

View Sheed Assessment for Urban Renovation Strategies: Landscape Values Perception Plays a Role for Urban Development

Arianna Mazzariello, Manuela Nardozza, and Francesco Scorza(✉)

Laboratory of Urban and Regional Systems Engineering, School of Engineering, University of Basilicata, 10, Viale dell'Ateneo Lucano, 85100 Potenza, Italy
ariannamazzariello@Live.it, manuela47652@gmail.com, francesco.scorza@unibas.it

Abstract. The starting position for this research is to consider "viewshed analysis" as a useful basis of the development of spatial planning practices aimed at the protection of the territorial landscape values. Considering the specific case study of the Potenza town, the scope of this work is to ensure landscape protection and to encourage design that look to the redevelopment of specific areas of the urban fabric actually classified as degraded. Together with the analytical approach based on view sheed analysis, local survey and classifications, and land suitability approach, a proposal had been developed in terms of strategic objectives to be included in a wider process of urban regeneration.

Keywords: Urban regeneration · Landscape · View sheed

1 Landscape Perception as a Driver for Urban Regeneration Policies

The focus on landscape comes from the observation that in the last fifty years, the Italian landscape was significantly changed from urban evolution, largely devoid of formal and functional qualities. The enormous development of automobile transport has led to a great dispersion of residential and production functions with huge land take, impairment of the most obvious landscape features, as well as loss of habitat and biodiversity, and energy expenditure [1–5].

The starting position for this research is to consider "viewshed analysis" as a useful basis of the development of spatial planning practices aimed at the protection of the territorial landscape values, which provides quantitative estimations for the major environmental interest areas, combining it with historical and cultural values in a specific urban context realizing a "place based" approach [6–9]. This plan aims at a high landscape quality as a key element in the sustainability and competitiveness of urban areas [10], therefore, is an attempt to optimize the quality of vision by carefully analyzing and reducing degradation of elements within it. The development of the area passes, first, by a heightened awareness of citizens [11–13], especially children because they will be the future key players and decision makers.

© Springer Nature Switzerland AG 2019
S. Misra et al. (Eds.): ICCSA 2019, LNCS 11624, pp. 308–317, 2019.
https://doi.org/10.1007/978-3-030-24311-1_22

The valuation of the potential of a place (and its value) was generally subjective assessment; otherwise based on special considerations, such as proximity to the city center and other services, and it make an assessment on the quality of the landscape, as linked to the perception of three key areas:

- Territorial environment: it gives value to the presence of natural elements on the territory: forests, rivers, areas subject to agricultural development, etc.;
- Cultural Identity: the presence on the territory of historical/cultural areas (e.g. the old villas, bridges, walls, historic monuments);
- Urban context: linked to build-up areas, the characteristics of buildings and the type of settlement system.

Results a complexity of the landscape domain, derived from its systemic character: *"a set of elements, a set of relationships and a set of meanings, meaning elements, relationships and meanings not only in material terms"* [14].

The scope of work is to ensure the landscape protection and encourage proposals that look to the redevelopment of specific areas of the urban fabric, to allow a local identity recovery Potenza's territory. Such ambitions in order to be effective has to consider the three basic principles of planning: *Equity,* Efficiency, Conservation of resources [12, 15, 16].

In a broader context that the New Urban Agenda [17] promote spatial assessment to define intervention priorities for urban regeneration through the implementation of 17 Sustainable Development Goals [18, 19]. Results an ambitious vision of the compact cities, developed along sustainable public transport axes and humanized by a poly-centric growth. Among the main points of the New Urban Agenda is the so-called right to city: "Cities are for people, not for profit" - a principle that drives governments to a schedule that favors the public over the private.

The NUA has the aim of exploiting the urban dynamism as an engine of sustainable development, but against the expansion invades and pollutes increasingly natural and precious resources, in fact natural ecosystems suffered fragmentation [20] and degradation. The NUA seeks to counter these phenomena while not providing practical guidance on the application of the principles on the financing of projects and the monitoring.

In the context of the right to the city is the methodological space of this research. In facts it analyze the relationship between people and their surroundings. The landscape is not only *landscape*, so as a vision of what the landscape is, but it is also *inscape*, that is what the landscape returns, as a result of the bond that exists between the place and the personality. For these reasons the landscape involves a number of dimensions which, although different from each other interpenetrate [21].

