

# BDC

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### **Inner and Marginalized Areas: Geographies and Alliances Towards New Cohesion Policies**

**Guest Editors**

Gabriella Esposito De Vita

Elena Marchigiani

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# **BDC**

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**LOCAL NEEDS AND GLOBAL CHALLENGES:  
HOW NEXT GENERATION ITALIA ADDRESSES THE TERRITORIAL  
DISPARITIES. A RESILIENT REINTERPRETATION OF THE REGGIO  
CALABRIA METROPOLITAN STRATEGY**

*Carmelina Bevilacqua, Ilaria Romeo*

**Abstract**

This paper aims at providing a conceptual framework to display how the Italian plan for recovery, under the next-generation goals, can “absorb” the disparities inside each regional context and how the local systems can differentiate the response to global challenges. The transition towards a more sustainable and innovative Europe is the main objective of the European Union and its policies. Considering the two pressing crises to tackle, namely, climate change and the COVID-19 pandemic, transformative development is gaining increasing momentum. Nowadays, processes of adaptation and transition are increasingly driving urban and territorial transformations. A reinterpretation of the Reggio Calabria Metropolitan Strategy is proposed to sharpen spatial targeting towards resilience and transition in a particular “fragile” context.

Keywords: recovery and resilience, urban transition, transformative policy

**ISTANZE LOCALI E SFIDE GLOBALI: COME NEXT GENERATION  
ITALIA AFFRONTA GLI SQUILIBRI TERRITORIALI. UNA  
REINTERPRETAZIONE RESILINETE DELLA STRATEGIA  
METROPOLITANA DI REGGIO CALABRIA****Sommario**

La transizione verso un'Europa più sostenibile e innovativa è l'obiettivo principale dell'Unione Europea e delle sue politiche. La convergenza delle due sfide da affrontare relative alla ripresa, nel breve periodo, a causa degli effetti ancora in corso della pandemia, e la lotta ai cambiamenti climatici in una visione sostenibile di lungo periodo ha conferito la valenza “trasformativa” alle policy nel nuovo quadro finanziario pluriennale europeo. In tale contesto i processi di adattamento e transizione stanno guidando sempre più le trasformazioni locali. Nell'ambito del dibattito su come il PNRR possa “assorbire” le disparità all'interno di ciascun contesto regionale e come i sistemi locali possano differenziare la risposta alle sfide globali, il contributo propone una reinterpretazione della Strategia Metropolitana di Reggio Calabria verso la resilienza e la transizione, come caso studio di un contesto “fragile”.

Parole chiave: recupero e resilienza, transizione urbana, politiche trasformative

## 1. Introduction

The recent global pandemic has brought to light the European issue of economic and social disparities, grown since 2008 with the great recession, even after the increase of populism in late 2018 (Rodríguez-Pose, 2020). The shock from Covid-19 has struck territories and communities crossed by gender and generational gaps that exploded with the pandemic but were well present in the pre-Covid era (OECD, 2020a; SVIMEZ, 2021). Harnessing globalization, addressing industrial change, embracing innovation and digitalization, managing migration in the long run and fighting climate change define the global challenges across distinctive features and conditions of places able to respond according to local needs. Policy packages need to be integrated and coordinated, delivered at a national, regional and local level while being adapted to the needs of different territories (McCann and Soete, 2020). The current period of global uncertainty is calling into question the essence of the economic prosperity followed in the last decades. The continuing and progressive changes due to the systemic impact of shocks and stresses at the global level pointed out the need for a convergence of efforts by all countries. The scenario that emerged during the outbreak, alongside climate change and the risks associated with it, has seriously questioned social-economic stability at each level and the confluence of institutions in multilevel governance processes (SVIMEZ, 2021). Considering the two pressing crises to tackle, namely, climate change and the COVID-19 pandemic, transformative development is gaining increasing momentum (Horlings *et al.* 2020; Stevens and Kanie 2016; Veldhuizen 2020). The rationale is, social and economic transformations are critical to addressing both structural political-economic conditions and “unruly” contingent, complex and context-specific processes, thereby leading to sustainable, inclusive and resilient development (Rizzi, Graziano and Dallara, 2018). How to address these two crises will undoubtedly be a difficult task, especially in the direction of an inclusive process, ensuring that change is being equally well-received across locations. In the “age of discontent” (Axford and Buhari-Gulmez, 2017; Dijkstra *et al.*, 2020), defining and implementing effective policies, aimed at triggering structural changes and reducing inequalities between core and peripheral areas, is becoming the main concern for policymakers (Iammarino *et al.*, 2019). The timber on which the policy action seems to rest regards the potential lying on knowledge complexity and innovation dynamics in reversing current trends, or path-dependence effect. However, recent studies show how such complexity is giving rise to inequalities sharpening the gap between core and peripheral areas not able to catch the opportunities to transfer knowledge into development opportunities (ESPON, 2017; Raugze *et al.*, 2018). If we combine the leveraging global megatrend with regional disparities, a new geography of peripheral areas emerges, which moves beyond the so-called “inner” areas (Rodríguez-Pose and Wilkie, 2019; Rauhut and Humer, 2020).

Based on the above premises, the paper engages with the current debate on how the recovery and resilience plans will shape the future of cities and regions in Europe. The reform of policy and investment put in place by the NextGenerationEU is explained against the recent approved Italian Recovery plan. The chance of twin transition, green and digital, is turned into a case study. A reinterpretation of the Reggio Calabria Metropolitan Strategy is proposed to sharpen spatial targeting towards resilience and transition in a particular “fragile” context. The use of fragile term claims the general definition that OECD provided under the resilience trajectories as the “combination of exposure to risks and insufficient coping capacities at the state, system, or community level for managing these risks” (OECD, 2020b). OECD

introduced five dimensions of fragility: Economic, Environmental, Political (vulnerability to risks inherent in political processes, events or decisions; lack of political inclusiveness transparency, corruption and society's ability to accommodate change and avoid oppression), Security, (vulnerability of overall security to violence and crime, including both political and social violence), Societal (OECD, 2016b). Although the fragile context has been generally associated with the urbanization process that will affect the southwards countries, with an increase of unsafe places, violence and conflicts, (Guo and Freeman, 2011; Harris *et al.*, 2013; Muggah, 2014), it is arguable to define fragile the path-dependence contexts, from regional to local level, which are historically not able to cope the change towards a resilience horizon (Mahoney and Schensul, 2006; Martin, 2014; Fröhlich and Hassink, 2018).

In light of this backdrop, this paper aims at contributing to the debate on the role of Italian metropolitan cities, located in particular fragile contexts, in the arduous implementation of twin transition, green and digital, to interrupt the path-dependence towards a sustainable transformation. The work is structured as follows. Firstly, the theoretical background provides the understanding of the current debate about sustainable development, urban resilience and transition within the NextgenerationEU, focusing on the Italian response for southern metropolitan cities. This allows the authors to understand the leading frameworks accounting for the evolution of the metropolitan strategy for the next period, 2021-2027. Secondly, the Reggio Calabria Metropolitan Strategy designed for the previous programming period is analyzed according to the resilience and transition frameworks drawn from the literature study. Thirdly, the discussion on the resilience and transition framework transposition to the context of the City of Reggio Calabria, to which substantial funding has been allocated through the National Operational Program for Metropolitan Cities 2014-2020 (PON Metro), aims to interpret the effects of the interventions envisaged by the program on the City, with the ultimate aim of defining how much and how these interventions aimed at bridging large intrinsic vulnerabilities in the territory can benefit the community, from an integrated and systemic perspective. The paper addresses the main question: how to convert the PON metropolitan strategy from a transition standpoint?

