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Silvia Ronchi *Editors*

Ecosystem Services and Green Infrastructure

Perspectives from
Spatial Planning in Italy


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Chapter 14

Messina. Green and Blue Infrastructures for the Re-urbanisation of the City



Carlo Gasparri and Anna Terracciano

Abstract The strong criticalities expressed by its environmental condition make Messina a *paradigm city* to face the multiplicity of factors that stress cities in the world today, dangerously intercepting the risks deriving from climate change, to which are added the effects of the economic and social crises. Thus, the new Urban Plan takes on the integrated interpretation of risks as an opportunity in the defining of a way of shaping the resilient metamorphosis of the city, based on adaptive and proactive tactics and design actions that entrust a central role to green and blue infrastructures (GBI). This dense network of GBI, starting from the existing ones, moves within a territorial and local dimension to contrast the conditions of fragility, reduce exposure and vulnerability, and maximise biodiversity and the production of ecosystem services also in urban areas, contributing to greater safeguarding of the areas at risk and the regeneration of the territory. Indeed, although they have a systemic approach, they take shape through places, resources and practices, representing an open network of multi-functional and multi-scale relations for the testing of places with landscape and ecological quality, with inclusive social practices, innovative economies and public–private collaborative processes.

Keywords Climate change · Integrated risks · Resilient metamorphosis · Adaptive and proactive tactics · Green and blue infrastructures · Ecosystem services · Landscape · Inclusive social practices · Circular economy

Carlo Gasparri: Author of paragraphs 1,2 and 3; Anna Terracciano: Author of paragraphs 4 and 5. All the images accompanying this text are elaborations produced during the drafting process of Preliminary outline of the new Messina City Plan and are edited by Anna Terracciano

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14.1 Articulation and Interaction of Risks

Messina is characterised by a complex context of risks that presents the profiles of a peculiar exasperation, which can also be found to varying degrees in many other Italian cities:

- It is a medium-sized city (just under 240,000 inhabitants) with a very large municipal area (211 sq km compared to the 180 sq km average for Italian regional capital cities), which includes a large stretch of the Peloritani Mountains with about 70 torrents characterised by a widespread hydrogeological condition of risk. It presents a high level of seismic hazard and was completely razed in 1908 by a catastrophic earthquake and the consequent tsunami.
- It was rebuilt with a plan with a high consumption of soil and low density, which provided for the start of urban growth processes along some torrents, directed towards the hilly slopes, confirmed and amplified by the settlement dynamics of the second half of the twentieth century through a succession of oversized plans, including the existing one, a pervasive consumption of hilly soil and a progressive “cementificazione” (introduction of concrete or building on) of some torrent and river beds.
- These choices have determined a widespread condition of geomorphological, hydrogeological, hydraulic and seismic criticality, triggering a series of landslides, floods and rivers bursting their banks, up to the tragic mudslide in the Giampilieri district in 2009 with 37 deaths. There is therefore an intense cumulation and reciprocal amplification of the size, complexity and extension of the danger, exposure and vulnerability factors with respect to the various risks inherent to the physical safety of the territory and of the human settlements. In addition to this, there is the ineffectiveness, technical backwardness and lack of integration of the risk maps that are made available by the superordinate public bodies starting from the Regional and the River Basin Authorities.
- The increasing risk conditions are amplified by the constructional poverty and seismic vulnerability of new building and intersect with other types of risk closely connected to the characteristics of the process of the building of the city and its metabolism (Wolman 1965) during the twentieth century. Scarcity and vulnerability of water resources, soil consumption and pollution, low level of urban plant resources, environmental pervasiveness of urban traffic and air pollution, microclimatic vulnerability of open spaces, unsustainability of the levels of energy consumption, lack of control of the waste cycle, widespread production of waste and abandoned areas: Messina records and amplifies, in forms that are sometimes extreme, most of these risk conditions that are stressing the cities of the world in this historical phase, which are even more amplified by the climate changes¹ in progress.

¹ See <https://unfccc.int/>

14.2 Messina: A Resilient and Anti-fragile City

The new urban plan takes on the integrated interpretation of risks as an opportunity to outline a priority strategic objective in defining a resilient metamorphosis of the city, based on adaptive and proactive tactics and design actions that entrust a central role to green and blue infrastructures (GBI) (Figs. 14.1 and 14.2).

The preliminary outline of the Plan (Comune di Messina 2018) has initiated a chain of interpretations of the urban, environmental and social repercussions that these conditions produce, starting from the background noise that is expressed in the daily risks of an urban metabolism that has gone mad, up to the extreme and undisputed peaks of increasingly ordinary calamitous events.

The diversification and integration of strategies and actions related to the primary environmental resources pass primarily through the rethinking and recycling of water and its reach in the city, the proactive contrast to the consumption of soil, the preservation and the increase of the permeability of the soil and new policies for the decontamination of polluted soils, the reduction of sources of pollution and the increase in urban plant resources, the greater efficiency of structural, energy use and facilities of the existing fabric, the recycling of waste and waste areas, the development of soft mobility and the strengthening of public rail transport.

However, this change of priorities, the multi-scale nature of strategies and actions, the ability to integrate them and make them synergic over time and space must serve an idea of the city legitimised by an adequate level of cultural awareness and not entrusted to sectoral urban policies. In this sense, the materials of resilient actions will contribute to providing Messina with a network of environmental infrastructures that are capable of constituting the frame of a city that imagines itself increasingly less pervasive from the construction point of view and increasingly focused on valorising the geography of a territory with exceptional landscape quality.

In this perspective, the construction of a specific “Action Plan” (De Cola and Gasparrini 2017) for Messina, inserted in the first “Report” of the *Casa Italia* Mission Structure of the Presidency of the Council of Ministers, gave a glimpse of a public planning and programmatic perspective within an integrated dimension of risks, both at the local scale of the city of Messina and at a national level, as a paradigmatic example of future policies to reduce Italian cities’ exposure to risk. At the same time, the definition of the preliminary outline of the new master plan of the city, starting from this objective of reducing exposure to hydrogeological, hydraulic and seismic risks, intends to prefigure a wider perspective of adaptation within a geostrategic dimension for the whole city.