The perception of the landscape becomes a vehicle for the acquisition of scenic value for the individual and for the local authorities, as well stimulated the search for intervention strategies, appropriately selected in a program of development and urban regeneration. In accordance with the NUA regeneration must take place as a function of sustainability principles also looking to European environmental objectives and on the targeted choices to the preservation and enhancement of the territory, preserving the integrity of the protected areas and favoring a development that is proportional to the housing demand of reality under consideration.

2 Case Study Area: Town Power

The city of Potenza is located in Basilicata, one of the Italian regions. The territorial analysis developed to construct a proposal of intervention for the New Urban Agenda in the city, that considers the perception of the landscape as the selection criteria for projects and areas of intervention, is based on the following basic data:

- Digital Surface Model: with a resolution of 5 m and with the relative shares of the elements above the surface (buildings, trees, etc.) retrieved;
- Charter Land Use: classified in three levels of Corinne Land Cover present for Basilicata;
- Data on pasture or fallow: in shape file format;
- Data of the lots in the industrial valley of Basento river: in shape file format;
- Google Earth as open data useful for mapping urban and landscape degradation.

The viewshed Analysis [22] is a spatial analysis technique that uses algorithms of lines of sight in order to determine the visibility of areas from a certain point of observation of the territory. Viewshed is the area that can be seen from a certain location or from a line (a series of points) of observation. We get the display of the areas as a function of the morphology of the terrain and of the position (and possibly elevation on the ground) of the observation point.

Therefore, the factors that affect the scenic-perceptive analysis, or the identification of the visual relationships that make recognizable the landscape and its characteristic elements, are:

- amplitude of the field of view;
- effects of light and shadow;
- the physical properties of some landscape elements (landmarks);
- sighting dynamic (static or dynamic);
- atmospheric refraction.

In reference to the case study, the choice of the observation points is a characterizing element. In fact, we worry about the perception of the landscape where a citizen can enjoy moving within the major urban parks, squares selected as a meeting place and close to the architectural heritage in historical and cultural significance, and on routes that represent intangible assets related to the performance historical and tourist itineraries parades.

In order to fully represent the view within the urban parks, for each of them were considered to be three observation points in each main observation area. The following figure show the public spaces from which it was carried out the analysis of intervisibility (Fig. 1).

The Land Use Map, at the first level of Corine Land Cover, has been used to assign a criterion of landscape quality, recognizing the maximum value of quality to the wooded areas, both those subject to protection (ex L. 431/85 Galasso), and those who remain excluded; minimum and to urban areas. The remaining part of the data was used to produce a map of degraded areas. By degradation is meant the alteration of the character and landscape quality. The degradation is designed as a component of land

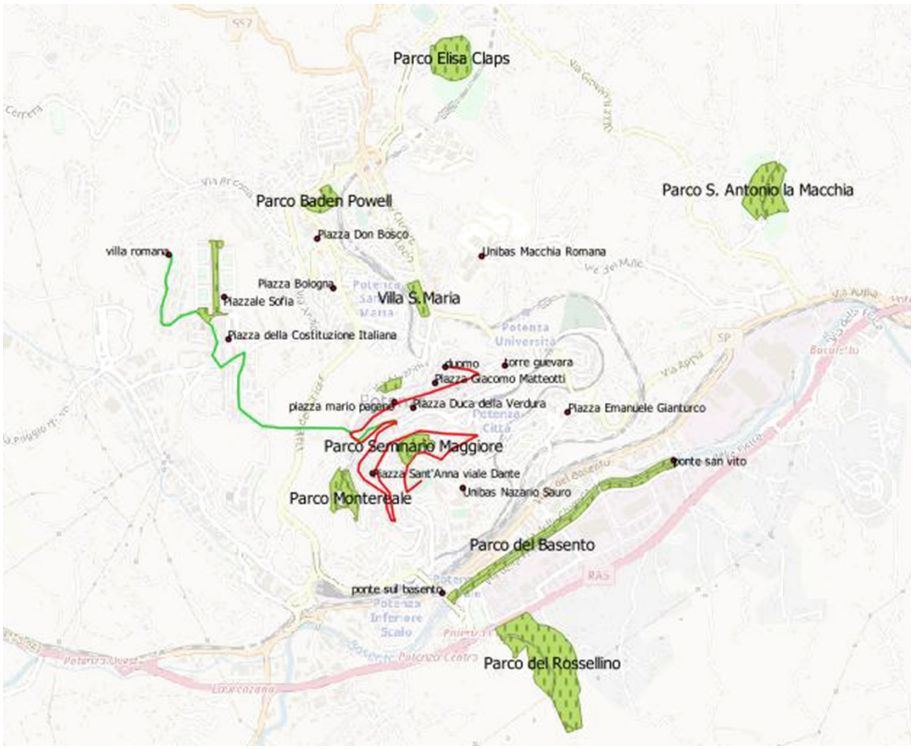


Fig. 1. Representation of OF1 points and routes.

