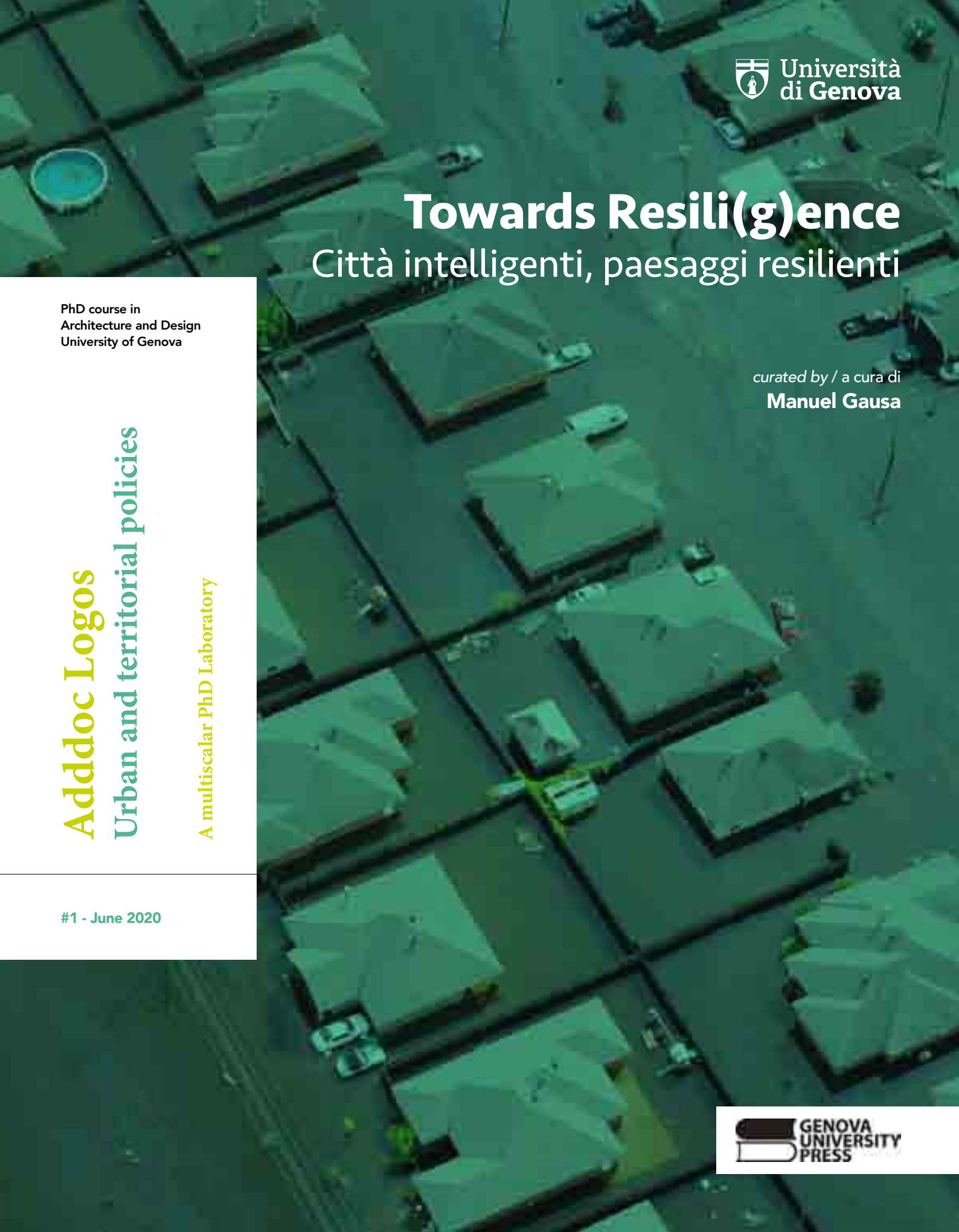

Università di Genova

# Towards Resili(g)ence

## Città intelligenti, paesaggi resilienti

*curated by* / a cura di
**Manuel Gausa**

PhD course in
Architecture and Design
University of Genova

Adddoc Logos
Urban and territorial policies

A multiscalar PhD Laboratory

#1 - June 2020

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## Urban and territorial policies

## #1 | Towards Resili(g)ence
Città intelligenti, paesaggi resilienti

**Resili(g)ence aims to combine a new "intelligent city" (information, knowledge, projection and adaptation) with a "resilient city" (resistance and recycling, reaction and recovery, renovation and adaptation) in a new responsive and sensory condition, sensorized and sensitive at the same time.**

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***Urban and territorial policies***

***#1 | Towards Resili(g)ence. Città intelligenti, paesaggi resilienti***

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# summary

# I
# FRAMEWORK: RESILI(G)ENT CITIES AND ADVANCED URBANISM

## The ADD-DAD approach

**Manuel Gausa**
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# RESILI(G)ENCE. A multilevel definition

• *RESILI(G)ENCE* •

**Over the last thirty years, our most important trading spaces and coexistence, cities, were scene of radical changes, both in its definition (urban and territorial, real and virtual, formal and informational), both in their configuration (multiple and multiplied, and variable differential, dense and irregular).**
**The ancient disciplinary paradigms, governed by the old tools of zoning and formal planning, have shown their limits against the constant progress unpredictable, complex and changing.**

## • I – RESILIENT CITIES •

The new and complex urban geographies made of dynamic and networked exchanges, are re-evaluating the old formal definitions, physical and unambiguous, of the city concept, interpreted as a new relational system, multivalent and ambivalent, where the old urban-territorial connotations are coexisting with the new manifestations of a new type of *operating topologies,* intended to exchange, continuously and simultaneously, simultaneous data and information, localized and de-localized at the same time[1].

[1] D. Harvey, *The Urbanization of Capital*, Johns Hopkins University Press, Baltimore, 1985.

These dynamic express a new intelligent understanding of cities (interactive and informational), linked to the increase and net-development of the new technologies and to a renewed environmental awareness, called to guide qualitatively the new urban developments in new advanced formulations (at the same time innovative and critical, proactive and responsible) able to combine, – especially in the European context –, new technological scenarios and new environmental sensitivities.
In a few years, the economic/environmental global crisis, combined, paradoxically, with the constant computational (and digital) advances have favoured, in this sense, the development of new socio-cultural and propositional values in the field of the urban design, the ecological thinking and the territorial planning, careful to complex processes – and systemic – global and local[2].
The general growth of metropolitan areas has produced, in fact, an increase in CO2 emissions, resulting collateral effects particularly negative on the climate and the environment, a reality strongly marked by the continuing increase in natural disasters.
Environmental crises associated with the exponential consumption of resources (land use, food scarcity, migration and immigration, population growth, etc.), transform today's cities and urban areas in increasingly fragile and vulnerable eco-systems. Sustainable practices, linked to the reinforcement of the resilient capacity of our environments, are essential.
New urban and territorial systems, indeed, are called to propose holistic solutions to multi-level problems related to mobility, population, energy, environment, health, food, water, security, housing, health, but also to threat and risk situations and to the weaknesses conditions of territories.
Today we need conscious solutions, open to new technologies and to more accessible, strategic and multi-scalar approaches, which are also dynamic and transversal, flexible, evolutionary, versatile and relational.
New approaches for this *Resilient* condition referred to six main topics which aimed at create possible transversal themes of research and answer[3]:

–**WATER** (storms, alluvions, floods but also management and rational use of water);
–**EARTH** (earthquakes, landslides, slips);
–**FIRE** (fires and volcanism but also greenhouse effect, global warming, alternative energies);
–**AIR** (pollution and emissions, but also environmental and sensorial comfort);
–**LAND USE&ECO-SYSTEMS** (anthropic land occupation, food and agriculture, transport and mobility, attention to materials and construction systems);
–**COMMUNITIES** (disintegration/social integration, but also identity/community participation).

[2] S. RUEDA, Models d'ordenació del territori més sostenibles, in AA.VV. Cap a un Habitatge Sostenible, CADS, Barcelona, 2011.

[3] I. Muñiz, A. Galindo, Urban Form and the Ecological Footprint of Commuting, in «Ecological Economics», 55, 2005, pp. 499-514.

Flood and slidings in Genova, October 2014

Contemporary complexity requires new tools: old approaches based on the "defensive control" and corrective contingency responses, are replaced by "synergy policies" addressed through preventive proactive, adaptable and reversible actions, which combine ancient "**scenarios of emergency**" (risk areas) with new "**emergent scenarios**" (areas of opportunity).
New *proactive* and *reactive* responses must work in a hybrid field: on one hand, prevention and mitigation of conflicts and risks through the interconnection and registry of systematized data (simulated or real-time), on other hand programming of planning interventions, divided into urban systems and global territories[4].
In this framework, the term *Resili(g)ent* proposes to combine "Intelligent" values (information, knowledge, anticipation, projection and adaptation) and "Resilient" valences (resistance and recycling, reaction and recovery, renovation and adaptation) in a new sensory condition, *sensorized* and *sensitive*, at time.
In the context of a new *resili(g)ent* approach this new sensibility must take in consideration the six resilient main topics that we have signed before (*water, earth, fire, air, land-use and eco-systems, communities*) referring them to a more complex and crossed network of six possible strategic fields of investigation and prospection (*MAPPING/MANAGING/ PLANNING/ LANDING/DESIGNING/ SOCIALIZING*), which also configure the framework of multiple innovative experiences today.
The combination "information (*trended*) + integration (tended)" announces new dynamics of urban planning aimed at advanced interdisciplinary research, oriented to a strategic integration of operating systems (both tangible and intangible, real and virtual) and to a holistic view of its multiple dimensions (patrimonial, sensorial, environmental, cultural and social) in new scenarios not only associated with pure informational management (*Smart Cities*), but also to its network systematic and to its strategic-planning projection (*Intelligent Cities*) in the same terms of exploration that are defining a new and emerging *Advanced Urbanism.*

[4] M. Gausa, Hiperterritorios–multiciudades–geourbanidades in M. Gausa, V. Guallart, W. Muller, Hiper-Catalunya, Territoris de Recerca, Generalitat de Catalunya, Barcellona, 2003, pp. 1–704.

## • II – ADVANCED URBANISM •

The approach to the development of a new *Advanced Urbanism* paradigm comes from the innovatory processing combination –in the last two decades– between the 3IN terms INFORMATION, INTERACTION and complex INTEGRATION, understood in all its dimensions, spatial environmental, social, technological and cultural[5].
The notion of information appears, in this advanced approach, directly related with the capacity to manage complex programs and simultaneous solicitations, tendentious parameters and environmental indicators, cultural tendencies and social dynamics, and, evidently, with the digital and computational increasing capacity to process, measure and optimise data in new anti-typological and open systemic approaches (integral and integrative) associated to a new *Informational Urbanism*.

[5] M. Gausa, V. Guallart, W. Muller, J. Morales, F. Porras, F. Soriano: The Metapolis Dictionary of Advanced Architecture, Actar, Barcelona, 2003.

A new urbanism linked with a new urban intelligence understood as a new relational (and informational) capacity (reactive, responsive and strategic) able to process together urban data and visions in a new integrative and qualitative way: not only a *multi-tool-urbanism* linked with the new technologies (*Smart*) but an *Empathic Urbanism* associate to new analytic and synthetic (in contemporary) and multi-scalar researches in the fields of the urban prospection, the innovative expression (and representation), the environmental scope, the social integration and the citizens convivial relationships and bottom-up and networked processes; and connected, in particular, with the capacity to launch new strategic and integrative gazes (and methodologies) open to work with complex, irregular and evolutionary territories[6].

In fact, the current dynamics of global development, multiplied by the information revolution itself, have given rise to the apparition of a new type of flexible and open (polyhedral and polyphonic) order in the territory: an order that would give special prominence to the interactive nature of the processes and phenomena associated with them, and whose most obvious manifestation would be an organism (the city) constantly re-informed (redefined and transformed) by continuous operations of action and reaction, adjustment and readjustment, between material and immaterial realities ("layers" of information and "networks" of articulation) in constant evolutionary combination.
These dynamics construct a new global framework, more complex and plural, for a new projective interpretation of the cities in/and the territory: that of a *multi-city* or *pluri-city* (*poli-polis*) agreed to a multiple network of infrastructures and intra-structures, landscapes and in-between-landscapes, density nodes and exchange cores, with relational and differential vocation, integrated and balanced at the same time, in a poly-territory that would no longer be manifested as a "single place" but as a "place of places", a multiple set of dynamic scenarios of relationship and interaction (Gausa 2010)[7].
A structure of variable geometry that today expresses, conclusively, its definitely dynamic condition and requires a new integrated and relational interpretation; with the capacity to articulate new visions, new schemes, and, therefore, new connections between old and new polycentric structures implicit in this new complex system of independent and interdependent "sets" at a time, where strata and layers intersect and overlap (Ascher 1995)[8].
We have occasionally used the term *n-cities*, also, to define these possible systemic, urban and interurban approaches, aimed at combining locally-oriented developments on the urban scale and globally-oriented development to the territorial large scale: developments in which the city would not more to be interpreted as a single expansive movement around a great unitary centre, but as a multi-central structure, sensibly modified and systematically

[6] M. Gausa, Advanced Urbanism / Visions & Challenges in the collection «KA-AU KNOWLEDGE ALLIANCE FOR ADVANCED URBANISM» Deliverables VOLUME 7, ISSN 2564-9035.

[7] M. Gausa, O.P.Lands: Paisatges Operatius in J. Espanyol (ed.): Arquitectes en el paisatge, Col.legi d'Arquitectes de Catalunya, Girona, 2000

[8] F. Asher, Métapoles ou l'Avenir des villes, Odile Jacob, Paris, 1995.

Flood and slidings in Genova, October 2014

interconnected, – made of moments and movements, of connections and convections (inductions of hot energies) – through effective eco networks, *infra, intra* (and *info*) structural.
The definition of possible "*multinter*" strategies (multilevel and internetworked, multi-urban and inter-territorial) for the great challenges that arise today in this exchange scenario, obliges to contemplate some of the great transversal themes associated with the new urban-territorial agendas of this beginning of the century, raising different strategic issues. In these spheres of reflection and research, some of the new urban redefinition works are set out to envisage new "operational logics" aimed at favouring strategic and integrated systems of action between city, architecture, infrastructure and landscape[9].
From these considerations various questions can then arise regarding the "multiple", strategic, and relational meaning and impact of the current conjunction city-territory, centre/centres-periphery/ peripheries and their own network articulation[10]:

– Questions related with a new multi-scalar condition:
• With a new geo-urban dimension "in", "with" and "towards" the territory, and with the assemblage of flexible and integrated structures "in set" and "in net", capable of conjugating municipal realities and inter-municipal relations, networks of articulation and nodes of cohesion, development matrices
and landscapes as links, in new integrated models;
• With the complementary role of the main attracting centres and the various intermediate nuclei in these polymorphic models, and with the effective articulation between mobility, growth, nature, and landscape in and between them.

– Questions related with the new mobility scenarios:
• With other possible inter-scalar criteria of integration through infrastructural nets able to propose new combinatory definitions for the transport and energy systems themselves, as multifunctional agents, "compressors" (and "tensors") in/of the territory.

– Questions related with a new active role of the landscape today:
• With a new functional condition given to the great natural spaces, understood not only as landscape reserves but as active scenarios;
• With a new programmatic and resilient role offered to an operational landscape understood as an urban and territorial "infrastructure" associated to the great environmental topics (water, energy, land use, matter, and recycling, etc.) but also to the new processes of urban re-naturalisation, in process;
• With a new poly-functional approach foreseen for the traditional primary agricultural spaces, transformed into new playful mixed scenarios able to combine primary and tertiary activities: agriculture, tourism, research, green economy, etc.;
• With a new social space, public, collective and interactive at time.

[9] O. Nel.lo, Ciutat de ciutats, Ampuries, Barcellona, 2001.

[10] J. Scröder, M. Carta, M. Ferretti, B. Lino (eds.), Dynamics of periphery. Atlas for Emerging Creative Resilient Habitats, Jovis, Berlin, 2018, pp 68-69.

– Questions related with our own life and relationship surroundings:
• With a new type of more stimulating habitats aimed to be creatively reformulated;
• With new models of development, beyond the old regular or polygonal extensions, able to translate a new environmental sensitivity associated with a new conception of habitat as a living-land, as a mixed an relational landscape.
• With new "anti-typological" repertories able to mix programs, uses, functions and morphologies in more hybrid configurations and "*natufices*".

– Questions related with our urban existing scenarios and with the capacity to develop and/or redefine themselves:

• With new ways of approaching to old core centres and new density spots aimed at re-inform (recycle, recalibrate, renew) them to ensure necessary processes of qualitative urban reactivation;
• With innovative actions of recycling for existing fabrics: "historic neighbourhoods" (mature stages or consolidated fabrics that are more or less obsolete) or "modern peripheries" (residential complexes, industrial estates or tourism scenarios that are often deficient in their performance and/or in their necessary programmatic and functional re-evaluation processes).

– Questions related with a new type of urban metabolism - and urban models - that have to be (re)defined:
• With the capacity to combine parameters of revaluation (redefinition, recycling, re-naturalization and/or restructuring) with new innovative and inductive repertoires (multifunctional, mixed, hybrid) to ensure genuine qualitative actions, diversity, and variety at the same time, in a territory potentially able to reconcile culture, life, production, leisure, and knowledge, from an adequate integrated enhancement of its own infrastructure.

– Questions related with the interplay between contemporary architecture, society, and culture in the new information society:
• With new creative and technological, spatial, and environmental ambitions called to express the challenges of an emerging society and its translation in new collective and interactive scenarios: scenarios conceived for activity, enjoyment, and knowledge, but conceived also as possibly interactive, reactive and responsive - that is more sustainable – "interfaces" (or mediation inter-spaces) in-between citizens, environment and new informational technologies.

Today it is a matter of rethinking the possible propositional quality implicit in the dynamic potential of this new *geo-urban* scenario, of displacement, mobility, and exchange—but also of landscape and inter-landscapes, of the connectivity and the (inter) relationship—connected with a new understanding of the idea of place or context (as a field of forces "articulated", in network) as

well as with new *projective* and *conceptive* tools, emerging today, associated to the new information technologies; thus recovering a certain optimistic— ambitious—epic of the *glocal* involved in the profound changes of scale and structures characteristic of the new metropolitan forms; favouring a positive and at the same time critical action, attentive to those conflicts, tensions, and deficits generated by the new phenomena and dynamics. These tensions and deficits—social and spatial and environmental—appeal to new approaches, resilient and integrated at the same time, for our life and relationship scenarios beyond the old paradigms of the discipline (Gausa *et.al*. 2003, Ricci 2012)[11].

The scenario of this change of scale appeals, already entering the new decade, to a new type of holistic, strategic and integrative recognition, in which representation would no longer be that of postmodern iconographic figuration or that of alternative photometry (and volumetry), neo-modern, but that of more advanced "synthetic capacity"; that of new systemic processes (and registers), multiple, increasingly complex.

"Action maps", "open devices", "network systems" (*info, eco, infra and intra-structural*) would give way to a new instrumentation made of multilayer cartographies, evolutionary schemes, compressor diagrams and/or conceptual ideograms, combining old analytical-analogical approaches and new synthetic-digital logics.

The increase of new technologies in the information age and a new expanded condition in which the co-participated processes will multiply, makes us think today of a new type of concerns in the analytical approaches to the city at the beginning of the century.

The generation of "open programs" (more than maps or registers) associated with the instrumentation of "open source" software such as Rhino, Grasshopper or interactive devices such as Arduino, refers to a new type of approach where evolutionary spaces and dynamic processes would be combined in the projection of possible algorithmic, parametric and simulated scenarios, as multiple as varied and differentiated in their diverse responses (responsive, reactive, interactive) to information, conditions and changing solicitations.

The application of these new recording capacities, orientated not only to the optimisation of our urban management and engagement but to new complex and integrated environmental answers (associated with a new implicated sensibility) talk about a new *resili(g)ent* condition (resilient and intelligent, at time) open to evolutionary and adaptable scenarios and designs. The old analogical *(re)presentation* gives way, more and more, to a new type of *(pre)presentation* –or multiple *(proto)presentation*, virtual and visual– as open and indeterminate as potentially orientable and *vectorizable* in its own definition, definitely processing and procedural.

In this sense, the innovative input of this new methodological urban approach can be based in 3 lines of action, diverse but interconnected in-between them, that are opening the door not only to different changes of paradigms but also to new frameworks, instrumental tools applications and experimental outputs [12]:

[11] M. Gausa, LAND-LINKS & RE-CITYING: verso una nuova geo-urbanità in rete in M. Gausa - M. Ricci, AUM 01, Atlante Urbano Mediterraneo, List, Trento, 2014. See also M. Ricci, *Nuovi Paradigmi*, List, Trento 2012.

[12] M. Gausa, C. Andriani, R. Fagnoni (eds.): International Forum MED.NET 3 Resili(g)ence: Intelligent Cities / Resilient Landscapes ADD Scientific Meeting. Conference Proceeding, Paper Doc, Barcelona 2017, pp. 11-36

**A) Techno-digital innovation (data-processing and management of information)**
**PROCESSES AND RECORDS > MAPPING & MANAGING.**
**Changes of paradigms**: the transition from ancient fixed, multi-strata representations to a new type of multilevel and algorithmically dynamic, sensory and evolutionary maps would represent the main paradigm shift in this field of simultaneous analysis and synthesis.
**Framework**: The progress of digital technologies and open, parametric and parameterized simulations would frame new scenarios associated with new software, digital processing and translation tools, in diversified and informational processes.
**Outputs**: Data-Visualization, Data-Simulation, Data-Orientation and Data-Applications would be operations involved in this type of dynamics, translated in real time.

**B) Urban-territorial-environmental innovation (integrated eco-systemic strategies)**
**NETWORKS AND SYSTEMS > PLANNING & LANDING**
**Changes of paradigms**: the transition from the old occupational planning to a new relational strategy, networked, would constitute the main paradigm shift in this set of urban-territorial conceptual levels.
**Framework**: Complex structures and integrated/integrative systems would frame a will of combination between multi-level and multi-scalar informational organizations, programs and matrices (urban-territorial structures, 'info', 'intra', 'infra', 'trans' and 'eco' relational, again, reactive and interactive among them) in new 'intertwined' scenarios.
**Outputs**: Strategic and prospective horizons between city, landscape, nature and mobility, understood as operating multi-systemic maps or *diagrammaTICities*, conjugated and qualified through adaptive and reactive criteria constitute important elements of this geo-urban condition.

**C) Social co-participated and co-affirmative innovation**
**(INTER)ACTIONS AND CO-GENERATIONS: MEDIATIONS AND OPERATIONS > DESIGNING & SOCIALIZING.**
**Changes of paradigms**: The transition from informative participation to the informational co-production and co-generation would frame new social sharing (and involvement) dynamics through new collective behaviours.
**Framework**: New (activism) actions favoured for new communication technologies that convoke more interactive, relational and experiential structures through public spaces and/or '(inter) active' programs of social reaffirmation, re-launch and recuperation.
Outputs: Collective open actions and mediations, "inter" and "co" active, as a new type of relational and responsive interfaces.

New Orleans, 2005

## • III– RESILI(G)ENCE •

This is the conceptual approach for a new emerging logic related with the topic *Advanced Urbanism* and its possible declination with the term Resilience, the other substantive topic associated, today, to the big mutations of our contemporary spaces of live and relation. The implicit challenge in this assemblage is the increasing capacity to explore the new potentials of these hypothetical "Intelligent" dimension associated to our "informational time" (responsive, reactive, variable and adaptable) crossing them with the needs (and latencies) of more efficient "resilient" scenarios (resistant, flexible, reactive and adaptable also) in this new *Resili(g)ent* condition able to combine intelligent and resilient cities... contexts, environments and landscapes[13].

[13] Ibidem

**Intelligent cities**

Intelligent (or Smart) Cities are understood, in the general assumptions (Wikipedia, etc.) as urban and informational systems destined to integrate multiple levels of information and communication technologies (ICT, IOT, etc.) in more secure, qualitative (and innovative) spaces of life and exchange, able to manage new city's assets.

Information and Communication Technologies (ICT) – but also new reactive and creative urban strategies– used to reinforce the level of quality, performativity and interactivity of urban services, structures and spaces (U-S.S.S), reducing costs and resource consumptions and improving positive interactions between citizens, habitats and local governances.

Traffic management, energy, health care, water, waste management, innovative urban agriculture and planning design, are common sectors implicated in a new intelligence of cities that *"resides in the increasing and effective combination of digital telecommunication networks (nerves), ubiquitously "embedded intelligence" as an "operational processing capacity" (brains), sensors and tags systematisation (sensory organs), software design and creative applications (knowledge and cognitive competence) and social, cultural and spatial innovative responsive capacities"* (Mitchell,W., 2007)[14].

[14] W.Mitchell, City of Bits, The MIT Press, Boston, 2007

**Resilient cities**

**Resilient Cities** are understood as living urban contexts with capacities to absorb (and redirect) shocks and stresses, weaknesses and threats, in their social, economic, and technical structures (and infrastructures), being able to maintain essentially their own functional, environmental and sociocultural conditions, values, and identities.

To increase their capacities for resilience, the cities will need to adopt new urban planning and building design strategies that allow them to increase their abilities to better respond and adapt themselves to the economic, social, and physical stresses and to face the complex challenges of increasing natural risks, energy scarcities, climate change, food needs, land use occupation, and population dynamic fluctuations (Resilientcity.org)[15].

[15] See www.resilientcity.org

**Intelligence: INT. key-factors**

Enlarging these definitions we can understood the term Intelligence from the Latin term *Intelligentia* – from *Inteligere*, *Intus* (between) and Legere (to try, to chose, to select) as the capacity "to choose between". *Intelligence* has been defined in many different ways including as one's capacity for logic, understanding, self-awareness, learning, emotional knowledge, planning creativity and problem solving, etc.

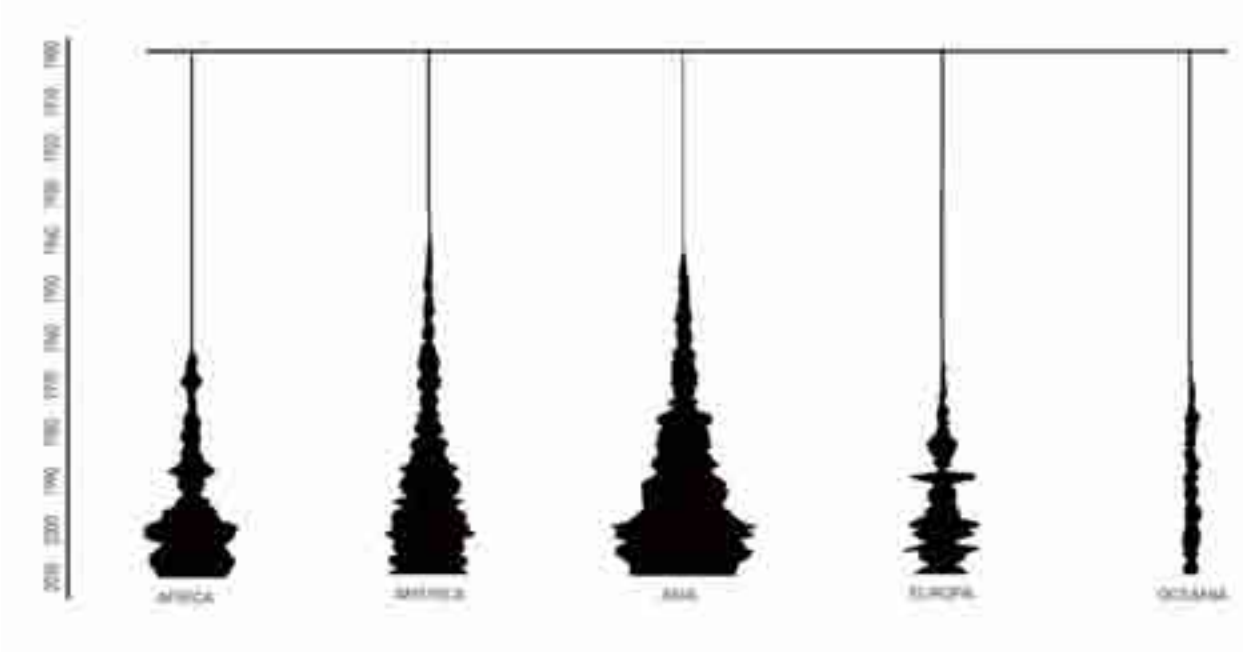
*Intelligence* can be more generally described as the ability to process and analyse information, and retain/synthesize it as knowledge to be applied towards adaptive behaviours within an environment or context.

We can talk, in this sense, of 5 Key Parameters (INT) associated to the term *Intelligence*.

INT.1– Processing capacity (analytical and conceptual)
INT.2– Adaptive capacity (evolutionary, flexible, reversible)
INT.3– Transversal capacity (connective and strategic)
INT.4– Operational capacity (reactive, dispositive)
INT.5– Relational capacity (emotional, empathic and interactive)
+ INT.6– Projective capacity (*setting up* capability > propositional, proactive, creative, innovative)

**Resilience: RS. key factors**
The term *Resilience* from Latin *Resiliens* – present participle of *Resilire* "to rebound, recoil," from re "back" + *salire* "to jump, leap" – calls to "the ability [of a system] to cope with change":
– the power or ability to return to the original form, position, etc., after being bent, compressed, or stretched; elasticity (TOPOLOGY)
– the ability to recover readily from illness, depression, adversity, or the like; buoyancy.
We can talk, in this sense, of 5 Key Parameters (RS) associated to the term *Resilience*.

RS.1– Anticipation
RS.2– Adaptation
RS.3– Integration
RS.4– Resistance (Endurance)
RS.5– Recuperation (Resetting)
+ RS.6– Future (Self)projection/Affirmation > IT.6



GIC.Lab (Lia Ara-Alessandro Astolfi-Marco Naibo-Eva Rovense )– IAAC MAA01- *From Craft to Research, Emergency Level. Smart Citizens* (Master in Advanced Architecture, 2012-2013)

**Resilience + Intelligence (Resiligence):**
Is significant the evidence that the terms resilience and intelligence can be explicitly combined - in every one of his capacities - to multiply its potentials of answer – and synergy – to the environment... and with the environment.
We can talk of:

RS.INT1 > RS.1: Anticipation, linked to INT.1: processing capacity (analytical and conceptual)
RS.INT2 > RS.2: Adaptation, linked to INT.2: adaptive capacity (evolutionary, flexible, reversible)
RS.INT3 > RS.3: Integration, linked to INT.3: transversal capacity (connective and strategic)
RS.INT4 > RS.4: Resistance (Endurance), linked to INT.4: operational capacity (reactive, dispositive)
RS.INT5 > RS.5: Recuperation (Resetting) linked to INT.5: relational capacity (emotional, empathic and interactive)
RS.INT5 > RS.5: Future (Self)Projection & Affirmation, linked to INT.6: projective capacity (setting up capability > propositional, proactive, creative, innovative)

Conditions attached, in turn, with the specific urban topics (and urban "shares") of a new advanced exploration linked with new data recording and mapping representation and simulation (*Mapping*, capacity for analysis and processing, analytical and conceptual) and with a new urban management (*Managing*, strategic adaptability and adaptation, flexible capacity of answering, evolutionary and reversible).