## **2. The European, national and regional perspectives: the new challenges for the period 2021-2027 at a glance**

The Green Deal is the European strategy to achieve the sustainable development goals of the United Nations 2030 Agenda through four main transition areas, namely climate, energy, circular economy, infrastructure, to catch up with the sustainable transition (European Commission, 2019; Söderholm, 2020).

The workability of sustainable development is possible only through a very ambitious agenda (European Commission, 2020a) that links research, innovation and investment with reforms and regulations capable of mobilizing a collective response.

It claims for a transformative policy (Diercks *et al.*, 2019; European Commission, 2020a) that guides investments, reforms and regulations in order to stimulate the dissemination of knowledge and (radical) solutions for the transformation towards sustainability.

For some time, the population has been dealing with global forces that are profoundly changing their needs. These forces that recent European documents identify with the term megatrend are shaping the world and will drastically influence the future of all citizens. The concept of megatrends is based on the definition given by John Naisbitt in the 1980s (Naisbitt, 1984), who identified them as "major social, economic, political, environmental or

technological changes that are slow to form but continue inexorably for different economic cycles". In 2016, the European Commission with the JRC Group identified 14 Megatrends which represent as many challenges to be responded to by coordinating policies towards sustainability (OECD, 2016a). Climate change postures an existential risk and requires more prominent climate action by the EU and at the worldwide level. The need for climate action has ended up progressively overpowering the business-as-usual pattern, generally driven by financial development and urbanization. The increase in global warming, ocean acidification, desertification and changing climate patterns have "immediate implications for food security, rising sea levels and stronger storms affecting coastal areas, health issues, migration, and growing economic damage. At the same time, the Earth's biodiversity and resilience show persistent declining trends" (Lenton *et al.*, 2019).

Climate change will require radical innovation and a low-carbon transition in many systems: the transition to a zero-greenhouse gas economy by mid-century will radically transform the energy system towards the hydrogen and agriculture sector and will require modernization of the industrial fabric and transport systems and cities.

Addressing other important societal challenges (such as ageing, energy security, urban quality of life and inequality) together with Sustainable Development Goals (SDGs) will require transformative innovations in health, agro-food and urban systems (Ruiz-Campillo, 2020; Sterling *et al.*, 2020).

Finally, low-carbon and sustainability transitions offer attractive prospects for growth, producing competitive opportunities towards the "green" transition and transforming environmental problems into solutions to promote investment and jobs. This involves the use of technological capabilities to drastically increase energy productivity and material resources. The markets of the future will grow in this direction. However, to exploit and compete globally towards a post-carbon economy, radical innovation should be cultivated. Alongside the incremental innovation, which adds value to existing products, services and processes, disruptive and revolutionary innovations are needed (Mazzucato, 2018; Markard *et al.*, 2020).

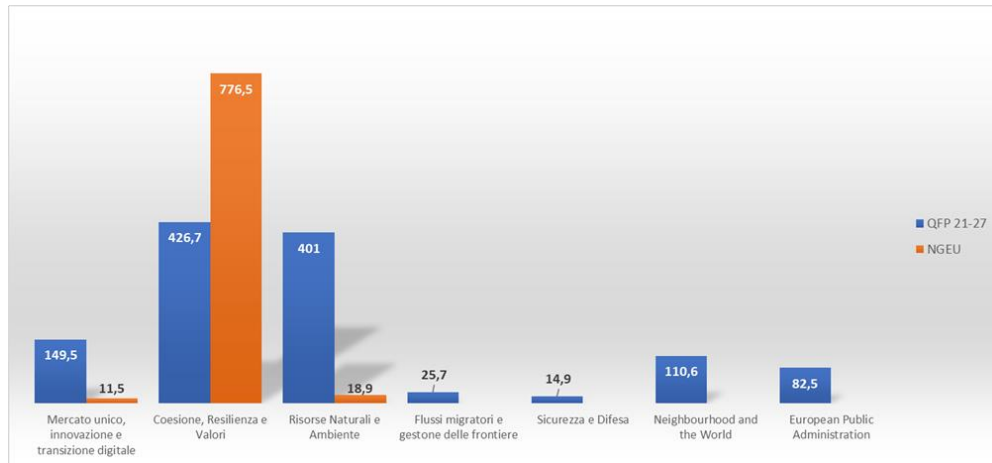
Transformative innovation policy plays a keen role in helping the European Union manage complexities and co-create a common direction in coordinating sustainable policies (McCann and Soete, 2020).

The 2021-2027 Multiannual Financial Framework (MFF 21-27) represents the link between policies in response to both the economic and social crisis caused by the coronavirus pandemic and the need to guide the transition towards a modern, sustainable and resilient Europe (Directorate-General for Budget (European Commission, 2021). The MFF 21-27 constitutes, in fact, the unitary framework for the 40 European programs articulated in the common budget based on 7 headings (category of expenditure).

The figure shows the distribution of the total financial allocation for the period 21-27, equal to approximately 2018 billion euros, by category of expenditure, distinguishing the contribution of the NextGenerationEU (NGEU) instrument that will be disbursed through the long-term budget EU, especially in the period 2021-2023.

The NextGenerationEU tool, aimed at recovery in order to make the European Union ready for the green and digital transition, is implemented through the Recovery and Resilience Facility that allows financial resources to be transferred to Member States in the form of grants and loans.

**Fig. 1 - Distribution of the total financial allocation for the period 21-27 by category of expenditure**



Source: Elaboration from MFF 21-27

To benefit from the support of the instrument, Member States have the task of submitting their recovery and resilience plans to the European Commission, each plan defining the reforms and investments to be implemented by the end of 2026.

Regulation (EU) 2021/241 defines in Article 3 the policy areas according to which to structure the national plans, these areas are concentrated in 6 pillars: 1. green transition; 2. digital transformation; 3. smart, sustainable and inclusive growth, including economic cohesion, employment, productivity, competitiveness, research, development and innovation, and a well-functioning internal market with strong SMEs; 4. social and territorial cohesion; 5. economic, social and institutional health and resilience, in order, inter alia, to strengthen crisis response capacity and crisis preparedness; 6. policies for the next generation, children and young people, such as education and skills.

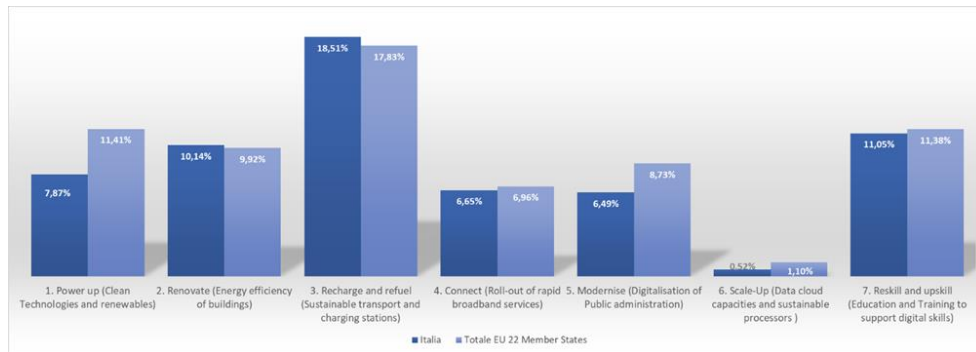
The national plans drawn up by each Member State are assessed by the Commission on the basis of the distribution of the financial allocation with respect to two specific targets requiring in allocating not less than 37% of the total financial resources to the Green Transition and not less than 20% to digital transformation.

The National Recovery and Resilience Plan (PNRR) presented by Italy in May 2021 (Governo Italiano, 2021) is divided into 6 missions in line with the pillars mentioned above: 1. digitization, innovation, competitiveness, culture and tourism; 2. green revolution and ecological transition; 3. infrastructure for sustainable mobility; 4. education and research; 5. inclusion and cohesion; 6. health.

