rebalance the perception of local communities towards the importance of environmental quality, even the

economic one. Which means to drive public and private decision makers in recognizing all different territorial elements as resources which equally participate to the production of the development and welfare a community needs.

Tools able to enhance and sustain innovation and creativity in finding new win-win solutions for the sustainable use of POS become particularly important in territories characterized by a high settlements density and conflicting demands for uses of scarce territorial resources. Many possible functions could be re-evaluated in an innovative perspective. Think for instance to open spaces to be used as expansion areas in case of floods (Brody and Highfield 2013) or other climate change driven natural hazards. During the no event periods (called peace time), green and recreational activities could be located, based on wetland ecosystems, landscape and agriculture. Such a solution could produce a reduction in territorial damages in case of event, that is less costs due to losses, and revenues and common values in peace time.

The next step may be the integration of decision making processes in spaces, also virtual ones, where to share views, exchange knowledge and understand each other's interests and goals. In this way also negotiation and multitasking interventions could be more likely to be developed and implemented. A system of guidelines and tools also useful as a scheme to assess the results of interventions in a monitoring perspective.

One thing should anyway change in territorial actors behaviour. To overcome the idea of POS as empty spaces to be necessarily fulfilled with activities, as happens, most of the times, in peri-urban areas. Which also implies a challenge: to overcome the perception of uses as they where only hard activities, building interventions and land cover. Is it still reasonable to consider the presence of open spaces as non productive resources, at least from a private perspective, when their being empty of objects means public utility and values? A work on the perception of values may be a key element to obtain a shift from the defensive to a proactive behaviour and action system.

A future decision making tool should therefore be able to enhance and enlarge the meaning itself of sustainability in POS uses allocation and to support public decision makers not only in the negotiation of conflicting interests but also in the promotion and encouragement of new use models, able to couple revenue production and environmental quality. In other words, a tool able to encourage, over time, the building of knowledge, expertise and capabilities to identify and promote solutions for consuming the less possible free soil and obtaining the best possible overall utility. A problem of optimal allocation in a sustainable development perspective, aiming at maximizing all expected values including environmental, social and cultural ones. Such win-win solutions, guaranteeing both public values and direct economic revenues to private stakeholders, could become the object of a normal, stable and voluntary strategy. For a future where the need for regulation and legal constraints could leave the ground to a real and stable interest in promoting public values by local communities and territorial actors.

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