*IAAC MAA01- From Craft to Research, Emergency Level. Smart Citizens. (Master in Advanced Architecture, 2012-2013)*

Main vulnerable and risk zones in the world (marked in red), in America the line is practically vertical, in Asia and Europe, horizontal, linked with the big stressed world earth failures.

Topics linked, at the same time, with a new mixed land-use reformulation –integrated– and with a new holistic attention to the urbanity in the territory, the environment and the landscape (*Planning*, transversal and integrative skill, multiple and inter-connective) but linked, also, with a new contextual endurance, as a functional and operational absorptive capacity – responsive and responsible – associated to a new active conception of the landscape as a field of forces (*Landing*, reactive and dispositional sustainable *spatiality*).

And topics associated, at the end, with a new social activism (*Socialising*; recovery, rebound, re-launch, relational skill, empathetic and interactive); and, ultimately, with innovation, that is, with proactive projection statement (*Designing*; projective capacity, propositional, creative and, therefore, innovative) particularly decisive in relation to the new challenges of a new advanced logic.

The exploration of a new positive (synergistic) mediation to define our habitats, but also of a new sensitive interaction (empathic or eco-empathic) to face increasingly complex scenarios, marks today many of the tastings produced in a time that multiplies, in turn, those inertia associated with global deficit

situations related with conflicts and threats, linked to critical geopolitical (and geo-economic) changes, but also, naturally, with climate change and its devastating effects on the most vulnerable populations (environmental risks, housing defects, pollution, ghettization, increase in poverty thresholds, etc.).
The informational capacity of the age of connective and productive (de-localized) interchange has increased the plural complexity (rich, varied, diverse) of the scenarios and relationships, but also, it has contributed to increase the entropic effects in the land-use of soil and the progressive inequality between realities and communities and, therefore, the appearance of a new type of disotropia not only physical but also socio-economic (and cultural) that can only be addressed from a new type of logics and governance more sensitive to holistic, equitable and empathic visions (*empathicities*)[16].
The appearance of a new type of sensitivity and social action linked to an architecture of the immediate, of the instantaneous, of the unforeseeable[17]– of a precise and precise hyper-moment – connected to the force of attack (force de frappe) of the 'active and activist, is marking the interest of the new generations, in-

[16] M. Gausa, City Sense: Territorializing Information in V.V.A.A.: City Sense, 4th Advanced Architecture Contest, Actar, Barcelona, 2015. See also V. Guallart, La ciudad autosuficiente, RBA, Barcelona 2012.

[17] With the title Improrrogable was presented the central exhibition of the Biennale of Valparaiso 2017, dedicated to a new resilient social activism in America Latina.

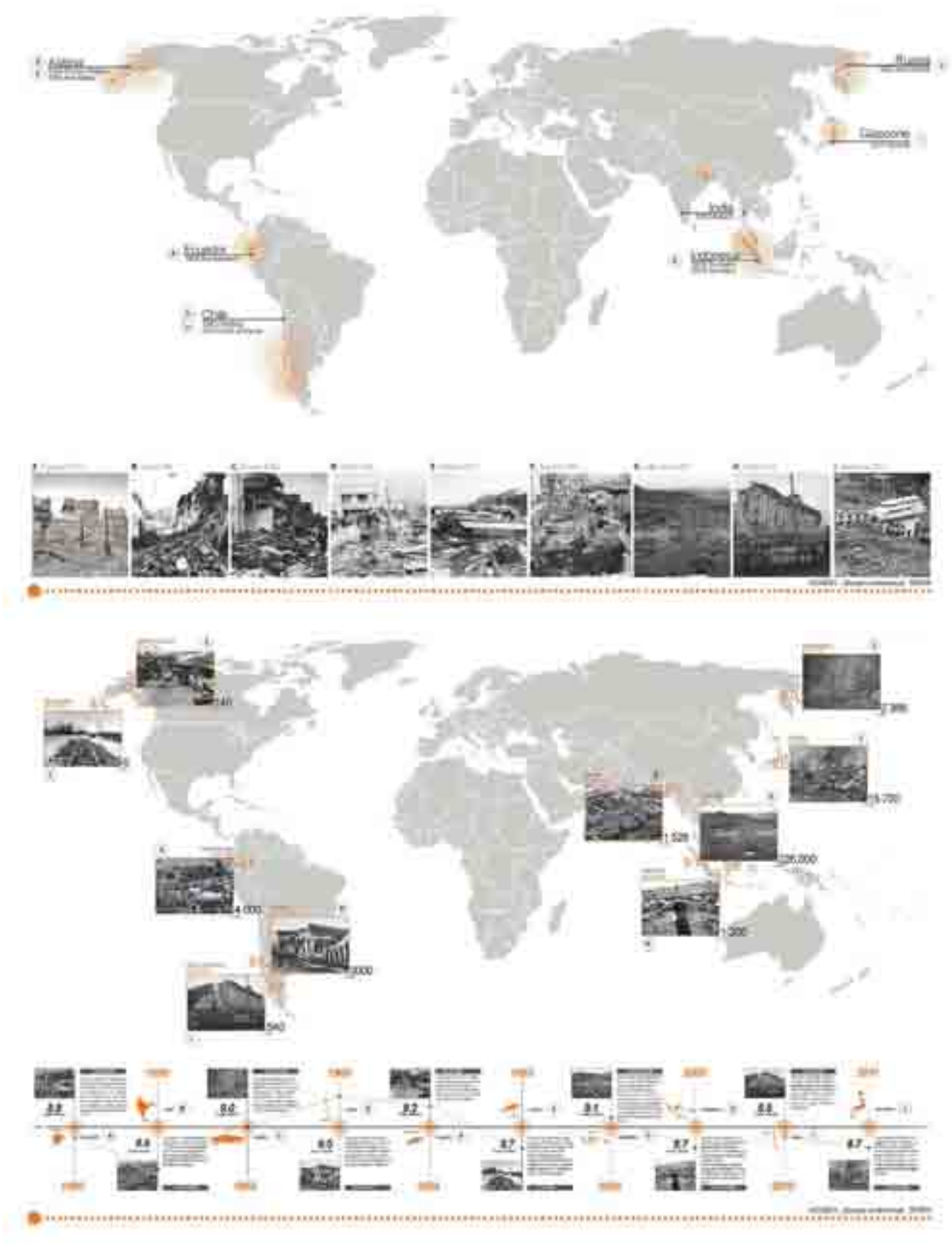
volved with this collective sensitivity, responsible and responsive at the same time. Processes of self-generation, co-production, participation or intervention, tend to combine operations and installations (more or less "snapshots" and "economic", in ways and means) in possible sharing spaces, urban reactivation and collective exchange and affirmation.

In this sense, the new formulation and planning strategies do not always require a technological apparatus to define direct and complex answers – favouring, in spite of, the research of shared process (co-produced, co-generated) and favouring, at time, a new "eco-mediation" aimed at elaborating and re-elaborating (in the form of parameters, indicators or algorithms that are precise, recordable, traceable, re-editable in formats, trajectories or variable contexts) our relational environments, translating them into new kind of "advanced" approaches.

Hence the importance of the concept of interaction (of a positive exchange between environment, society, culture and information) in relation to a new and more sustainable development, not only as ethical and socio-economic responsibility but also as a creative and coherent consequence of the informational and relational revolution today in progress[18].

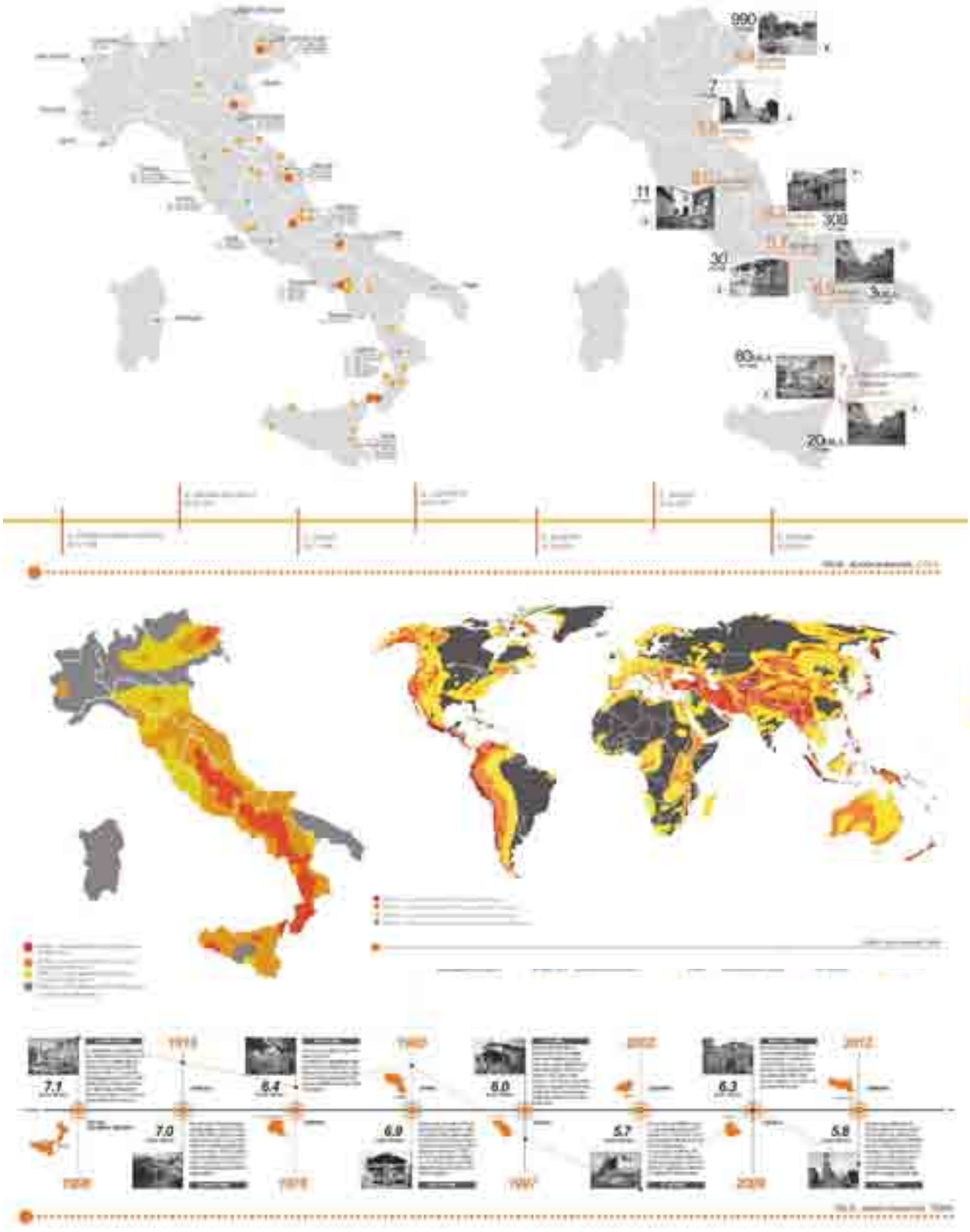
[18] J. Rifkin, La nouvelle société du coût marginal zéro, LLL Les Lines qui Libèrent, Paris, 2014.

Dynamic data-maps of energy focuses and evolving landslides effects in Torre Baró Neighbour (Barcelona).
IAAC – GSS 2014.



Main earthquakes occurred in the world in the XX and XXI centuries. Localizations and Time Line

Source: GIC.Lab (Lia Ara-Alessandro Astolfi-Marco Naibo-Eva Rovense)




Seismic risk assessment plan in Italy and in the world

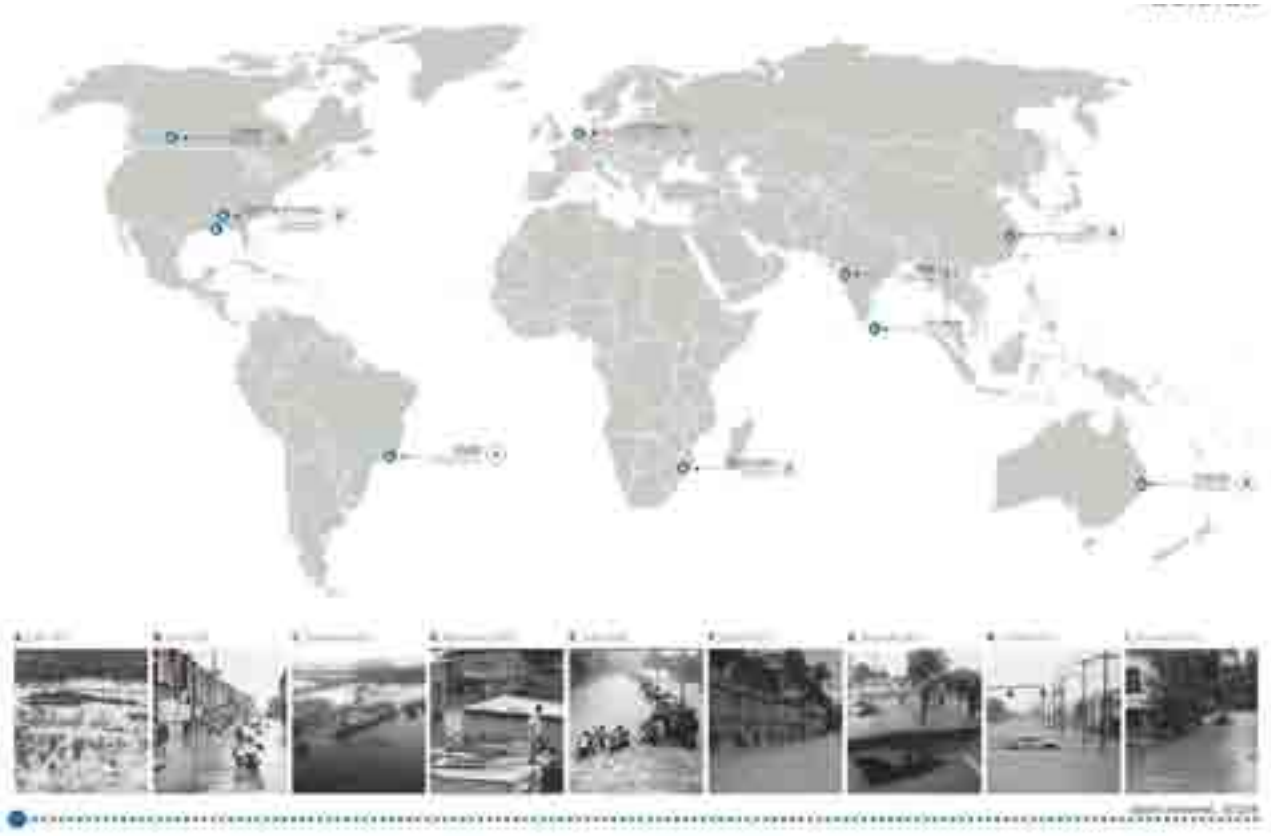
ZONE 1 - Red: high seismicity, PGA over 0.25 g. (708 municipalities).

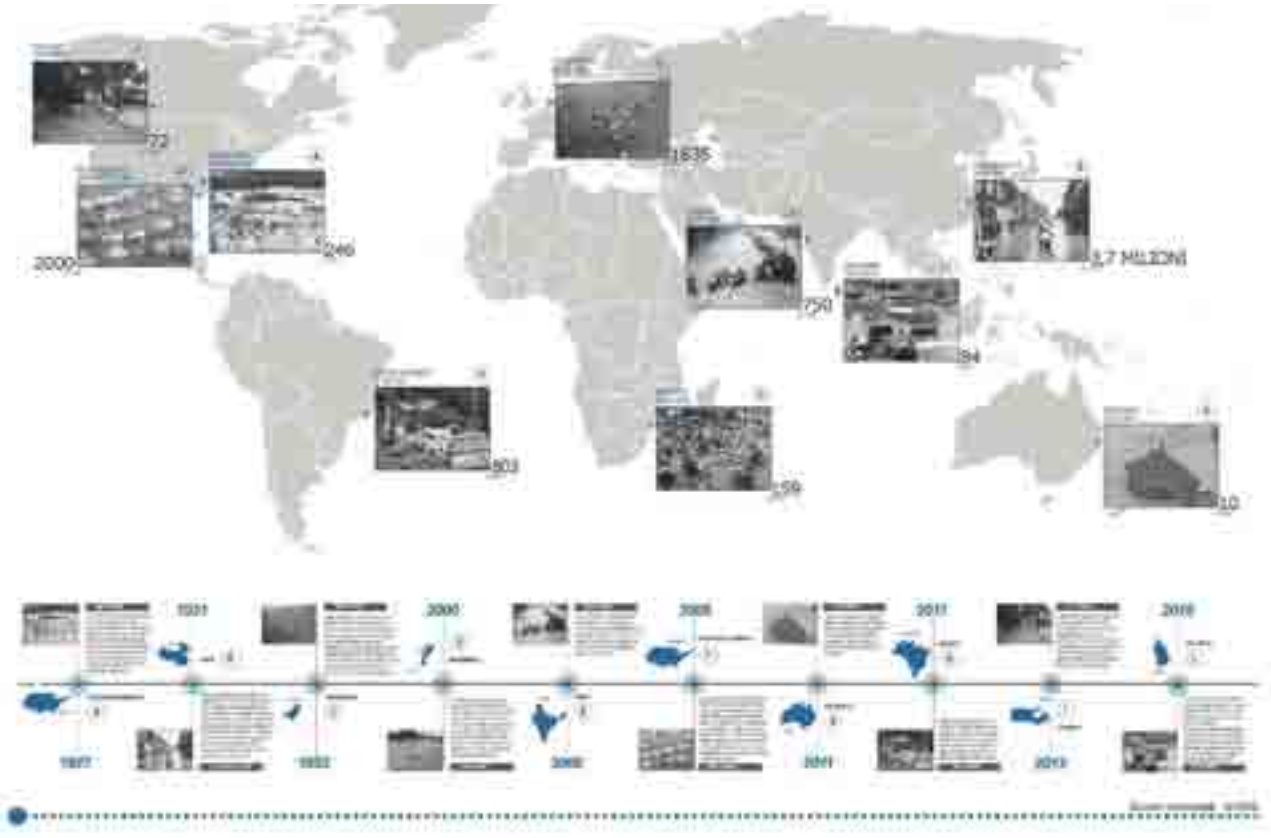
ZONE 2 - Orange: average seismicity, PGA between 0.15 and 0.25 g. (2.345 municipalities).

ZONE 3 - Yellow: low seismicity, PGA between 0.05 and 0.15 g. (1,560 municipalities).

ZONE 4 - Gray: very low seismicity, PGA less than 0.05 g. (3,488 municipalities).

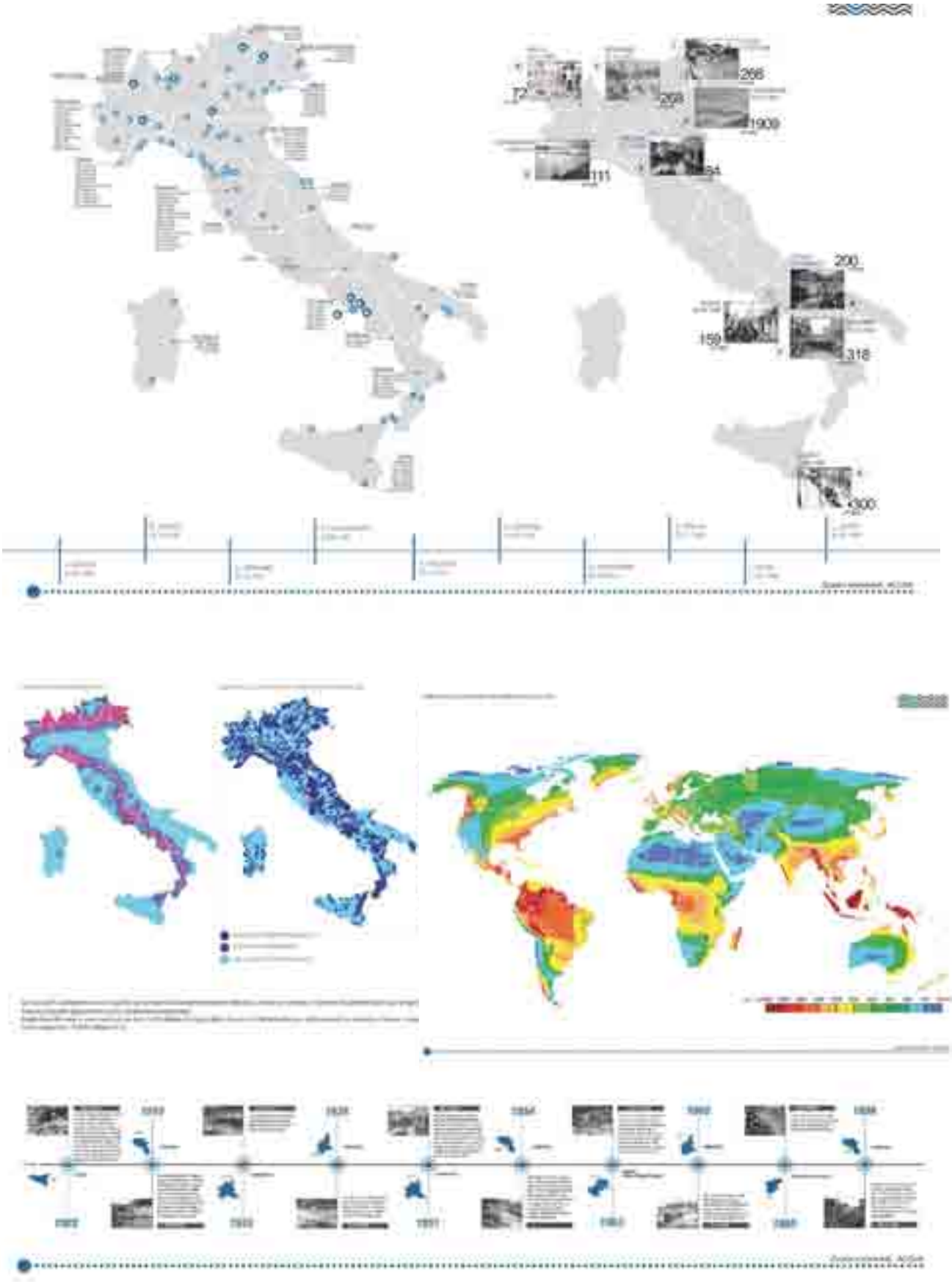
Source: GIC.Lab (Lia Ara-Alessandro Astolfi-Marco Naibo-Eva Rovense)





Main floods occurred in the world in the XX and XXI centuries. Localizations and Time Line

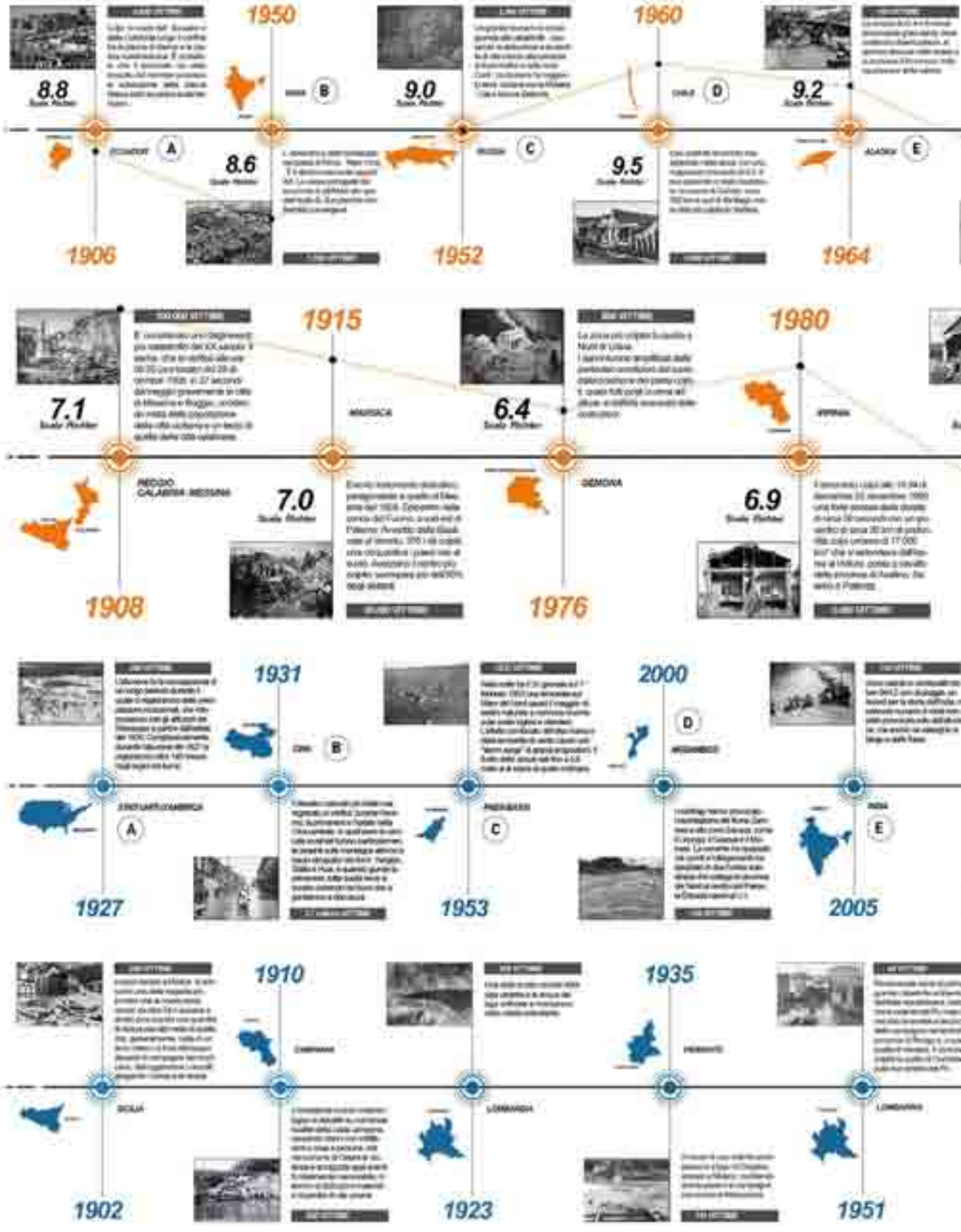
Source: GIC.Lab (Lia Ara-Alessandro Astolfi-Marco Naibo-Eva Rovense)



Main floods occurred in the world in the XX and XXI centuries. Localizations and Time Line

From red mm>10.000 to light blue <50 mm

Source: GIC.Lab (Lia Ara-Alessandro Astolfi-Marco Naibo-Eva Rovense)




Red line: EARTH. Main disasters in the world and in Italy during centuries XX and XXI

Blue line: WATER. Main disasters in the world and in Italy during centuries XX and XXI


1965
9.1
2005
8.8
2011
8.7
8.7
8.7
2004
2010


2002
6.0
6.3
2012
5.7
5.8
1997
2009


2005
2011
2016
2011
2013


1954
1965
1998
1963
1985


1845
1949
Rheinhöhe
HOCHWASSER
JANUAR 1995


Fuß- u. Zollpegel
zur Messung der Rheinhöhe
amtl. belegt von 1818 - 1872
1834
31
107
106
105
104
103
102
101
X
99
98
97

# *II*
# *CROSSING SCENARIOS:*

## *contribution's introduction*

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# GEOGRAFIE DEL RISCHIO
## Verso una nuova cultura del progetto

**La profonda mutazione climatica che ha investito l'interopianetaedinparticolareicontestiantropizzati, ha creato una condizione di emergenza mai vissuta fino ad ora. Il surriscaldamento progressivo della crosta terrestre, l'innalzamento del livello d'acqua degli oceani, il rischio esondazioni, le emissioni di gas serra, l'inasprirsi dell'effetto isola di calore, per citare solo alcuni degli effetti nefasti di un cambiamento senza precedenti, hanno accelerato il passo delle ricerche specialistiche e di settore ed allo stesso tempo hanno lanciato un allarme a tutte le competenze che hanno nel territorio il loro campo d'azione.**

La vulnerabilità è una condizione diffusa su tutto il globo terrestre, le cause sono molteplici e riguardano tipologie diverse di traumi. Terremoti, alluvioni, incendi, oppure disastri ambientali provocati dall'uomo, procurano uno shock improvviso e mettono in campo la potenza distruttiva di una natura più forte o degenerata anche per cattivi interventi antropici.
Il cambiamento climatico viceversa, come l'inquinamento atmosferico, o la scarsità progressiva di risorse primarie, costituiscono invece una minaccia subdola che, prolungata nel tempo, crea assuefazione ed indebolisce la capacità o la motivazione a difendersi.

Si delinea dunque un quadro instabile, in cui, da una parte abbiamo un contesto in continuo cambiamento, dall'altra sistemi rigidi che male si adattano ad assecondarlo. Questa geografia del rischio interessa l'intero globo terrestre.
Numerose ricerche avviate già agli inizi di questo secolo hanno individuato in cause antropiche e non più naturali le origini di numerosi fenomeni meteorologici catastrofici quali alluvioni ed esondazioni. Così come una costruzione non attenta al livello di rischio sismico del luogo in cui è costruita può produrre catastrofi inaccettabili perché prevedibili. Prevenzione e Manutenzione sono quindi due parole chiave che entrano nei processi di modificazione o di tutela di un territorio, richiedendo azioni mirate di progetto ed integrazione delle competenze.
La condizione di rischio è estesa a tutto il globo terrestre e mette in campo alcuni dati allarmanti[1].
Uno di questi riguarda il numero sempre crescente della popolazione inurbata ed il conseguente aumento, in termini di densità edilizia e consumo di suolo, dei contesti metropolitani.
Pur occupando attualmente solo il 2% dell'intera superficie terrestre[2] le città sono responsabili per il 75% dei consumi energetici globali e per l'80% delle emissioni gas serra[3]. Svolgono dunque un ruolo nevralgico nei processi di cambiamento climatico sia nel senso negativo, come massa inerte che divora energia invece di produrla, che nel senso positivo, come potenziale e straordinario elemento di mitigazione possibile.
È una questione centrale che sposterà le regole del costruire e che obbligherà ad intervenire sull'esistente agendo sulla materia stessa della costruzione.
E sui dispositivi che possano contrastare e mitigare sia il consumo energetico che le emissioni inquinanti[4].
Le azioni di mitigazione volte a ridurre il rischio o a prevenirlo, hanno il duplice obiettivo di innalzare la 'soglia della tolleranza' e di diminuire la vulnerabilità nel tempo, agendo sulle cause e soprattutto controllandone gli effetti.
È il principio di 'durabilité' (il termine francese è più eloquente), ovvero di sostenibilità intesa come tutto ciò che migliora il presente senza compromettere il futuro: 'durabilità' nel tempo.
L'emergenza climatica porta con sé la necessità di un approccio transcalare, connette diverse ecologie, può diventare, secondo la interpretazione della Sassen[5] (2009) il nuovo catalizzatore sociale, tecnico, politico, concettuale. Può obbligarci a ripensare stili di vita e culture territoriali, innescare nuove forme di conoscenza e di approccio, inventare nuove sistemi spaziali e palinsesti infrastrutturali.
Basti pensare all'azione congiunta del global warming con l'effetto isola calore che potrebbe innalzare le temperature degli edifici e degli spazi pubblici in maniera non più tollerabile: questo porterà a rivedere la natura di quegli spazi e la natura stessa degli edifici, inciderà sulla sostanza della materia di cui sono fatti, sui dispositivi di protezione e di mitigazione, sulla forma dei vuoti, sugli involucri, sulle connessioni fra le parti, le intercapedini,

[1] Andriani C. - Sabbion P. *Resilienza urbana, strategia per le città di domani: un inquadramento teorico* in Manuel Gausa, Carmen Andriani, Raffaella Fagnoni (a cura di) *MED. NET3 RESILI(G)ENCE - ADD SCIENTIFIC MEETING, conference proceedings,* Papersdoc, Barcellona, 2017.