About 40% of the total resources are allocated to the South and in relation to the targets set by the European Commission, the PNRR allocates about 40% to the Green Transition and 27% to the Digital Transition. Through the six missions identified, the PNRR contributes to the seven initiatives promoted by the EU (European Flagship) in order to stimulate cutting-edge technologies to achieve revolutionary effects that allow economic and social growth

towards the green and digital transition. The figure above shows the percentage weight of each flagship within the PNRR and compared to the average of the 22 Member States that submitted the Recovery Plan.

**Fig. 2 – The distribution of resources per flagship (%) – Italy and Member States**



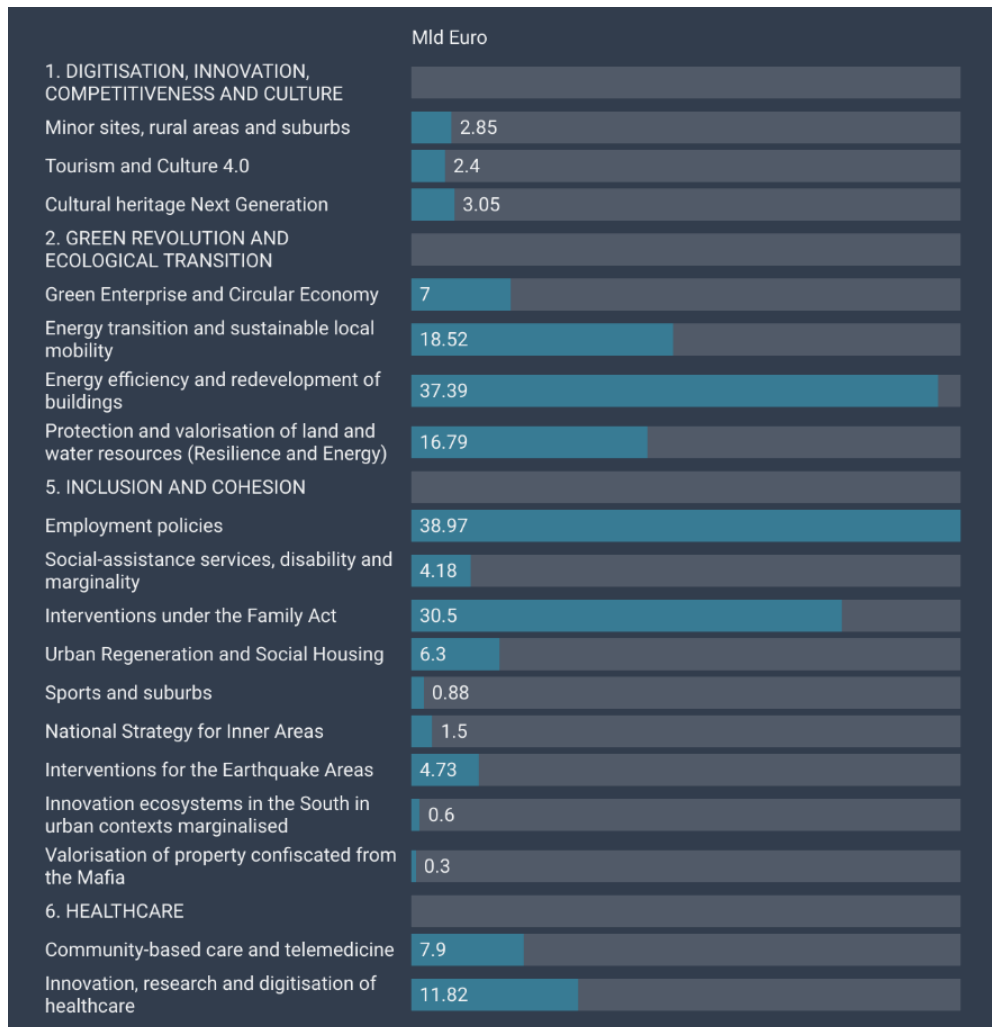
Source: Elaboration from Bruegel dataset (<https://www.bruegel.org/>)

According with the current debate on the transformative power of cities, the PNRR puts the centrality of cities, urban areas and inner areas in pursuit of ecological transition goals. It is not a coincidence that the European Parliament adopted in the late 2020 the new Leipzig chart, in the aftermath of the pandemic burst: “Cities and urban systems need flexibility as well as the ability to respond to external disruptive events and chronic stress. The robustness of cities to cope with changing framework conditions should be supported by an ability to learn from past events and from each other, flexible urban governance for the common good as well as balanced implementation of just, green and productive cities. Predictive and preventive policies, plans and projects should include diverse scenarios to anticipate environmental and climatic challenges and economic risks as well as social transformation and health concerns.” (European Commission, 2020b).

In this backdrop, urban regeneration acquires particular relevance as a mechanism for activating urban transition towards green districts, energy districts and circular economy in waste management (Urban Europe, 2020). Five out of six missions within PNRR claim urban regeneration as an explicit tool in several components of the missions, which characterizes the interventions in cities, urban and peripheral areas towards sustainable transition. The figure below shows the components of each mission in which the urban regeneration is the main tool to achieve the planned goals (Fig.3).

Urban regeneration epitomizes one of the main paradigms present in today’s society, where the needs of the ever-growing population and decreasing economic resources are confronted daily, against the background of the urgent climate crisis. It is arguable to advance that urban regeneration is no longer an alternative to old practices but a consolidated urban strategy while promoting new technical practices responsive to social, economic and environmental issues.



**Fig.3 – PNRR: Urban regeneration qualification within missions’ components and resources**

Source: Authors' Elaboration from PNRR 2021

The implementation approach of urban regeneration implies holding together all the complex factors, extending to categories such as quality of life, well-being, social inclusion, equity, the need to face even radical changes, whether demographic or environmental problems (Rogers *et al.*, 2012; Mendizabal *et al.*, 2018; Urban Europe, 2020; Alagna *et al.*, 2021).

### **3. Urban resilience and transition, the 100 resilient cities framework and the Wuppertal transformative approach to urban sustainable development**

It is widely recognized the strong impulse that the Agenda 2030 and the Sustainable Development Goals (SDGs), adopted by all member states of the United Nations in 2015,

gave to policy makers in re-shaping the future of nations (King *et al.*, 2014; Allen *et al.*, 2016; Dohlman, 2016; Hák *et al.*, 2016; Nilsson *et al.*, 2018; Brand *et al.*, 2021). Moreover, Agenda 2030 definitely established evidence-based policymaking at the ground of sound public policies for sustainability (Eden and Wagstaff, 2021).

The 17 Sustainable Development Goals (SDGs) together with the 169 sub-goals associated define the core of the 2030 Agenda. They take into account in a balanced way the three dimensions of sustainable development, namely economic, social and ecological. For the first time, a single policy document brings together sustainable development and the fight against poverty. Building resilience to crisis and shocks is one of the three challenges that the United Nations lead agency on international development (UNDP) framed to set the core of development needs (UNDP, 2020).

Among the 17 SDGs, the Goal 11 “Make cities inclusive, safe, resilient and sustainable”, directly concerns urban policies. The 10 action strategies include social, environmental, infrastructural, economic and resource use policies. As it implies the specific conditions of cities, necessary it has a broader horizon and is cross-cutting to other goals. Many of the other 16 goals, while not explicitly referring to the urban dimension concern issues, behaviors that relate to urban phenomena. Consequently, the SDGs with their strategies and targets should as a whole and in their integration constitute the reference framework for the policies of urban transformations aimed at sustainability.