Messina thus aims to search for possible and compatible forms of adaptation in areas of moderate risk and, in some cases, to withdraw progressively from the torrent and river beds and from areas of high-risk and high environmental sensitivity, favouring densification and compactness and valorising the diversity of the landscape of the different forms of settlement. The construction of an “Integrated charter of risks and susceptibility to urban redevelopment,” prefigured as a first

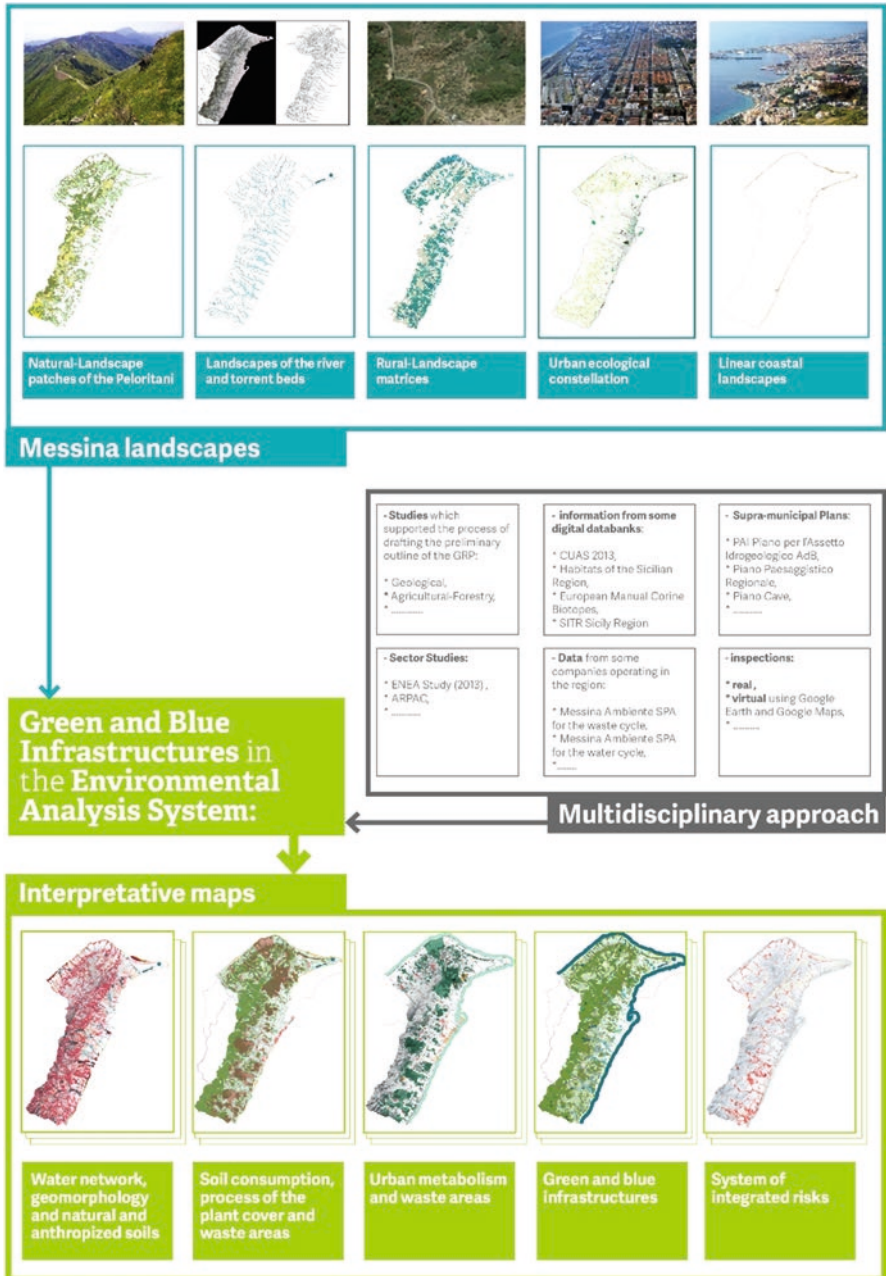


Fig. 14.1 Guidelines for the environmental infrastructures project: general scheme and multi-scalar approach



Fig. 14.2 Green and blue infrastructures: adaptive and proactive tactics and design actions

approximation in the preliminary outline of the plan, may constitute the dynamically updated reference for a strategy of contrast and adaptation to a multiplicity of risks that would be able to accommodate ecological-environmental, social and economic ones. This change describes an idea of a resilient city that valorises the noble parts of urban history (the regular “chessboard” of the Borzì Plan, the network of villages and the historical and architectural emergencies) and finally takes the perverse intersection of existing risks into account – primarily hydrogeological, hydraulic and seismic ones. In this sense, it starts a slow and incremental process of ecologically oriented regeneration to adapt to these critical conditions, raising the performance quality of the existing fabrics and open spaces.

This is a strategy at two scales – regional and local – which mainly relies on the creation of a GBI network, starting from the existing ones, capable of combating fragile conditions and, at the same time, maximising biodiversity and the production of ecosystem services even in urban areas (Sinnott et al. 2015).

14.3 An Incremental Frame for the Resilient Metamorphosis of Messina

The role of the GBIs in this change of direction with respect to the past takes its cue from an evaluation of the most fertile legacy of the debate at the international level in the last 15 years. In the experience of urban, strategic and operational planning of cities and urbanised territories – from large metropolitan areas to intermediate cities up to inland areas – the GBIs tend to take on a central role in the search for possible territorial coalescences and viable prospects for cohesion, which are ecologically oriented, socially inclusive as well as capable of targeting new circular urban economies (Benedict and McMahon 2006). This process is particularly substantial and articulated in Europe where, in the guidelines of urban policies and the most advanced regulatory and managerial European Union guidelines, in the increasingly central role of cities and their networks and alliances on the issue, as well as in the cultural debate and in research, the need for a complex and integrated dimension of the GBIs is being affirmed to respond to the demand for an inescapable resilient re-urbanisation of landscape, environmental and functional quality (Gasparrini 2019).

The virtuous convergence of different questions, to which sectoral and fragmentary answers have always been given, allows us to go beyond the traditional environmental field in which the GBIs have been imagined and intercept more complex urban, social, economic and managerial declinations that are more closely connected to the pervasiveness of the outcomes of the dynamics of contemporary urbanisation and its various ecological, social and economic risks (Beck 2013).

The GBIs are reflected in the extensive production of EU policies and strategies over the last 10 years (Mell 2008, 2015), the 2009 White Paper on adaptation to climate change (European Union 2009) and the European Biodiversity Strategy (European Union 2010) not to mention the Green Infrastructure Strategy of 2013. It is the meaning of these networks that has suffered in the last few years from a

substantially environmental perspective, poorly in step with the multidimensional complexity that has been taking shape in European cities.