[2] dati UN-HABITAT. United Nations Human Settlements Programme, Global Report on Human Settlement 2011 "Cities and Climate Change", London - Washington, DC

[3] Cfr. Manigrasso M., *Città e Clima_Verso una nuova cultura del progetto*, SALA Editori, Pescara 2013 pubblicazione della Tesi di Dottorato 'Le strategie di adattamento ai cambiamenti climatici nei contesti urbani', relatori C.Andriani, A. Clementi, Dottorato di ricerca in Architettura ed Urbanistica, XXIV ciclo, Università degli Studi G. d'Annunzio_Pescara.

[4] Le indicazioni riguardano le direttive europee sull'efficienza energetica varate qualche anno fa secondo cui entro il 2021 i nuovi edifici dovranno essere 'neutrali ' da un punto di vista energetico, ovvero in grado di garantire attraverso l'involucro condizioni tali da non aver bisogno di apporti per il riscaldamento e il raffrescamento oppure che questi siano soddisfatti attraverso fonti rinnovabili. Cfr. a questo proposito : Zanchini E., *Corviale sostenibile* in Le Forme del Cemento / Sostenibilità, vol 4 (a cura di Andriani C.) Ed Gangemi, Roma 2012

[5] Sassen S., *Le città nell'economia globale,* Ed Il Mulino, 2010

il sistema degli impianti, sulla capacità reattiva ed adattativa dell'insieme.
Il progetto dell'ambiente in cui viviamo si carica di una responsabilità aggiunta, qualcosa che riguarda l'adattabilità a condizioni sempre mutevoli, la flessibilità al cambiamento, la reversibilità, la interattività, la 'capacità di riorganizzarsi in presenza di nuove condizioni' (Tompkins&Adger 2003). È il concetto di resilienza di cui molto si parla negli ultimi anni. È un concetto transdisciplinare, nato dalla ingegneria meccanica e dalla fisica come capacità di un materiale di reagire agli urti, in senso più ampio indica la capacità di adattamento di un contesto o di un soggetto a far fronte ad una condizione critica, traumatica od instabile.
Un sistema rigido reagisce male ad uno shock improvviso ma anche ad un cambiamento più lento. Oppone una resistenza che porta alla rottura. La malleabilità o adattabilità di un sistema è invece la condizione necessaria a far fronte a condizioni di mutamento e comprende uno spettro ampio di significati.
È l'adattabilità che si chiede agli strumenti di pianificazione delle città, ma è anche la capacità di reazione della materia di cui sono fatti gli edifici. Alcune realtà urbane sono più avanti di altre. Città americane ed europee hanno studiato piani specifici per il clima, strategie di adattamento e realizzato progetti puntuali. Il PLANYC di New York è un piano della sostenibilità che pone al centro il *climate change* fin nella struttura della pianificazione. Le politiche adottate in California lavorano invece sulla prevenzione rispetto al rischio costante e catastrofico di cancellazione della baia di San Francisco. La proposta di modellazione topografica del lungofiume di Anversa riduce le esondazioni attraverso l'ispessimento del bordo di contenimento. Convivere con il rischio. Non opporsi ma trasformarlo in una opportunità aggiunta del progetto, che risponde in maniera plastica ad un contesto instabile e mutevole nel tempo.
Si capisce anche come il concetto di temporalità subisca anch'esso variazioni sostanziali. La condizione di incertezza conferisce al tempo un significato diverso, la imprevedibilità degli eventi e il prevalere delle urgenze, lo rendono non più programmabile[6].
Cambia il rapporto con il Tempo.
Cambia il rapporto con la Storia.
Cosa è cambiato di fatto rispetto al passato?
L'architettura ha sempre agito sull'ambiente mitigandolo. L'architettura offre riparo, protezione dalle intemperie, realizza attorno a noi spazialità più confortevoli. Dalla capanna dell'Abate Laugier all'archetipo dell'Arca , dispositivo di salvezza dalla catastrofe globale sia per uomini che per animali, l'architettura ha inventato dispositivi spaziali per un abitare migliore. Le culture materiali, hanno prodotto innumerevoli sistemi di difesa e di adattamento climatico, assecondando la specificità dei luoghi. Spesso queste soluzioni, consolidate dall'esperienza e da un saper fare comune, sono confluite nelle opere dei Maestri del novecento. Lo testimonia ad esempio l'opera di Villanueva in Venezuela, il suo modo di far fronte al difficile clima tropicale, la

[6] Op cit Manigrasso

sapiente alternanza di luce, ombra, vegetazione e ventilazione naturale realizzata in molte sue opere ed il continuum fluido che attraverso un lungo elenco di dettagli innesta su una tradizione consolidata l'approccio creativo della cultura del Moderno. Può ritenersi l'attuale emergenza climatica una condizione diversa?
La condizione dell'oggi è una condizione inedita. L'emergenza climatica è una circostanza nuova da affrontare e gli strumenti per farlo non possono essere più gli stessi. Andiamo 'verso una nuova cultura del progetto' che non lascia spazio a interrogativi. La materia, di cui è fatta la realtà fisica in cui viviamo, non può più essere materia inerte, materia passiva che divora energia senza restituirla. Ciò produce uno scarto "tra inerzia e mutazione"[7].
Sta al progetto colmare questo scarto, generare soluzioni adattive che ricucino strappi temporali anche inattesi. Sempre più gli elementi che costituiscono l'insieme fisico dei territori che abitiamo, (città, casa, paesaggio. Infrastruttura, suolo) saranno elementi connessi attivamente, fra loro comunicanti.
Le nuove strategie di mitigazione e di adattamento potranno definire nuove strutture spaziali (Viganò) in grado di supportare questa trasformazione, generando visioni inedite ma soprattutto un nuovo concetto di infrastruttura. Ci avviciniamo nuovamente ai luoghi dei nostri territori, per leggerli diversamente, da vicino, nelle topografie, nella storia dei cambiamenti ambientali, nella diversità delle culture che hanno espresso.
È questa la "nuova geografia del rischio" che si fa costruttivamente traccia di progetto. Scardina il processo progettuale, introduce nuovi interrogativi, traguarda una nuova idea di paesaggio, investendolo di maggiore complessità e di una nuove nozione del tempo "multiforme", "multi-direzionale", e "non ricorsivo"8. Un paesaggio che introietta e metabolizza l'emergenza climatica svelando la sua "terza natura", in filigrana; che abbandona forme di stabilità, a favore di continue, possibili configurazioni territoriali, e diverse relazioni fra gli elementi depositati.

[7] Op cit Manigrasso

# 1

*Territorial vectors*

**Andreu Ullied**
MCRIT, Barcelona

# FOR AN EXPANSIVE CONCEPT OF RESILIENCE

## • *I – The value of conviviality* •

**The most influential book in the history of urban planning is, surely, The death and life of the great American cities (1961), wrote by the journalist and activist Jane Jacobs. Jacobs defends coexistence and conviviality, and the social value of sidewalks, squares and parks, public spaces and facilities, open to everyone, markets and urban commerce, where People of any condition meet fortuitously and relate. These unforeseen relationships are the matrix of urban life, the nucleus of urban culture. The big cities are not villages of larger size, recall Jacobs; they are places where foreigners abound, people coming from outside, even neighbours are often strangers.**

There are innumerable opportunities to make new acquaintances, to find new friends.
To no longer see the couple you will recently brook.
Cities are the place where we can live anonymously, everyone at his home, and the possibility to be more of ourselves.

Precisely for that public space - public transport, proximity commerce, relational landscapes - are fundamental environments to coexistence, and autonomous vehicles, cash machines, electronic purchases, pose a risk, isolating us, individualizing us and, at the same time, making us uniform.
It is not necessary to overdesign the public space gained to the car; it is better let the neighbours gain it and reinvent it to according of their needs.
There are areas of calm traffic in the historic centre of Barcelona (and in many other cities around the world) but examples as the new super-blocks in the Cerdà Grid, recently started to be developed, allow a new, unexpected way for many neighbours, to inhabit the city.
(...) Jacobs gave so much value to the conviviality that he preferred that the urban projects arose from the people itself, even if they were on a small scale or not quite right, suspicious of the experts planning.
But there are cases where the plans must have sufficient dimension and sufficient technical support to be able to have a significant impact, as Sennett recognizes.

## • II– Coexisting with the risk •

In this sense, climate change is only partially observable phenomenon.
It has been discovered and demonstrated - supposedly proven, according to their detractors - by scientists, physicists of the atmosphere, mathematicians experts in simulation models, etc.
The way it has been explained to the general public - for Al Gore, for example - has been a lot effective, perhaps because we live with an increasing perception of vulnerability, in the society that the German sociologist Ulrich Beck called «The society of risk» (1986).
Bestselling Author Michael Crichton wrote *State of Fear*, a novel that questioned the phenomenon of the climatic change and that generated controversy between the scientists who are investigating to show that this phenomenon is real.
*State of Fear* is a techno-thriller in which ecoterrorists are planning attacks to frighten the population and make it more aware of the danger of warming global.
Despite being a fictional work, the pubblication contains graphics and notes at the bottom of the pages, two appendices and a twenty-page bibliography to support Crichton's criticism of global warming.
For an unhealthy and not expert person, it is not easy to identify the errors in the Crichton's opinions, if they exist.
Nor for an expert would be it, I think.
Climate is a complex and global phenomenon, which evolves over millions of years, and the series of available statistical data is scarce, although it points in favour of the studies of the IPCC, the

Pollution in China

international group of experts on climatic change that carries out analyses and studies of forecast.
But it is quite clear to everyone that oil consumption and emissions to the atmosphere is counterproductive, and that the explosion motor is one obsolete technology.
It was a technology less than the electric one already early twentieth century, but the existence of abundant oil in the States Units made the explosion motor more interesting as a model of business .
Electric motors and renewable energy sources - solar or wind -, as well as the improvements in the efficiency of the energetic consumption and in the intelligence of processes, they are convenient from all the views.
It is certain that the world would be different if, instead of the explosion motors, the American automobile industry would have adopted electric motors in the early twentieth century. The evidence it's that petroleum smells, spells and, if you breathe gas for a long time, it flies you and it kills you.
Climate change is sometimes explained as the modern version of the apocalypse – the threat that, like the sword of Damocles, hangs of humanity for his pride and, in this sense, he remembers the catastrophic analysis of the Club of Rome in the seventies on the limits of growth, or the essays of the theologian Robert Malthus; that is, the admonitions of the God of the Bible against the cities of sin.

But we should believe that scientists do not lie themselves and to ourselves, and it is important to accelerate the transition towards an economy released from fossil fuels Both of Robert Malthus like the Club of Rome, like the scientists of the IPCC, could be to say that «*se non è vero, è ben trovato*», ("if it is not true, is well-proven"), as used to say Pasqual Maragall of everything that, probably being true, it is important to don´t call in question because it contributes positively to strengthening the values and the projects that we believe in.

On 2007, with the information of *Climate Change 2007: Impacts, Adaptation and Vulnerability* (IPCC, 2007), it is stated that even it is essential and crucial to take measures to mitigate the Climate Change; the most vulnerable communities need to make itself adaptable, flexible and resilient to confront the impacts that are generated.

The changes generated by the augmentation of the concentrations of carbon dioxide to the atmosphere are provoking phenomena as hurricanes, tempests and marine turbulences and floods with more intensities, and dryer periods more severstemporally, which contributes to increasing the elemental risks.

The measures of mitigation – to decrease the emission of carbon dioxid, to hold it back before the emission, or to capture it after it – could help to reduce those risks, at least globaly.

In the short or long term the economy will tend to be decarbonized, to replace fossil fuels for others energy sources, but the levels of carbon dioxide in the atmosphere they are already high.

The danger of any risk is uncertain and difficult to be quantified in the medium and long term. But the big cities present a high vulnerability, because they concentrate huge volumes of population and activities of high added value; They have a high density of infrastructures and of facilities and, for these reason, material and personal costs - derived from adverse and very intense climatological phenomena - can be very high and significant.

Consequently, in order to reduce the risks as much as possible, many big cities in the world have carried out plans of adaptation: Chicago, New York, London, Rotterdam, Sydney, Hong Kong or Buenos Aires, among others. Durban, in 2009, was the first to include one in the Strategic Plan of the city. In Barcelona, Teresa Franquesa started to work in this direction in 2002.

All cities share the same perception of risk.

All they face, to a greater or lesser extent, growing risks: most frequent floods, slides, fires, periods of shortage of water, erosion of the beaches and of the first line of the coast, etc.

The cities with adaptation plans, they apply new criteria in planning of infrastructures and urban development, public spaces and facilities; in the management of the public services of the city, the regulation of the activities of the companies and the information to the citizens. Rather than increase the security guarantees of each infrastructure is about taking into account the synergies between them, and anticipate them to the extent possible.

Barcelona presents a comparatively high level of risk, which de-

rives from its Mediterranean situation, and it will be strongly exposed to extreme climatic effects: droughts, heat waves, flood episodes. Regarding economic activities, the risks derived from climate change focus, above all, on the tourism activity.
Tourism currently represents 10% of the GDP of the city and generates more than 200,000 jobs. With the decrease of the comfort of the city, the arrival patterns of tourists may change - it would rise in winter and decrease in summer - and, in the worst case, that overnight stays will be reduced only for climatic issues.
In the summer of 2003, 887 w premature deaths ere produced in Catalonia due to dehydration, stroke of heat and aggravation of already existing diseases due to these phenomena.

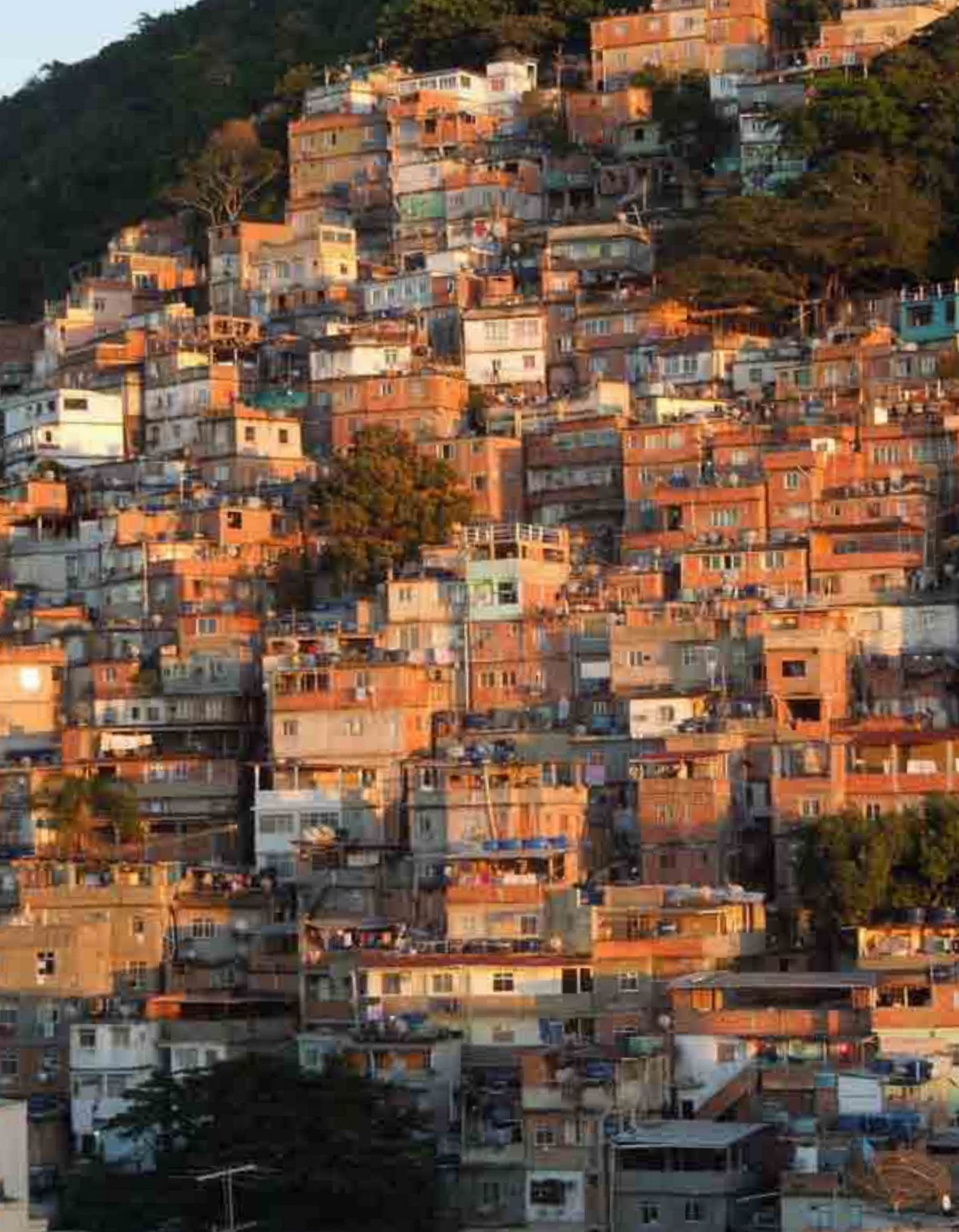
## • III – Resilient Cities •

Resilience is the ability of the city to respond to one external threat. Natural catastrophes or the depletion of natural resources are perhaps the most significant cases, but recently the term has also been related to the consequences of the economic-financial crisis. Resilient cities and neighbourhoods are those who better resisted the impact of the general crisis or those who have known adapt to the new scenarios.
A resilient city must be capable to anticipate future disturbances, whether climatic or financial, or of any other kind.
In fact, the security to deal with natural inclemency or industrial accidents - also to armed conflicts - has been fundamental in the design and construction of cities. Adaptation plans at climate change aims to review and update these criteria of agreement with the evolution of the external climatic dangers and of the internal vulnerability of contemporary cities.
The standards of density and allowed uses according to the current urban legislation planning already responds to safety and security criteria social welfare.
All infrastructures are also designed with safety criteria.
Engineer Manuel Valdés has been coordinating since years a network of resilient metropolitan towns, driven from Barcelona.
Hydrological risks could serve as an example. The process of urbanization has waterproofed large surfaces of coastal land, of so that rain falls on asphalted streets, rooftops of industrial buildings and on of all kind of constructions, making, on the one hand, that rainwater does not infiltrate the subsoil and, on the other, increasing the water screw speed and reducing the time of concentration of the different tributary currents at the same crossing point of the main stream; increasing, then, more than proportionally the flow of avenues and, for so much, becoming vulnerable to flooding downstream areas than before they were not drowned and that often are inefficiently urbanized.
On the other hand, the reduction of the erosion of the ground, result of the urbanization or the canalization of coastal rivers, reduces the contributions of sand to the beaches. The coastal cur-

Pollution in China

Pollution in Barcelona

rent accumulates in the dams and breakwater and that it can not naturally rest, when the eastern storms take it away.
At the in turn, the loss of sand makes them more vulnerable and difficult to defend the infrastructures and activities located along the coast.
The Solution can no longer be to build larger channels or longer spikes to protect the sand from the beaches of the landslides, but to restrict urbanization at the headwaters of the coastal basins and to incorporate into urbanization plans and designs, logic criteria to retain water from rain, or increase infiltration – to dis-urbanize and to ruralize (to rurbanize) everything possible and as soon as possible.
In the resilient efficiency it is not a question of revising and updating the usual upstream and conventional urban standards because climatological conditions may be more demanding in the future; What happens, rather, is that we can no longer apply these conventional standards to each sautonomous, single or singular project, but we will have to work, increasingly, with sets logics, between individual projects and general systems, in order to be able to consider also the synergies between all of them.



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# BETWEEN BLACK SWANS AND DRAGON-KINGS: THE NARROW PATH TO THE RESILIENCE OF URBAN REGIONS

*On and on the rain will fall*
*like tears from a star, like tears from a star*
*on and on the rain will say*
*how fragile we are, how fragile we are*
Sting

## • *From the city to urban systems and urban regions* •

**The human settlement on Earth has evolved in the contemporary age in a wide range of inhabited centers, from the smallest village (which still constitutes the prevalent form of collective living in many regions of the planet) to those that today we call "megalopolis", where we can observe a concentration of tens of millions of people.**

The history of humanity has never reached not only such a large number of individuals, but also such a diversified variety (quantitative and qualitative) of settlement forms.
What emerges clearly from studies of urban geography is however a common trait to all these different forms of settlement: their existence, development and - sometimes - even perish, in

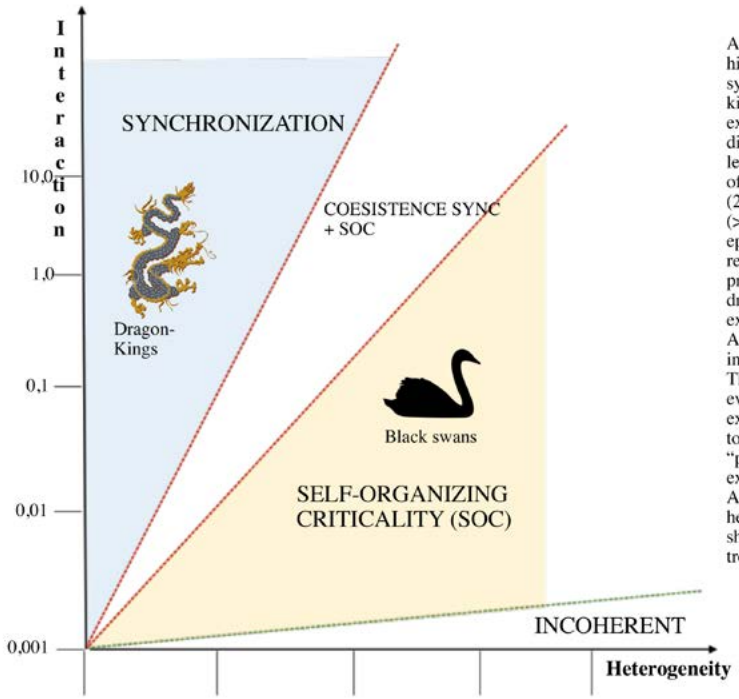
reticular forms. The relationships between the different urban centers mean that we can no longer speak of the city as an isolated phenomenon, a spatial fact of population concentration which corresponds to an equally evident relationship of domination over an "external" space to the city itself. The cities, if we can still call with this word them (and recognize them), in this period dominated by the urban realm (Choay, 1994), live and change only as elements of a complex network system, which in turn tends to configure in the space clusters of connected centers, which we can define "urban regions". And the urban region is the true protagonist of contemporary economic and social events, perhaps more than nation-states.
In contemporary urban regions, which link urban forms that are very different from each other, the built-up space intersects with ecological networks, green spaces, agriculture space, often in contradictory and problematic but often (at least potentially) virtuous form (Douglas, 2013; Grimm N. et al., 2008). The open space is a fundamental part of contemporary urban agglomerations and through it, its use (or often: over-use), its relationships with the built space, generate those problems that go under the name of sustainability and urban resilience. The artificialization of contemporary living, which first involved the cities and then progressively wider spaces around them, passed in the space of a few decades from the process of industrialization and urbanization of the first Industrial Revolution to contemporary urban forms. In today's urban regions, the cities of the atom were superimposed over the cities of bits and they are dominated, in economic and social terms, by the platform economy (Srnicek, 2017; Kenney and Zysman, 2016) which characterizes the so-called fourth industrial revolution (Schwab, 2016). The exponential dynamics of control over the environment through the artificial have been accompanied by the processes of environmental change that today constitute one of the elements of crisis in our societies. The emergence of the Anthropocene (Crutzen and Stoermer, 2000) is one of the fundamental elements of the transition that humanity is experiencing, accompanied by the other two equally impressive in dimensions: the demographic and the technological ones. And there seems to be no doubt that the processes of environmental modification have undergone a strong acceleration, at a global level, starting from 1945 (McNeill and Engelke, 2014).

## • The differentiation of urban settlement forms •

Cities originate and develop from the bottom up. They are generated when some individuals begin to put together their respective skills in a way that they can take advantage of physical proximity and thus begin to achieve economies of scale. According to Jane Jacobs (1970), the concept of city is intrinsically

anthropological, even existing in nomadic societies at the time when packages of innovation are generated thanks to the advantage deriving from coming together, sharing and dividing work. In this sense, the city, in the forms it has assumed in the West, is not the only possible form of human settlement, as recently demonstrated by J. Scott (2017) in his work on the birth of urban civilizations. The cities born with the great agrarian grain civilizations are the result of a systematic process of production control and of economic and social reproduction mechanisms. Other forms of settlement are possible and have been practiced throughout history in various regions and times over the planet. However, the cities developed according to the Western model and which today characterize the contemporary settlement landscape (which is a predominantly urban landscape) are, together with the process that generates them (the post-metropolis process: Soja, 2000), the most clearly pervasive fact on a planetary level.

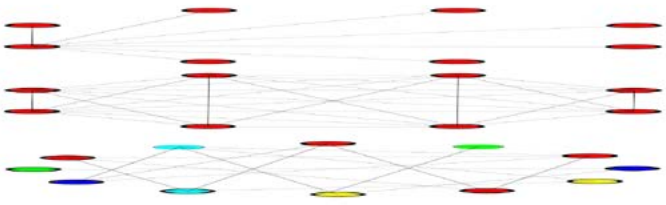
In a world in which the global population is entering a phase of demographic transition that will probably lead to its stabilization at the end of this century, the population itself is urbanizing at an ever increasing rate. This does not mean that we will all live in one big city in the future, but rather in a world made up of cities of all sizes, with an overall distribution among different settlement dimension similar to the current one (Batty, 2015). What we are living in this period is a radical transition (a tipping-point) from a rural world to an urban world that takes place 5,000 years after the emergence of the first cities and the start of stable agriculture. This means passing from a world of strongly localized interactions to a world of global connections, from a world based on physical technologies to a world based instead on those of computers, from a world of atoms to a bit world (Negroponte, 1995). While the world urban population has exceeded the 50% threshold in 2008, by 2050 this percentage will reach 66%, to reach at least 75% at the end of this century. All this presupposes that a high percentage of the population lives and will live in some kind of settlement that we call “city” or in any case in an environment that we call “urban” (although the debate on what today can be understood with this term is strong: Brenner, 2014). At the statistical level, the definition of urban of the United Nations, which is the one mainly used (Dijkstra, 2014; U.N., 2018), is closely connected to the concept of concentration or density of interconnected populations. In a panorama made of so many different urban centers (different in size and function), if the urbanization process until a few years ago was determined by a strong migration from rural to urban, in a world of zero growth (which is what let us stretch and that it is already present in some regional realities, such as Europe for example), migratory waves will tend to shift from a rural-urban dynamic to an urban-urban one. Thus, some cities will grow enormously and others will be subjected to equally dramatic phenomena of decline.



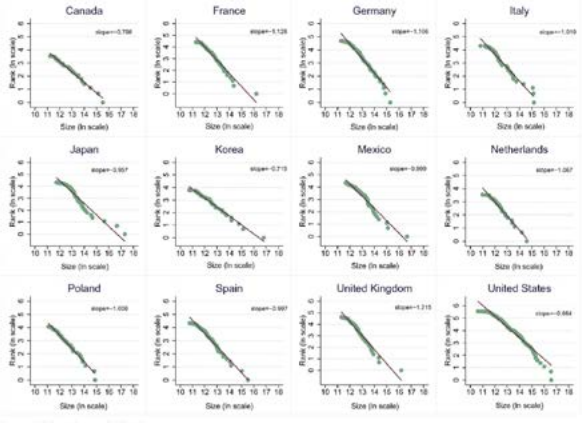

A system with a low level of diversity (or heterogeneity) but a high level of interaction can be considered a system in a synchronized phase. In this phase emerge rarely a Dragon-king. Dragon kings form special kinds of events leading to extreme risks (which can also be opportunities). Natural disasters provide many examples (e.g., asteroid impacts leading to extinction). Some statistical examples of the impact of extremes are that: the largest nuclear power plant accident (2011 Fukushima disaster) caused more damage than all (>200) other historical accidents together, the largest 5 epidemics since 1900 caused 20 times the fatalities of the remaining 1363, etc. In general such statistics arrive in the presence of heavy tailed distributions, and the presence of dragon kings will augment the already oversized impact of extreme events.

A system with a high level of heterogeneity and a high level of interaction is a system in a phase of self-organizing criticality. The system possesses excellent ability to respond to external events (robustness) thanks to its self-organization, however, extremely rare and unpredictable events may appear, unrelated to any internal variable. Black swans encourage one to "prepare rather than predict", and limit one's exposure to extreme fluctuations.

A system with a low level of interaction and a high level of heterogeneity is a system within a phase of incoherence (a shock event is extremely probable). It has a structure like a tree (following C. Alexander…).

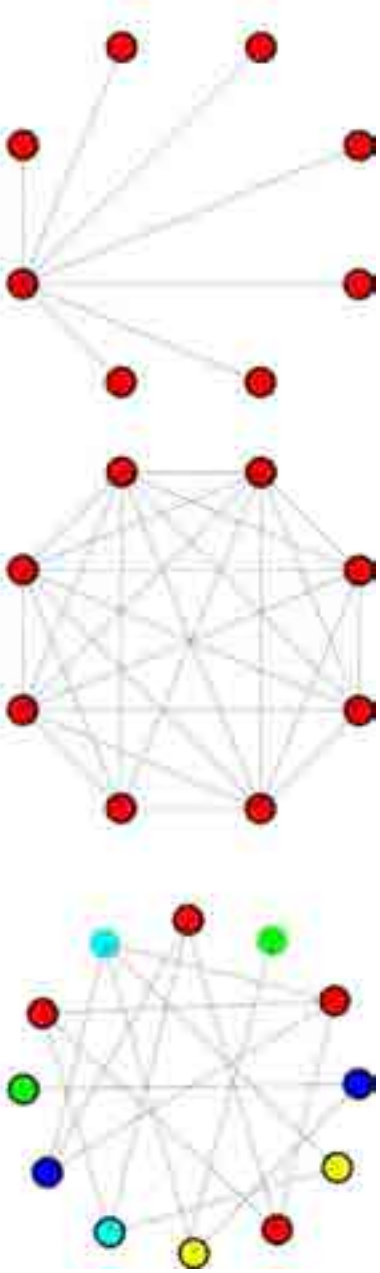


Systems with different degrees of internal connectivity and different levels of heterogeneity




The rank size rule of the urban systems of some OECD countries. In several of them emerges the presence of primate cities that represent exceptions to the allometric rule represented by the power law. These are real dragon kings (in some cases we witness the phenomenon of double primate cities) that are repeated at different scales and that cause strong regional and urban imbalances. A challenge for urban and regional resilience.