During the last decade, urban resilience has become a highly discussed topic both in the political and the academic arena. Thanks to 100 Resilient Cities Program (lately transformed to Global Resilient Cities Network), Resilience Strategies are emerging as useful tools to strengthen urban systems and build resilient communities, enhancing their ability to face any potential stress or shock. The original paradigm of post disaster recovery, namely resilience as “bouncing back” to the initial state (Davoudi *et al.*, 2012), has moved to a proactive vision in which vulnerabilities and risks are addressed as opportunities capable of re-shaping the trajectory towards a more desirable future, namely resilience as “bouncing forward (Davoudi *et al.*, 2013; Mazur, 2015).

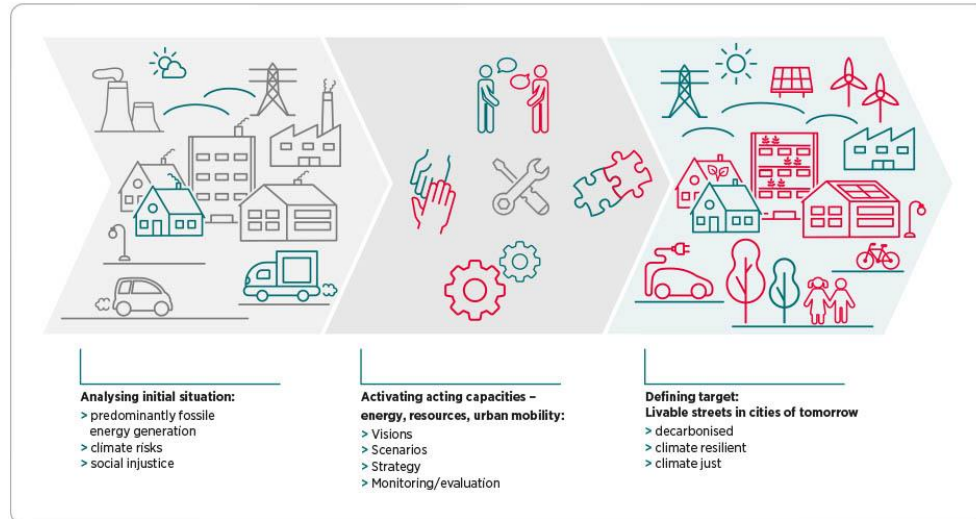
The Rockefeller foundation in 2013 launched the 100 Resilient Cities (100RC) initiative, aimed at helping cities around the world to become more resilient in the face of the environmental, social and economic challenges that characterize our century (The Rockefeller Foundation and Arup, 2015a).

The 100RC initiative, through the appointment of a Chief Resilience Officer (CRO) and 100RC global network platform, promoted the creation of a Resilience Strategy and the knowledge sharing action by employing the City Resilience Framework (CRF) that allows to organize their own development strategy paths and, at the same time, make them mutually comparable and communicable. The City Resilience Index, developed by the ARUP work as a toolkit to apply the CRF, contains: the City Resilience Indicators – 52 indicators according to the 4 dimensions (Health e& Wellbeing, Economy & Society, Leadership & Strategy, Infrastructure & Environment) and 12 goals of the CRF; the City Resilience Assessment – a tool enables cities to baseline resilience performance and to monitor over time, City Resilience Database – the data collected from multiple cities that can be analyzed to refine the toolkit, and create greater understanding of resilience.

**Fig. 4 - The City Resilience Assessment**

Source: *The Rockefeller Foundation and Arup, 2015b*

The Wuppertal Institute (leading international think tank for sustainability research) introduced the Transformative Science as a new research concept “that is not limited to observing and describing processes of transformation, but rather becomes an agent in these processes, simultaneously learning about and proactively catalysing transformations to sustainability” (Göpel, 2016). It proposes a transdisciplinary research programme system knowledge oriented, that is structured in 4 topic divisions (Future Energy and Industry Systems, Energy, Transport and Climate Policy, Sustainable Production and Consumption, Circular Economy) and 13 research units strictly interrelated. The Urban Transition research unit pursues the vision of a “low-emission, resilient, climate-sensitive and socially active and innovative city” and extends the research fields to three policy areas (Climate protection/energy, climate change adaptation and sustainability), pointing out 4 key topics of urban transition: Transition of governance, Transition of city economics and energy economy, Transition of construction and living in buildings and urban districts, Transition of land use and residential development. The approach is more community-based oriented in which the Transformative Science concept claims for tactic solutions according to three steps process: 1. Analyzing the initial situation; 2. Activating active capacities – energies, resources, urban mobilities; 3. Defining target: Liveable streets in cities of tomorrow.

**Fig. 5 – Urban Transition: Thematic focus – Wuppertal Institute**

Source: Research Unit Urban Transitions – Wuppertal Institute

#### 4. The Metropolitan City of Reggio Calabria: the strategy under the lens of transition and resilience

The European Union launched in 2011 the European Urban Agenda to strengthen the recognition of the urban dimension by European and national policy actors. The core statement prompt the Cities of tomorrow—challenges, visions, ways forward (European Union Regional Policy, 2011), and pushed ahead sustainable urban development for the period 2014-2020. According to the Europe 2020 goals, a smart, sustainable and inclusive growth, the urban dimension has been included in the operational programs at the national and regional level. In Italy, the Multi-Fund National Operational Program Metropolitan Cities 2014-2020 (PON METRO) was dedicated to large cities that acquired the administrative function of metropolitan city. 14 Italian Metropolitan Cities conceived the strategy according to the specific aims: of improving the quality of life, promoting social inclusion, reducing the CO<sub>2</sub> production by encouraging sustainable mobility, especially through public transportation, and boosting the digital transition, especially in offering public services (health, education, utilities).

The Italian partnership agreement, currently being adopted, provides for the PON METRO structure in the 14 cities by 21-27 (DiPCOE, 2021), expanding the reference target areas, including a vision of the metropolitan area according to the new administrative contexts. By adopting the general frame of the PON METRO (Agenzia per la Coesione Territoriale, 2014), the main goal is to address environmental issues with adequate investments in responding to the challenge of climate change and the transition to a circular economy. The urban regeneration initiatives will be boosted to create conditions for the transition to a post-carbon city and more resilient governance.

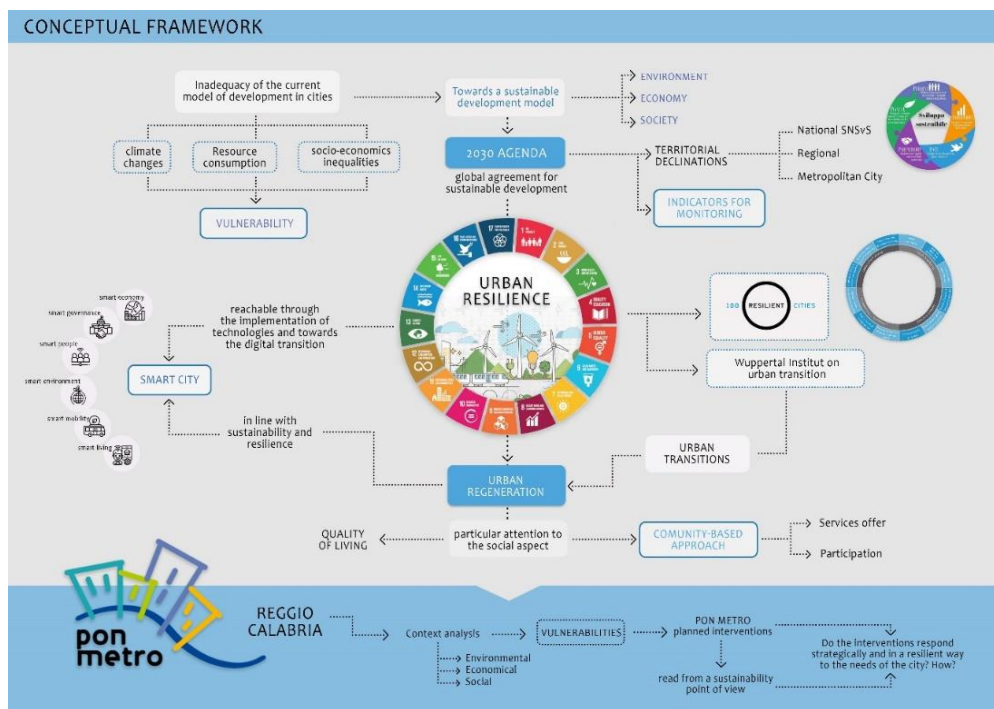
According to the new challenges of the metropolitan cities within the 21-27 period, each strategy will be reorganized to be transition-oriented by addressing mobility, energy and urban environment towards innovative cityscape in matching the general objective to reduce the energy and soil consumption (Alagna *et al.*, 2021).