An explicit and convincing reference for Green Infrastructures can be found in 2017 in the Bologna Charter for the Environment² undersigned by the metropolitan cities – Messina included – for sustainable development, following the approval of the 2030 Agenda by the United Nations in 2015 (United Nations 2015): “Recognizing green infrastructures as indispensable elements for climate change adaptation and mitigation, for increasing territorial resilience and for enhancing ecosystem services” (supply or procurement, regulatory, cultural and support services).³ The earmarking of new European Funds for Regional Development and Cohesion 2021–2027 opens a virtuous perspective in this context to affirm an integrated vision of GBIs to give effective answers to a plurality of questions, integrating economic planning objectives with those of an urban, strategic and operational planning of local administrations. A “Greener Europe” is one of the five strategic objectives underpinning the proposal for the Regulation for the Programming of the new 7-year period, approved by the European Commission.⁴ A goal that must be pursued “through the promotion of a transition to clean and fair energy, green and blue investments, the circular economy, adaptation to climate change and risk management and prevention” (European Commission 2018). Therefore, an integrated dimension of the green perspective in our cities and in our territories entrusts the environmental infrastructures with the ability to triangulate different fields of public action, favouring interactions and complementarity with other public and private financial channels within the ideas of a city of which we hope to see an incremental resilient metamorphosis (Gasparini 2017a, b). In this evolving framework, the ongoing experience at Messina interprets the role of the GBIs at the same time as follows:

- A dynamic and resilient system of adaptation to the multiplicity of environmental risks, amplified by climate changes on planetary and urban scales
- The widespread, growing range of the production of ecosystem services for active and compensating counteractions to the criticalities produced by soil consumption
- The primary reference context for the re-organisation of urban metabolism and the life cycles of resources (primarily water, soil, plant resources, waste, energy)
- The frame of the new public city characterised by high urban and ecological-environmental standards

In this sense, it is possible to include in the GBIs different declinations and fields of public action which, in international experience starting from those in Europe, appear mixed and integrated differently:

² <http://www.comune.bologna.it/sites/default/files/documenti/Carta%20di%20bologna%20per%20l%27ambientepdf>

³ See the definition of the Millennium Ecosystem Assessment <https://www.millenniumassessment.org/en/index.html>

⁴ https://ec.europa.eu/regional_policy/it/2021_2027/

- Water networks and technical infrastructures of urban and territorial drainage designed for a dynamic city–water coexistence, mitigation and adaptation to hydrogeological and hydraulic risk, retention and recycling of water resources
- Networks and constellations of vegetative landscapes and permeable soils or soils that need unsealing to guarantee the production of ecosystem services, the replenishment of groundwater, the management of evapotranspiration processes, the reduction of CO₂ and climate-altering gases in the atmosphere, the improvement of urban microclimatic conditions (starting from the heat islands), air quality and urban ventilation
- Networks and constellations of drosscapes (polluted soils and bodies of water, abandoned residential or industrial and marginal areas, etc.) to be reclaimed, renaturated and recycled for ecologically oriented collective, social and productive uses
- Networks of roads and underground utilities that are adequate for the current and future demands for space for soft mobility, infrastructures for water retention, disposal and recycling, and energy and digital infrastructures
- Frame of public spaces of landscape quality for the identity, social life and security of the territories and communities
- Places of convergence of actions with a multi-actor approach for social re-appropriation and the creation of collaborative accords, and agreements relating to the management of common goods
- Privileged fields for the development of innovative urban economy production chain linked to recycling and the circular economy, inter-related to the production and management of common goods included in the GBIs (water, soil, greenery, waste, energy, soft mobility, welfare)

This obviously requires a series of choices that put the instrumentation, procedures, rules and organisation forms of the Public Administration under tension. In fact, they call for a convergence and complementarity of public resources at all scales, the activation of urban planning incentives and tax breaks aimed at the objective to match specific “cost centres” at the local level, the push for a new geography of social actors and entrepreneurial and contractual and partnership tools, multi-level governance and an internal re-organisation of public structures according to objective, the re-organisation of the production chains of plans from the vast to the municipal scale to ensure the effectiveness of public action.

14.4 The GBIs to Describe the Landscapes of Messina

The GBIs in Messina are configured like a huge frame that, with different gradients of naturalness, penetrates from the mountains to the sea mainly along the river beds, innervating the anthropic systems in the urbanised areas, also thanks to the strong pressure exerted by the Peloritani and its slopes that extend towards the coast. The GBIs thus pass through all types of landscapes, coming into contact with a territory

of disuse and abandonment, empty spaces, environmental and infrastructural criticalities, social conflicts and crises of some production cycles.

The highly critical aspects expressed by its environmental condition constitute one of the distinctive figures of the Messina landscape and make it a *paradigm city* to face the multiplicity of factors⁵ that in this historical phase put cities in the world under stress, also dangerously intercepting the risks deriving from the changes in addition to the visible effects of economic and social crises, expressed above all by the lack of equal access to resources and the right to the city (United Nations 2019).

From the reading of the historical territory and from the succession of settlement processes according to some significant temporal analyses, it is possible to deduce the degree of permanence and persistence that the GBIs still preserve as a supporting structure, capable of innervating the entire metropolitan dimension, while profoundly modifying itself through urban, peri-urban and natural contexts. This founding, structuring dimension has enormous potential in terms of regeneration of the GBIs and crosses all the documents in the Environmental System and, more generally, in the new Plan in which the GBIs take on a significant and innovative value because they propose the overcoming of the traditional meaning of an environmental and ecological network, entering into synergy with the landscape in its broadest and most contemporary meaning (LOTUS 1999).

The change⁶ in the concept of landscape – understood today as an interpretative, narrative and planning device – towards an integrated and unitary conception, is reaffirmed also in the European Landscape Convention⁷ of 2000, extending, in the works of the new City Plan,⁸ to the whole of the territory and to the differentiated outcomes of the processes of interaction, stratification and sedimentation of human activities with natural components. These reports allow the identification of a set of territorial identities, also for the purpose of multidisciplinary qualification of landscape-environmental planning, overcoming the idea of landscape as limited to some historical-environmental excellences. The decoding and narration of the features of the Messina landscape was a complex process, characterised by a multi-scalar dimension, the result of the interaction and multidisciplinary convergence of different knowledge that has made it possible to build an updated picture of the territorial structure, plant landscapes, evolutionary dynamics of use and consumption of soils, areas of environmental criticalities and, more generally, of the

⁵Of the numerous reports and world events we report: Brundtland Report (1987); Rio de Janeiro Environmental Conference (1992); Agenda 21 (1992); UNEP World Environment Report (GEO 5) (2012); Rio +20 Conference (2012).

⁶Also for the influence of Landscape Planning (McHarg 1997; Mostafavi and Doherty 2010; Waldheim 2006) and Landscape Ecology (Forman and Godron 1986)

⁷The European Landscape Convention defines the landscape as “An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” (Council of Europe 2010).

⁸A selection of the main documents and the report of the Preliminary Urban Design of the City Plan for Messina is available at <https://www.comunemessina.gov.it/area-pol-territorio/schema-di-massima-prg-2018/>

outcomes of urban metabolism and the more or less virtuous functioning of the city itself.