transformation, often these degraded landscapes are mixed with the socio-economic processes deriving from de-industrialization. To identify an objective criterion in the definition of degradation, it is assumed everything within the urban fabric without a clear function representative of urban decay (Fig. 2).

The viewshed analysis, the reclassification of land use classes and the map of the degradation in the town of Potenza, are the criteria used to build a Land Suitability map. This is the base to assess the territorial specialization: analytical approach combining various layers of information for assess where it is strongest susceptibility intervention.

FAO looks to three degrees of suitability [23, 24]:

- S1 = plots that do not have significant limitations or have only minor limitations in order to support a particular type of soil use without a significant reduction in productivity or the benefits and not request further input in excess of an acceptable level;
- S2 = Land with limitations that, overall, are moderately severe for sustained application of the given type of land use; restrictions reduce productivity or benefits and increase the required input to the extent that the overall benefit you get from

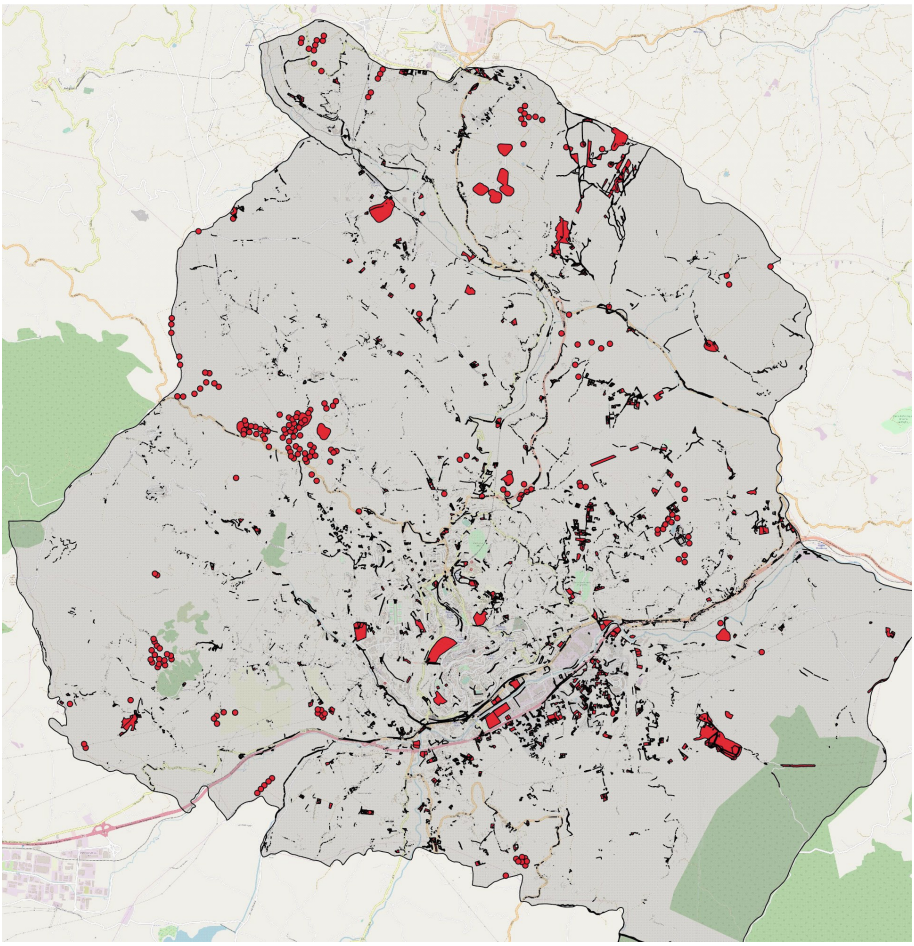


Fig. 2. Representation of urban decay areas and landscape.

use, although still attractive, it will be appreciated than that expected from the land of the S1 class.