The paper proposes the case study of Reggio Calabria to apply an urban resilience strategy framework in a metropolitan context characterized by fragile conditions, to reckon the PON-Metro structure, and in particular, the Reggio Calabria strategy, respectively to the more incisive transition challenges cities are facing.

Reggio Calabria started designing the urban development strategy in 2014-2020 within the PON METRO structure. Among the 14 metropolitan cities, Reggio Calabria shows a fragile condition because of two keen sources of instability. First refers to the pervasive presence of the criminal/mafia phenomenon and its level of impact on every area of civil life, which claims powerful efforts to restore a regime of legality connected with a reconstruction of a solid social capital (PON Strategy – Reggio Calabria, 2018). The other source of fragility concerns the persistent infrastructure gap that contributes to isolating the urban context and enhancing barriers for internal metropolitan connectivity.

The intended Urban Resilience Framework stems from the combination of three main sources of conceptualizing urban resilience coming from Agenda 2030, 100 Resilient Cities Framework and the transformative approach of Wuppertal Institute to urban development.

**Fig. 6 Urban Resilience Framework**



Source: Own Elaboration

Accordingly, the framework structure interplays across three interconnected layers:

1. Detecting Vulnerability – Measuring the performance
2. Defining transformative approach under urban resilience strategy
3. Restoring the PON Metro concept

The layer “detecting vulnerability” explores the key factors that can be drivers of and barriers to sustainability. The contextual factors influence what kinds of sustainability issues are prioritized by a city and provide insight into the motivations that drive particular actions (EEA, 2020). The recent report on urban sustainability in Europe, released by the European Environmental Agency (EEA) in 2020, remarks that “Existing urban form, structure of the economy and demographics” result as the most inhibit factors to sustainability, according to the contextual utterances.

The context of Reggio Calabria has been analyzed according to the three dimensions of sustainability that keep being complexity interpretation handlers, namely society, economy and environment. The analysis was conducted through the SDGs indicators to couple the Reggio Calabria profile with the framework of 100 resilient cities and the Wuppertal transformative approach.

The three dimensions of sustainability are articulated as following:

1. Society
  - a. Health and Education; b. Safety; c. Services; d. Urban quality
2. Economy
  - a. Income; b. Employment; c. Innovation and Digital
3. Environment
  - a. Waste management; b. Water; c. Biodiversity

The layer “Defining transformative approach under urban resilience strategy” investigates the correlation of the panel data collected according to the three sustainability dimensions and the City Resilience Toolkit (CRT) developed by the ARUP to frame the 100 RC strategy (The Rockefeller Foundation and Arup, 2015b) The CRT offers a complete and robust basis for assessing the City Resilience Index (CRI) globally applicable, holistic and evidence-based. As mentioned above, the CRI includes 52 indicators which are assessed via 156 questions, resulting in both quantitative and qualitative data. The answers to these questions are aggregated and presented according to the 12 goals of the framework, which converge in the four key dimensions of the resilient city:

- Health & Well Being: systems that ensure the health and well-being of all citizens and workers of the city.

1. Minimal human vulnerability
 

The extent to which everyone’s basic needs are met.
2. Diverse livelihoods and employment
 

Access to finance, ability to accrue savings, skill training, business support and social welfare
3. Effective safeguards to human life and health
 

Integrated health facilities and services, and responsive emergency services

- Economy & Society (economy and society): the social and economic system that ensures urban populations a peaceful and harmonious coexistence.

1. Collective identity and community support
 

Active community engagement, strong social/ networks and social/ integration
2. Comprehensive security and rule of law

- 
- Law enforcement, fair justice and prevention of crime and corruption
  - 3. Sustainable economy
    - Sound management of city finances, diverse revenue streams, and the ability to attract business investment, allocate capital and build emergency funds
    - Infrastructure & Environment: built and natural systems that provide essential services, protect and connect citizens.
      - 1. Reduced exposure and fragility
        - Understanding of the hazards and risks to which a city is exposed, informs the development of integrated strategies to physically protect the city
      - 2. Effective provision of critical services
        - Active management and maintenance of ecosystems, diversity, redundant capacity, maintenance of essential services & contingency planning
      - 3. Reliable mobility and communications
        - Diverse and affordable multi-modal transport systems and ICT networks & contingency planning
    - Leadership & Strategy: the need for informed, inclusive, integrated and iterative decision making for cities.
      - 1. Effective leadership and management
        - Trusted individual, multi-stakeholder consultation, evidence-based decision-making and disaster risk reduction activities
      - 2. Empowered stakeholders
        - Education for all, access to up-to-date information and knowledge to enable people and organizations to take action
      - 3. Integrated development planning
        - Presence of a vision, integrated development strategy, and regularly reviewed plans updated by cross-departmental groups
- The layer “Restoring the PON Metro concept” aims at constructing a ground-breaking approach to meet the PON METRO rationale with the resilience-building processes that can be interpreted as a continuous trade-off between a shift in the short run towards unfolding a new growth path, namely the “adaptation”, and the capacity of the system to adapt in the long term, marked as “adaptability” (Pike, Dawley and Tomaney, 2010). The result is a concept design of the Reggio Calabria strategy based on the bridge with SDGs and the assessment carried along with the two previous layers, according to the 2021-2027 twin transitions (digital and green) trajectories.

## 5. Results

According to the conceptual framework, the interconnection of the three layers hints at a cross-cutting analysis and interpretation of the panel data gathered.

The panel, data built on the sustainability dimensions, refers to two official sources, the up-to-date releases of SDGs and BES (well-being and sustainability) indicators provided by the Italian National Institute of Statistics (ISTAT) in 2021. The tables below (Table. 1, 2, 3, 4, 5) show the selected indicators to detect vulnerability of the Reggio Calabria context.

**Table 1 – Society dimension – Indicators per sub-themes**

<b>SOCIETY</b>	<b>Calabria</b>	<b>South islands</b>	<b>Italy</b>
<b>Health and Education</b>			
3.4.1 Healthy life expectancy at birth (year)	55	58,9	60,9
1.2.2. At risk of poverty or social exclusion (%) - (2019)	39,8	42,2	25,6
4.1.2 Early leavers from education and training (%) (2020)	16,6	10,5	13,1
4.4.1 People with high level of IT competencies (%) (2020)	17,2	25	31,7
<b>Safety</b>			
11.5.1 Population at risk of flood (%) (2017)	4	3,2	10,4
Population at risk of landslides (%) (2017)	4,5	3,2	2,2
Resident population in landslides risk areas per km2 (2017)	5,76	5,28	4,24
Resident population in flood risk areas per km2 (2017)	5,09	5,34	20,47
<b>Housing and urban quality</b>			
11.3.1 Illegal building rate (%) (2020)	62,6	45,6	17,7
Soil sealing from artificial land cover per capita (mq) (2019)	390		355
11.1.1 Share of total population living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames of floor (2019)	22	15,5	14
Overcrowding rate (2019)	28,3	28	25,5

Source: Elaboration from SDGs and BES Indicators Istat (2021).