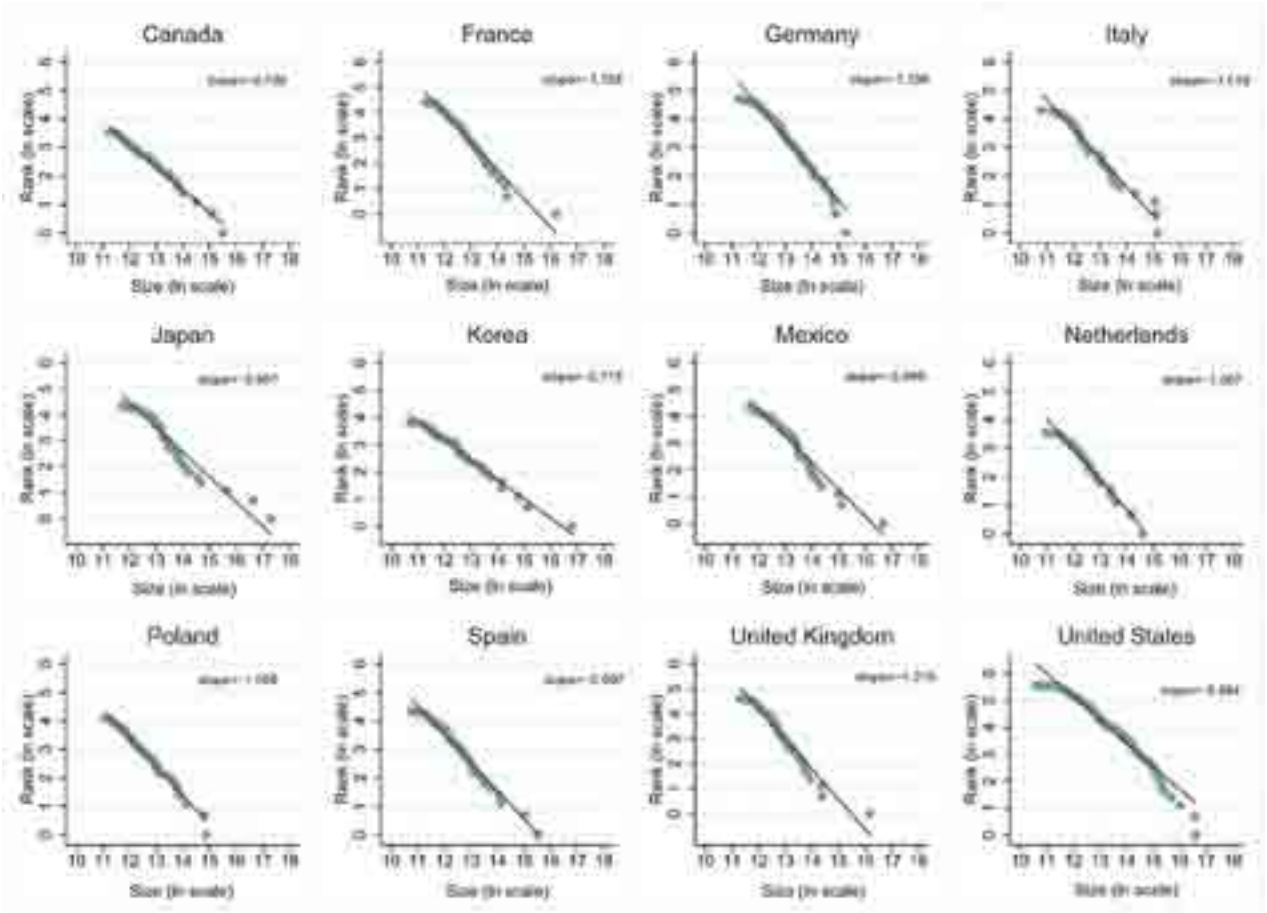
## • The evolution of urban systems: the size of cities and the rank-size rule •



If we consider the historical trend of the 50 largest cities in the world, we can see how their growth exceeds the growth rate of the world population in percentage terms only since the Industrial Revolution. The total population of the 50 largest cities was in fact about 2.5% of the world population at the time of the Roman Empire, while in the following thousand years, this ratio collapsed to 1.7% and then fell again to 1,3% in 1825. Since that time its growth has been very substantial, reaching around 10% around 2000, while now it seems to suffer a further decline (Reba M. et al., 2016). The distribution of the city size has remained rather stable over the last two centuries (those of the great urbanization) and perhaps even earlier and is characterized by a small number of large cities and a large number of small cities: a configuration, that is, that seems like follow the well-known Zipf-rank rule. This distribution seems to reflect in some respects a competitive equilibrium (Krugman, 1996) where, despite the constancy over time of the overall relationship between larger cities and smaller towns, in cities of different sizes the struggle for resources, wealth and power prevails. The larger cities of the distribution seem to follow a power law (with an overall log-normal frequency). Even a completely (or almost) urbanized world will involve a rank-size distribution of cities similar to that which has been continuously recorded for several millennia until today: there will therefore be many small cities and a much smaller number of larger cities and a small amount of mega-cities. Using the Nordpil data set and constructing the rank-size chart for cities with over 750,000 inhabitants for 5-year intervals from 1950 to 2015, we can see how the distribution curves (represented in a log-log graph) can be approximated for good part of their length to a power law (Cristelli et al., 2012) and how this distribution can be approximated to a line. Within this hierarchy, cities move rather quickly (Batty, 2006), although total distribution tends to remain stable over the years. The distribution is represented by a series of lines that decrease their angular value over time. This means that larger cities tend to be, on the whole, less important than smaller cities. The consequence of this projection is that most of the world's population will live in small and medium cities rather than in large or very large cities in the near future. The urban systems (or urban regions) formed by so many small and medium-sized centers and a few large cities will be the prevailing ones globally. The majority of the population will live in this type of urban region and the future of global sustainability will be played in these areas.

Population differences between cities are decreasing over time. The explanation of this phenomenon may be due to the impact of new technologies (especially ICT) and how these increasingly connect cities to each other.

The distribution of the city-size seems to take the typical form of the Gibrat's law (EeckhoutT, 2004) and finds an interesting parallel with what happens in the business world, where we observe




Rank Size of Urban Contemporary Urban Systems in a Set of Urbanized Countries

the presence, in almost all sectors, of many small and medium companies and a few large companies. Both processes (cities and companies) follow a particular form of statistical distribution which is characterized by a higher localized concentration, in the frequency graph, towards the left, in correspondence with the medium and small size units and which becomes normal if observed at one logarithmic scale. If the process continues for a sufficiently long time, the distribution of the variable reaches an equilibrium, or steady state, from which it remains unchanged, taking the name of stationary distribution. Just as the development of production units is not affected by systematic factors connected to the productive dimension, so urban systems tend to be stable over time along a given distribution law. For companies, this means that the opportunities on the markets for goods, labor, money and technology are independent of size. Similarly, for cities, the chances of success (or failure) are to a large extent independent of their size, but actually lie in other factors such as, for example, their degree of connection with territorial networks and other cities, the rate of innovation, the relationship with the environment (and therefore with the use of resources).

## • The size of the city and the emergence of Dragon-Kings phenomena •

To define what a city is and what distinguishes it from a minor settlement (village or hamlet) there is today a certain sharing in considering the minimum demographic dimension equal to 1,000 individuals grouped in a stable manner. In the course of the history of thought, on this subject, the first to express a formal idea was Plato, who had arrived, on the basis of a complex demographic and geometric argument, to define a settlement with 5,040 inhabitants as the optimal dimension of the city (Batty and Ferguson, 2011 ; Batty, 2015). In modern times the theme of the optimal dimension has crossed the whole history of urbanism, passing through Mumford, Howard, Le Corbusier, Jacobs, Saaty in urban planning and Alonso, Richardson, Mirelles in the economic field. The fact is that if the cities could exceed just one million inhabitants at the beginning of the great transition represented by the Industrial Revolution, it was precisely technological development to break down this barrier. But despite the technological advances, however, there continue to exist physical limits to the spatial dimension of the city (or urban region): we can suppose, for example, that it is difficult to think a city as an entity in which transport time is greater than one hour of travel in each direction for daily journeys. Although there are no stable rules on how long a daily shift can be (over time), it is difficult to imagine cities dispersed over a radius of more than 100 km from their center. Beyond this limit, it is unlikely to still consider a city an unitary organism. Thus, while the limits imposed by density and transport technologies will continue to limit the city in its maximum dimensions, a complete decentralization of the population in small and very small clusters is highly unlikely.

Linked to the phenomenon of the urban dimension is the distribution of large cities within urban systems and their role within these. Just as, on an urban level scale, there is the question of the supremacy that certain urban poles can assume within the spatial configuration of the urban region. On a global level, if we look at the ranking of the world cities ordered according to the rank-size rule, we note that there is no “primatial” city (i.e. no city is much larger than the one that follows it in the ranking). There is no global effect of a primate city (primatial city, according to the term coined for the first time by Jefferson in 1939). At the regional level instead (and even more at an infra-urban level) we can observe the emergence of a primatial effect in many States and regions and in many cities or urban regions. Emblematic cases of primatial cities are London and Paris, in the sense that they are urban entities much more populous than the second respective cities (Liverpool the second most populated city in Great Britain is 7 times smaller and Lyon, in France, 5 times smaller). These deviations from the power law are the result of a phenomenon called “Dragon-King” (D-K), observed in many scientific fields.

Primatial type events have been observed within phenomena characterized by a normal power law distribution in a wide vari-

ety of systems. While in a probability distribution that is configured as a power law, the dependence as a function of the size of the event or object seems to be omnipresent in a wide variety of statistics of natural phenomena and social systems (ie of complex systems) and is considered the confirmation of the presence of self-organizing mechanisms; the appearance of exceptional cases, real black swans, also seems to be configured as a phenomenon with based on different rules. The appearance of these extreme cases in functions which are otherwise quite predictable, has been observed in several examples (Sornette, 2009; Pisarenko and Sornette, 2012): the rank-size distribution of cities, the distribution of particular acoustic emissions associated with material failures, the distribution of speed increases in hydrodynamic turbulence, the distribution of anomalies in financial markets, the distribution of energy during epileptic seizures, the distribution of energy peaks during an earthquake. Although not predictable over time and / or in space, such events are in any case foreseeable in the fact that they will nevertheless occur with high probability rates. For contemporary urban systems, characterized by high levels of interconnection and complex hierarchies, this means that the appearance of king-dragons will be systematic and increasingly present.

If we think of urban systems and cities as network constellations, they take on more the form of a set of interconnected networks. The best definition of hierarchy within an urban reticular region can be represented as a set of geographical units or communities that are gradually smaller and grouped within larger geographical areas. At the level of the overall urban system, this configuration corresponds to a structure in which neighborhood services grow in specialization (decreasing in number) as the size of the neighborhood itself increases. If we suppose that each neighborhood remains rather separated from all others, a perfect hierarchy will emerge. This structure represents the model of a theoretically resilient system: a set of strongly interconnected groups of elements, but with weaker relations with each other. Systems where the basic units are grouped into sets with a dense internal structure, but a lower level interconnection between groups are very resilient at the level of the single base unit.

The connections within an urban region are not only geographical (physically determined: roads, telecommunications, maritime routes, etc.) but they also have a social, aesthetic and cultural nature. With modern information technologies the "real" city gets to cover a much larger extension than the physical city, since its inhabitants live on much more extensive connections than this. We are often led to think that an urban system is more resilient if it's strongly connected. In reality, if the connectivity and redundancy of connections in many situations helps the system to deal with crises, in many situations excessive connectivity can instead cause excessive and exponential damage propagation (similarly to what has been demonstrated in epidemiology and in the error propagation theory). Cluster configurations internally strongly connected but more weakly related to each other, responds better to those needs of resilient performance required today in our urban regions. Likewise, similarly, a strongly diversified environment within it, but with parts and functions connected at various levels, is a guarantee of better responses in terms of resilience. Although the resilience depends, in addition to the internal variety of a system and its degree and distribution of connectivity, on the typically self-organizing ability to adapt and learn from mistakes.

The large size (with its large number of connections and therefore, apparently, opportunities) is not synonymous with resilience. In the study by Briguglio et al. (2009), for example, the so-called Singapore paradox stands out. More than a nation, this Asian dragon is a city-state, whose small size seems to make it terribly vulnerable: too dependent on exports, therefore defenseless in the face of external shocks that come from the global economy. Yet Singapore has become a resilience laboratory. As well as, in other respects, Switzerland. The formula of their success lies in the extraordinary ability to adapt and to maintain a constant balance between external needs and external solicitations. Here the black swan (Taleb, 2010) is not represented so much by the unexpected and in some

ways unpredictable ability to survive by entities that we would expect extremely weak, but by the extraordinary resilience capabilities, based on a "creative" self-organization. Following the thought of Taleb (2013), therefore, uncertainty and unpredictability is not only a source of dangers to defend oneself from: we can take advantage of volatility and disorder, even from errors, and therefore be antifragile. The robust bears shocks and remains the same, the antifragile wants them, and feeds them to grow and improve. In terms of anti-fragility, city-states work better than nation-states, the spontaneous confusion of souks is preferable to the formal elegance of regulated markets, large corporations are a threat for society (examples of Dragon-Kings), as much as small entrepreneurs represent their strength.

What is "antifragile", that is able to thrive thanks to chaos and uncertainty, stress and disorder is what characterizes the organic systems, which are strengthened if exposed to environmental stresses. It is a characteristic of life, which is antifragile because through chance it conquers its variety. And it is also a characteristic of creative thinking, antifragile because it manifests itself in the presence of obstacles to overcome, and problems to be solved. The characteristics that can make cities resilient are therefore a strong sense of identity, the ability to adapt to historical and social change, the courage to invest in different sectors even at the risk of some failure, being permeable to the outside world, capacity to learn, the ability to reinvent oneself.

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# RESILI(G)ENCE CITY.
# Transformations at the time of BigData

**Resilience is a term derived from the materials science and indicates the property that some materials have to maintain their structure or to regain its original shape after being subjected to crushing or deformation. In psychology connotes precisely the ability of people to cope with stressful or traumatic events and positively reorganize their lives face of difficulties.**

People with a high level of resiliency can effectively deal with the opposition, to give new impetus to their existence and even to reach important goals.
Applied to an entire community or a city or a region, rather than to a single individual, the concept of resilience is emerging in the analysis of subsequent social contexts to major natural disasters or due to human action such as, for example, terrorist attacks, wars or revolutions.
The *RESILI(G)ENCE* is a combined word to Manuel Gausa, between resilience and intelligence. This intelligence is not only artificial but also the human one, though undoubtedly today the world of BigData and OpenData can help you better understand the city and its dynamics.
In the city it has transformed the conception of technology as a simple licensor for better delivery of public services, in the broadest sense, has become a valuable mine of information for the good government of the territory. The smart city is primarily a knowledge challenge.

A good governance of the territory must be able to make decisions based on the knowledge of what is happening. The data-driven decision is the result of a virtuous process able to transform the raw data into knowledge. Interpret information and make it available to citizens is the goal that you have to give a territory that wants to enable innovation.
The resilient city, resilient cities, is an urban system that is not limited to adapt to climate change (especially global warming) that in recent decades make it increasingly vulnerable cities with ever more dramatic consequences and rocketing costs. The resilient city is changed by building social responses, economic and environmental new enabling it to withstand in the long run to the stresses of the environment and history.
Resilience is therefore now a necessary component for sustainable development, by acting first and foremost on organizational and management models of urban systems. A sustainable city is therefore a resilient city.
Technology, of course, part of a new "open" design method, has become pillar of resilient cities: resilience is another fundamental characteristic of the smart city. In physical resilience is defined as the ability of materials to withstand external stresses . Transferred on the development plan, but also social, is the ability of a city to adapt and grow even when affected by traumatic events, such as floods and earthquakes, or if afflicted by "unnatural disasters" such as chronic unemployment, mobility problems and lack of green spaces, for example.
Resiliency does not imply only develop strategies of response and adaptation to external stress, but also put in paths field transformative acts to improve the city also in terms of prevention. Resilient cities are those who have knowledge of exposure to certain risks and thus establish a pro-active and integrated plan to prevent them. In this context, the data play a central role.
The digital age we live in is putting available a huge amount of data that we can use to improve the resilience of our cities and territories. The Big Data are in fact becoming a dominant theme, not only in the business world, but at every level of social organization, and in particular in the pursuit of environmental sustainability of cities of the future. The knowledge made available by processing big data, if properly used, will make us more responsive to change and able to adapt more quickly to the opportunities and pitfalls of the complex multi-experiential space in which we orient ourselves.
Today we are faced with the need to seek new forms of development based on the recovery and enhancement of environmental resources and thus optimizing the energy levels for the sustenance of cities and territories. The digital revolution should visit us more attentive to the assessment of the effects and externalities produced by the spread, on a planetary scale, new products and behaviors.
Even in the Mediterranean global warming it affects in various ways, particularly with extreme events: droughts, storms, heavy

precipitation accentuate the hydrogeological fragility of our territory, multiplying the consequences. Moreover, the disclosure and the urban development of many historical settlements in unstable areas (landslides and floods especially) creates additional dangers. The reduced rainfall also create problems of water supply, not only in summer. Among the specific effects of global warming in urban areas are the heat islands. It is a phenomenon that is created during the summer in dense urbanistically town, narrow and tall buildings, built with high thermal conductivity material and crossed by paved roads. In this city accumulates thermal energy that is not disposed even at night. Often the high temperature also entails more air pollution.

Only in March 2008, the Conference of Parties 13 (COP 13), under the aegis of the structural United Nations Conference on Climate Change, described the Bali Action Plan a first set of commitments and of very general objectives that can be linked to resilience. Later, on the basis of voluntary membership of the states most exposed, it began on "Dialogue on land and water management for adaptation to climate change", which in 2009 produced a first in Nairobi Statement which set some guiding principles and recommendations among the such as the construction of the resilience, in particular in the government of the soil and water.

Back in 2007 the European Union had produced a Green Paper containing analysis and advice to member states and commitments for Community policies, which emphasized the need to integrate mitigation and adaptation actions in one thematic strategy on climate. The Green Paper indicated the most vulnerable areas of Europe: the Mediterranean and the Alps, coastal areas and flood plains.

In April 2009 the Commission therefore presented a white paper to increase the resilience of all ecosystems. In the European Parliament resolution of 6 May 2010 on the Commission White Paper, it is made a brief nod to urban environments.

Only in 2010 we have defined the issue at international level, with the first conference of the world's cities on adaptation to climate change. In Bonn, in 2010, there were 22 resilient cities, representing 19 countries, who have drawn attention to the importance of the role of local governments to combat the climate impacts and reduce the consequent disasters and have thus supported the campaign " making Cities Resilient ". The key concept came out of the first congress was "adaptation."

The Local Agenda 21 Italian, the support structure for the promotion of the Covenant of Mayors and the implementation of the Action Plans for Energy Efficiency (SEAP), decided to address the issue because the National Conference topics related to climate change in urban areas, while crucial, they were virtually absent. In this way he tried to fill a void and draw public attention to a government of the most sustainable cities in the belief that action on transport, electricity and heating is critical to achieving the Kyoto Protocol targets.

The purposeful work then took off with the Bologna Conference in December 2008, carried out in collaboration with the INU and the Municipality of Bologna. The proposal made by the Co-ordination with the Charter of the cities and territories of Italy for the climate and the subsequent commitments focuses on the integration of mitigation actions (ie emission reductions) with those for adaptation (climate comfort ).
Later it was presented the Policy Document, the Covenant to the Plan, which makes explicit the processes that are part of local governments that adhere to the Covenant of Mayors, to facilitate the construction process and also the implementation of the SEAP. The Document aims to transform PAERS exclusively by energy plans n Action Plans for energy efficiency and climate (PAESC).
In the guidelines for local Action Plans for Sustainable Energy and climate Coordination it has identified the priority areas of intervention in order to define actions, projects and measures to prepare local areas to make cities resilient to climate change.
Resiliency does not therefore imply the restoration to an initial state, but the restoration of function through change and adaptation.
In this sense, the resilient town or city is a resilient urban system that is not limited to adapt, adapting to climate change (especially global warming), which in recent decades make it increasingly vulnerable cities with ever more dramatic consequences and costs very heavy, but it is modified by building social responses, economic and environmental new enabling it to withstand in the long run to the stresses of the environment and history.
A resilient city, at the end, is one that has developed the capacity to absorb future shocks and stresses the social, economic, technological and infrastructural systems through processes of "evolution / adaptation" recognizable maintaining its functions, structures and identity.


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**Today's cities are characterized by the ability to collect, process, send, produce and react to information (Greenfield, 2011). By constituting a complex information system, they are no longer defined mainly in terms of their physical architecture, but also, for their architecture of information.** (Berardi 2015)

The amount of information that in 2010 was provided every two days was equal to the one shown from the beginning of humanity until 2003[1]. We are immersed daily in a flow, a river full of information. What does it mean? Are we relentlessly heading towards the extreme paradox of Datatown? (MVRDV 1999) Are we going towards a city established by information, without a specific topography, ideology or context, only a huge flow of pure data? This vision is deliberately extreme; it clearly indicates, however, how diagrams, information flows and collective updates also influence the constitution of the physical city.

"*To ask for a map is to say, 'Tell me a story'*".
*Peter Turchi, Maps of the Imagination: The Writer as Cartographer.*

The production, collection and then representation of data is influenced by multiple factors, such as technical capacity to produce process and manage them; but also, it is directed by political opinion, ethical considerations and economic choices (Kitchin 2013). The data are never completely "raw", they are always a "precooked" product (Gitelman, Jackson 2013); the creation and col-

[1] 1. Eric Schmidt, Executive Chairman of Google in 2010 during an interview stated: "We create as much information in 2 days now as we did from the dawn of man up to 2003. That's something as 5 exabytes of data".

lection of information can never be considered completely pure. In this context, also the diagrammatic representation takes on a fundamental character: the diagram, selecting specific data, already integrates in itself a design choice. (Gausa, 2010).
Whether generated by citizens, crowdsourced data, or detected by sensors, data are now increasingly available in real time, as well as the technologies with which they are registered reported; they are becoming opportunities and potential tools for planning and urban development. As every tool, they are interesting and useful once you are able not only to produce them, but also to provide them with a directionality. We are paradoxically inundated with information, answers; to be able to iunderstand them, however, we must be able to ask the right questions.

Society is increasing its capacity to produce information and to manage our artificial environments, to organize and control cities activity and structure. However, at the same time the environmental, social and economic crisis, associated with a huge consumption of resources, has now shown clearly that our cities are fragile and complex ecosystems; it is now evident that we are no longer able to control and built our cities with the old strategies, based on defence and control.

It is in this context that the word resilience began to be used more and more frequently from the early 2000s. It gained relevance in the scientific production, as well as in planning strategies, being used as an objective to be achieved in urban agendas, as an indicator, sometimes just as a slogan.
The definitions of resilience are complex and often linked to multiple areas (Béné, 2017): already in the Seventies the ecologist Crawford Holling introduced the concept of ecological resilience, understood as the ability of natural systems to absorb a disturbance and reorganize while change is taking place, continuing to maintain its vitality, its functions and fundamentally the own structure. Resilience, according to him represented the ability to tolerate the disorder without collapsing (Holling, 1973).
The one provided by Holling, although not the first existing definition of resilience, introduces the distinction between the engineering and the ecological vision. Engineering or physical resilience is defined as the ability of a material to absorb elastic energy and recover that energy during the discharge phase (Callister, 2007); from this it is therefore distinguished the ecological resilience, which begins with the study of the equilibrium conditions of the ecosystems (Béné, 2017).
This last vision is particularly interesting when used in the urban context. If the contemporary city is assimilated to a complex system or ecosystem, within which various forces, organisms and elements contribute to a general equilibrium - or disequilibrium - then ecological resilience, introduced by Holling, plays a fundamental role in future development urban centres, and their ability to adapt to current and future changes.
Cities, where most of the world population lives, are the places where we can find the main causes of crisis coexisting together with the opportunities - of knowledge, creativity, research, (Ferraro, 1998); therefore, the urban settlements are the field of action where is possible to make changes that can have a real impact on a large scale.

Since the grow of interest around the word resilience, several associations, research groups and international initiatives dealing with urban resilience began to emerge. Between them there are C40 Cities, Connecting Delta Cities, MIT's Urban Risk Lab and the 100 Resilient Cities public-private partnership.

The definition of urban resilience introduced 100 Resilient Cities partnership states: "Urban Resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience".[2] Resilience, specifically urban resilience, therefore understood as the capacity of an organism, a city, a community, to cope with situations of shock or continuous stress, of various nature (due to natural, social or other factors), not only by overcoming them but by learning from such events. Among the different definitions, this one is particular: the fundamental difference compared to the definition strictly related to the field of material technology, lies in the system's ability to learn, from past events, from data produced in real time or from other systems. The technological capabilities of gathering and processing information are in this context a great possibility of growth.
If the city is conceived as a complex system consisting of nodes and connections, within which it is possible to observe, record and use the data produced and the interactions between man and city, it will be possible to intervene on the latter to make the city itself more flexible, and allow it to adapt and respond to these demands. (Berardi 2015)

[2] More informations can be found at: www.100resilientcities.org.

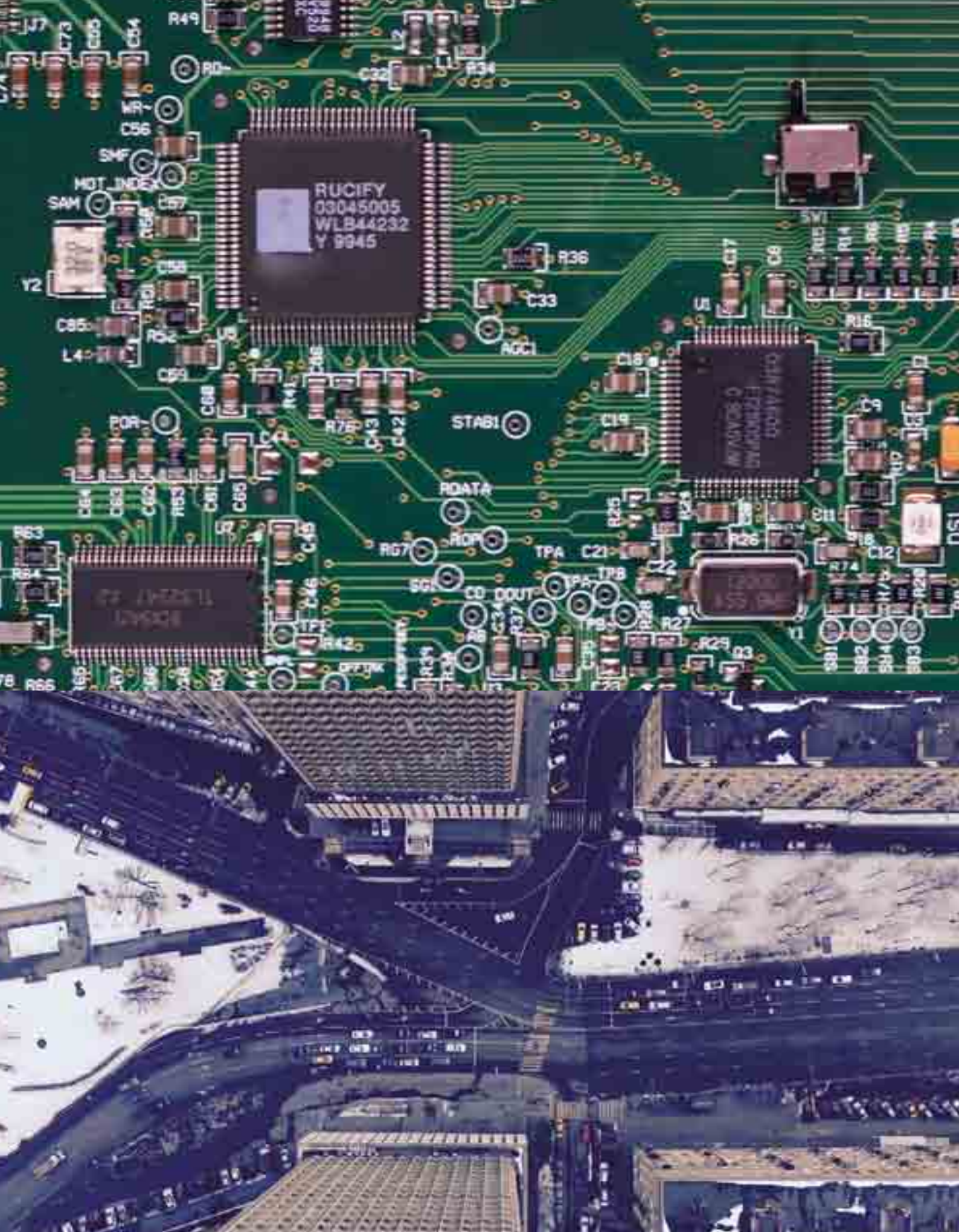
## • Resili(g)ence •

In 2016, in occasion of the international symposium Med Net 3, the word Resili(g)ence has been created by Manuel Gausa through the crasis between the words resilience and intelligence and indicates precisely the ability to integrate new technologies within the resilient urban strategies.
Gausa himself, (2001), underlines how the digital world and information technologies have expanded the potential for exchange and interaction within the complex-city system by suggesting a new dynamic urban condition. An informational condition, which, him points out, must be able to combine advanced technological models with the ability to create prospective visions and strategies.

*"Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody."*
Jane Jacobs, *The Death and Life of Great American Cities*

The main opportunity of new technologies integrated within the urban strategies is to think the idea of participatory processes under a new and interactive light. New tools offer the possibilities to share information and connect communities. The point of the resilient environment is the capacity to create a dynamic process in which people are an integral and active part, and not just users. Resilient and Resili(g)ent strategies are the ones that allows to

*Comparison between the urban structure and roads and circuit board.*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OPTION
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AGC1
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C8
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C18
C19
C9
STAB1
RDATA
RDP
RG7
SCL
TPA
C21
C22
TPB
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DOUT
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Q3
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C12
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Y1

maintain a dynamic balance between top-down design processes, led by planners and municipalities, and bottom-up initiatives (Berardi, 2015).
As highlighted by Ratti, in the book Smart city, smart citizen, the new soft technologies, linked to networks, to the so-called smart dust that allows communication, represent also a great opportunity for all those cities that they have struggled to adapt to the industrial revolution of the last century, and to its heavy and invasive technologies. Complex places, as fragile as many Italian cities, have the possibility, with the current technological revolution, of combining a huge historical and cultural heritage, unique in its kind, with smart technologies. (Ratti, 2014).
Fragile and complex territories are a place of fertile development of tools for the production, collection and dissemination of real-time data related to the risk level. A common and interesting example are online platforms and apps that allow the sharing of data related to emergency situations to define user-generated mappings of areas at risk. Among these platforms we can see PetaJakarta, Humanitarian OpensStreetMap, in SriLanka, the Urban Risk Map of MIT or Flood Serv on the Genoese territory (Centanaro, 2018). All of them are conceived to collect data generated by users, who become, during this process, co-authors of the dynamic map.
Peta Jakarta, for example, used Twitter to allow citizens to indicate and share the positions of inundations, and to create a real time map, during floods. Urban Risk Map, developed by the Urban Risk Lab of MIT, has the dual function of collecting crowdsourced data on time real about the emergency and to put the population in direct contact with rescuers and institutions.