- S3 = Land with limitations that, overall, are severe for the use prolonged application of soil data type and so reduce productivity or benefits, or increase the required inputs, that any expenditure will be only marginally justified.

As for the classification of GEODESIGN [25–28] however, they have identified these classes: feasible, suitable, capable, not appropriate, existing.

To obtain this classification different weights had been assigned to the three criteria (greatest weight to the degradation) and, in order to get a realistic scenario, the areas that are not visible had been classified as "not appropriate areas" for intervention since we can't make any consideration about them. Wooded areas with high visibility will be

classified as "existing" since they are the areas to be protected without any interventions.

3 Results and Discussion

All areas visible from the observation points had been reclassified according to the visibility rate: from a single point (in white), up to the visibility from seven points (in green) (Fig. 3).

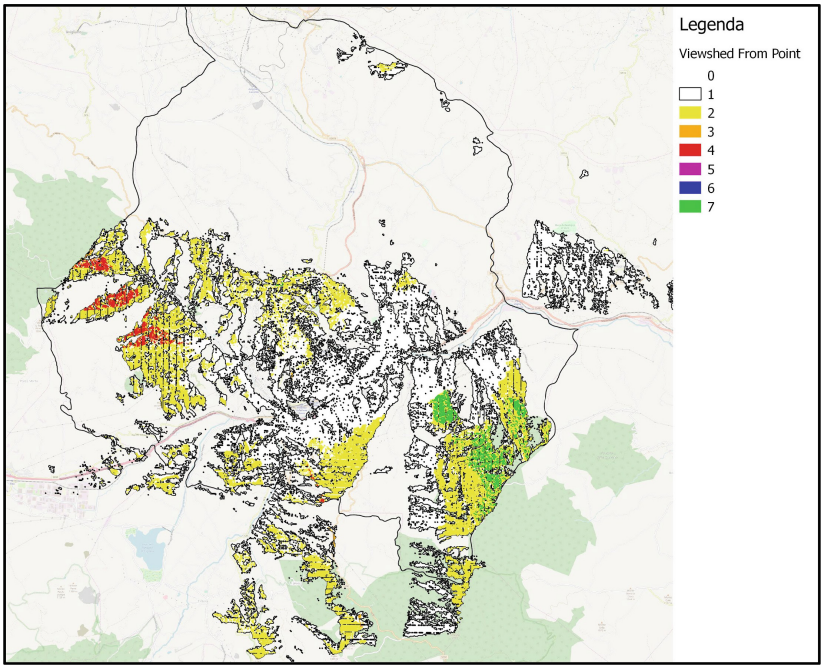


Fig. 3. Visibility rate. (Color figure online)

After that we included degradation analysis: urban-fabric vacant lots, abandoned buildings or in a bad state and maintenance state-suburban or peri – uncultivated, landfills, wind and solar plants. Such datasets represents those areas generating the landscape degradation. In terms of area extend in relation to the entire municipal area we obtained a 3.34%. This has allowed us to obtain the full map of lad suitability according with degradation degree (base-line approach) (Fig. 4).

On the right side of the image shows a zoom on the city center in scale 1: 50000, from which all degraded areas had been classified as "feasible".

In order to estimate intervention priorities threshold equal to 2.19 had been imposed in order to classify "feasible" territorial areas according with the expert perception of landscape degradation.