**Table 2 – Economy dimension – Indicators per sub-themes (Income)**

<b>ECONOMY</b>	<b>Calabria</b>	<b>South islands</b>	<b>Italy</b>
<b>Income</b>			
10.1.1 Gross disposable income per capita (euro) (2019)	13.160	14.193	19.124
People at risk of poverty (%) (2019)	30,9	34,7	20,1
Growth rates of household income per capita among the bottom 40 per cent of the population (2019)	3,3	0,3	1,9
8.3.1 Share of employed persons not in regular occupation (2020)	22,1	17,9	12,9
Bad debt rate of bank loans to households (2019)	1,3	0,9	0,8

Source: Elaboration from SDGs and BES Indicators Istat (2021).

This study applies a multi-criteria analysis (adaptation of weighted product model - WPM) to assess the vulnerability weight for each dimension and sub-themes and grasp the



interconnections inside each dimension and across them (Myagmartseren *et al.* 2017; Supriyono and Sari, 2018).

The Weighted Product Method (WPM) is one of the methods that are used to solve Multiple Attribute Decision Making finalizing in evaluation, prioritization and selection of a set of alternatives that are expressed by multiple attributes, eventually in conflict with each other. The WPM is also used to individuate among alternatives the benefits and costs that each attribute highlights concerning specific criteria (Supriyono and Sari, 2018).

**Table 3 – Economy dimension – Indicators per sub-themes (Employment, Innovation digital)**

<b>ECONOMY</b>	<b>Calabria</b>	<b>South islands</b>	<b>Italy</b>
<b>Employment</b>			
8.5.2 Unemployment rate (2020)	20,1	15,9	9,2
Non-participation rate (2020)	37,7	33,5	19,0
People not in education, employment, or training (NEET) (aged 15-24) (2020)	26,5	25,7	19,0
People not in education, employment, or training (NEET) (2020)	34,6	32,6	23,3
<b>Innovation and digital</b>			
9.5.1 - Research and development expenditure as a proportion of GDP (2018)	0,5	0,9	1,4
Product and/or process innovative enterprises (per 100 enterprises)	45,6	48,1	55,6
9.b.1 - Proportion of medium and high-tech industry value added in total value added	15,3	23,5	32,1
17.6.1 Households with fixed and/or mobile broadband connection (%) (2020)	66,3	72,5	77,8
12.2.2. Domestic material consumption per capita (2017)	5,2	7,6	8,0

Source: Elaboration from SDGs and BES Indicators Istat (2021).

**Table 4 – Environment dimension – Indicators per sub-themes (Waste and Water)**

<b>ENVIRONMENT</b>	<b>Calabria</b>	<b>South islands</b>	<b>Italy</b>
<b>Waste</b>			
11.6.1 - Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities (2019)	40,3	31,2	20,9
<b>Water</b>			
6.1.1 - Proportion of population using safely managed drinking water services: Water supplied per capita (2018)	264	199	215
Households that do not trust to drink tap water (%) (2020)	41,1	40,4	28,4
Irregularities in water supply (%)	38,8	17,6	8,9

Source Elaboration from SDGs and BES Indicators Istat (2021).

**Table 5 – Environment dimension – Indicators per sub-themes (Biodiversity)**

ENVIRONMENT	Calabria	South islands	Italy
<b>Biodiversity</b>			
15.3.1 - Proportion of land that is degraded over total land area: Soil sealing from artificial land cover (2019)	5,04	5,86	7,10
Fragmentation of natural and agricultural land % (2019)	27,2	32,7	36,1
15.4.2 Mountain Green Cover Index (2018)	96,1	93,7	88,2
15.1.2 - Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type (2017)	26,6	25,2	21,6
11.7.1 - Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities: Incidence of urban green areas on urbanized area of the cities	4,5	5,8	9,0
11.7.1 - Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities: Incidence of urban green areas on urbanized area of the cities	4,6	15,9	14,5
“Natura 2000”, Sites of Community Importance (SCIs), Special Areas of Conservation (SACs), and Special Protection Areas (SPAs), % on the total surface (2020)	5,04	5,86	7,10

Source Elaboration by SDGs and BES Indicators Istat (2021).

According to this latter approach, this study applied the distance of each attribute to the Italian average as a general criterion to set the algorithm to reckon the vulnerability rating to build the decisional making matrix (Vilutienè et al., 2003). The adaptation of WPM consisted of building the decisional making matrix in which the criteria system includes the 37 indicators concerning the three dimensions, namely Society, Economy and Environment.

The weight processes have been handled in two steps. In the first step, the study considered the dimensions separately. Yet, all indicators have been normalized by considering the dimensions as alternatives to finalize the matrix.

The result, represented by the treemap charts (fig. 7) distributed among each dimension, defines an order of vulnerability factors highly affecting the Reggio Calabria context.

In particular, the “Society dimension” detects the Illegal building rate predominant concerning the others and attributes to Housing and urban quality the priority for sustainability. The “Economy dimension” highlights Employment as the principal source of vulnerability, and the “Environment dimension” underlines the irregularities in the water supply.

The application of the CRI based on the results of vulnerability allows at measuring the performance of the Reggio Calabria. The figure 8 shows the resilience index preview achieved by using the 52 indicators measured according to the “Detecting Vulnerability” layer.

**Fig.7 – The tree map charts according to the Society, Economy and Environment dimensions**

Housing and urban quality			Health and Education		Safety		Services	
11.3.1 Illegal building rate (2020)	11.1.1 Share of total population living in a dwelling with a leaking roof, damp walls, floors or foundation, or...	Overcrowding rate (2019)	1.2.2. At risk of poverty or social exclusion - AROPE (2019)	4.1.2 Early leavers from education and training (2020)	Population at risk of landslides (2017)	Resident population in landslides risk areas per km2 (2017)	1.4.1 Households per difficulties of links with public transport means	
	Soil sealing from artificial land cover per capita (mq) (2019)		3.4.1 Healthy life expectancy at birth	4.4.1 People with high...			11.5.1...	Resident...

Employment			Income			Innovation and digital			
8.5.2 Unemployment rate (2020)	Non-participation rate (2020)	People not in education, employment, or training (NEET) (2020)	Growth rates of household income per capita among the bottom 40 per cent of the population (2019)	8.3.1 Share of employed persons not in regular occupation (2020)	People at risk of poverty (2019)	10.1.1 Gross disposable income per capita (2019)	17.6.1 Households with fixed and/or mobile...	Product and/or process innovative enterprise...	
		People not in education, employment, or training (NEET) (aged 15-24) (2020)					12.2.2. Domestic material consumption per...	9.b.1 - Proportion of medium...	9.5.1 - Research and...