This process re-establishes a geography of the places where the components of the GBIs that characterise the territory and are easily recognisable on a large scale can mainly be attributed to five categories of landscapes: (1) the “Natural-Landscape patches of the Peloritani,” (2) the “Comb-like structure of the river beds,” (3) the “Rural-Landscape matrices,” (4) the “Urban ecological constellation” and (5) the “Linear coastal landscapes” (Fig. 14.3).

The materials that compose them and the relations they have with each other constitute the structure of the territory itself and are of fundamental importance to understand the relationships that exist between the hydro-geomorphological and vegetation aspects, but also between the consolidated and recently expanding urban settlements with agricultural contexts and coastal areas. This process was based on the interaction of some analytical-specialist readings from different sources such as: (1) Studies (Geological and Agricultural-Forestry) which supported the process of drafting the preliminary outline of the City Plan; (2) information from some digital databanks (SIT Regione Sicilia, CUAS 2013, Charter of the Habitats of the Sicilian Region, Habitat of the European Corine Biotopes Manual, Sitr Sicily Region,⁹ etc.); the forecasts of the Supra-municipal Plans and those of the Sector; some Sector Studies such as the ENEA Study (2013) for the assessment of landslide hazard in the municipal area; data from some companies operating in the region (such as Messina Ambiente SPA¹⁰ for the waste cycle); real and virtual inspections using Google Earth and Google Maps. The outcomes of this fact-finding process are represented in the interpretative readings contained in five families of papers, amongst which the “Integrated charter of the risks and the susceptibility to urban redevelopment” and the “Urban metabolism and dross spaces”¹¹ stand out for their newness and innovation.

The “Map of the integrated risks and susceptibility to urban redevelopment” is a multi-risk map and the result of the relationships and overlaps between the map of superordinate constraints, geological hazards and seismic hazards,¹² also considering some active geological conditions that determine changes to the territory (e.g. processes like flooding, landslides, permanent soil deformation due to seismic inputs), and represent a working document that aims to provide a summary picture of the state of vulnerability of the territory¹³ to guide the choices of the new Plan towards an integrated, resilient and adaptive mitigation dimension.

The map “Urban metabolism and dross spaces” represents the multiplicity of drosscapes, abandoned buildings, residual spaces, and brownfields intercepted by the continuity of infrastructural networks and by the reticular dimension of

⁹<http://www.sitr.regione.sicilia.it/>

¹⁰<http://www.messinambiente.it/>

¹¹ See <https://www.comunemessina.gov.it/area-pol-territorio/schema-di-massima-prg-2018/>

¹² Or Level 1 seismic microzonation (MS1).

¹³ See Geological study.

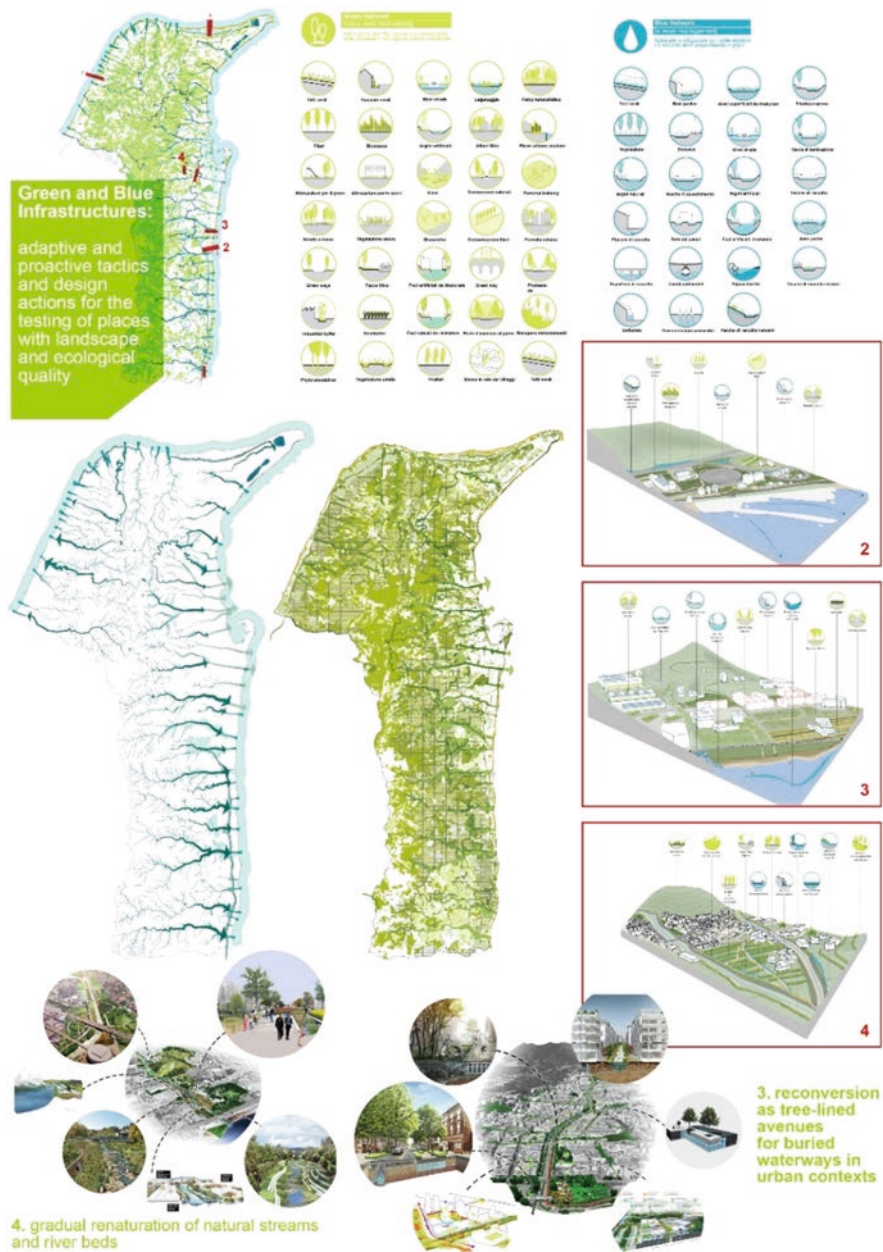


Fig. 14.3 Environmental analysis system: methodological scheme to describe the landscapes of Messina

ecological connections, restoring a critical porous structure that traverses the urban areas at various depths, inevitably overlapping with processes of soil consumption still in progress and the exhaustion of economic, productive and ecosystem life cycles. In Messina, the complex dimension of drosscapes but also and above all the mechanisms and outcomes of an out-of-control urban metabolism can be mainly traced back to the crisis of five life cycles: (1) compromised ecosystems (forestation, coast), (2) production cycles (agriculture, industry), (3) critical fabrics (services and equipment, settlements and residential buildings), (4) compromised infrastructure (mobility, special products) and (5) waste cycle.