The new tools are useful to create a more *resili(g)ent* city where technology is – and will be more and more – part of the city and urban spaces. However, the urban space is not made up just of technology and data. The opportunity provided by all these new tools and *resili(g)ent* strategies is instead placing the citizen and communities at the centre.

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www.100resilientcities.org

www.deltacities.com

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# THE REPRESENTATION FOR THE IDENTIFICATION AND VERIFICATION OF RESILIGENCE PHENOMENA

**The first point to be clarified is that related to the title: resiligence. Resiligence, or intelligent resilience: elasticity, adaptability combined with the ability to act for the best, meaning with this to mean for the best possible return, in relation to the cost / benefit ratio; naturally, here, with the term 'cost', not only the economic element is identified, but the whole set of factors 'against...', users, operators, but also - and perhaps above all - reference context.**
**It seems essential, in the first instance, to clarify the terms of the question, starting from the linguistic terms, to analyze and critically read interactions, relationships, hierarchies, in order to avoid any kind of misunderstanding**
(from Enciclopedia Treccani on line).

Resilience: the speed with which a community (or an ecological system) returns to its initial state, after being subjected to a perturbation that has removed it from that state; the alterations can be caused both by natural events and by human activities.

Usually, the r. it is directly proportional to the variability of environmental conditions and the frequency of catastrophic events to which a species or a group of species have adapted. For example, the Mediterranean garrigues or the vegetation of the landslides have a high resilience.

Intelligence: Complex of psychic and mental faculties that allow us to think, understand or explain facts or actions, to elaborate abstract models of reality, to understand and be understood by others, to judge and adapt to the environment. It is possible to distinguish some main modes of intelligence: a) the one that does not appeal either to operations or to structures (associationism); b) the one that refers to structures based on logic, but not on an operative nature (the psychology of thought of the Würzburg school); c) the one that appeals to operating processes without considering the overall structures (Claparède, C.E. Spearman); d) the one that refers to structures, but without passing through the operating mechanisms (Gestalttheorie, factor analysis, some theories on learning); e) the "operative" one, according to the school address of J. Piaget.

From these initial observations it is clear that it is necessary to distinguish, in relation to relisigence, between what happens in nature and / or for 'natural' reasons and what, on the contrary, is due to human action; if on the one hand, in both configurations the resilience can be defined as indicated above, on the other hand, it will be necessary to give a different meaning to the intelligent attribute. Very often, talking about what surrounds us and does not depend on man, we personalize: nature 'mother or stepmother', 'welcoming or hostile' environment and so on, almost to signify a relationship of empathy 'on par with' the host structure and the guest. This, of course, is nothing but a metaphor or a personification, which helps to communicate in the most effective way possible the feelings that are felt under certain conditions, regardless of whether the feeling is strictly related to the surrounding environment or to changes that in it was brought about by anthropic intervention.

In relation to this, the claim that there is an 'intelligent' ability to cope with crisis situations to find adaptations, new balances, opportunities, ways out, implies a differentiated content of the same term, depending on whether it is applied to nature or to man; and, in fact, the symposium has a subtitle, which clarifies and details in detail the two specificities, ie intelligent cities and landscapes / resilient environments. City, human works, artefacts in various ways inserted or superimposed on the territory; intelligent, able to understand the potentials and limits of the environment, to modify the natural asset without creating irreversible imbalances and to guarantee a continuous and correct management of these changes. Natural catastrophes and anthropic disasters.
In relation to the above, a reference of considerable interest is represented by the conclusion of the document prepared by the

InterAcademy Partnership (IAP), network of Academies, strongly supported by the Accademia dei Lincei, called Charter of Rome on the Resilience of Art Cities to natural catastrophes, which closes the reflections with a paragraph particularly worthy of attention for the reflections it proposes: Natural versus manmade disaster. Exactly as anticipated in the previous paragraph, the emphasis here is on how the resilience is to be understood in a profoundly different way in case of anthropic or natural situations, so as to be able to immediately explain this differentiation right from the very name of the phenomenon: catastrophe, if it is natural phenomena; disaster, if instead we talk about the work of man, which, in both cases, remedy or bring a new balance.

Here, then, that resilience can be read as intelligent, if it is proposed as an action of man; naturally, both in the case of the anthropic disaster, and of natural catastrophe, resilience can be just as 'natural', if not derived from interacting with man, as well as derived from choices made with rationality. Examples in this sense can be many: - Wars - Terrorist actions - Irresponsible buildings. If in the first two cases it is completely intuitive to understand how and what are the devastating effects to be reduced, up to their potential cancellation to recompose a new equilibrium situation, less immediate is the perception of what happens in the third, often less devastating and incisive on people's lives; Excessive overbuilding, occupation of soil unsuitable for anthropization, excess of changes in environmental conditions through large technological works are extensive cases that have often led to phenomena similar to real tragedies. The causes can be the most varied, from lack of maintenance, to the consequences of abandonment, to the loss of capacity and the possibility of continuous interventions or changes in interpersonal relations and social and professional organization and may be ascribed to the sphere of the economy, but also of politics, of the socio-cultural field and so on, as a consequence of multiple factors that are not always easily quantifiable, nor identifiable.

It will therefore be a question of seeking an approach, even a multidisciplinary one, that can identify cognitive processes and, subsequently, operational ones.

In this contest, of course, this will be the problem from the point of view of specific skills, which in this case are related to the discipline of representation, understood in an open sense, and - in particular - to the visual perception and its incidence during investigations. pre-planning. First of all, it is necessary to refer to the visual reactions that the observer has to face phenomena of natural crisis and the subsequent resilience, still a natural factor; it is also necessary to remember how the visual perception of each person has, of course, a physical value and a psychological reflection that is entirely personal and how it varies from subject to subject, so as not to be able to constitute a unique evaluation parameter.

*Image 1 | Cartography and orthophotos, provided by the Civil Protection, on the occasion of the 2016 Science Festival for the activities of learning the graphic codes that represent the territory; the laboratory in question is entitled Acchiappa il segno! and has the purpose of increasing knowledge on risk phenomena and their recognisability.*

However, the general impression that most observers have of the same phenomenon can give valuable indications, if the impression is generally the same. Here, then, is the importance of a perceptive investigation, based on photographic shoots, sketches, schemes and graphs, which give the possibility of permanently transcribing what can be a temporary phenomenon, indicative of an initiated process, however. potentially repeatable and risky; just think, for example, of the invasion of rainwater in the countryside, when the extent of the normally inactive streams is inadequate to receive excess rains.

If this, as a rule, is a phenomenon that is exhausted in a short time - for example, as soon as the exceptionality of the precipitation is over - it is true, however, that repeated similar events can undermine and change the stable equilibrium. Here, then, is the validity and usefulness of using the representation to support analysis and technical and statistical studies.

Analogous, but partly diversified, is the contribution that perceptive reading can give as a pre-planning requisite, when it comes to intelligent resilience, ie overcoming the state of crisis and transforming weakness into anthropic situations or wherever the active intervention by man; here, in fact, the representation becomes even more necessary, uniting the usefulness of the work of witnessing the phenomenon to that of the role of prefiguration of the project of stabilization or re-stabilization of the equilibrium situation. Reactions (perceptive) and actions (technical-design), therefore. A possible identification of an effective control process and immediate feasibility, in which the different skills are put into the system at the delicate moment of the investigation, possibly well before the moment of real resilience, which takes place when the crisis is already underway and evident.
It is precisely on the possibility of acting in a quiet state that it is worth dwelling on to see if what has already been proposed, accepted and consolidated in other areas - first of all the medical


*Image 2 | screened by Google Earth; to note the importance of a realistic overall view for the immediate reading of the characteristics of the territory and urbanization. Source: see image 3*

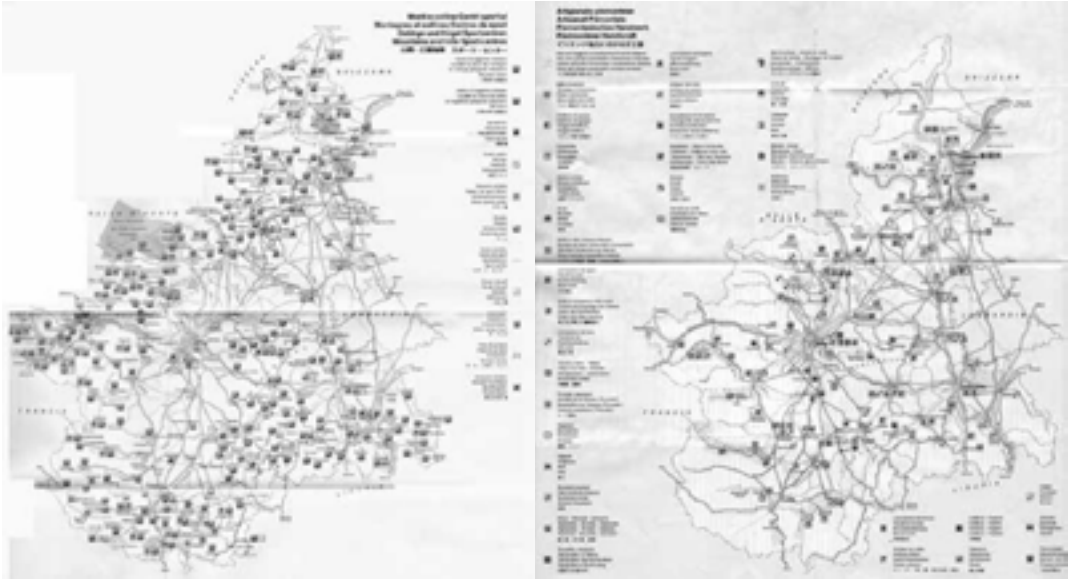

*Image 3 | Maps produced with the use of icons, for different information purposes, useful tools also for drawing up and disseminating risk maps accessible even to non-experts. Source: ML Falcidieno (2016), Rappresentazioni cartografiche dello spazio urbano tra fruizione pubblica e privata, in P. Belardi, A. Cirafici, A. di Luggo, E. Dotto, F. Gay, F. Maggio, F. Quici (edited by), Idee per la Rappresentazione 7. Visuality, Proceedings of the VII Seminar of Studies Ideas for the Representation, Aversa May 9th 2014, Department of Architecture and Industrial Design Luigi Vanvitelli, ArteGrafica, Rome*

*Image 4 | synoptic texture of degradation phenomena in the terraced landscape and mapping realized with GIS technology*

prevention - can also become practices in the field of crisis prevention. , which subsequently needs the ability to find solutions and opportunities to solve this situation; It is certainly necessary to bear in mind that the crisis due to acts of war or terrorism can not concern the type of prevention mentioned above, while the anthropic acts of urbanization and land use are fully included, as well as - at least in part - the phenomena natural. An example to cite is the recent research undertaken with the Civil Protection of Genoa by some Representation professors at the Department of Sciences for Architecture (scientific responsible MLFalcidieno) to bring widespread knowledge on the territory about the natural phenomena that involve risks for the population; not so much - and not only - designing an articulated system of visual alert communications, but rather, developing a project of education and attention to avoid behaviors that contribute to increasing the danger.

The main element is the awareness of what happens to be able to recognize the signs of risk on the territory: Aiutaci a riconoscere il rischio – Siamo tutti protezione civile, this is the concept on which the work of the laboratory that Civil Protection has led to the Festival of Science in 2016 , in Genoa, entitled *Acchiappa il segno!*. The topic of the laboratory is the acquisition of the ability to correctly translate the graphic signs that are shown on the maps, so as to make the information contained in them understandable not only by 'insiders', but also by all those who need to view them ; consequently, the development of the ability to correlate

the visual information deduced from the paper with what directly experienced by the vision and perception of the surrounding environment is also pursued. (Images 1, 2 and 3).
This assumes an additional value in consideration of the fact that entire passages of territory are at the same time affected by "signs" of potential natural fragility, as well as by "signs" of potential fragility induced by the work of man: this is the case of Liguria region and, in particular, its vast expanse of little or no steep terrain that can be used from the point of view of the distances, as well as from the point of view of agricultural activities. The solution adopted was that of terracing as an agricultural practice; as it often happens, the changed socio-economic conditions have led to changed needs and experiences also working and the consequence was in many cases the abandonment of the care of the anthropized territory. Because of the change induced on the original state - by the work of man, before, and by the subsequent lack of maintenance, afterwards producing an exasperation of instability of the slopes.
On the side, a list of purely visual communication campaigns, which contribute to the spread of behavioral awareness about the great themes of danger: floods and landslides, tidal waves, fires, earthquakes.

In conclusion, from what has been observed so far, it is clear how the contribution of the methods of representation applied to a perceptual reading of the space around us is still useful today and how it can contribute to the formation of a virtuous process of widespread knowledge of the phenomena of possible crisis due to both natural factors and anthropic interventions. Next to and as a consequence of this, we must also strive for a gradual, but continuous change of economic, cultural and social behavior, which sees in the host territory the man and his actions (residential, work, collective meetings, exchanges and routes) not a potential tabula rasa on which to operate without constraints, if not those of a technical and technological nature, but a call for action congruous and consistent with its main characteristics; moreover, understanding the attitude of a place is a necessary condition for making possible operative and resolutive suggestions in the face of possible crises. The correct action of the civil structure in the situations described above may ultimately lead to conscious corrective actions, recovery or acceptance of changes, only if supported by a deep and continuous search for knowledge.

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# MOTORWAY AS A TECHNOECOSYSTEM
## New method to overcome the limits between the motorway and the landscape

*• The imaginary motorway •*

**The main motorways are as powerful and dense moving systems, in which only in Italy occupy the 4.63%[1] of the public network on which concentrates most of the vehicular traffic. Over the last years, since the start of the twentieth century until today, the imaginary on the motorways has had a remarkable transformation.**

The idea of the motorway goes through an idea of development and engine of change processes for the local landscapes, to an extreme image, more future-oriented, where the roadways turn into empty containers, free of features which need to be redesigned with new uses.
The number of roads, but in general of abandoned infrastructure, is increasing (Guaralda, 2006). This probably is due, along with other socio-economic factors, to a greater focus placed on the development of hub systems rather than on the lattice. Instead of build new major projects, it's important to improve the existing ones, not through the use of a technical manual with the pure maintenance, but through new tools which communicate differently with the landscape. Nowadays we are floating in a phase of transition between passed and absolute idea of "Broadcare City" in Wright's infrastructured country-

[1] Data from: "Dotazione di infrastrutture stradali sul territorio italiano" di Automobile Club d'Italia (ACI), 2011.

side and the future imaginary of the Skycar Cities of MVRDV, in which cars will become aircraft.
Therefore we are in a phase of ideological change, which will necessarily have to be supported by the evolution of technology, that in its innovative processes needs a context increasingly able to adapt to sudden changes in which it is the main key, both from the spatial and behavioral point of view. Therefore from now on there will probably be no more need to set goals related to build infrastructure on the territory, but more related to the identification of strategies on the existing structures. It is crucial to understand how to use the intrinsic potential that links the infrastructure to its surroundings, to take action on those in use and also on those currently in operation. The infrastructure from a transition element will be transformed into a permanent space in which to stop, no longer a tube that connects two distant realities, but a real biological and ecological material that is a part of a new condition of habitation (Ricci, 2015).

## • The technical, perceptive and ecological path •

In motorway design, until the intervention of Porcinai on Autobrennero, the problems tend merely to solve technicalities related to traffic, to the design speed, to the flooring, to the alignments and other technical aspects. This technical rigidity has led to prefer a cost-benefit formula that has left scars on the territory, inevitable in a territorial development process, but they could be limited in their effects. Gradually, however, thanks to research in landscape area linked to the perception of the landscape in speed, the designer tried to carry out a careful mitigation infrastructure and tried to make, by means of this, the revaluation of the local landscapes. Just think to Lynch's studio of the 'View from the road', in addition to the investigations of the landscape architect Bernard Lassus. In this scenario, therefore, the attention on form and function is moved to an increasingly perceptive and cultural gaze on the landscape in motion.
Simultaneously, with 'Design with nature', the ecology has always been a guide to follow in landscape design. This transdisciplinary science was born in the twentieth century, investigating the complex relationships between biotic and abiotic organisms in their environment. Over time, the definition of a new functional space, called ecosystem, had considerable implications in the humanistic field as well as scientific, with consequences of the same intensity in other disciplines. Among these, the first is the governance and the planning of the land, where the environmental movement is the dominant point of view, medium for a more ecological approach on the design of the territories. This tendency guides the design towards the use of complex adaptive systems, where the landscape is rediscovered as a template and as a tool to design (Reed, Lister, 2013).
Under this scenario, the landscape begins to be considered in

this technical overview, perceptive and organic, like a living organism in which cultural, functional and ecological networks, often overlapping, allow it to function. This spatial overlap of networks often involves the overstep of one on the other, inevitably generating fragmentation and different consequences on the territory. Many man-made structures, although in some ways useful, with resulting effects, can adversely affect the overall functioning of the landscape system (Morelli, 2004), which must be preserved and adapted to the inevitable changes, with its social, cultural and technological innovation.

## • From ecosystem to Road Ecology •

All these branches of ecology follow the concept of ecosystem as a functional paradigm and the central units of the 'Earth system' in which we live. In particular, the river ecology uses the basin ecosystem as a parameter to check the natural processes (Rinaldi, 2010), the urban ecology uses the city as an artificial ecosystem that enters into a metabolic relationship with others natural ecosystems (Endlicher & al., 2007), while the landscape ecology focuses on the general idea that the landscape is a set of interacting ecosystems (Farina, 2001). However, the same approach is not found in the Road Ecology. Here the road element is interpreted as a detractor of quality and multiplier of adverse effects on the environment. The Road Ecology studies the behaviour of biotic and abiotic organisms in relation to roads and vehicles (Forman & al., 2002). The road, although central in the research in this field, is not an ecosystem, but is engine of territorial fragmentation and cause of changes. In particular effects on processes relate to the surrounding ecosystems, through pollution of air, water, sound, light in addition to the direct impact on wildlife. This vision of an eco-environmental culture, often embodies a blindness that leads to making design decisions, relating to infrastructure, little decisive, close to the idea that the 'not acting' on the existing, is better of 'doing well'. The consequence is an ineptitude in understanding what might be the potential that a space, such as an infrastructure, could offer to the regeneration of the landscape through restoration, mitigation and ecological compensation tactics, taking into account not a manuals of 'repetition approach' but a 'context sensitive' ones (Rizzi, 2014).

Focusing our attention on the motorway system, we realize how much this network has an important spatial influence on the environment. The motorway network is not only a set of aliens portion in the landscape, which shall perform a link function between the various urban centers, but it is a set of 'dense fibers' (Morante, 2010) that define spaces and affect entire levels of terrain, limiting and changing the use.

In Italy the motorways occupy a surface area of 870 kmq[2]. Taking into account only the buffer zones of motorways, 60 m per

[2] The value is calculated with the information given in the last report of AISCAT Associazione Italiana Società Concessionarie Autostrade e Trafori, in particular: 5906.5 km of active Italian motorway network, including 105 km of new sections, 808.4 km of tunnels and 996.3 km of bridges and viaducts.

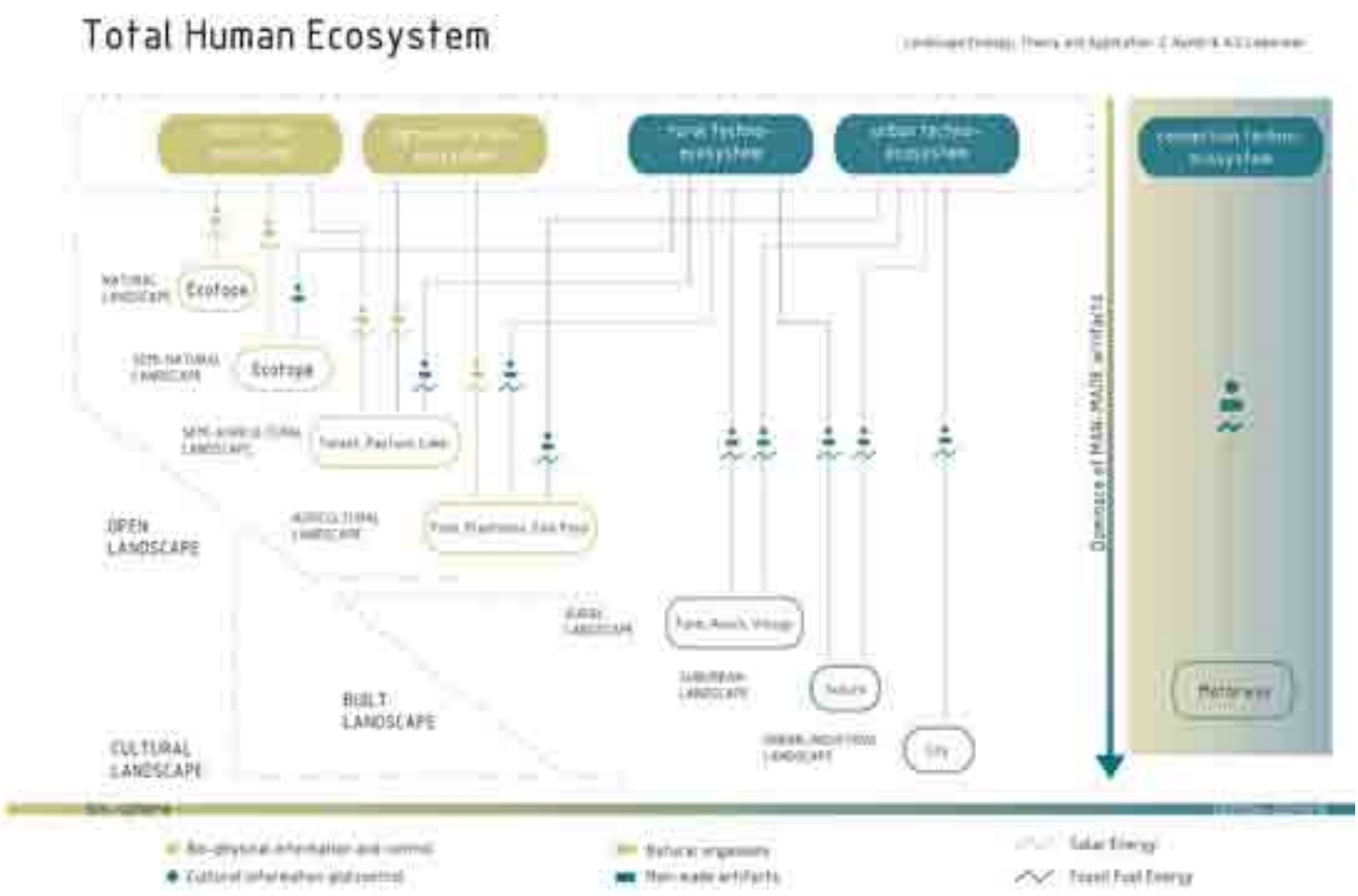


*Image 1*
*Total Human Ecosystem. In the theoretical framework of Landscape ecology, the connection TechnoEcosystems activate the exchange of cultural and biophysical information through fossil fuels and renewable energy*

side, provided by the motorway Code, these are the three-quarters of the total surface, more than the surface of Paris, Milan and Barcelona combined together. To this should be added the Road Effect Zone (Forman & al., 2002), which is the variable spatial buffer that represents the infrastructure effect on habitats. It is the distance between the road axis and the point on which a specific effect is materialized. This distance could be up to 1200 m from the roadway[3], defining an area clearly larger than the visible influence area. Faced with this evidence, how can we talk about motorways as networks locked in their boundaries, when in Italy, only their physical size is greater than the area of three major European cities?

[3] The value is reported in a research developed by the Sustainable Transportation Center at the University of California at Davis, with funding from the US Department of Transportation. In particular, as Road Effect Zone, it will consider the following distances: Amphibians 1000 m, 1200 m birdlife, large mammals 600 m, soil pollution 30 m, wetlands 500 m, 400 m human health; in reference to articles and previous publications. (Shilling, Waetjen, 2012)

Over the past years, comparing the data reported by AISCAT[4] 2009-2014, related to ecological behaviour of motorways, in Italy there was a sudden change of direction, mainly related to increased adoption of sustainable consciousness, due also to the objectives of European policies about energy[5].
In particular, from the annual statistical reports, in 2011 there was an increase of energy production from the motorways, six times higher than the previous year, together with the increase of energy devices of renewable energy (RES) in the owned space of the motorway companies. This scenario goes in parallel with an increasing attention related to the quality of the motorway devices, more and more suitable to limit the effects caused by the different types of pollution that produces the infrastructure itself.
In this general framework, in a spontaneous way, the motorways and the residual spaces started to have an active role in the relationship with the surroundings. This through providing services aimed to the connection of spread urbanity and to activate exchanges with close contexts, providing regulating and cultural ecosystem services, as in true natural ecosystems.
Exactly as an ecosystem, or rather, as a TechnoEcoSystem[6], the motorway begins to use its structural, metabolic and potential morphology to produce energy, ecosystemic and functional services for the surrounding territories.

Within this theoretical framework, the infrastructure become active in the energy exchange processes with other ecosystems and enter in a new category, the connecting TechnoEcoSystems. These join in those natural biogeochemical cycles that allow energy flows exchange between various open functional systems (Odum, 1983). The motorway as TechnoEcoSystem become a promoter of new processes, which allow regional planning to open a new chapter that sees the motorway not as a quality detractor in the landscape, but as space and basin for reusing, designing, controlling, and monitoring. The motorway becomes: Techno, that is smart, innovative and artificial, in a permanent state of relationship, networking, 'glocal' and resilient to changes in the context and for the context; Eco, that is ecological, ecosystemic and energetic, in a state of perpetual and dynamic metabolic exchange, which acts in the environment and for the environment; System, that is the structure, function and ensemble, in a state of interacting support, articulated and constant in the territories and for the territories. In summary, the TechnoEcoSystem is a motorway that works within the landscape and for the landscape. In this new vision, in addiction to reverse the apocalyptic point of view related to the infrastructure network concept in relation with the environment, there is also an intention to overcome the logic of 'regional ontologies' (Masiero, 2014) thinking in a holistic view of design. Bringing together

[4] AISCAT_Associazione Italiana Società Concessionarie Autostrade e Trafori. Aiscat in cifre

[5] European Union, energetic policy 2030: to reduce the gas emission at least of 40% in comparison to the levels of 1990, to get 27% of the energy from renewable sources, to improve energy efficiency 27-30%, to bring the interconnection level of electricity up to 15% (between European country).

[6] TechnoEcosystem (Naveh, Lieberman, 1990). The total of human ecosystems is defined as ecosphere in which it is possible to distinguish the Biosphere from Technoecosphere, using three basic categories: the exchange of information within the system, which can be natural or cultural; the type of physical structure, natural or artificial; and finally the type of energy exchanged, solar or related to the use of fossil fuels. These three categories allow us to select the systems, by Bio to Techno, according to their degree of 'naturalness' defined by these three categories. (image 1)

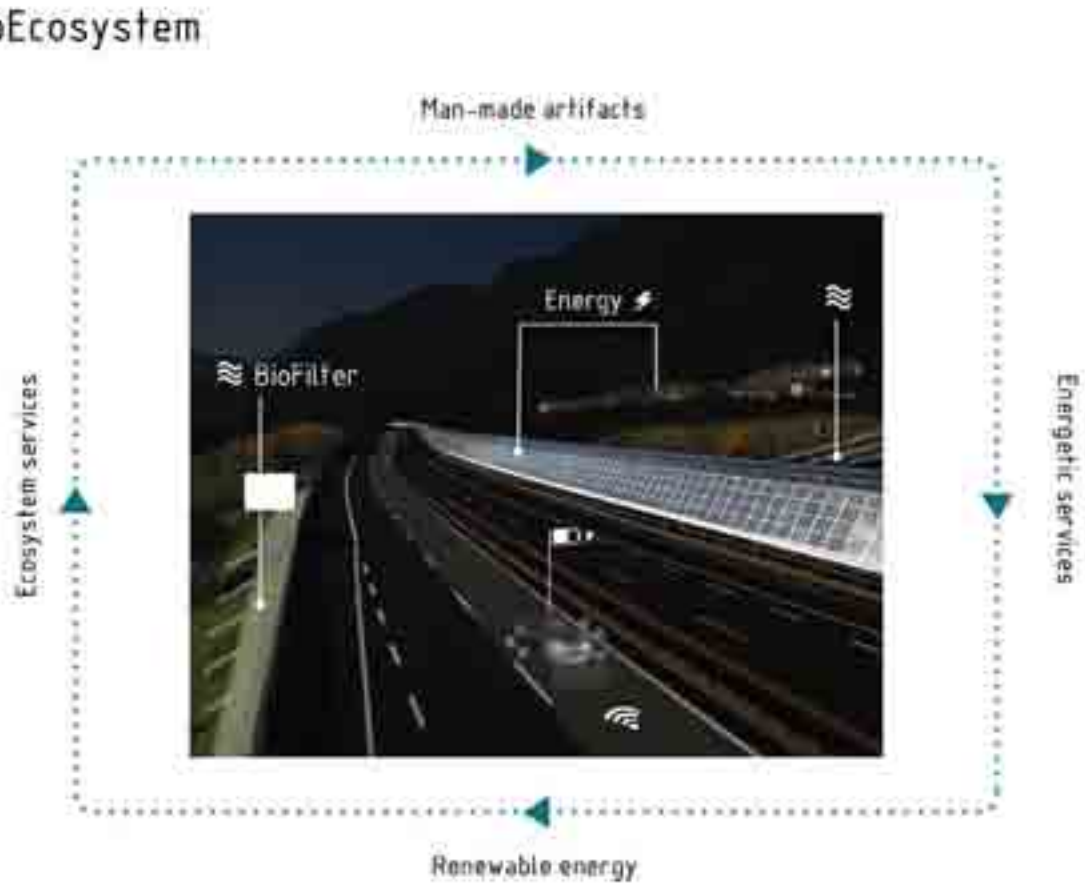


*Image 2*
*TechnoEcoSystem. The image represents a vision of an adaptive eco-technological system, on the Brennero motorway*

technological and ecological aspects in devices that perform mitigation and compensation functions for habitats, it could become a challenge that seeks to exceed the sector regionalisms in which the planner could become a coordinator.