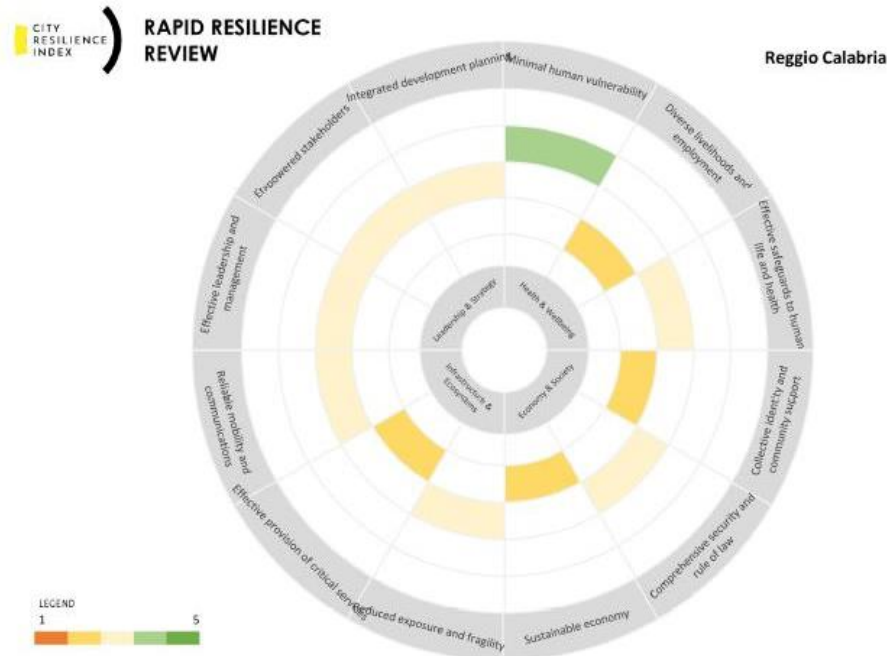
  

Water		Biodiversity			Waste	
Irregularities in water supply	Households that don't trust to drink tap water (2020)	15.3.1 - Proportion of land that is degraded over total land area: Soil sealing from artificial land cover (2019)	Fragmentation of natural and agricultural land	15.4.2 Mountain Green Cover Index (2018)	11.6.1 - Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities (2019)	
	6.1.1 - Proportion of population using safely managed drinking water services: Water...	11.7.1 - Average share of the built-up area of cities that is open space for public use...	15.1.2 - Proportion of important sites for terrestrial and...			

In line with the the vulnerability priorities distributed along the three dimensions of sustainability, a reinterpretation of the Reggio Calabria PON METRO strategy under the resilience-oriented actions suggests four areas of interventions in which the performance effects are lower:

1. Diverse livelihoods and employment Access to finance, ability to accrue savings, skills training, business support and social welfare;
2. Collective identity and community support Active community engagement, strong social networks and social integration;
3. Sustainable economy Sound management of city finances, diverse revenue streams, and the ability to attract business investment, allocate capital and build emergency funds;
4. Effective provision of critical services Active management and maintenance of ecosystems, diversity, redundant capacity, maintenance of essential services & contingency planning.

Fig.8 – Reggio Calabria: City Resilience Index



HEALTH AND WELL-BEING		INFRASTRUCTURE AND ECOSYSTEMS	
<b>Minimal human vulnerability</b> <i>The extent to which everyone's basic needs are met</i>	3,80	<b>Reduced exposure and fragility</b> <i>Understanding of the hazards and risks to which a city is exposed, informs the development of integrated strategies to physically protect the city</i>	3,00
<b>Diverse livelihoods and employment</b> <i>Access to finance, ability to accrue savings, skills training, business support and social welfare</i>	2,20	<b>Effective provision of critical services</b> <i>Active management and maintenance of ecosystems, diversity, redundant capacity, maintenance of essential services &amp; contingency planning</i>	2,40
<b>Effective safeguards to human life and health</b> <i>Integrated health facilities and services, and responsive emergency services</i>	3,00	<b>Reliable mobility and communications</b> <i>Diverse and affordable multi-modal transport systems and ICT networks &amp; contingency planning</i>	2,75
ECONOMY AND SOCIETY		LEADERSHIP AND STRATEGY	
<b>Collective identity and community support</b> <i>Active community engagement, strong social networks and social integration</i>	2,50	<b>Effective leadership and management</b> <i>Trusted individuals, multi-stakeholder consultation, evidence-based decision-making and disaster risk reduction activities</i>	3,00
<b>Comprehensive security and rule of law</b> <i>Law enforcement, fair justice and prevention of crime and corruption</i>	3,00	<b>Empowered stakeholders</b> <i>Education for all, access to up-to-date information and knowledge to enable people and organisations to take action</i>	3,33
<b>Sustainable economy</b> <i>Sound management of city finances, diverse revenue streams, and the ability to attract business investment, allocate capital and build emergency funds</i>	2,60	<b>Integrated development planning</b> <i>Presence of a vision, integrated development strategy, and regularly reviewed plans updated by cross-departmental groups</i>	2,75

The Reggio Calabria PON Metro strategy aims to design and implement the attractiveness of its territory to become a sustainable and competitive core, from a metropolitan area standpoint, including the additional medium-small urban and rural centers. The main goal holds toward the vision of acquiring the role of hinge between Europe and the Mediterranean area.

**Table 6 – Relational matrix: Vulnerability priority, Resilience action and PON METRO strategy**

Vulnerability - priority	Resilience action (CRI)	PON Metro Strategy			
<b>Housing and urban quality</b>	Collective identity and community support Active community engagement, strong social networks and social integration	Housing	Innovative recovery of a large property confiscated in Pellaro for social housing interventions and housing support for people in difficulty		
			Housing and day centre services for the specific use of the elderly: experimentation of a public-private network at the Ricoveri Riuniti		
			Recovery of the Ex Colonia (Catona headquarters for "After us" interventions		
			Redevelopment and adaptation of housing affordable units		
		Services Housing	Civic Network Services for 6 Neighborhood Poles in peripheral areas: community actions and experimentation of public-private partnership paths;		
			Beauty sites in degraded peripheral areas of the Municipality of Reggio Calabria and the small cities of the Metropolitan Area;		
			Recovery of property in Arghilla for the creation of a proximity centre (community-based);		
			Innovative housing support services;		
			Services and tools to support housing problems Realization of the Family Services Hub in Gebbione;		
			Day centre services for homeless people		
			Activation and strengthening of services in areas of high social exclusion. Mobility coordination		
			Recovery of public property for the Social Housing Agency		
			Work and entrepreneurship	Recovery of the former confiscated farm in Contrada Tirone di Gallico for the implementation of activities in the agri-food and rural tourism fields;	
				Environmental recovery and regeneration of the former confiscated company of San Giovanni di Pellaro for the implementation of activities in the agri-food sector;	
Recovery of two confiscated properties in the Morloquio di Gallina district for the creation of spaces for co-working in the fields of ICT, process and product innovation and spaces for a fab-lab;					
Refurbishment of a building in Condera for the realization of activities in the field of creative recycling of furniture and accessories .					
Innovative services for the job inclusion of the disabled and disadvantaged categories in degraded areas					
Social entrepreneurship construction sites - Urban center					
Networks for the socio-work inclusion of Roma, Sinti and Camminanti					
Sustainable economy	Sound management of city finances, diverse revenue streams, and the ability to attract business investment, allocate capital and build emergency funds;	Mobility	ITS Platform and Mobility Control Center (CCM)		
			Strengthening local public transport fleets		
		Energy	Extension, modernization and standardization of Bus Preferential Lanes		
			TPL Waterfront protected preferential lanes		
			City waterfront intermodal junction		
			Protected pedestrian path and Waterfront cycle path -Pineta Zerbi		
			Intervention to reduce energy consumption in the City Business Center and construction of photovoltaic roofs to cover the car parks		
	Energy audit Municipal buildings and schools				
	Energy audit of the public lighting network				
<b>Water</b>	Effective provision of critical services Active management and maintenance of ecosystems, diversity, redundant capacity, maintenance of essential services & contingency planning				

The challenge that Reggio Calabria should mostly face in the long term is to transform the city for allowing its citizens first, and those who intend to visit or invest in, to deal with a territorial context that satisfies the principles of sustainable growth and economic

development. According with the PON METRO general framework (Digital Agenda, Public Services and Mobility, Social Inclusion, Infrastructures for social inclusion), the interventions aim at filling, through the integration of infrastructures and services, the satisfaction of specific citizenship rights and the general improvement of the quality of life. The strategy copes for building a new idea of the city that turns place animated by the principle of co-responsibility and oriented towards the social and cultural growth of the community.