14.5 Guidelines for the Environmental Infrastructures Project

From the reading of the territory, the centrality assumed by the environmental components emerges in the direction of a complex multi-system network of GBIs as a new potential resilient re-urbanisation frame for the city because it is not only able to penetrate into urban contexts to deeply regenerate the existing fabrics (Fabos and Ahern 1995), focusing on performance standards of high environmental quality, but also to intercept that constellation of existing micro and macro green pores, not only to reconstruct the ecological continuity from the mountains to the sea through reconnection and reconfiguration operations, but also to redefine a new relationship of coexistence between waters, communities and cities.

The Project Guidelines for Environmental Infrastructures in the Preliminary outline of the new City Plan aim to set up a frame of GBI Networks and Landscapes that plays a role of generator and regenerator for a virtuous urban metabolism in which stability objectives, richness and variety of natural and anthropic ecosystems are guaranteed, avoiding the formation of barriers or solutions of continuity between the habitats concerned. The role of an eco-landscape supporting framework, favouring a resilient, systemic and multi-scalar approach capable of providing adaptive and dynamic solutions, plays an essential role in protecting and strengthening the characteristics of the historicised landscape but also of its vulnerability.

For these reasons, the choices of the new City Plan for the Environmental Infrastructure System were based on the interaction of the following factors: (1) the implementation of guidelines, prescriptions and constraints contained in the superordinate Plans and in national and regional laws in specific sectors and components of the territory; (2) the evaluation of the interpretative outcomes of some specialised analyses prepared in support of the City Plan to represent an updated picture of the territory and of the risk conditions; (3) the evaluation of the interpretative results of some analyses developed to represent the characterising and qualifying

environmental components of the Messina landscape; and (4) the results of the first evaluations for the identification of the Urban Regeneration Areas – ARU.¹⁴

The evaluation of these factors should be considered within a broader framework of priority objectives¹⁵ where the main strategic guidelines identify the safeguarding and valorisation of landscapes, the virtuous adaptation to risk conditions and the awareness of the widespread demand for urban and environmental regeneration as the main fields of action of the choices of the new Plan.

The guidelines for the GBI System Project thus acquire a priority role in support of this strategic framework in which with the prospect of focusing on the regeneration of the existing city and, in particular, on destructured and precarious fabrics, on recycling and the re-use of buildings and of the special abandoned complexes, on the densification of low density and degraded fabrics and on the widespread recovery of unoccupied housing, it perfectly combines with the need not to further increase the consumption of new soil.

In particular, the large strategic fields for multi-scalar and inter-systemic actions are identified by the following landscapes:

- The “Natural-Landscape patches of the Peloritani” for which interventions are envisaged to valorise the woodland landscape as the large core area of a larger metropolitan park that goes as far as the historical and consolidated coastal city
- The “Landscapes of the river and torrent beds” for which mitigation measures are envisaged for the hydraulic risk and the more comprehensive system of integrated risks through operations of gradual renaturation of natural streams and river beds and reversion as tree-lined avenues for buried waterways in urban contexts together with the preservation and enhancement of the Ganzirri and Faro lake landscape and of historical hydraulic devices
- The “Rural-Landscape matrices” for which interventions are envisaged for safeguarding and valorising the agrarian landscapes on the slopes along the valleys of the rivers, the agricultural landscapes of the valley bottom characterised mainly by citrus groves and coastal agricultural landscapes in the sub-plain areas, together with the incentivisation of a process of consolidation of the agrarian terracing in use and of restoring abandoned ones which strongly characterise the historical agricultural landscape

¹⁴ See Document “P2.2 Settlement System and Services. Project Guidelines” of the Preliminary outline of the new City Plan of Messina. P2.2 Sistema Insediativo e dei servizi. Linee Guida di progetto” dello Schema di Massima del nuovo PRG di Messina. Available at Comune di Messina. <https://www.comunemessina.gov.it/area-pol-territorio/schema-di-massima-prg-2018/>

¹⁵ See the report of the preliminary outline of the new City Plan, which identifies a strategic framework articulated in priority objectives and strategic features to which some *visions* of cities correspond: (1) “City-mosaic of excellent landscapes”; (2) “Resilient and anti-fragile city”; (3) “Polycentric, regenerated and habitable city”; (4) “City-intersection, interconnected and accessible”; (5) “Attractive, welcoming and creative city”; (1) “Città-mosaico di paesaggi eccellenti”; (2) “Città resiliente e anti-fragile”; (3) “Città policentrica, rigenerata e abitabile”; (4) “Città-snodo, interconnessa e accessibile”; (5) “Città attrattiva, accogliente e creativa”. Available at Comune di Messina. <https://www.comunemessina.gov.it/area-pol-territorio/schema-di-massima-prg-2018/>

- The “Linear coastal landscapes” for which erosion mitigation, beach nourishment and redevelopment operations are envisaged, together with the strengthening of retrodunal vegetation
- The “Urban ecological constellation” for which, on an urban scale, regeneration interventions, valorisation and implementation of the existing system and the potential of micro and macro green pores are envisaged to rethink the relationship between cities and open spaces, incentivising sustainable management of soils and water, implementing the provision of urban standards through a new offer of multi-functional and leisure spaces, and, on the regional scale, actions for ensuring that safety standards are respected, reclamation and recycling also as large parks for quarries and disused tips and activities, if they are to be abandoned

14.6 The GBIs in Support of the Strategic Flagship Projects and Intervention Priorities

This dense network of GBIs, defined starting from the existing ones, moves within a dual-scale dimension, regional and local, to contrast the conditions of fragility and stress by identifying a set of multi-scalar and inter-systemic actions to reduce the exposure and vulnerability, maximise biodiversity and the production of ecosystem services, also in urban areas, thus contributing to ensuring that safety standards are respected in the areas at risk and regeneration of the territory (Center of Neighborhood Technology CNT 2010). Indeed, although they have a systemic approach, they take shape through places, resources and practices, representing an open network of multifunctional (Fabos and Ahern 1995) and multi-scalar relationships that become central in the rethinking of a new vision of the city for experimental planning of places of landscape and ecological quality, traversed by inclusive social practices, innovative economies and collaborative public–private processes, starting from the identification of the three Strategic Flagship Projects (SFP):