## • New tools for the TechnoEcoSystem landscape •

There are many projects in the world which reuse the spaces near the motorways, as support services to the surrounding contexts. In these examples, the focus is on the possibility to reuse these spaces especially for energy purposes, considering the objectives of the European Union by 2030[7] and the reached agreement during the recent climate international conference in Paris.
Among many examples, there is the competition Solar Park South or the recent contest promoted by ANAS, where the results have not been made known yet. Already in the call requests, it is highlighted the positive evaluation of interventions, on the

[7] European Union, energetic policy 2030: to reduce the gas emission at least of 40% in comparison to the levels of 1990, to get 27% of the energy from renewable sources, to improve energy efficiency 27-30%, to bring the interconnection level of electricity up to 15% (between European country).

overpasses, which aiming to be adaptive and responsive in energetic and sustainable issues, but also in connection with the contexts in which they are located.
This attention to the design competition of motorway, which aims to encourage different outcomes, it makes us think about how the design on the TechnoEcoSystem is actually open to new experimental opportunities, which could enrich the fragmented territories under touristic, cultural, economic, social and energetic point of view.
What is missing in this scenario? Probably a tool able to manage the individual projects. This is useful to avoid that interventions will become simple spots in the infrastructure network, but could feed tactics of an overall strategy. For this reason we should think a basic unity in 'a territory in which through the competitiveness and attractiveness of the territory and shared community policies increases... the quality of the landscape and the lives of the citizens' (Masiero , 2014). The concept of Smart Land defined by Roberto Masiero is exactly the point. The territory has to start working more on local logic and towards the use of homogeneous spatial configurations on which to act. The function of TechnoEcoSystem will be exactly engine of this homogeneity in the Smart Land, becoming the supporting structure and processing incubator that manages and articulates the local features through territorial policies focused on the context sensitive design approach, foreshadowing landscape projects that will improve the image of a territory, using the motorway as the center and the TechnoEcoDivices as tools of actions to be implemented.

## • A22 as a TechnoEcoSystem •

Although it is already an example of great landscape architecture for the work done by landscape architect Piero Porcinai, Autobrennero motorway, study object of the InfrA22Lab group at the Department of Civil, Environmental and Mechanical Engineering, of University of Trento, proves once again to be a perfect setting to experience and imagine the motorway of the future. The landscape crossed by Autobrennero could be divided into three main parts: the flat area in the Po Valley, from Modena to Verona, the Veneto foothill, from Verona to Affi and finally the alpine section which extends up to the Brenner Pass, but can be also divided into Trentino and AltoAdige province, for landscape, morphological, as well as administrative point of view. This variety of landscapes is the territorial matrix, which with the analytical matrix in which cultural, energy, landscape and ecological values converge, allow us to design and plan a TechnoEcological matrix, which makes the motorway a TechnoEcoSystem.
The research is working in parallel both on a strategic and experimental overview on three case studies. The theoretical and

strategic part focus on the idea of imagining the motorway infrastructure as osmotic device (Ricci, Scaglione, 2012), as an ecosystem that provides ecosystemic and cultural services to the surrounding areas, also through the use of technology systems; while the experimental part is trying to implement the theorized tactics. This type of work is helpful to have instant feedback, between what is theorized and the application results, establishing a link between method and action that is often missing in research on landscape planning. The objective of InfrA22Lab work will be to show the A22 experience as a theoretical and experimental base for the evaluation of possible transformations of existing devices along an ecosystemic infrastructure. On some areas, considered strategically important by the company, there will be developed pilot projects, in order to make the Autobrennero testing ground for a motorway not only environmentally friendly and safe, but also resource for the surrounding territories and a tool for enhancement of its landscape.

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**Jörg Schröder**
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**The "Regenerative City" is discussed as a trend-setting model and answer to profound spatial and social transformations, in architecture and urban planning as well as in a broad public and political debate** (Schröder 2018). **The "Regenerative City" refers to the EU Urban Agenda of 2016, which defines sustainable urban development as an essential policy area of the European Union.**
**Global Sustainable Development Goals (UN) are referred to current challenges in Europe. "Regenerative City" combines several current target areas of spatial development that are associated with the term "resilience".**

In addition to its origins in ecology and environmental sciences (resilience of ecosystems to stress factors) and of engineering (resilience of built systems versus shock factors, risks and disasters), for the view on the city the term "resilience" is significantly expanded. This expansion was particularly triggered by the economic crisis in Europe after 2008, it asks about resilience in social and economic terms. With the perspective of architecture and urbanism, two other key factors are added to this expanded version of the term "Resilience": (1) the city's space as a complex entity of various factors of influence and as a lived space that is all about

resilience, and (2) the dimension of the future: as ability not only to react to stress and shock and to regenerate, but to conceive and transform proactively towards a resilient city, which already carries future resilience in itself and in which a regenerative basic orientation of sustainable design is already anchored. Thus, a mission statement of the "Regenerative City" cannot become just a destination, but a process- and capacity-oriented focus on a city that constantly renews and reinvents itself meaningfully.

## • Continuous Construction •

In this context, a special focus should be put into a closer look: continuous construction of the city and territories. It is an essential feature in Europe that further development is a current and future core task. As an illustration, two figures: in growing cities such as Hamburg, about 1 percent of the construction area is recast every year (a relevant size). In addition, there are numerous - and increasing - small individual interventions and larger settlement extensions. This also applies to the constantly expanding metropolitan contexts. All of these activities are closely related to continuation, but they are also a reinvention of urban contexts and city concepts in general. The second figure concerns a greater deal: in the Alpine region (Schröder, Hartmann, Leitgeb 2015), about 90 percent of the construction stock was built before 1990, so today it is about renewal of settlements and their programs, multilocality and tourist factors, energy efficiency in the building stock as well as stimulating new architectures for economic and social innovation - all intimately connected with building and reinventing. Only about 3 percent of the construction stock in the Alps is listed as cultural monuments, but the topic of continuos construction must go beyond this protected structure of individual buildings and incorporate a much greater focus on local and landscape contexts.

## • Dynamics of Periphery •

In order to grasp dynamic factors within continuos and pro-active regeneration, the concept of Dynamics of Periphery has been launched (Schröder, Carta, Ferretti, Lino 2018) starting from the crucial economically and socially critical situations. Both in Europe and as part of a global debate, integrative and balanced development of metropolitan peripheries and of areas outside of new metropolitan regions is being stressed in research, planning practice, and politics. In addition to offering a wide range of current research concepts and approaches, the atlas aims to point towards future research into integrative urbanism and territorial development with a multi-disciplinary and multi-actor focus.
At least since the economic crisis of 2008, our notion of innovation has been enriched by a spatial focus our notion of innova-

tion. This focus has entailed merging, superimposing, and hybridising innovations in technology and digitalisation with the founding of social and cultural communities—, and with—as is the aim of Dynamics of Periphery to show— new qualities in lived space and in territories Parallel to the increased consciousness of spatial change, these new qualities evolved in different velocities with new connotations: slow, which also assumes advantages for supporting resilience; fast, opening up to a targeted use of timeframes and temporality. Dynamic factors, dynamic constellations, and dynamic processes nevertheless remain bound to and shed light on cultural, social, and economic frameworks in which spatial transformation is constructed and influences visions of life.

In urbanism (used as term for a projective approach) over the last ten years, most voices kept to a mind-set and to concepts that took the city as a starting point—even if the very idea of city has, since globalisation in the nineteen-nineties, finally become blurred, along with that the assumption of modernism that dynamics are only bound to clustering and to centres of ever larger size. Parallel to a multiplicity of spatial phenomena, structures, and multi-actor constellations, the notion of dynamic positioning in space has also been exponentially extended (the flat world of digitalisation and mobility) and, at the same time, limited, as it has become re-centred for many people and in many aspects. On the one hand, this is the hypothesis of a (mostly silent) process of powerful centralisation, and on the other, a search to actively—in a larger extension—link to new modes of shaping nodes and networks between space and society that Dynamics of Periphery aims to address.

## • Discovering Places beyond Metropolis •

In this context, Dynamics of Peripheries wants to be understood as a provocation, questioning long-running beliefs of urbanism disciplines, and of the public and political mainstream. “Periphery” is understood by many in the sense of “urban periphery” (a term used since industrialisation and the disruptive expansion of cities), or in a more general sense as “not being central”. We propose to reconnect with the origin of the word, peri-phero, which in ancient Greek means “to carry around, to move around”, digging into relations and dynamics of constellations of living spaces. And, finally, in order to refresh a theme and a debate for politics, we refer to the idea of polis = city. The rediscovery of places beyond the metropolis—and of connecting to the metropolis in a new way, and of being connected to transformations of the metropolis itself—as guiding themes can be based on a great variety of cultural, social, and economic innovations of recent years: a new awareness for regional dimensions in terms of food provision (e.g. Foodscapes project in the Food Revolution 5.0 exhibition); of Re-Cycle as an architectural and urbanistic movement

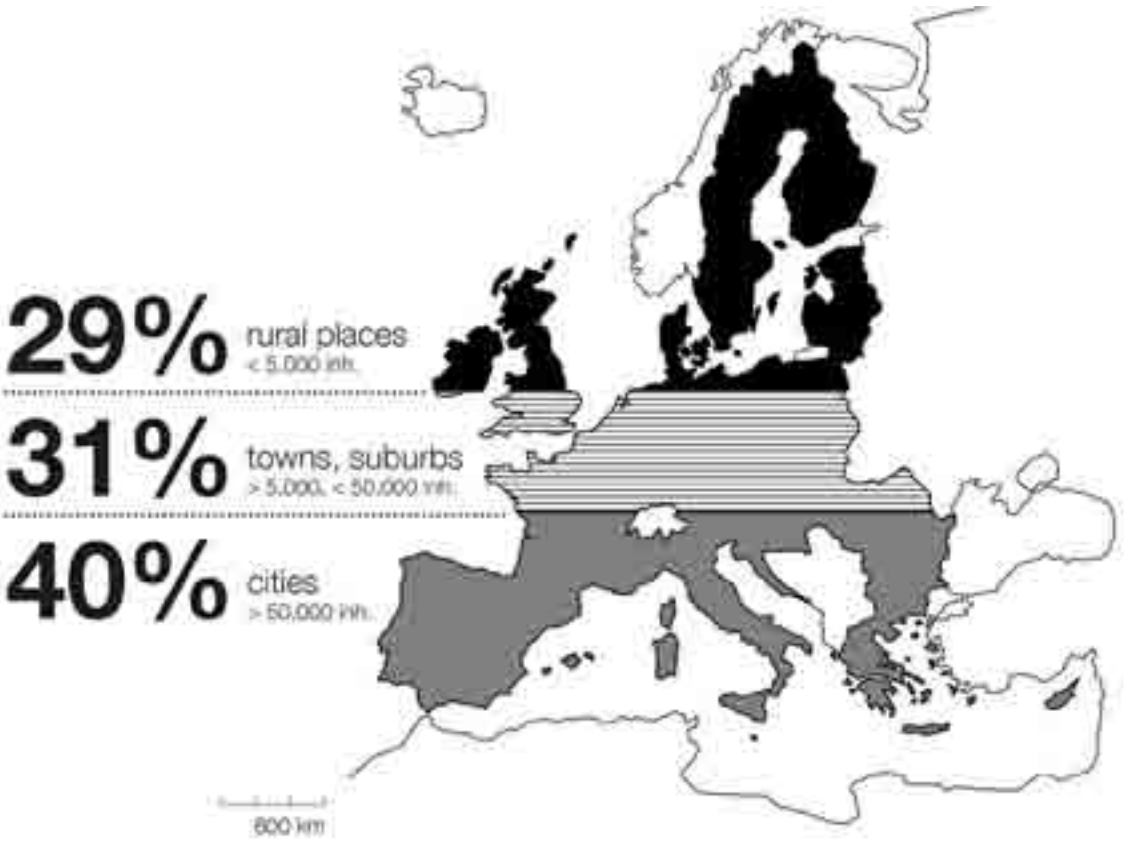


*Figure 1 | EU-28 population according to settlement typologisation, projected by graphic share (precision: municipal level, LAU2).*
*Data: Dijkstra, Poelman 2014. Graphic: J. Schröder.*

(Ricci, Schröder 2016); of the renaissance of Europe as a secure and sustainable tourism and leisure destination; of new mobile lifestyles, migration and resettlement movements, and pioneering place-making in European peripheries (Schröder 2017); and, not least of all, digital-material transformation that leads to new role and new importance of material space.

## • Peripheries Are for Real •

In fact, metropolisation, much more than diffuse "urbanisation" or the "urban age", can be seen to represent the peaks and nodes of the flows of the "information age". Digitalisation—apart from making new lifestyles possible by shrinking, enlarging, or virtualising materials space—has effectively deepened spatial and material divides and caused new marginalisation. This is especially true for European spaces, which is provoking ongoing transformations in Europe's highly structured and articulated settlements. The relative distribution of the living spaces of Europeans in 2014 shows this variety of settlement: 40% of Europeans live in cities (of more than 50,000 inhabitants), 31% live in towns and suburbs (of between 5,000 and 50,000 inhabitants), and 29% live in smaller settlements (of less than 5,000 inhabitants), as can be

seen in Fig. 1 as the size of these shares on a map of the continent. Yet beyond the deep polarities of urban/rural—and the blurring of their meaning in different scales—these data still do not communicate the character or even types of these living places and especially of their contexts. Nevertheless, the lenses through which we think and act politically work differently with different centralities and different networks in ways that highlight the roles of large cities, of medium and small cities (with different definitions), and towns, quarters, villages, hamlets, and other forms of settlement.

## • Peripheries Are for Real •

This challenge becomes even clearer with the mapping of the metropolitan regions in Germany in 2017 (Fig. 2), which originated in global economic positioning and are underway to becoming platforms of territorial governance of all sectorial policies and of development programmes beyond the increased cultural and economic (and population) concentration in the metropolitan cores that is provoking major disruptions in real estate markets. Eleven metropolitan regions cover 50%t of the area, with a total of 63% of the population (fifty-two million inhabitants). These regions exist in the forms of associations of territorial bodies of different sizes, and in most cases also with economic and civil society organisations as partners; in Germany, no new institutional bodies for metropolitan cities have been created as in France or Italy in recent years. A part from the challenge of increased pressure in most of the metropolitan cores, at the same time the large associations (that extend in order to in reach the goal to include at least five million inhabitants, and because of having a dynamic of their own that is both an attractive network and attracts networks) increasingly face debates about how to steer very different territorial realities in their configuration—or, to simply to call them by their old names, very different urban and rural parts. In fact, urban-rural cooperation, new concepts of polycentricism in a wider range, transversal strategies that comprehend/balance/combine phenomena of (often discontinuous) shrinkage and growth in different parts, and alliances for subspaces have become recurrent topics in metropolitan regions (Schröder 2017). One example that shows this is the recent study RegioDesign for cultural and creative industries as a new force of cohesion and a motor to activate territorial capital in the metropolitan region of Hannover Braunschweig Göttingen Wolfsburg (Fig. 3). At the same time, to speak about global or European major metropolises, not all eleven metropolitan cores qualify for that designation, and some metropolitan regions are even organised in polycentric constellations. Hence, the metropolitan regions display growing differences among themselves not only in economic fields, but also in spatial challenges and chances.

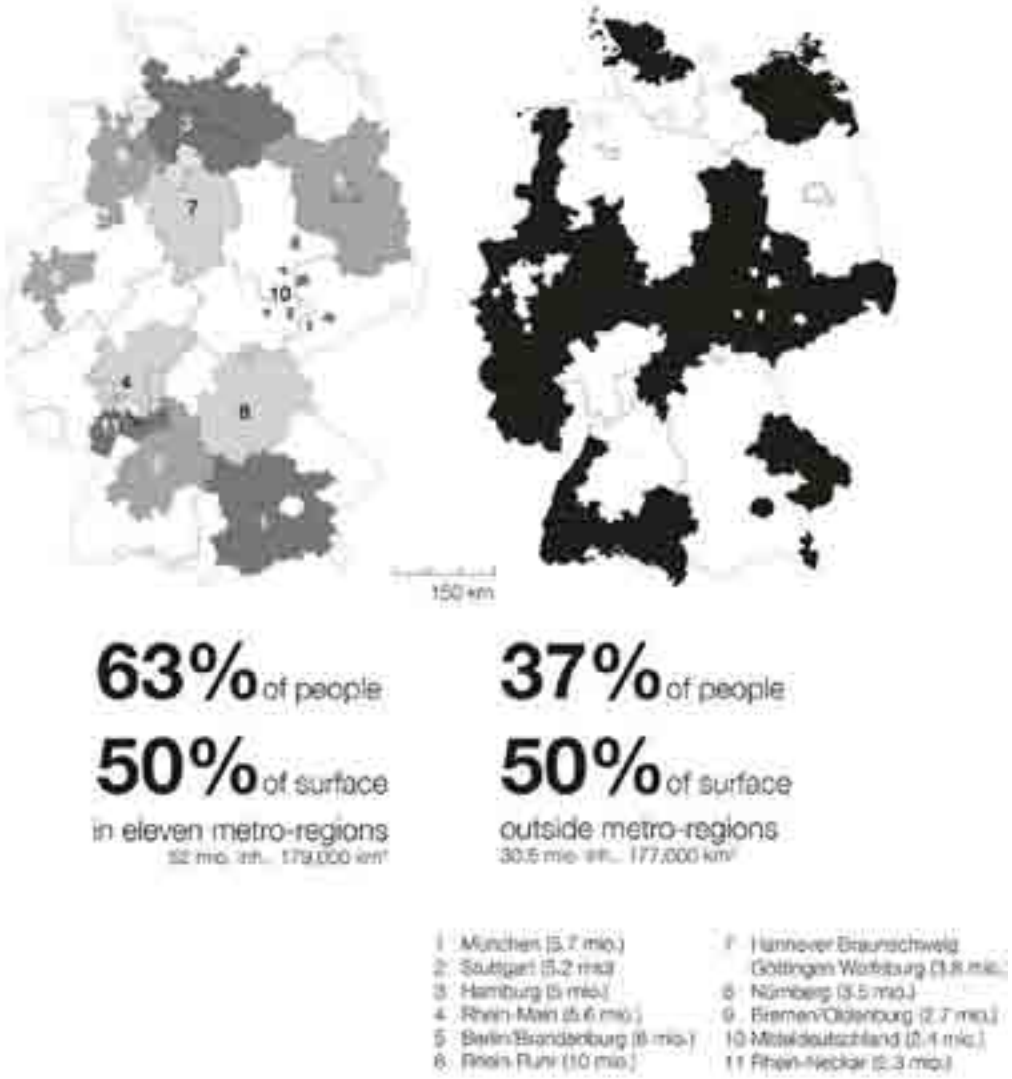


*Figure 2 | Eleven metropolitan regions in Germany in 2017, NUTS3 composition: 63% of population, 50% of surface, 289 inh/km². Non-metropolitan region areas in Germany in 2017, NUTS-3 composition: 37% of population, 50% of surface, 172 inh/km². Data source: Statistisches Bundesamt, 2017. Graphic: J. Schröder.*

The other interesting question that this map puts forward is the areas outside of these eleven metropolitan regions (see Fig. 2): these have been significantly moved out of public, political, and specifically media-related awareness, debates, and communication, even if they cover the other half of the 50% of area and 37% of the population of Germany (30.5 million inhabitants). Obviously not all these areas "outside of metropolis" are "remote" in geographic or economic sense, even if some are, and various urban forms and new forms of regional associations can be observed that connect activities of development cooperation with the economic positioning of a growth area outside of metropolis. The areas "outside" include cities that can be defined as small (50,000–100,000 inhabitants) and medium-sized (100,000–250,000 inhabitants) in European terminology, and a rich range of smaller settlement realities.

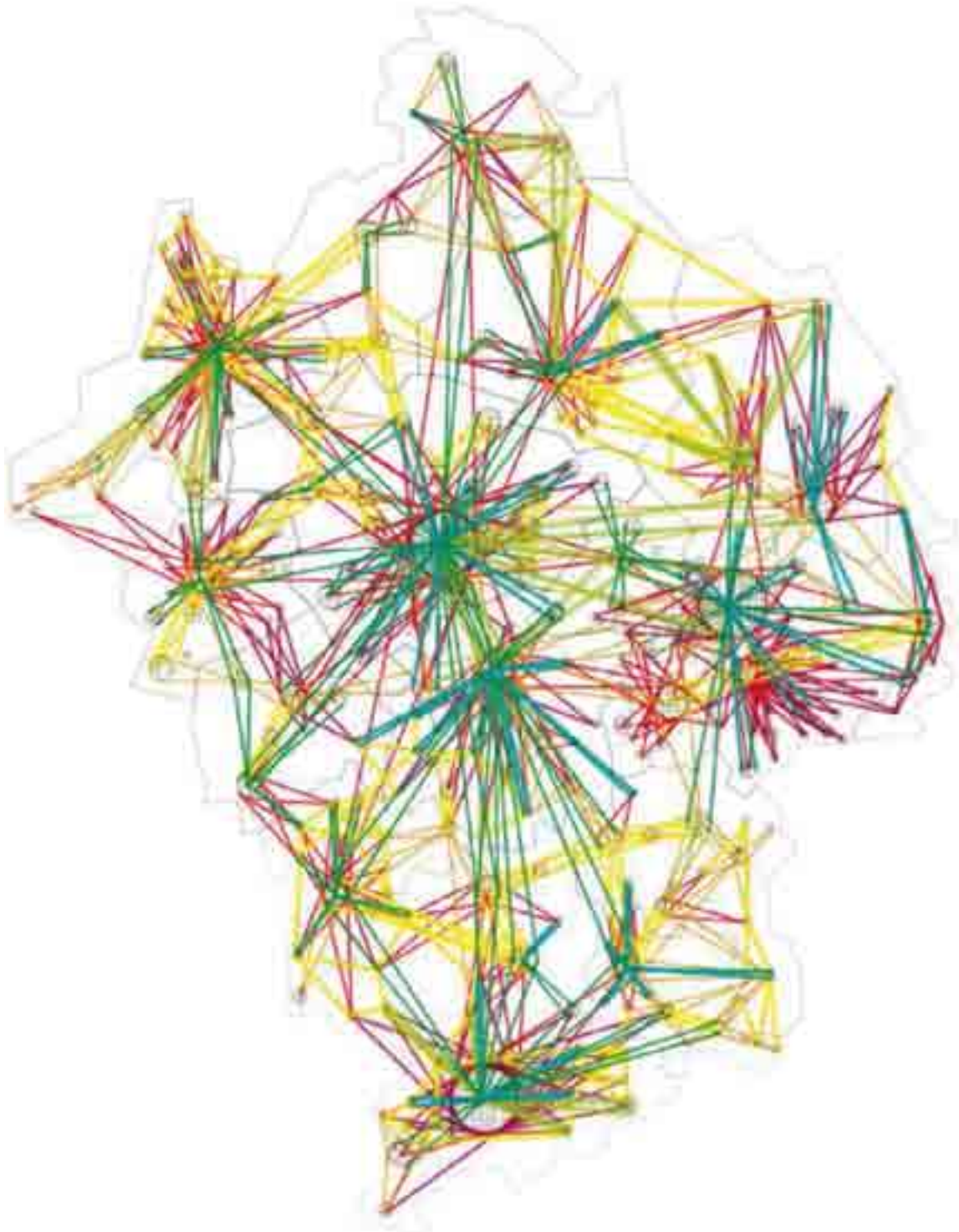

*Figure 3 | Creative Clusters Vision, metropolitan region Hannover Braunschweig, Göttingen, Wolfsburg. Graphic: Jan Philipp Drude, Raphaela Djalili, Lisa Iglseder, Valentin Zellmer, LUH Regionales Bauen und Siedlungsplanung 2017.*

## • Peripheries Are Everywhere •

The new realities and ongoing trends in centralisation and marginalisation—especially in the larger territorial scales—mirror similar fragmentations in smaller scales. Still, concepts of urbanism that lean, for example, towards the ideas of Soja (2011) are still working along the line of the diffusion of "the city" into the region and sticking to perspectives of the 1990s. This is the case even when growing inequalities can be seen to call for reflections on spatial structures on a metropolitan scale (Secchi 2013) that can be extended beyond. Here the provocation of Dynamics of Periphery is to combine observation and reasoning about new peripheries in all parts of territories, and to look for new connections that perhaps begin directly from the variety of these parts. Critical observers such as Guilluy already subsumed many different notions of periphery into a wide-ranging cultural and political debate about a major social division, in his books Fractures françaises (2010) and La France périphérique (2015). Issues of separation, fragmentation, specialisation, polarisation, periurban, and neo-rural are merged in a critical assessment of a France "threatened by social and cultural separatism" and by a "profound crisis of living together", but which is not being perceived because of "intellectual and media-related blindness". And—just to add one more factor—because of an urbanism discipline that is increasingly trapped in good practices and process evaluation, without structural, critical, or creative force. Still, the growing interest in "territory" as cultural creation and as development chance has been manifest already since the crisis of 2008 (Barca 2009; Roncayolo 2016), and is beginning to spread.

## • Towards Spatial Change •

By subsuming many notions of periphery and asking about the role and impact of this trend in lived space, urbanism needs to face the task of refreshing approaches in the discipline, its concepts, and its practices. In fact, already in the constellations of urban expansion and urban diffusion, spatial strategies for larger scales that combine metropolitan cores with urban peripheries have regularly encountered limitations in the autonomy of municipalities, in many economic and social factors, and in superimposed large infrastructures (transport, energy, etc.); and these strategies have not been effectively combined with protection movements for nature and heritage—both today increasingly important themes. Already the notorious Milan Intermunicipal Plan of 1963 coordinated by Giancarlo De Carlo was effectively never realised. More than fifty years later, we continue to face all of these questions in a similar manner, and the need for spatial strategies is ever more urgent. Hence, spatial fragmentation as key issue since the globalisation of

the 1990s gave impetus to a wide and varied debate in urbanism about new concepts and strategies in large-scale urban-metropolitan development. Fragmentation as a key issue can be observed equally in and outside of the metropolitan cores: in voids (Solà-Morales 2001), in new borders, and in loosed connections. In fact, zoning—though declared to be a tool of a remote modernist past—is constantly having even more impact, erecting new borders not only in building typologies or urban morphology, but also very much in a territorial scale of spatial segregation and des-integration in the mosaics of superimposed urban, rural, and natural patches: voids, borders, and loosed connection can be found in metropolitan centres, in transformed suburban fringes, in medium-sized cities, in all forms of differently sized and shaped settlements in the territory. This spatial fragmentation corresponds very intimately to increasing social segregation (Secchi 2013). For an urbanism pushing to work on the the roles and meanings of space as positive agent in rapid changes of society, climate change, and technology, this can be seen as major chance for actualisation: new tools are needed for recognising spatial phenomena, for concepts and strategies in transdisciplinary and multi-actor constellations to activate and shape living spaces, and for drawing new lines of connection in space, projects, communities, and collaboration.

## • Sharing Narratives of Cooperation: Enhancing Transformative Visioning •

Narratives as a projective tool in urbanism (Salmon 2007, Matthey 2014) imply a critique of description, scripts, and indicators, especially if they are derived from non-spatial backgrounds and do not consider spatial criteria. The critique of an immanent "descriptive urbanism" (already formulated by Secchi 1992), together with the call to construct new stories and to push towards new narratives as part of urbanistic activities, may reconnect us to more visionary urban concepts of the 1960s and 1970s. However, the critique of pre-categorised description and ex-ante evaluation strongly pertains to the gap between ever more sectorial and at the same time more comprehensive sets of objectives in spatial development (Resilience Agendas, UN Sustainable Development Goals, EU Urban Agenda, etc.); it also touches on spatial strategies desired to be developed for a long period of time and at the same time to be immediately very effective. Innovative, non-established stories are difficult to merge to fixed indicator sets and process scripts. The chance to exit stable imbalances towards activating potential energies of peripheries, and to become dynamic factors for new development models with larger spatial networks and new instances of cooperation, reveal the multiscalar and multiperspective capacity of narratives. Their design is

confronted with these implicit questions, as has become clear in recent important analytical and conceptual projects, e.g., the fundamental resaerch of HyperCatalunya (Gausa, Guallart, Muller 2003), research on spatial strategies for the Ruhr area (Polívka, Reicher, Zöpel 2017), for the Territorial Mosaic City in Catalonia (Llop 2017), on a new analytical basis for Postmetropolitan Territories in Italy (Balducci, Fedeli, Curci 2017), or on projects as knowledge producer (Viganò 2016). The construction of narratives is crucial for strengthening bottom-up and social innovation projects (Murray, Caulier-Grice, Mulgan 2010) in their desired role beyond fixed compounds and limited social groups. Construction of shared narratives for city and territory is also part of—and may become even more important for—newly gathering communities that are materially, digitally, and virtually assembled in the Circular Economy (Webster 2015), the Regenerative City, the Augmented City (Carta 2017) and the Responsive City (Gausa 2015)—passing from becoming "smart" (Goldsmith, Crawford 2014) in data technologies towards more informational (Gausa 2018), more interactive, more material, and more emotional qualities of space. All these concepts are very much linked to the idea of moving from the observation/evaluation of abstract spatial transformation towards invention strategies for complex spatial change and dynamics.

Concepts of space as an aggregator of inclusion and as a newly attractive material reality call for refreshed abilities in urbanism to work on and with territorial creativity— abilities linked to activities and agents—and for expertise in constructing new interaction of space and society. This is very much opposed to the old concept of "using territorial capital" as passive asset to be put into action. Thus, "shared territorial visions" (as formulated for the EU project Rurbance; Schröder 2015) or "explorative scenarios" (for the German BMBF research project Regiobranding; Schröder, Ferretti 2018) can become accelerators rather than outputs of integrative and interactive processes of spatial change in different scales. This new demand in abilities in urbanism is not limited to co-designing processes in strong relation to space and communities. It also calls for new forms and new roles of designing visions, for exploring capacities and potentials in a projective sense, and for co-constructing free spaces as "socially interactive machines (that are) highly adaptable to the shifting conditions of their time and place," as Cedric Price postulated with The Fun Palace and The Potteries Thinkbelt (Matthews 2006). Territorial creativity can be seen as major driver for innovative arts, entrepreneurship, and communities that also aims at developing more than mere valorisation of heritage, and it is a widely discussed themes in cultural and economic policies in Europe.

How can dynamic factors and dynamic phenomena outside of metropolitan cores be displayed for debates about territorial futures? New approaches, tools, and strategies in architecture, urban design, and territorial planning are called to promote spatial qualities, capacities, and dynamisms, and to respond to an actual demand for the quality of lived space in ongoing cultural and political debates. On a conceptual level, the move from staying fixed to oppositions towards the consideration of dynamic factors and polarities and towards crossing the limits of systems implies extending the notion of peripheries from sectorial indicators towards more complex spatial relationality and the inclusion of externalities. Thus, the rediscovery of "peripheral" phenomena and situations and their transformation in relation to multiple contexts may influence and charge structural dimensions (in space, programming, and meaning) as well as refresh creativity and communities.