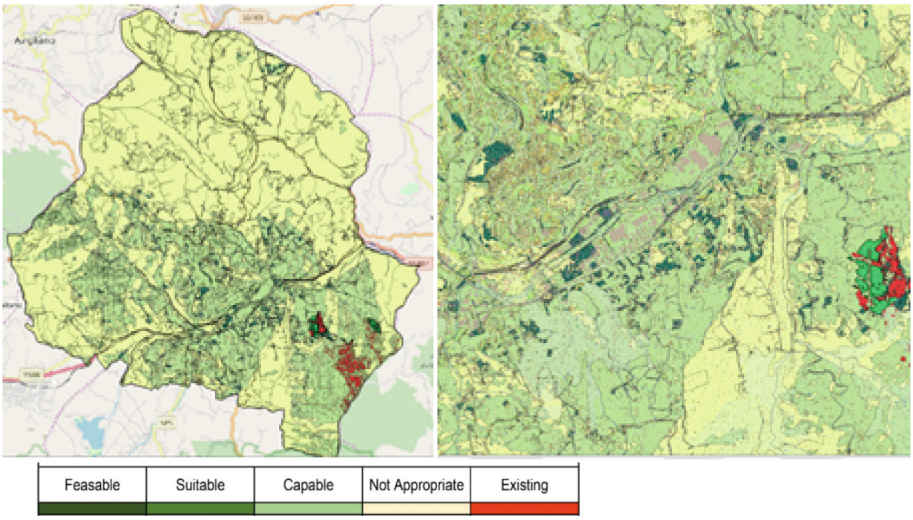


Fig. 4. Representation of the baseline scenario.

4 Final Remarks

In the map shown in Fig. 5 a synthetic representation of areas that need intervention (visible with "feasable" value) is available. Such category is more included in the urban area. It includes abandoned industrial lots or abandoned and uncultivated areas, which are mostly concentrated in the peri-urban and interurban fringe. The proposals for action on the whole municipality of Potenza is based on the following specific objectives:

- To preserve and enhance the heritage landscape exists;
- To reinforce local identity;
- To invest in the recovery of the urban and landscape degradation.

The proposed strategic framework for environmental protection will ensure the implementation of restrictions for new anthropic transformations avoiding territorial fragmentation and lad take. On the organizational point of view the protection of the existing landscape has to be monitored by an Observatory of the landscape, whose purpose is to be a meeting place between administrative levels of government, institutions, universities, professional sectors and the entire society operating in the field of landscape management. Other interventions regard the involvement and training in schools with activities already tested and promoted by "Legambiente" pointing at the education of a conscious and informed citizen [11–13, 29–31]. An example is represented by "Ecomuseums" project: a portion of the territory characterized by traditional living environments, natural and historical heritage art worthy of protection, restoration and enhancement.

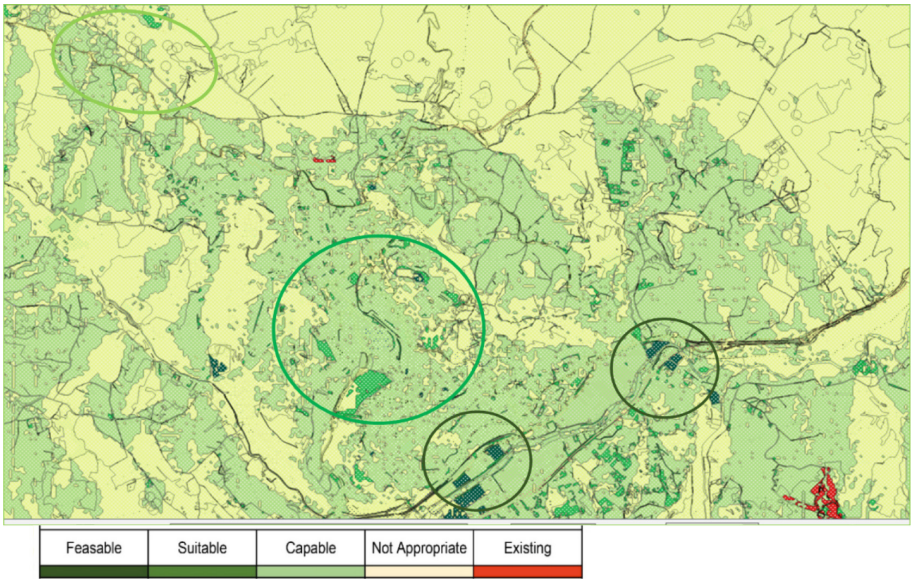


Fig. 5. Diversification of the scenario in relation to the second threshold value and identification of intervention priorities.

These proposals fit into a place based approach connected with several funding opportunities in order to concretely overcome landscape neglecting tradition in Pontenza planning.

A priority is represented by the need to recovery degraded urban areas starting from the redevelopment of vacant lots: in fact, the Land Suitability have been identified with the "feasable" value of the areas that fall mostly in the ASI area. The goal is to break down some sheds that flock to the state of decay (some with asbestos roofing, as shown in the Google Earth map) or abandonment (CIP ZOO) in order to clean up the surrounding area. It is necessary to redevelop the uncultivated areas identified in suburban area: all unused green areas are part of degradation, especially the urban ones, since areas with no functionality in the urban context.