- “The great metropolitan park of the Peloritani in the city itself and the ‘comb’ of the rivers” as an opportunity for the city to have a park that is adequate to the real urban dimension and the environmental regeneration of the present fabrics infiltrated by the GBIs inside which there are rivers desaturated by building pressure and made safe, valorised and certified in terms of equipment and services, in order to reconstruct the balance of relationships between the city, the waters and the quality of the soils and their uses (Fig. 14.4).
- “The sequence of coastal landscapes and excellences on the two seas” that, along the large blue infrastructure of the coastline, intercepts a sequence of places and landscapes to be made safe and valorised in their environmental and functional diversity, from Giampileri and the Port of Tremestieri, to the former industrial areas that have been regenerated and the historic Port of Falcata up to Capo Peloro and beyond, towards Mortelle Tono and Villafranca. The development of

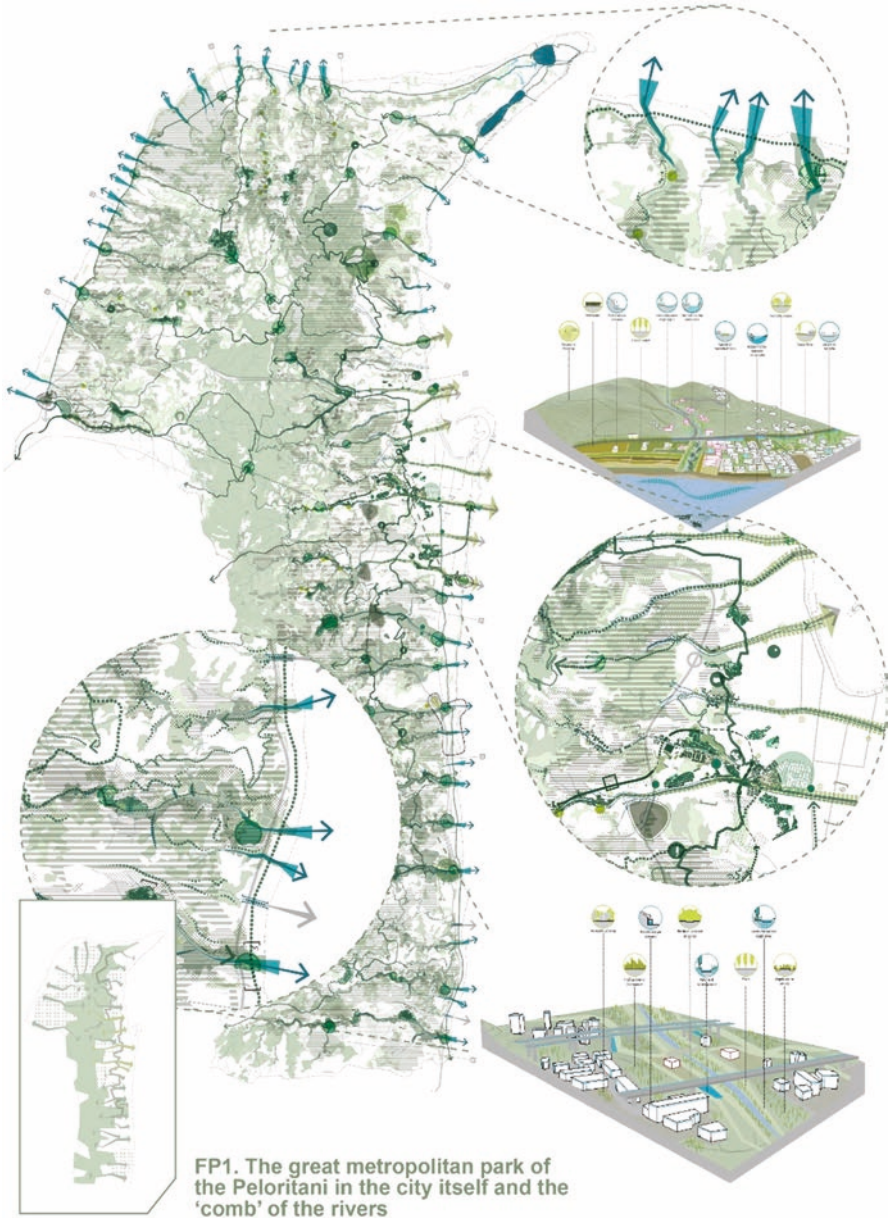


Fig. 14.4 Strategic Flagship Projects 1: “The great metropolitan park of the Peloritani in the city itself and the ‘comb’ of the rivers”