In light to reinterpret the Reggio Calabria PON Metro strategy under resilience-oriented actions, this study correlated the vulnerability factors with the lowest resilience performance found through CRI. The table 6 shows how the PON Metro strategy along the interventions set matches the resilience areas of low performance. The Vulnerability factor connected to the irregularities in water supply does not match any interventions claiming for being included in a resilience-oriented strategy.

The final result in restoring the PON Metro strategy rests in the concept design in which the effective implementation is tested against the resilience performance. The final result in restoring the PON Metro strategy rests in the concept design in which the effective implementation is tested against the resilience performance.

## 6. Discussion and Conclusions

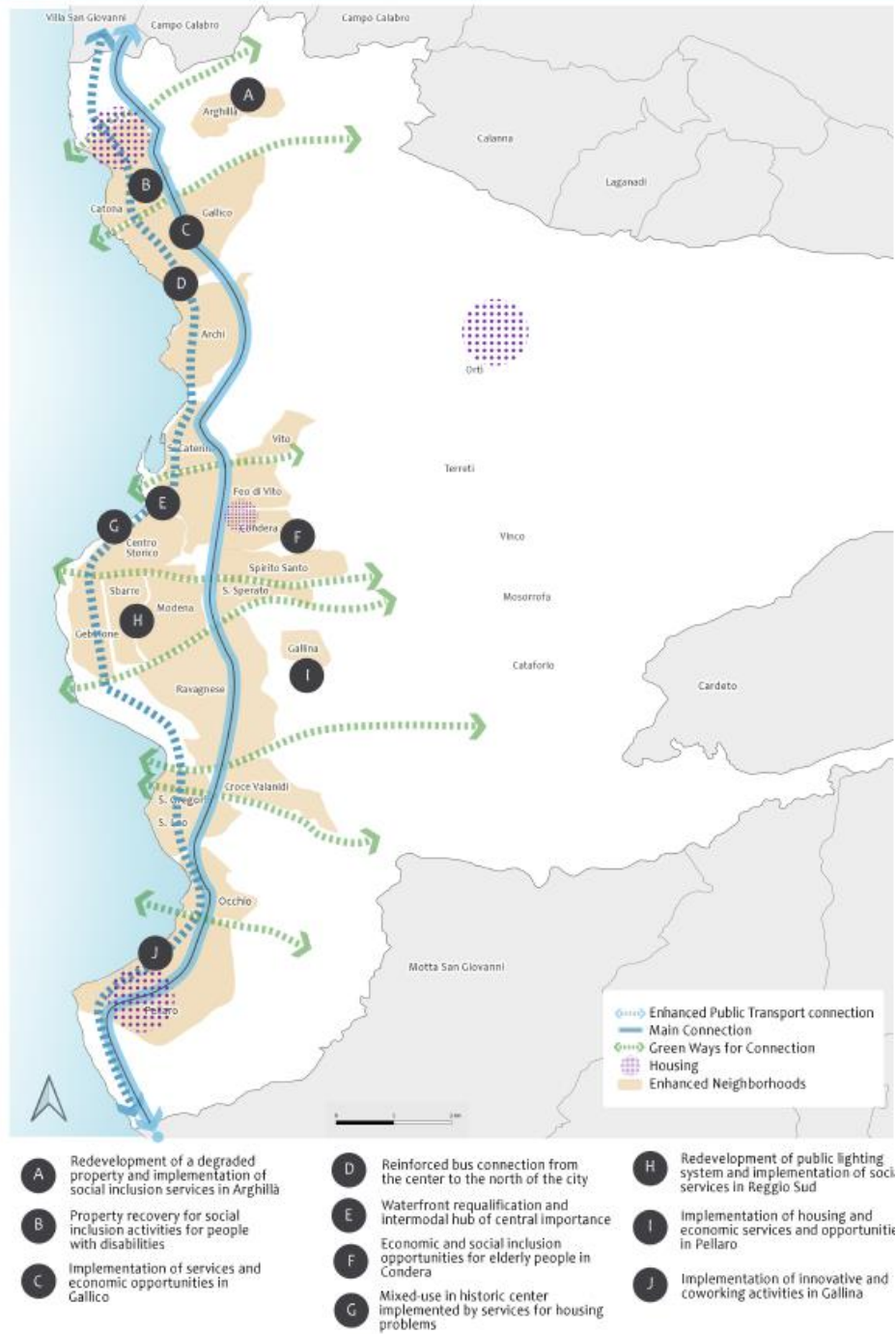
The paper wanted to address the issue of sustainable development in urban contexts, within which too often the shortcomings in terms of infrastructure, quality of buildings and services generate not only conditions of severe discomfort and social exclusion, but also a thriving vulnerability in the face of a growing demand for adaptation to environmental and social shocks. Remaining indifferent to such a context is no longer an option. The political framework at national and European levels recognizes the role of the city in driving transformative development towards sustainability (Wolfram, 2016; Geels *et al.*, 2017; Kivimaa, Paula ; Geels, Frank ; Turnheim, Bruno ; Asquith, Mike ; Kern, 2019). The debate on urban planning responses to the new transition path claims for new approaches more resilience-oriented. Many scholars have put central the issue of rearranging the way in which urban transformation and urban regeneration are taking place (Blakeley, 2005; Sadahiro, 2008; DEGEN and GARCÍA, 2012; Eraydin and Taşan-Kok, 2013; Trapani and Prescia, 2016; Berta, Bottero and Ferretti, 2018; Ricci and Mariano, 2018; Battisti, Barnocchi and Iorio, 2019).

The present work wanted to experiment with an approach to the design of urban development strategies starting from the framework of the vulnerability factors of an urban context earmarked as “fragile”. In an attempt to outline this conceptual framework, the 2030 Agenda proves to be the cornerstone of sustainable development in its various facets, together with the contribution provided by the Rockefeller Foundation with its 100 Resilient Cities framework, another point of reference. Reggio Calabria was presented a case study because of its fragile conditions in being a metropolitan city according to Italian PON METRO program.

The conceptual framework is based on three layers:

1. Detecting Vulnerability – Measuring the performance
2. Defining transformative approach under urban resilience strategy
3. Restoring the PON Metro concept.

**Fig. 9 – The Concept Design of PON Metro strategy against the resilience performance**



Within the first layer, the vulnerability factors were detected. This study applied the Weighted Product Model (WPM) with some arrangements according to the objective to define a priority along the vulnerability factors analyzed. The results displayed the most relevant factors of vulnerability for Reggio Calabria: illegal builds rate for the Society domain, employment for the Economy domain and irregularities in water supply for the Environment domain.

The application of the CRI toolkit based on the vulnerability factors revealed the weakest resilience areas of action. The Reggio Calabria strategy along the interventions set for 2014-2020 has been interpreted in designing an oriented-resilient concept.

This study presents some limitations. The resilience approach needs a time-frame assessment of the vulnerability factors. The conceptual framework proposed is based on the up-to-date indicators the model used did not consider the time variability. Moreover, the effectiveness level of the interventions, drawn through the PON Metro strategy, was not evaluated. The resilience performance lacks information on the real improvement that each intervention is supposed to offer, both individually and in complementarity with the overall strategic design. A quality-quantitative method could have produced more information on the resilience performance potentials based on impact evaluation. Nevertheless, the conceptual framework opens a new scenario in designing urban strategy according to a resilience-oriented approach allowing a more direct connection between the strategic level with the implementation one starting from vulnerability factors. Finally, it is grounded in evidence and implies a corresponding concept design to be implemented effectively, which is crucial for the achievement of the 2030 Agenda.

### Acknowledgment

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Carmelina Bevilacqua elaborated the manuscript contents concerning the conceptualization, the methodological approach, the acquisition and data processing phases. She has drafted the work, revised it, and has approved the submitted version. Ilaria Romeo has elaborated the fig. 6, fig. 8 and fig. 9.

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