Acknowledgement. This research was developed in the framework of the Territorial Engineering studios (AY 2018-2019) School of Engineering, University of Basilicata. The work reports main evidences from the analysis developed by students supervised by Francesco Scorza.

References

1. Ciabò, S.: The landscape value: interpretive categories, diagnostic techniques and management rules fast planning/ fast monitoring view project sprinkling model view project Serena Ciabò. Planum. J. Urban. **2** (2013)
2. Zoppi, C., Lai, S.: Land-taking processes: an interpretive study concerning an Italian region. Land Use Policy **36**, 369–380 (2014). https://doi.org/10.1016/j.landusepol.2013.09.011

3. Scorza, F., Pilogallo, A., Las Casas, G.: Investigating tourism attractiveness in inland areas: ecosystem services, open data and smart specializations. In: Calabrò, F., Della Spina, L., Bevilacqua, C. (eds.) ISHT 2018. SIST, vol. 100, pp. 30–38. Springer, Cham (2019). https://doi.org/10.1007/978-3-319-92099-3_4
4. Mazzariello, A., Pilogallo, A., Scorza, F., Murgante, B., Las Casas, G.: Carbon stock as an indicator for the estimation of anthropic pressure on territorial components. In: Gervasi, O., et al. (eds.) ICCSA 2018. LNCS, vol. 10964, pp. 697–711. Springer, Cham (2018). https://doi.org/10.1007/978-3-319-95174-4_53
5. Romano, B., Zullo, F.: Landscape fragmentation in Italy. Indices implementation to support territorial policies. In: Campagna, M., De Montis, A., Isola, F., Lai, S., Pira, C., Zoppi, C. (eds.) Planning Support Tools: Policy Analysis, Implementation and Evaluation, pp. 399–414. Franco Angeli, Milano (2012)
6. Barca, F.: An agenda for a reformed cohesion policy (2009)
7. Las Casas, G., Scorza, F.: Un approccio "context-based" e "valutazione integrata" per il futuro della programmazione operativa regionale in Europa. In: Bramanti, A., Salone, C. (eds.) Lo sviluppo territoriale nell'economia della conoscenza: teorie, attori strategie, Collana Scienze Regionali, pp. 253–269. Franco Angeli, Milano (2009)
8. Scorza, F., Casas, G.L., Murgante, B.: Overcoming interoperability weaknesses in e-government processes: organizing and sharing knowledge in regional development programs using ontologies. In: Lytras, M.D., Ordonez de Pablos, P., Ziderman, A., Roulstone, A., Maurer, H., Imber, J.B. (eds.) WSKS 2010. CCIS, vol. 112, pp. 243–253. Springer, Heidelberg (2010). https://doi.org/10.1007/978-3-642-16324-1_26
9. Murgante, B., Scorza, F.: Ontology and spatial planning. In: Murgante, B., Gervasi, O., Iglesias, A., Taniar, D., Apduhan, B.O. (eds.) ICCSA 2011. LNCS, vol. 6783, pp. 255–264. Springer, Heidelberg (2011). https://doi.org/10.1007/978-3-642-21887-3_20
10. European Commission: First Report on Economic and Social Cohesion (1996)
11. Murgante, B., Botonico, G., Graziadei, A., Sassano, G., Amato, F., Scorza, F.: Innovation, technologies, participation: new paradigms towards a 2.0 citizenship. Int. J. Electron. Gov. **11**, 62–88 (2019). https://doi.org/10.1504/IJEG.2019.098814
12. Las Casas, G., Scorza, F.: A renewed rational approach from liquid society towards anti-fragile planning. In: Gervasi, O., et al. (eds.) ICCSA 2017. LNCS, vol. 10409, pp. 517–526. Springer, Cham (2017). https://doi.org/10.1007/978-3-319-62407-5_36
13. Pontrandolfi, P., Scorza, F.: Making urban regeneration feasible: tools and procedures to integrate urban agenda and UE cohesion regional programs. In: Gervasi, O., et al. (eds.) ICCSA 2017. LNCS, vol. 10409, pp. 564–572. Springer, Cham (2017). https://doi.org/10.1007/978-3-319-62407-5_40
14. Castiglioni, B., Parascandolo, F., Tanca, M.: Landscape as Mediator, Landscape as Commons International Perspectives on Landscape Research, Padova (2015)
15. Casas, G.L., Scorza, F.: Sustainable planning: a methodological toolkit. In: Gervasi, O., et al. (eds.) ICCSA 2016. LNCS, vol. 9786, pp. 627–635. Springer, Cham (2016). https://doi.org/10.1007/978-3-319-42085-1_53
16. Las Casas, G., Scorza, F., Murgante, B.: New urban agenda and open challenges for urban and regional planning. In: Calabrò, F., Della Spina, L., Bevilacqua, C. (eds.) ISHT 2018. SIST, vol. 100, pp. 282–288. Springer, Cham (2019). https://doi.org/10.1007/978-3-319-92099-3_33
17. UN Habitat: New Urban Agenda, United Nations (2017)
18. Hák, T., Janoušková, S., Moldan, B.: Sustainable development goals: a need for relevant indicators. Ecol. Indic. **60**, 565–573 (2016). https://doi.org/10.1016/j.ecolind.2015.08.003
19. UN: Sustainable Development Goals (2014). http://www.igbp.net/download/18.62dc35801456272b46d51/1399290813740/NL82-SDGs.pdf. https://doi.org/10.1038/505587a