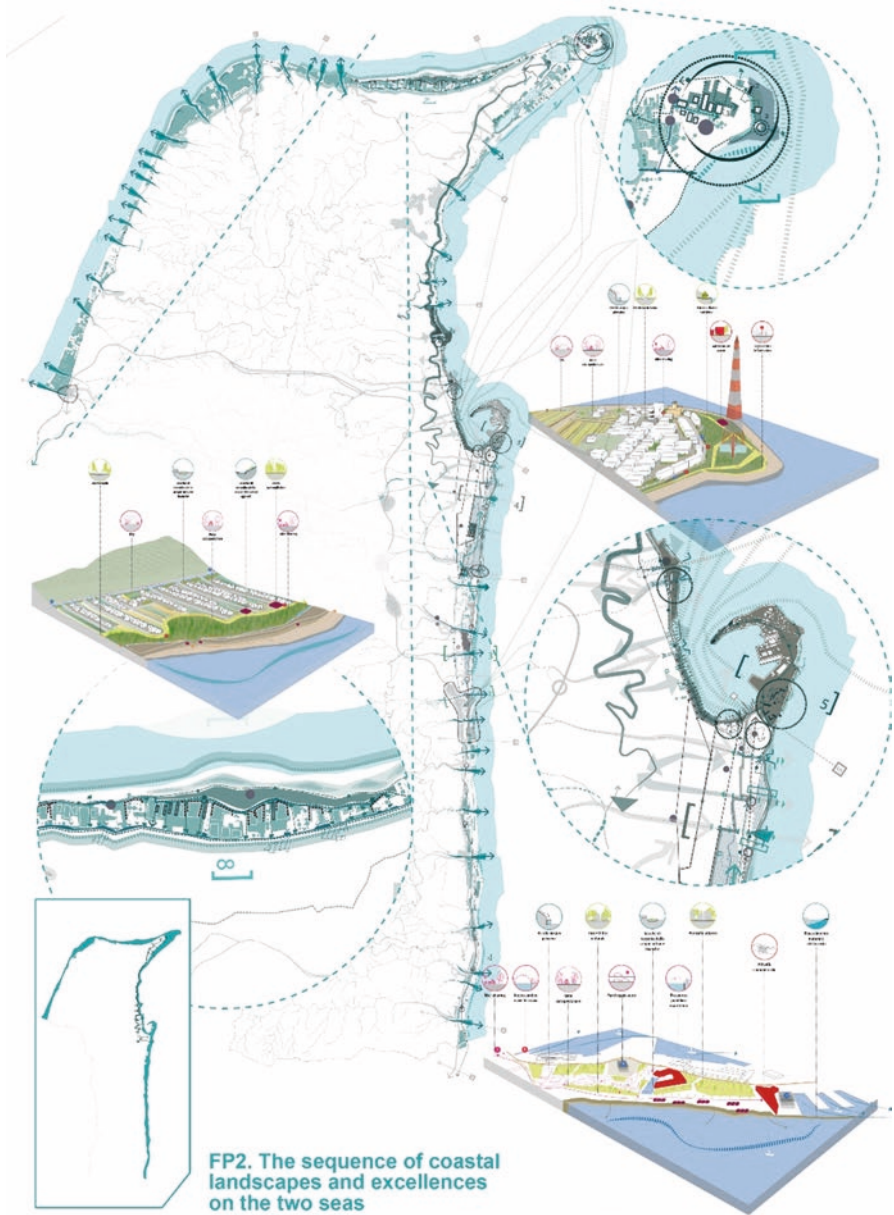


Fig. 14.5 Strategic Flagship Projects 2: “The sequence of coastal landscapes and excellences on the two seas”

slow cycling and pedestrian mobility and continuous public transport also favours the widespread accessibility to some urban and local scale centralities to be characterised and promoted (Fig. 14.5).

- “The disused railway as a greenway for urban regeneration” along the Messina-Palermo railway line, which cuts across the municipal territory from coast to coast, from the Ionian Sea to the Tyrrhenian Sea. Its recycling and re-functionalisation as a greenway, and therefore as a linear public space, activates a series of urban regeneration interventions of the settlements with the greatest urban and social degradation starting from the initiatives already being undertaken with national and international funds by the “CapaCity” project and POC Metro.¹⁶ At the same time, the Linear Park defines a strategic axis in the broader system of slow mobility, connecting it to the coastal circuit to close an urban cycle and pedestrian *ring road* as the backbone of a minute network of connections, footpaths and pedestrian paths that innervate the city from the sea to the mountains (Fig. 14.6).

Thus, in the parts of the city involved in the SFPs, there are the same places and areas of greater malleability and propensity to change traversed by the GBIs, and these represent the priority design and implementation opportunities because they are not only able to accept the main fields of convergence of the action public but also give shape to the main issues, be they central or cross cutting, of urban regeneration identified within the framework of strategic objectives and for which the efforts and resources of the various public administrations and private subjects involved in the implementation of the City Plan will be concentrated.

It is therefore clear that GBIs and SFPs inform each other through a circular dynamic in which the safeguarding, protection and requalification of the natural and anthropogenic landscapes that characterise and qualify the city and the territory of Messina are expressed through the strengthening of the great territorial ecological connections and matrices (Fabos and Ryan 2004). At the same time, the consolidation and strengthening of the widespread system of urban permeability, the protection of biodiversity and eco-sustainability of farming systems and the quality of the landscapes aim to produce not only environmental but also economic effects, due to the tourist vocation, of which the variety of landscapes in Messina is an essential component.

Note The reflections contained in this essay refer to a wider work developed during the drafting process of the Preliminary Plan of the City Plan of Messina (approved by the City Council on April 26, 2018). A selection of drawings and the General Report can be examined on the website of the Municipality of Messina (<http://www.comunemessina.gov.it/area-pol-territorio/schema-di-massima-prg-2018/>).

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¹⁶<http://www.ponmetro.it/home/programma/cosa-e/programma-azione-coesione-complementare/>

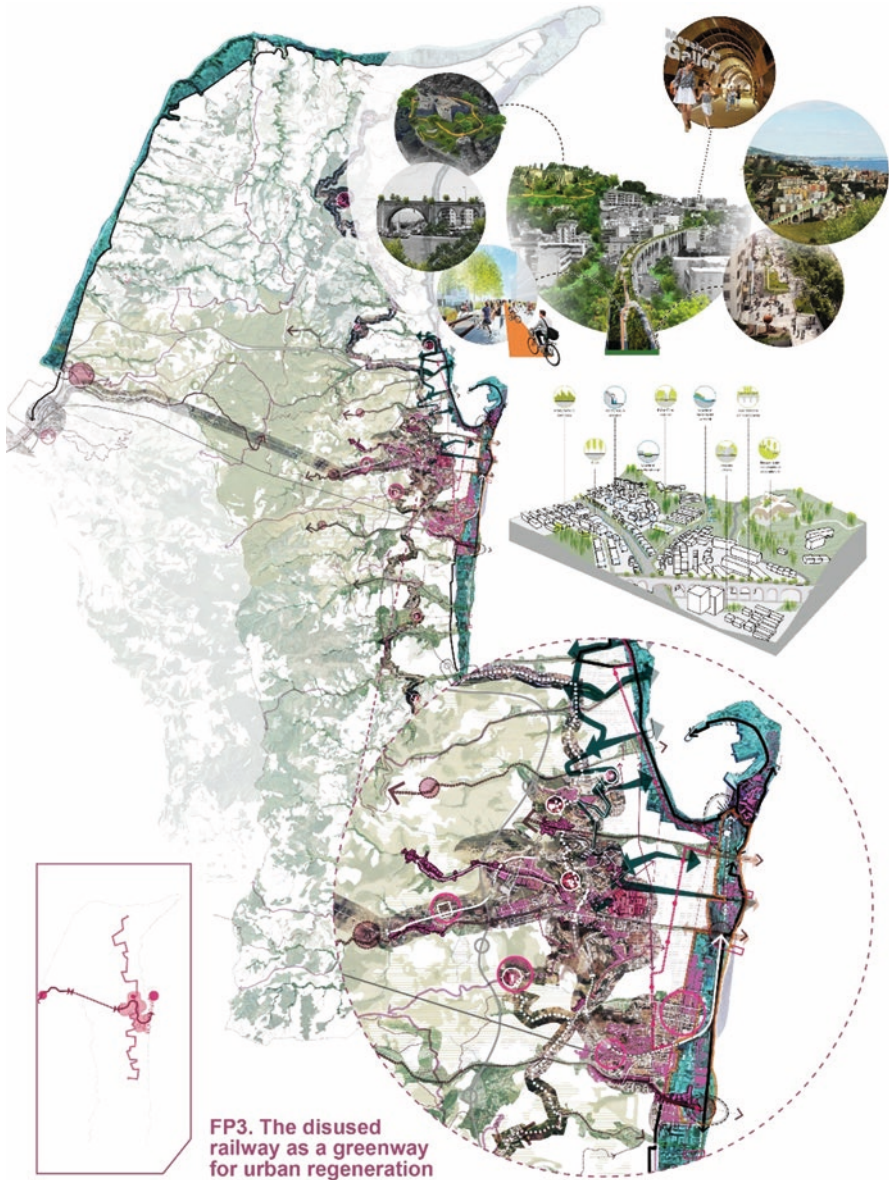


Fig. 14.6 Strategic Flagship Projects 3: “The disused railway as a greenway for urban regeneration” along the Messina–Palermo railway line