Habitat—living spaces in city and territory with an open perspective and as open devices—in this sense refers to debates of the 1950s. The Doorn Manifesto of Team Ten from 1954, as drawn by Alison and Peter Smithson (Chung 2005), indicated with its "valley section" a framework larger than the city, thus exploring manifold activities of association interlinked in this vision and connected to natural factors. The video La città degli uomini (The human city) by Giancarlo De Carlo at the X Triennale of Milan (Zucci 1992) in the same year is exemplary of a shared debate in Europe—and worldwide—for a new attention to the cultural and social dimensions in interaction towards which architectural and urban design was desired to evolve. And already in 1950, Lina Bo Bardi in São Paulo began to co-direct and design the magazine Habitat (Terenzi 2007) with the aim to create a cultural context for innovative performative arts, design, architecture, and urbanism in a modern society, and for its cultural and social involvement as engaged in a discovery of the vernacular and the natural in the rich diversities of Brazil. And as an idea that is quite near to the idea of modernist redesign of all living and cultural expressions (in Europe at the same time, Max Bill in Germany and Ernesto Nathan Rogers in Italy promoted the motto "from the spoon to the city" as a field of modernist Gestaltung or performative shaping), today the openness and passion in this movement support the call for creative, synthetic, experimental approaches in shaping human living surroundings. The universality and locality intended with the Anthropocene Age of human implication in geological change strongly calls for a re-reasoning of human living space—and this will have to go beyond the ecological meaning of habitat as niche. This is discussed in ecology itself—in relation to stable imbalances, changes, and the relationality of complex systems—and also to a great degree in urbanism, against the overall and increasing trend of fragmentation.

## • Research Focus “Future Habitats” •

Architecture and urban planning are working on the reorientation of concepts and tools in close connection between research and practice in order to be able to give innovative contributions to social, cultural, spatial, economic and ecological challenges. This applies in particular for the challenge of climate change, for which city and nature are combined in a common future prospect. Through its interdisciplinary structure, through numerous cooperations with other faculties, through cooperation beyond the university, as well as with cities and social and economic initiatives and organizations, the Faculty of Architecture and Landscape of Leibniz University Hannover of is well positioned to set accents in research. A new faculty-wide research focus is currently developed and implemented for the Faculty Development Plan 2019–23: under the title “Habitats of the Future - Shaping the Human Living Environment”, the research on Regenerative Territories will be strengthened in the bundling of interdisciplinary competencies and transferred to a broader horizon: a variety of forms of settlement, regional perspectives, built space and nature. The leitmotiv of design encompasses new interdisciplinary bundling of working methods: urban and architectural design, spatial strategy and program formation, urban and territorial planning, tools of participation, regulation and incentives, communication, knowledge transfer and education.

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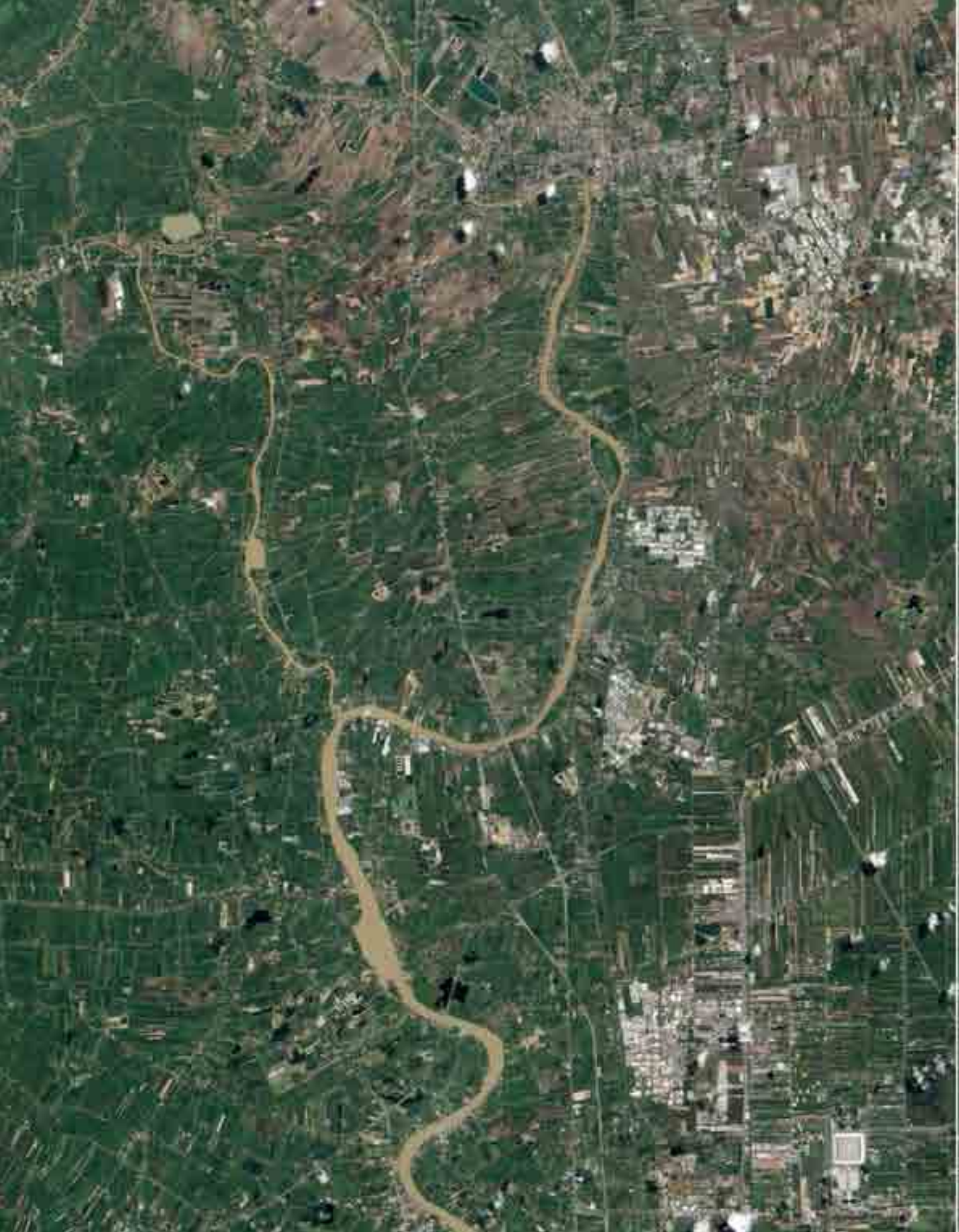

# 2

*Landscape potentials*

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# DESIGNING THE LANDSCAPE TO PROTECT THE TOWNS

## • *Redundant borders* •

**It is important to leave spaces for unpredictable events to be beard. Quoting Clément (2004), we need to think the project as a space "including reserves", with questions to be posed, as a texture with a large weft, letting nature to interfere. Redundancy is becoming a need, to face the future.**

At different scales, from the edges of a park to the borders of a town, the margins represent a transition from one element to another, where we can find the higher richness of species and bio-diversity and where the users' interest is strongly focused.
Referring to the changes of the town, it is important to strengthen the connections and build new links with the surrounding landscape, using the transformation areas as possibilities to activate contacts with nature, occasions to underline the value of memory signs and elements. Particularly about urban spaces, the extension of metropolitan area are erasing the difference between town and country, by a continuous degradated undifferentiated sprawl. Contemporary landscape design reinterpretes the concept of borders as high quality spaces, to be tagged to a network of connections from which to orient and understand a hierarchy of places. The landscape design can show that residual spaces can be seen as new frontiers to meet nature and to put rural areas at the center of everyday urban

attention, as places that are able to stimulate our memory, our culture, our sensibility.
Many examples solve the borders as a frame with a specific redundant thickness, between dense urban areas and open remnant rural areas, that become new interesting urban scenery.

## • Changes as novelties and opportunities •

The design of a new urban landscape must be able to admit the necessary transformation, granting different uses, diverse social and cultural scenarios, abandoning completeness and formal configuration of auteur project, to take root in the motivations of contest and of people's needs. Time becomes more and more a strategic element to articulate the plan, that must be able to evolve and suit the different raising demands, involving in a process of continuous evolution the stakeholders that will use and actively participate the future spaces. If temporal dimension is becoming a fundamental component of the project, the definitive drawings, the forms and the objects loose their importance, when relations, actions and processes that can be activated by the design, also in different phases, achieve a strategic role. The possibility of projects to persist, despite adaptability, is tied to the rootedness in the contest, by the individuation of shared transmissible values.

## • Adaptative projects •

The manipulation of time finds elective terrain in the landscape projects that exploit the interstices, the transversal readings, the chances of meeting and overlapping, working on the gaps of the diverse speeds of urban transformation, priming, slackening or quickening processes and changes. The landscape project-process follows a critical route, starting from well-established methodologies of Landscape Architecture, to comprehend and interpret the contest, it allows an opening toward an innovative experimentation, affected by flexibility and reversibility. Some interesting examples draw different uses for the same urban place, by the over position of signs and signals, where traces on the floor can suggest sport-playgrounds, parking areas, market, place for concert, and other different activities (see the works by Gabriele Kiefer in Berlin, on a parking area, or by Kristine Jensen in Kolding on a school courtyard). Other experiences affect temporary designs for public spaces, involving communities and food production, offering examples of bottom-up processes or planned participative actions, experimenting new forms of transformation. Despite its capability to adapt, the original guidelines of a project is able to remain, focusing on the characters of a site, selecting the values, offering possible links and chances to compare and relate, or

*Image 1 | The urban public gardens Baltimora, known as "Plastic gardens", in the centre of the town of Genoa, directly close to the historical walls of the ancient city.*

showing a frame, an interpretation in which the stakeholders can bring their different contents.
We need a smart, adaptive, innovative and inter-disciplinarian design, to suggest new uses, to satisfy diverse needs, opening to the multi-ethnic cultures, that are enriching urban reality (Kroll, 2001), with whom we must interact. The language we refer to is experimental, fragmented and polyphonic, but when in our society there is a lack of solid references, it can give a reacher interpretation, instead of banalization or reduction. Observing daily habits tells a measure, a code to understand the multiple "fluid" cultures (Baumann, 2007) crossing a same place: it becomes a privilege to focus on resources, potentialities, signs, to point out values and degradation, trying to get the processes that are producing the transformation. The natural element in the urban space is a precious help for the design, because with its growing and seasonal changes, gives signal of the passing of time, offers a possible contact with the vegetal and animal worlds and can assume a role of protagonist, filling a cultural void, in many anonymous urban sites: it also provides a refuge for bio-diversity, absolving many eco-

systemic services (Santolini, 2011). The reference to natural elements, in the urban scenery, can focus on contents of hope and strength, that are tied to the capability of plants to regenerate. Inserting natural elements to start a transformation, in urban areas, can be an important "instrument of persuasion" (Cortesi, 2004, p. 12), in terms of bettering the quality of urban environment, grafting a new urban nature in the soils of abandoned areas. Good practice to manage abandoned areas are the French experiences of pré-verdissement.
An important example is the inaccessible and mysterious nature of the"isle" in the Park Henri Matisse, in Lille, where Gilles Clèment, in 1995, quotes the forest, suggesting a possible proximity with a non-urban space.

## • Agriculture •

Some experiences of rural parks in metropolitan areas (see for example the Rice Park in Milan) are working on the capacity of existing rural areas inside or around the cities to help to face environmental problems. They can generate resources (not only food, but also cultural services, with an important role in the maintenance of local identity and in the fostering of social cohesion) and provide provisioning/regulating/supporting services, improving urban resilience. Agriculture urban areas can help to preserve resources such as water and soil, providing drainage and habitats for different species, assuring the conservation of bio-diversity. These areas can represent a resource to reduce heat island and climate change effects, to improve life quality, with a role of "starter" of urban regeneration processes. For example the plan "Rome to cultivate" offers to young farmers the possibility to cultivate abandoned public areas. Urban farming and community gardens can also suggest strategies to improve urban attitude towards agriculture, where urban agriculture becomes an aggregation and sharing device. Terraced rural areas can represent a problem because of the need of a continuous maintenance of dry-stone wall. Abandonment is causing a progressive degrade that represent a risk of instability. Many times terraced systems surround the urban outskirts (in Liguria and other mountainous regions): their cultivation can represent a necessary protection of versants and of the territory, against slides and flood. To improve urban resilience we need to support agriculture. The recovery of non-cultivated areas, also with the help of new laws as the one about the bank of soil, is an important strategy to protect the city.

*Image 2 | Quadrio Road (Genoa): between the "sopraelevata" high-way and the historical walls of the city, there is a place used in 2017 for a temporary free market (born to regolarize an abusive market, by an agreement between the Municipality and the Regional Federation of Solidarity and Work).*

*Image 3 | Genoa, residual rural areas in Coronata hills.*

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**Nell'ultimo ventennio si sta assistendo a una crescente instabilità climatica: globalmente si sono registrate temperature medie sempre maggiori, stabilendo di anno in anno nuovi record termici** (WMO 2016) **e l'incremento in intensità e frequenza degli eventi meteorici estremi** (IPCC 2013)**.**

Nell'ultimo ventennio si sta assistendo a una crescente instabilità climatica: globalmente si sono registrate temperature medie sempre maggiori, stabilendo di anno in anno nuovi record termici (WMO 2016) e un incremento in intensità e frequenza degli eventi meteorici estremi (IPCC 2013). Gli impatti negativi di tali eventi aumentano in presenza di modelli insediativi inefficienti e trasformazioni socio-economiche che hanno generato consumo di suolo, aumento di superfici impermeabili, frammentazione degli habitat. Le conseguenze di tali condizioni possono portare all'impoverimento della qualità ambientale ed ecologica e contribuire ad originare eventi calamitosi anche di grave entità.
I costi dei disastri naturali sono ingentissimi: dall'inizio del XXI secolo in tutto il mondo si contano circa 1.285.000 vittime e 1.847 miliardi (US$) di danni economici stimati (EM-DAT)[1]. In Italia si riscontrano innalzamenti termici prolungati e piovosità superiori alla norma. L'intensità delle precipitazioni, unita al verificarsi di fenomeni convettivi con basso grado di predicibilità è risultata in eventi estremamente intensi all'origine di allagamenti localizzati, destabilizzazione dei versanti e talvolta di grave dissesto idro-

[1] Secondo le fonti statistiche sarebbero 32 milioni le vittime di disastri naturali dall'inizio del '900. Nel solo anno 2015 a livello globale si sono stimati circa 377 disastri naturali, che hanno causato 23.744 vittime, lasciato senza casa quasi 60.000 persone e superato i 70 miliardi di dollari in perdite economiche (EM-DAT).

geologico (Sistema Nazionale Protezione dell'Ambiente 2015). Questo anche perché l'inurbamento delle popolazioni, a partire dagli anni '50 del '900, ha avuto effetti incontrollati sull'ambiente urbano, contribuendo inoltre all'instabilità idro-geologica dei versanti collinari a causa dell'abbandono degli usi agricoli. A questo proposito, si osserva che nel territorio nazionale ben il 68,9% dei comuni (5.581) ricadono in aree classificate a potenziale rischio idrogeologico più alto e il 6,8% del territorio è interessato da fenomeni franosi. I danni per alluvioni in Italia negli ultimi 20 anni ammontano a 8 miliardi di euro. L'aumento dei danni per dissesto idrogeologico è stimato in circa 2,5 miliardi di euro/anno, mentre sarebbero necessari 43 miliardi di euro per mettere in sicurezza l'intero territorio italiano (ISPRA 2015)[2].

Tali eventi colpiscono in particolare ambiti urbani vulnerabili, fattore ancor più rilevante se si considera che l'attuale tendenza all'urbanizzazione globale vede una crescita delle popolazioni inurbate: si stima infatti che la popolazione che vive in città raggiungerà il 75% del totale entro il 2050 (Bentham 2011). Questo fenomeno riguarderà in particolare le megalopoli con più di 10 milioni di abitanti. Pertanto vi è un interesse crescente nello studio delle dinamiche dei processi antropici urbani quali possibili fattori di incremento o contrasto degli effetti del *climate change* e i relativi impatti sulla qualità ambientale. Considerando che le città sono responsabili di tre quarti delle emissioni di gas serra globali (UN-HABITAT 2011), le nuove strategie si stanno orientando verso modelli pianificatori legati al concetto di resilienza urbana, alla riduzione della vulnerabilità e alla conversione sostenibile delle città (Grimm *et al.* 2008; Chelleri 2015).

I dati brevemente sopra riportati danno idea della rilevanza di una condizione della quale la società nel suo complesso – e le discipline del progetto in particolare – sono chiamate a farsi carico, affinché il territorio diventi il teatro di una più consapevole coscienza ambientale e sociale.

Per ridurre la vulnerabilità ai disastri dovuti ai rischi naturali, si è tradizionalmente cercato di perseguirne il controllo attraverso la messa in atto di approcci di mitigazione. La mitigazione del rischio comprende misure che vanno dall'ingegneria strutturale (ad es. attraverso la costruzione di opere come argini, dighe, scolmatori idraulici, ecc.) all'azione normativa per regolamentare la pianificazione territoriale. Tuttavia, gli interventi di mitigazione intervengono generalmente a fronte di eventi eccezionali; spesso sono elementi rivolti a prevenire o fronteggiare i danni immediati.

Con il concetto di *resilienza*, invece, non si intende univocamente la resistenza che viene opposta ad un disturbo, ma si presuppone un più complesso processo adattativo attraverso il quale le città 'imparano' a rispondere efficacemente non solo a possibili disastri naturali (Godschalk 2003), ma anche a minacce che agiscono sul medio-lungo termine (ad esempio l'aumento della CO2 o delle temperature medie).

In particolare, il concetto di resilienza si è notevolmente diffuso

[2] Il numero di vittime, feriti o dispersi in Italia, tra il 1900 e oggi, a causa del dissesto idrogeologico raggiunge le 10.000 unità; con 350.000 sfollati e persone che hanno perso la propria casa (ISPRA 2015).

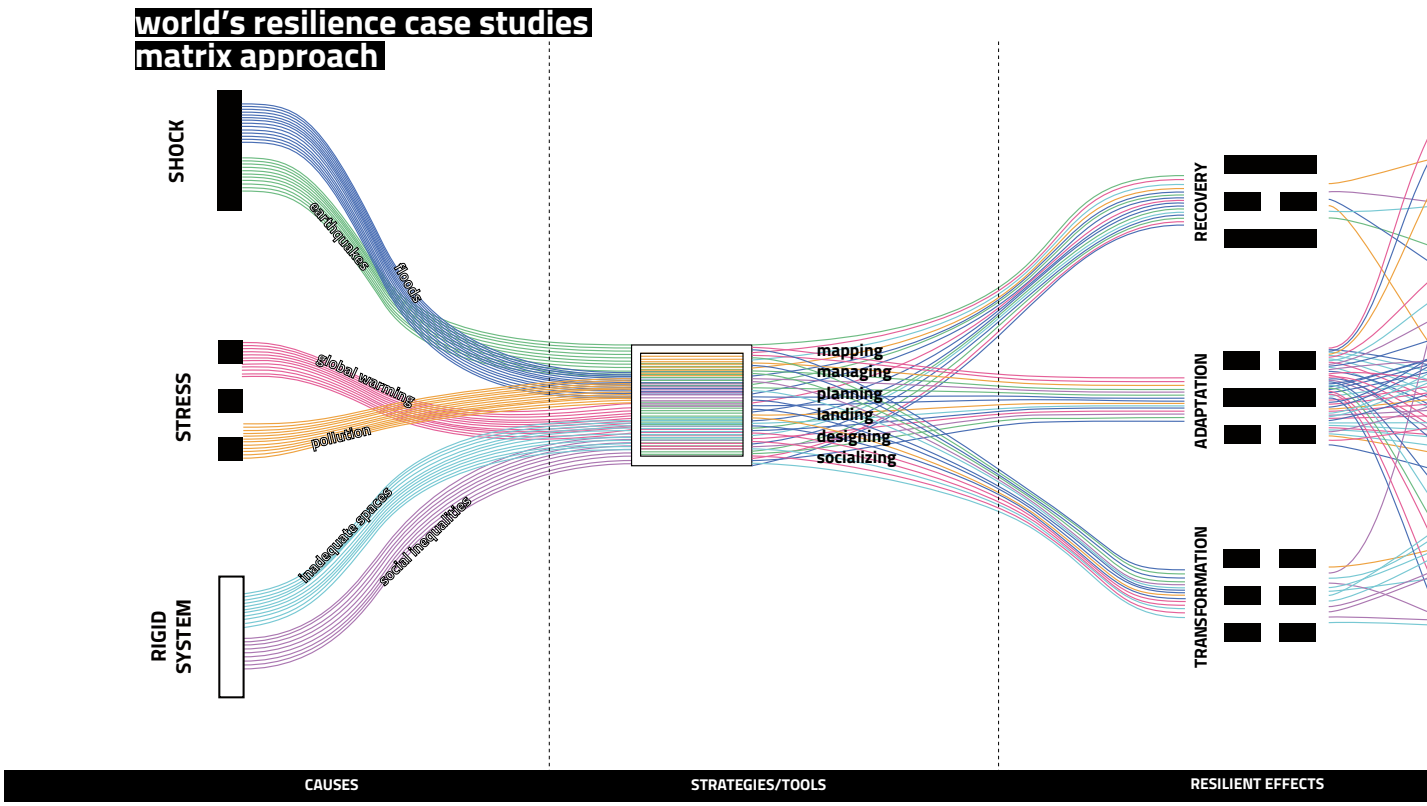
nel dibattito contemporaneo sui cambiamenti climatici, ambito in cui essa viene definita come «la capacità dei sistemi sociali, economici e ambientali di far fronte a eventi pericolosi, tendenze o disturbi, di rispondere o riorganizzarsi in modo da mantenere le funzionalità essenziali, l'identità e la struttura, attraverso capacità di adattamento, apprendimento e trasformazione» (IPCC 2014).
A livello internazionale, vengono pertanto individuate una serie di strategie 'basate sulla natura' [*Nature-based Solutions*], mirate a prevenire le condizioni di rischio sul lungo periodo, in una combinazione di azioni basate su mitigazione e adattamento, gestione del rischio e aumento della resilienza urbana[3].

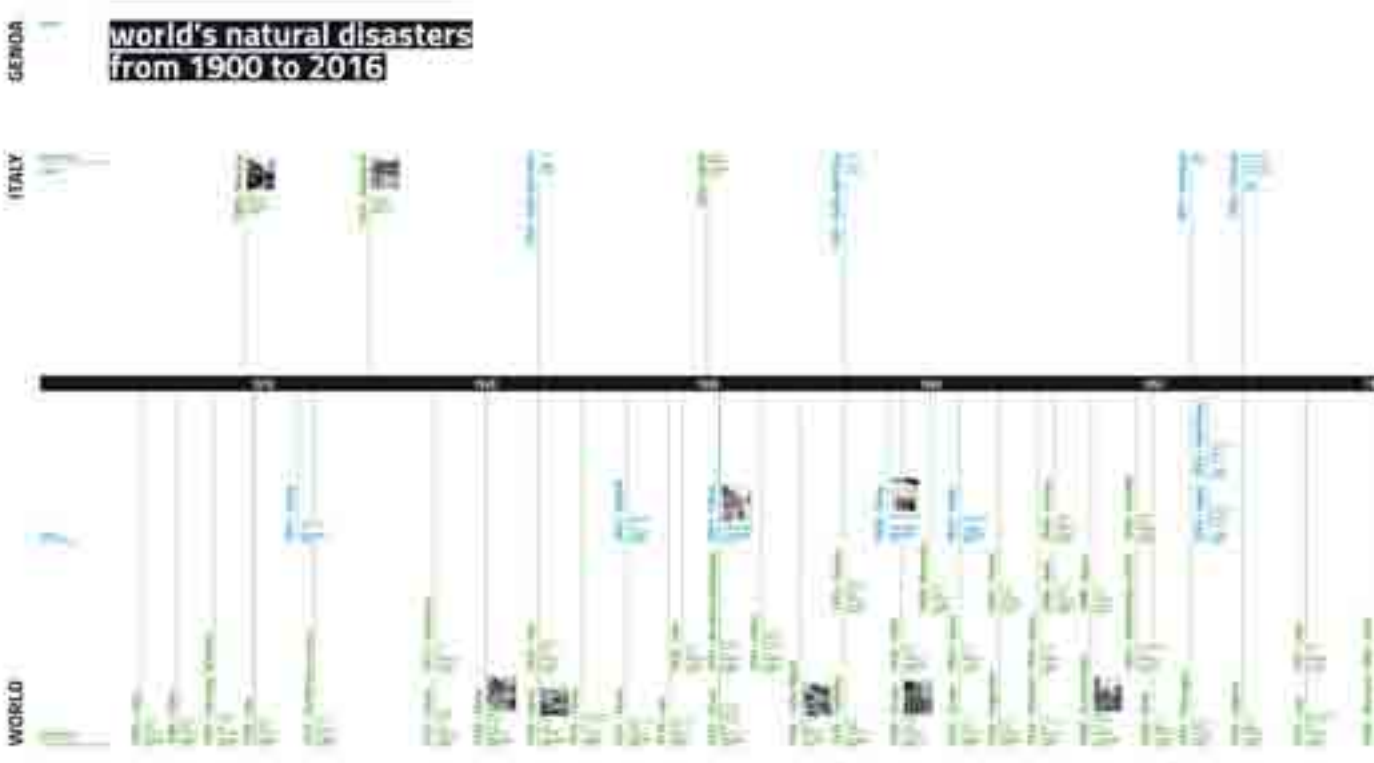
[3] Si noti che l'attuale agenda di ricerca e innovazione dell'UE sulle *Nature Based Solutions* riunisce e capitalizza i principali filoni di ricerca e risultati dei precedenti programmi quadro dell'UE su biodiversità ed ecosistemi, sviluppo urbano sostenibile, gestione delle risorse naturali, mitigazione e adattamento ai cambiamenti climatici e disastro riduzione del rischio.

## • Resilienza urbana: riconnettere comunità ed ecosistemi •

'Resilienza' deriva dal latino *resilire*, che potrebbe essere tradotto con 'tornare indietro, rimbalzare'. In origine il concetto di resilienza è stato utilizzato in fisica per descrivere la capacità di un materiale di resistere ad uno shock senza perdere le proprie caratteristiche, per estendersi poi ad altre discipline. In ingegneria, la resilienza riguarda i disturbi alla stabilità funzionale dei sistemi e tipicamente viene messa in correlazione alla capacità di recupero in tempi rapidi di normali livelli di funzionalità (Wang & Blackmore 2009). Il termine 'resilienza' in ingegneria può pertanto essere ricondotto al concetto di 'ripristino' [*recovery*], sottintendendo la capacità di recuperare la condizione originaria al cessare di uno stress e la sua misura si focalizza soprattutto sulla rapidità del tempo di rispristino della piena funzionalità (Hashimoto *et al.* 1982; Hollnagel *et al.* 2008; Liao 2012).
Il concetto di resilienza in ecologia è stato invece introdotto per la prima volta nel 1973 dall'ecologo canadese Crawford Stanley Holling. Attraverso lo studio dei sistemi ecologici, Holling definì con il termine 'resilienza' la capacità degli ecosistemi di reagire alle minacce esterne, riorganizzandosi attorno ad un diverso punto di equilibrio, superando il concetto di stabilità per abbracciare quello di multi-equilibrio e una visione adattativa dei sistemi[4]. Questa nuova concezione è possibile partendo dalla considerazione che un ritorno in tempi rapidi alla condizione originaria dopo uno shock intenso appare estremamente improbabile – e talvolta impossibile – in sistemi complessi come possono essere quelli ecologici o sociali (Holling 1973; Scheffer *et al.* 2001). Una risposta resiliente, in quest'accezione, non prevede che il sistema debba tornare allo stato di equilibrio precedente, ma che esso abbia la possibilità di adattarsi e trasformarsi in uno stato che gli consenta di sopravvivere in una nuova configurazione (Folke *et al.* 2010). In sostanza, si potrebbe affermare che in ambito ingegneristico con 'resilienza' si intenda la capacità di mantenere la stabilità, mantenendo invariato (o con fluttuazioni minime) lo stato del sistema, mentre in ecologia essa rappresenti piuttosto

[4] Tale definizione è stata in seguito adottata anche dalle discipline socio-economiche (Pendall *et al*. 2010).