20. Saganeiti, L., Favale, A., Pilogallo, A., Scorza, F., Murgante, B.: Assessing urban fragmentation at regional scale using sprinkling indexes. Sustainability **10**, 3274 (2018). https://doi.org/10.3390/su10093274
21. Petrocelli, E.: Il Paesaggio: un tema transdisciplinare, Napoli (2019). https://doi.org/10.6093/978-88-6887-052-2
22. Joly, D., et al.: A quantitative approach to the visual evaluation of landscape. Ann. Assoc. Am. Geogr. **99**, 292–308 (2009). https://doi.org/10.1080/00045600802708473
23. Higgins, G.M., Kassam, A.H., Higgins Ah Kassam, G.M.: The FAO Agro-ecological zone approach to determination of land potentlal. Pedologie **XXXI**, 147–168 (1981)
24. Bydekerke, L., Van Ranst, E., Vanmechelen, L., Groenemans, R.: Land suitability assessment for cherimoya in southern Ecuador using expert knowledge and GIS. Agric. Ecosyst. Environ. **69**, 89–98 (1998). https://doi.org/10.1016/S0167-8809(98)00090-5
25. Steinitz, C.: A Frame Work for Geodesign. Changing Geography by Design (2012)
26. Campagna, M.: Geodesign from theory to practice: from metaplanning to 2nd generation of planning support systems. Tema - J. L. Use Mob. Environ. (2014). https://doi.org/10.6092/1970-9870/2516
27. Padula, A., Fiore, P., Pilogallo, A., Scorza, F.: Collaborative approach in strategic development planning for small municipalities. Applying geodesign methodology and tools for a new municipal strategy in Scanzano Jonico. In: Leone, A., Gargiulo, C. (eds.) Environmental and Territorial Modelling for Planning and Design, pp. 665–672. FedOApress (2018). https://doi.org/10.6093/978-88-6887-048-5
28. Fiore, P., Padula, A., Pilogallo, A., Scorza, F.: Facing urban regeneration issues through geodesign approach. The case of Gravina in Puglia. In: Leone, A., Gargiulo, C. (eds.) Environmental and Territorial Modelling for Planning and Design. FedOAPress (2018). https://doi.org/10.6093/978-88-6887-048-5
29. Scorza, F., Grecu, V.: Assessing sustainability: research directions and relevant issues. In: Gervasi, O., et al. (eds.) ICCSA 2016. LNCS, vol. 9786, pp. 642–647. Springer, Cham (2016). https://doi.org/10.1007/978-3-319-42085-1_55
30. Dvarioniene, J., Grecu, V., Lai, S., Scorza, F.: Four perspectives of applied sustainability: research implications and possible integrations. In: Gervasi, O., et al. (eds.) ICCSA 2017. LNCS, vol. 10409, pp. 554–563. Springer, Cham (2017). https://doi.org/10.1007/978-3-319-62407-5_39
31. Las Casas, G., Scorza, F., Murgante, B.: Conflicts and sustainable planning: peculiar instances coming from Val D'agri structural inter-municipal plan. In: Papa, R., Fistola, R., Gargiulo, C. (eds.) Smart Planning: Sustainability and Mobility in the Age of Change. GET, pp. 163–177. Springer, Cham (2018). https://doi.org/10.1007/978-3-319-77682-8_10