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References

- Beck U (2013) *La società del rischio. Verso una seconda modernità*, Quality paperbacks, Carocci
- Benedict MA, McMahon ET (2006) *Green infrastructure: linking landscapes and communities in landscape ecology*, vol 22, issue 5. Island Press, Washington, DC, pp 797–798
- Center of Neighborhood Technology CNT (2010) *The value of green infrastructure: a guide to recognizing its economic, environmental and social benefits*, Chicago, Illinois, Center for Neighborhood Technology and American Rivers. Available at CNT. <https://www.cnt.org/publications/the-value-of-green-infrastructure-a-guide-to-recognizing-its-economic-environmental-and>
- Comune di Messina (2018) Piano regolatore generale. Schema di Massima. Relazione. Available at Comune di Messina. <https://www.comunemessina.gov.it/area-pol-territorio/schema-di-massima-prg-2018/>
- Council of Europe (2010) *Convenzione europea del paesaggio*. Available at COE. <https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=0900001680080621>. Accessed 20 Oct 2010
- De Cola S, Gasparrini C (2017) Il Piano d'Azione "Ricostruzione del quadro informativo sull'esposizione ai rischi naturali del patrimonio abitativo del Comune di Messina". In: *Rapporto sulla Promozione della sicurezza dai Rischi naturali del Patrimonio abitativo*, Struttura di Missione Casa Italia, Presidenza del Consiglio dei Ministri. Available at Dipartimento Casa Italia. <http://www.casaitalia.governo.it/it/approfondimenti/rapporto-sulla-promozione-della-sicurezza/>
- ENEA (2013) *Valutazione della pericolosità da frana nel territorio del Comune di Messina*. Available at ENEA. <http://openarchive.enea.it/handle/10840/4771?show=full>
- European Commission (2018) *Report from the Commission to the European Parliament and the Council on the Implementation of the EU Strategy on Adaptation to Climate Change*. Brussels, 12.11.2018 COM(2018) 738 final. Retrieved from <https://www.eea.europa.eu/>
- European Union (2009) *Libro Bianco. L'adattamento ai cambiamenti climatici: verso un quadro d'azione europeo*. Available at EUR-Lex. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0147:FIN:it:PDF>. Accessed 31 Apr 2009
- European Union (2010) *Biodiversity strategy for 2020*. Available at EEA. <https://www.eea.europa.eu/publications/eu-2010-biodiversity-baseline/>. Accessed 31 May 2010
- Fabos J, Ahern J (1995) *Greenways: the beginning of an international movement*. Elsevier, Amsterdam
- Fabos JG, Ryan RL (2004) Editorial: international greenway planning: an introduction. *Landscape Urban Plan* 68(2–3):143–146
- Forman RTT, Godron M (1986) *Landscape ecology*. Wiley
- Gasparrini C (2017a) *The resilient metamorphosis of the cities*". In: *The Plan Journal "Resilient edges"* n. 2
- Gasparrini C, Terracciano A (eds) (2017b) *Drosscity*, ListLAB, Trento-Barcelona

- Gasparrini C (2019) Infrastrutture verdi e blu. Una priorità nazionale per la pianificazione urbanistica e la coesione territoriale nei prossimi anni. In: *Urbanistica Informazioni* n. 282
- LOTUS (1999) Tutto è paesaggio, n. 101
- McHarg IL (1997) *Ecology and design*. In: Thompson GF, Steiner FR (eds) *Ecological design and planning*. Wiley, New York, pp 321–332
- Mell IC (2008) *Green infrastructure: concepts and planning*. *FORUM: Int J Postgraduate Stud Archit Plann Landsc* 8(1):69–80
- Mell IC (2015) *Green infrastructure planning: policy and objectives*. In: Sinnett D, Smith N, Burgess S (eds) *Handbook on green infrastructure: planning, design and implementation*. Edward Elgar Publishing Limited, Cheltenham. Available at E-Elgar. <https://www.e-elgar.com/shop/eep/preview/book/isbn/9781783474004/>
- Mostafavi M, Doherty G (2010) *Ecological urbanism*. Lars Muller Publishers
- Sinnett D, Smith N, Burgess S (2015) *Handbook on green infrastructure: planning, design and implementation*. Edward Elgar Publishing Limited, Cheltenham. Available at E-Elgar. <https://www.e-elgar.com/shop/eep/preview/book/isbn/9781783474004/>
- SIT Regione Sicilia, CUAS (2013) *Carta dell'uso del suolo agricolo*, Retrieved from <http://www.sitr.regione.sicilia.it/download-cartografia>
- United Nations (1987) *Brundtland Report. Report of World Commission on Environment and Development "Our common future"*. Available at ARE. https://www.are.admin.ch/are/it/home/sviluppo-sostenibile/cooperazione-internazionale/l_agenda-2030-per-uno-sviluppo-sostenibile/ONU_-le-pietre-miliari-dello-sviluppo-sostenibile/1987%2D%2Drapporto-brundtland.html
- United Nations (1992) *Agenda 21. United Nations Conference on Environment & Development Rio de Janeiro, Brazil, 3 to 14 June 1992*. Available at UN Sustainable Development Goals. <https://sustainabledevelopment.un.org/outcomedocuments/agenda21>
- United Nations (2012) *Il futuro che vogliamo. Atti della conferenza Rio +20 United Nations Conference on Sustainable Development*. Available at ARE. https://www.are.admin.ch/are/it/home/sviluppo-sostenibile/cooperazione-internazionale/l_agenda-2030-per-uno-sviluppo-sostenibile/ONU_-le-pietre-miliari-dello-sviluppo-sostenibile/2012%2D%2Dconferenza-sullo-sviluppo-sostenibile%2D%2Drio-20-.html
- United Nations (2015) *Trasformare il nostro mondo: l'Agenda 2030 per lo Sviluppo Sostenibile*. Available at UNRIC. https://www.unric.org/it/images/Agenda_2030_ITA.pdf. Accessed 21 Oct 2015
- United Nations (2019) *UN environment's sixth global environment outlook*. Available at UN Environment. <https://www.unenvironment.org/resources/global-environment-outlook-6>
- United Nations Environment Programme (UNEP) (2012) *5th Global Environment Outlook (GEO-5) "Environment for the future we want"*, Malta, Retrieved from <https://www.unenvironment.org/resources/global-environment-outlook-5>
- Waldheim C (2006) *Landscape urbanism reader*. Princeton Architectural Press, New York
- Wolman A (1965) *The metabolism of cities*, *Scientific American*, n. 213