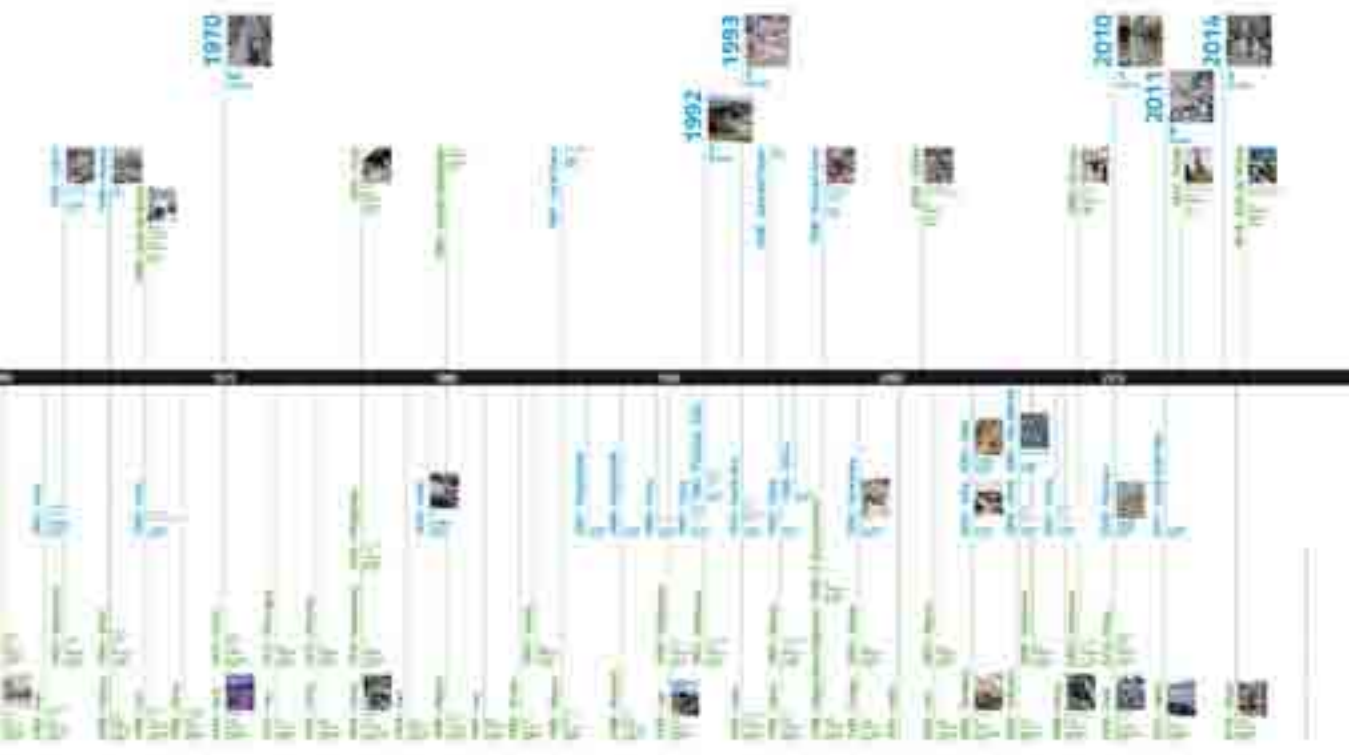



*World's resilience case studies matrix approach and chronological line of world's natural disasters - Paola Sabbion, Elisa Tozzi - MED.NET 3 RESILI(G)ENCE Intelligent Cities/Resilient Landscapes Exhibition: Genova 25 october – 6 november 2016*

100 RESILIENT CITIES - Arup
ADAPTIEVE DIJKEN - H+N+S architects + NEXT architects
AGROPOLIS - Schroeder + Baldauf architects
AIR POLLUTION - aqicn org
ASFALTO MON AMOUR - Coloco
AT NIGHT - Santamaria-Martinez
AVALANCE - TVK architects
BARRANCAS MANAGEMENT - Territorios Arq.
BERGES DU RHONE - IN SITU + Jourda Architectes
BERGSCHE MAAS - Bosch Slabbers landschapsarchitecten
BLOCONZE - La Coll
BO01 - Renzo Piano, Christoph Kolhbecker
BOSTON COMMUNITY ENERGY STUDY - MIT
C40 initiative - C40 org
COSTAL ROULETTE - SWA Group
DETROIT FUTURE CITY - STOSS
DISCARGE - OMA
DOWNSVIEW PARK - Tschumi-OMA + Corner
ELEMENTAL PRES-CONSTITUCION - Alejandro Aravena
ESPACIO DE JUEGOS EN MALABO - Basurama
FACTORY BY WATER - Schweingruber architekten
FLOATING HOMES - Factor Architecten
FLOOD BAD KREUZNACH MANAGEMENT - Francke + Knittel
FLOOD MILTENBERG MANAGEMENT - Hartmut Holl
FLOOD OLD TOWN MANAGEMENT -Trojan + Neu Architects
FORESTE FONDAZIONALI - Michel Desvigne
FRESHKILLS PARK - Field Operations + James Corner
GREAT RIVER PASSAGE - William Wenk Studio
HAFEN CITY - KCAP Architects & Planners
HISTORIC FOURTH WARD PARK - HDR inc
HUMAN ECOSYSTEMS LTD - Salvatore Iaconesi
FURT-PUCKLER LAND - IBA Internationale Bauausstellung
KRONSBERG ECO-DISTRICT - Hannover city
L'ORIGINE DEL MONDO - Coloco
LAFAYETTE GREENS - Kenneth Weikal Landscape
LANDARTPARK BUITENSCHOT - H+N+S Landscape Architects
LOWER 9th ESCAPE HOUSE - MVRDV
LYON CONFLUENCE - Michel Desvigne
MADRID RIO - WEST8 + MRIO Arquitectos
MAPPING COASTAL FLOOD RISK (NOAA) Resilient Inst.
MASTERPLAN EMSCHER-ZUKUNFT - Post + Welters
MOBIsLEs - Balmori Associates
MUSEUM PARK LOUVRE LENS - Mosbach Catherine
NATIONAL FLOOD INSURANCE PROGRAM - Trevor Johnson
NEW MEADOWLANDS - MIT CAU + ZUS
NO LIMIT - TVK Architects
PAILLON RIVER PARK - Péna Paysages
PARQUE DE ARANZADI - Iñaki Alday + Margarita Jover
PARQUE DEL AGUA - Iñaki Alday + Margarita Jover
QUEEN ELIZABETH OLYMPIC PARK - Hargreaves Associates
RESILIENT SF2080 - UrbanRiskLab
RIVER AIRE RENATURATION - Atelier Descombes
ROTTERDAM ADAPTATION STRATEGY - De Urbanisten
RIVER FOREST ISLAND - SWA Group
SHOP CREEK - Wenk Architects
SOLAR SYSTEM - Mapdwell
SUPERKILEN - Big Architects + Topotek 1 + Superflex
TBM PARK - Coll-Leclerc Arquitectos
THE CREATIVE CORRIDOR - Universitu of Arkansas
THE LOWLINE - RAAD Studio
THE HIGHLINE - Diller Scofio + Renfro
THE METRO FOREST PROJECT - Kobkaikit Tawatchai
TIANJIN PARK - Turenscape
TULEDA CULIP RESTORATION - EMF Landscape architecture
UNDERSTANDING GLOBAL HAZARDS - UrbanRiskLab
VALL D'EN JOAN LANFILL - Batlle i Roig Arquitectes
WATER SQUARE BENTHEMPLEIN - De Urbanisten
WORKING VACANCY NOLA - STOSS
YANWEIZHOU PARK - Pechin University + Turenscape

## CASE STUDIES



«la capacità di sopravvivere, indipendentemente dallo stato del sistema» (Chelleri, 2015)[5].
Il significato di resilienza in questo modo arriva ad incorporare i concetti delle teorie della complessità (auto-organizzazione, co-evoluzione e comportamenti non-lineari), da cui deriva in particolare il concetto di *evolutionary resilience* (Davoudi *et al.* 2013). In questo contesto si inserisce il concetto di *ciclo di rinnovamento* adattivo (Gunderson & Holling 2002), secondo cui l'evoluzione è costituita da cicli dinamici costituiti da diverse fasi: crescita – conservazione – collasso – riorganizzazione. In tale modello shock e disturbi sono momenti necessari allo sviluppo in quanto elementi in grado di innescare il mutamento, attraverso la stimolazione di processi di apprendimento e auto-organizzazione (Lombardini 2013).

La definizione di *resilienza urbana* deriva proprio da quest'ultima prospettiva, riferendosi generalmente alla «capacità di una città o di un sistema urbano di sopportare una serie di urti e sollecitazioni» (Agudelo-Vero *et al.* 2012), benché il concetto non sia privo di ambiguità. I sistemi urbani includono, infatti, strutture non-lineari come quella sociale, un complesso sistema adattivo in cui per resilienza si intende la «capacità di una rete di riorganizzarsi, adattarsi, modificarsi, di innovarsi di fronte a stimoli interni ed esterni» (Carpenter *et al.* 2005). I sistemi urbani sono pertanto considerati nell'insieme delle componenti ecologiche, sociali e tecniche, in cui processi umani e naturali interagiscono, co-evolvendo in modo tale da formare *ecosistemi urbani* (Meerow *et al.* 2016).
Un approccio basato sui concetti di flessibilità, diversità e apprendimento adattivo va così a sostituire le rigidità del concetto ingegneristico di resilienza per adattarlo ai sistemi antropici di ambito socio-economico. Per questo, alcuni studiosi hanno definito la resilienza urbana «il grado in cui le città riescono a tollerare alterazioni prima di riorganizzarsi attorno ad un nuovo insieme di strutture e processi» (Alberti *et al.* 2003). Secondo altri essa è «la capacità di un sistema di regolarsi a fronte di mutate condizioni» (Pickett *et al.* 2004) o, ancora, «la capacità di una città di assorbire perturbazioni mantenendo le sue funzioni e strutture» (Lu e Stead 2013). Secondo altre definizioni ancora, «la resilienza urbana, nel contesto della gestione ambientale e della sostenibilità, è la capacità di un sistema socio-ecologico di assorbire disturbi, riorganizzarsi, e, quindi, mantenere le funzioni essenziali, le strutture e i feedback» (Carpenter *et al.* 2012).
Alcune di queste definizioni considerano importante una dimensione temporale: la resilienza esprime «la capacità e l'abilità di una comunità di sopportare lo stress, sopravvivere, adattarsi, riprendersi da una crisi o calamità e *rapidamente* andare avanti. Resilienza deve essere intesa come la capacità della società di attuare sforzi sociali per costruire una capacità collettiva di resistere allo stress» (ICLEI 2012).
Moberg & Hauge Simonsen forniscono una definizione del ter-

[5] Definendo la resilienza come la capacità di riorganizzazione e gestione al fine di mantenere le medesime funzionalità, identità e strutture, Holling non intendeva il mantenimento della stabilità di singole componenti del sistema, quanto una più generale «capacità di mantenersi "vitali" passando da una condizione di equilibrio (instabile) ad un'altra» (Lombardini 2013).

mine che risulta forse la più efficace nel mettere l'accento sulla capacità di trasformare il disturbo in opportunità[6]. La resilienza urbana è definita dai due studiosi svedesi come la «capacità di un sistema, sia esso un individuo, una foresta, una città o un'economia, di affrontare il cambiamento e continuare a svilupparsi. Si tratta della capacità di utilizzare shock e disturbi come una crisi economica o il cambiamento climatico per stimolare il rinnovamento e il pensiero innovativo. Il concetto di resilienza abbraccia quelli di apprendimento, diversità... [e] la capacità a lungo termine di un sistema di affrontare il cambiamento» (Moberg & Hauge Simonsen 2011). Con questa definizione entrano in gioco non soltanto le azioni intraprese per ridurre la vulnerabilità dei sistemi naturali, ma anche le componenti sociali e le risorse culturali delle comunità umane che debbono mettere in gioco la propria capacità di analisi e comprensione, di progettualità e cooperazione, allo scopo di riconnettere comunità ed ecosistemi.

[6] Se il cambiamento è visto come una minaccia è ovvio tendere a voler riportare il sistema allo stato che precedeva lo stato di shock. Tuttavia, se il cambiamento è visto come un'opportunità per giungere ad una configurazione migliore, esso diventa una spinta alla ricerca di soluzioni innovative e nuove direzioni. È necessario infatti considerare che talvolta ripristinare lo stato precedente il disturbo non è un'opzione desiderabile (talvolta proprio là stavano le cause della vulnerabilità) o potrebbe non esserlo in egual modo da tutti i portatori di interesse coinvolti (ad esempio i più deboli).

## • Strategie e azioni: Intelligent Cities/Resilient Landscapes •

Per rappresentare l'impatto e la frequenza dei disastri naturali, attraverso la mostra *Resili(g)ence: Intelligent Cities/Resilient Landscapes*[7], è stata realizzata una *timeline* che raccoglie gli eventi verificatesi a partire dal 1900 nella città di Genova, nel territorio nazionale italiano e nel mondo, realizzata consultando le principali banche date disponibili (EM-DAT; IFRC; Catalogo Parametrico Terremoti Italiani). Da questo lavoro si è evinto chiaramente che, se i disastri di carattere geofisico hanno avuto un andamento piuttosto costante a causa della natura dei fenomeni coinvolti (ma allo stesso tempo evidenziando un'insufficiente attenzione alle caratteristiche del territorio e alla qualità degli insediamenti ancora diffusa), la frequenza degli eventi di natura climatologica, metereologica e idrogeologica è risultata in crescita negli ultimi decenni.
A questa lettura si è affiancata quella della situazione relativa al territorio comunale, restituita attraverso una rielaborazione grafica delle informazioni utilizzate per effettuare la Valutazione Ambientale Strategica (VAS) del Piano Urbanistico Comunale del Comune di Genova, rappresentante: alvei; acquiferi significativi; frane attive e quiescenti; aree inondabili; cave e discariche attive e inattive; riporti o discariche inattive (Comune di Genova 2015).
L'analisi della letteratura scientifica recente ha permesso di individuare alcune definizioni principali necessarie a costruire un percorso in grado di spiegare ad un pubblico eterogeneo il significato di *resilienza urbana*, ovvero la capacità di un sistema urbano di affrontare il cambiamento e continuare a svilupparsi, utilizzando shock e disturbi per innescare il rinnovamento ed apprendere la messa in atto di strategie adattative.
Chiarito il significato del termine, si è inteso portare all'attenzione del pubblico una serie di azioni strategiche e strumenti pro-

[7] La mostra *Med.Net Resili(G)Ence/ Goa Resili(G)Ent City*, a cura di Carmen Andriani, si è tenuta nell'ambito del *Forum Internazionale MED.NET03. RESILI(G)ENCE Intelligent Cities/Resilient Landscapes* presso il Dipartimento di Architettura e Design dell'Università di Genova (25 Ottobre - 4 Novembre 2016)

gettuali esemplari, presentando una selezione di alcuni dei numerosi casi studio internazionali oggetto di ricerca, con lo scopo di evidenziare le migliori pratiche internazionali[8]. I casi studio sono stati sistematizzati all'interno di uno schema-matrice, ordinandoli secondo le cause dei disturbi, le tipologie di strategie e azioni adottate ed i risultati raggiunti.
Ai fini di una sistematizzazione funzionale alla mostra, le cause dei disturbi sono state ricondotte a tre categorie principali, dipendenti dalla dimensione temporale, distinguendo cioè tra eventi naturali improvvisi e scarsamente prevedibili come terremoti, uragani, alluvioni, etc. [*shock*]; minacce a lungo termine come riscaldamento globale, crisi economiche, esaurimento delle risorse, aumento della CO2, etc. [*stress*]; conseguenze negative imputabili alle rigidità dei sistemi umani (ad es. pianificazione del territorio inadeguata, dinamiche di disgregazione sociale, ritardo dei sistemi urbani nell'adeguarsi ai rapidi mutamenti socioeconomici, etc.) [*rigid system*].
Ogni caso studio è stato infine ricondotto a tre diverse categorie di risultati perseguibili [*recovery – adaptation – transformation*], attraverso una serie di azioni progettuali agenti non solo sulla materia, lo spazio o il territorio fisico [*designing*], ma anche sull'informazione intesa come conoscenza dei processi in atto [*mapping*], sulla gestione di tali processi [*managing*], o ancora sulla struttura sociale [*socialising*], categorie corrispondenti ai 6 *strategic fields* esplorati attraverso le diverse sessioni del *Forum MenNet3 Resili(g)ence*. Infine, uno speciale tag indicava la prevalenza di topics specifici associati al prevalente campo di applicazione: *#water; #earth; #fire/energy; #air; #land use/ecosystems; #community*.

In un'ottica di lungo periodo, appare necessario rivolgersi ai processi di cambiamento in corso predisponendo azioni di prevenzione e adattamento continue e diffuse, in aggiunta alle infrastrutture di mitigazione utili per far fronte a shock imprevisti. Le *Nature-based Solutions* agiscono in questo senso, sfruttando le caratteristiche e i processi tipici dei sistemi ecologici complessi, come i cicli del carbonio e dell'acqua, per la riduzione del rischio e il conseguimento di ambienti urbani più adatti al benessere umano e all'inclusività sociale.

Per quanto riguarda l'uso del suolo e la sua rigenerazione, tra i casi studio più significativi individuati si possono annoverare:

- *Detroit Future City* (2012): elaborato dal gruppo Stoss, il piano strategico di Detroit individua le efficienze produttive, stabilendo collegamenti tra sistemi sociali, economici ed ecologici attraverso una mappatura analitica delle aree di opportunità da trasformare attraverso l'incremento di comunità sostenibili, infrastrutture verdi e blu, agricoltura urbana, usi temporanei degli spazi

[8] La ricerca è stata condotta sotto la direzione scientifica di Manuel Gausa, nell'ambito delle azioni cofinanziate dal Programma Europeo Erasmus+.

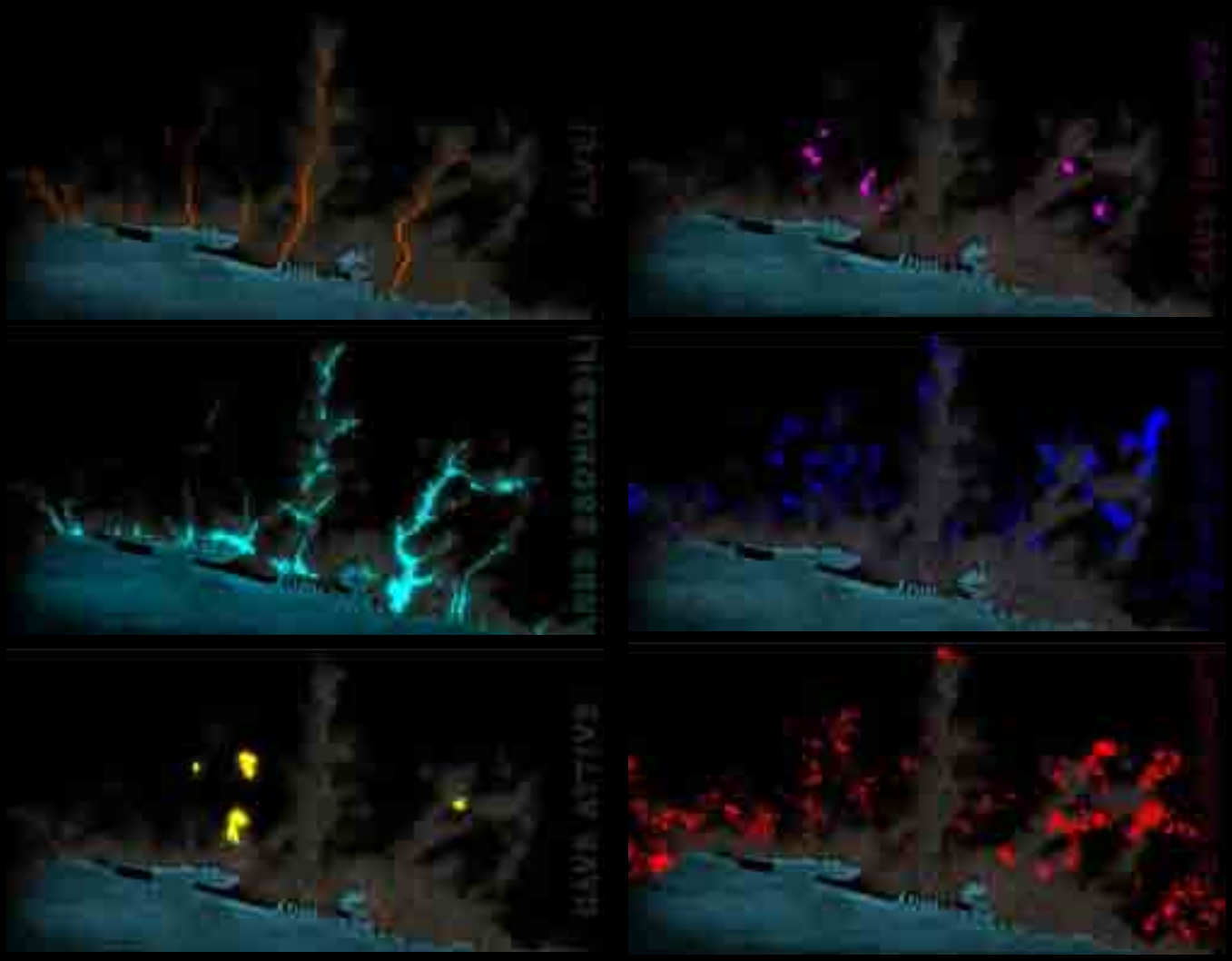
pubblici.
- *Fresh Kills Park* (2012): progetto per la bonifica della discarica di Staten Island, NYC. Field Operations ha proposto un Master Plan per un parco di quasi 900 ettari che guiderà la trasformazione della discarica nei prossimi 30 anni. La bonifica prevede un incremento della biodiversità e la rigenerazione degli spazi per le attività ricreative, sportive e culturali. Poiché il sito è vasto e complesso, l'idea di un paesaggio sviluppato per fasi realizzabili nel corso del tempo, è stata fondamentale per dare forza alla proposta e ne costituisce il carattere più innovativo.

- *Agropolis* (2009): progetto di rigenerazione degli spazi residuali della nuova area urbana di Freiham, grande area di sviluppo della città di Monaco, in Germania, ridisegna le relazioni tra mondo rurale e urbano proponendo una nuova identità sostenibile. Il progetto prevede l'utilizzo di spazi residuali per la realizzazione di fattorie temporanee capaci di generare un modello urbano orientato allo sviluppo sostenibile.

- *No Limit* (2009): studio per l'inserimento della tangenziale periferica di Parigi. Gli scenari urbani, individuati dallo studio TVK, rientrano in un approccio che esplora soluzioni innovative con l'obiettivo di aprire percorsi di cambiamento e ampliare la discussione alla pianificazione condivisa.

Per quanto riguarda l'acqua, gli effetti del cambiamento climatico rendono la mitigazione del rischio idrogeologico una sfida non più derogabile. Lo sviluppo di città sensibili all'acqua [*Water Sensitive Cities*] sta assumendo un rilievo sempre maggiore a livello globale come strumento per affrontare il rischio idrogeologico. L'adattamento agli effetti del *climate change* attraverso l'inserimento di infrastrutture verdi e blu e l'integrazione delle stesse nella pianificazione urbana è stato affrontato in numerosi progetti a livello globale per ridurre il rischio sulle coste marine e fluviali, rallentare il deflusso superficiale e aumentare la capacità di infiltrazione dei suoli urbani. Inoltre, tali sistemi possono contribuire a migliorare la qualità dello spazio urbano. Tra i casi studio più significativi individuati nella ricerca, si possono citare:

- *Blue Dunes* (2014): progetto per la difesa costiera di NYC e del New Jersey. West8 e Team WXY hanno elaborato questo Master Plan per integrare sistemi complessi di protezione, on e off-shore, integrando la protezione delle coste con lo sviluppo di nuove economie e la qualità dell'ambiente urbano e degli habitat.
- *Water Square Benthemplein* (2013): la prima piazza d'acqua realizzata a Rotterdam combina la conservazione dell'acqua piovana con il miglioramento della qualità dello spazio pubblico urbano. Il gruppo De Urbanisten ha realizzato un dispositivo di qualità ambientale e urbana attraverso un processo partecipativo, inserendolo a pieno titolo nel contesto più ampio del piano di *Rotterdam Adaptation Strategy*.



- *Madrid Rio Park* (2010): West8, in collaborazione con MRIO e Porras Lacasta, hanno ridisegnato il Master Plan del Rio Manzanares liberando l'area dalla viabilità e dando vita a un grande parco urbano che connette spazi esistenti e di nuova concezione, ridando al fiume la meritata centralità.

Al fine di progettare città resilienti, non soltanto l'ambiente fisico, ma anche lo spazio sociale deve essere in grado di sviluppare intelligenza, accogliendo modelli di diversità. Politiche e spazi flessibili possono rendere le città più adattative e in grado di adeguarsi a cambiamenti imprevisti, coniugando l'attenzione agli aspetti legati al cambiamento climatico e ambientale con un atteggiamento proattivo orientato ad armonizzare le trasformazioni economiche e sociali con le esigenze delle comunità, per disegnare città capaci di soddisfare abitanti e collettività che le abitano attraverso una maggior qualità dell'ambiente di vita.

Tra i casi studio selezionati, rappresentano un esempio eccellente di questo approccio:

- *Superkilen* (2012): uno spazio urbano che attraversa per 800 metri uno dei distretti più etnicamente diversi e socialmente complessi di Copenaghen. L'idea di Topotek è stata quella di riempire questo spazio con gli oggetti che provengono dalle 60 diverse nazionalità degli abitanti del quartiere. Una sorta di «raccolta surrealista della diversità urbana globale» che riflette la vera natura di questo quartiere nel segno dell'inclusività.

- *Superilles* (2010): piano per la città di Barcellona in cui i blocchi sono configurati come unità urbane dal traffico limitato dove le strade sono dedicate a spazio pubblico pedonale. Un esempio di partecipazione e condivisione che promuove un dibattito approfondito sugli usi dello spazio urbano e la riappropriazione da parte dei cittadini come processo aperto di trasformazione collettiva urbana.

In conclusione, le azioni di prevenzione, manutenzione, rigenerazione dovrebbero considerare le interazioni delle componenti naturali e antropiche nell'ambito di sistemi complessi, prevedendo strategie di adattamento che contemplino la possibilità per l'uomo di 'ritirarsi', agendo anche per sottrazione e decostruzione, oltre che per aggiunta e costruzione. Tali trasformazioni richiedono talvolta un radicale cambio di abitudini e uno sforzo condiviso. Per aumentare la resilienza delle città è quindi importante trasformare gradualmente non soltanto le configurazioni spaziali, ma soprattutto riorientare «stili di vita, servizi, infrastrutture, accessibilità al mercato del lavoro, nonché modelli istituzionali e di business» (Olazabal & Chelleri 2012).
La trasformazione è quindi sia fisica che immateriale e richiede la cooperazione e l'impegno di amministrazioni e singoli, includendo politici, decisori, pianificatori e cittadini (Chelleri 2015), in un'impresa comune di intelligenza sociale e collettiva.

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# FUTURE PERSPECTIVES FOR THE MEDITERRANEAN RURAL-COASTAL LANDSCAPE

**Today, therefore, we are faced with a situation in which the cities of the coast for some aspects have been consolidated thanks to decades of urban sprawl, for others, however, especially where the urban contexts has occupied spontaneously peripheral areas. The so-called sprawl towns, superimposing over the surrounding rural territory has given way to formless and chaotic expansion of the urban core over the years.**

Since the Seventies the research, about the growth and decline processes of the cities, were not limited to an only urban perspective, but have investigated all the economic globalization phenomena that incorporate and act on urban spaces, identified «... not only such as object of study, but also as a strategic reference for the theory of a wide range of social, economic and political processes in the current era» (Sassen, 1997).

These complex dynamics and the current revolutionary phenomena are shaping new perspectives in the evolution of rural suburbs that are emerging nowadays thanks to the progress of technology in contemporary society and the close connection with the development of primary activities. Faced with this varied context, which is the present-day architect's position towards the planning of this 'new' Mediterranean countryside farmland in terms of production and environmental development?

The advent of mass technological systems, new processes of governance in urban planning, awareness of strategies to recycle degraded urban spaces and the integration of these in the community, have outlined an epochal paradigm shift, the antithesis of urban-rural or metropolitan-periphery is therefore largely out-dated. The small and medium rural Mediterranean today's cities are the result of the evolution of these phenomena and the various strategic planning processes of the twentieth century (Rome Treaty 1957), which have radically changed the balances and the models of life in the rural areas. Many of them, however, were able to reinvent and adapt themselves to the new requirements in terms of:
- socio-cultural aspects, promoting inclusion and social hybridization;
- environmental issues, focusing new attention to issues relating to the consumption of resources and preservation of the landscape;
- economic activities, aiming to improve the seaside activities;
- agricultural programs, adapting to the rural development programs.
To approach the study of this Mediterranean landscape in a consistent and non-reductive way, it is inevitable to understand that cannot be only one 'method' of planning, which can correlate every single aspect that makes up the city, without generating a superficial planning and the danger of an homogenisation of the territories.

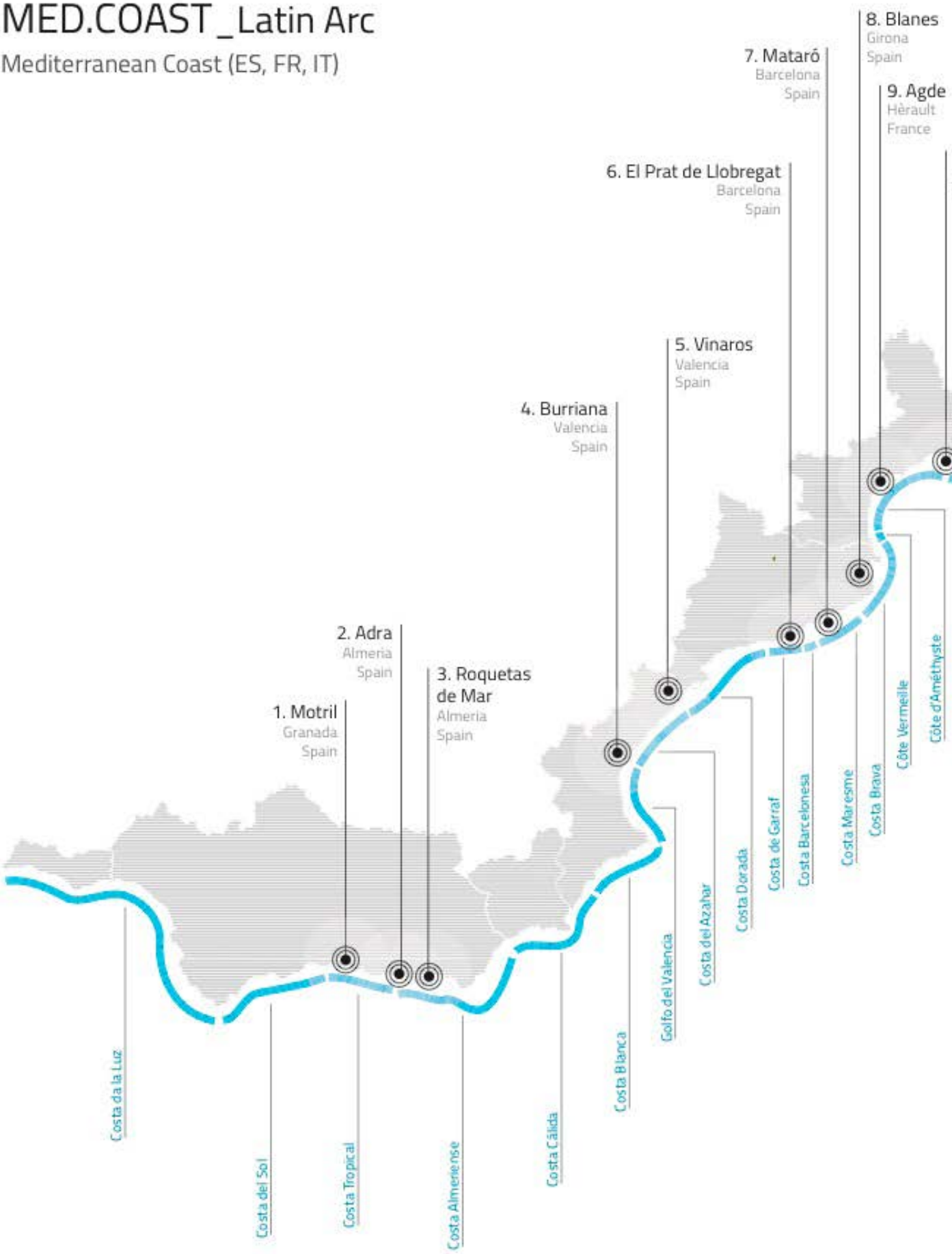
## • Narratives •

Within a framework that consider the contemporary phenomena, the renewed interest about the reoccupation of the farmland – or 'rurbanization', to quote Sorokin, Zimmerman, and Galpin – it was a concept that significantly changed the relationship in the urban-rural dichotomy, approaching the concept of rural-urban continuum. This process will have to be thinked so that it can adapt to future changes where the perception of space, context and environment, will be radically changed «The city, in fact, seems less and less topical and territorial and more and more teletopical and deeply extraterritorial, in which central and suburban geometric notions are losing their meanings» (Virilio, 1996).
The technological revolution that affects the rural peripheries and the agricultural sector is indeed the result of the now inseparable existence of technological devices entered permanently into the everyday life of each of us, an extension of the same person. Should they be considered a key element in dealing with governance issues related to the rural development?

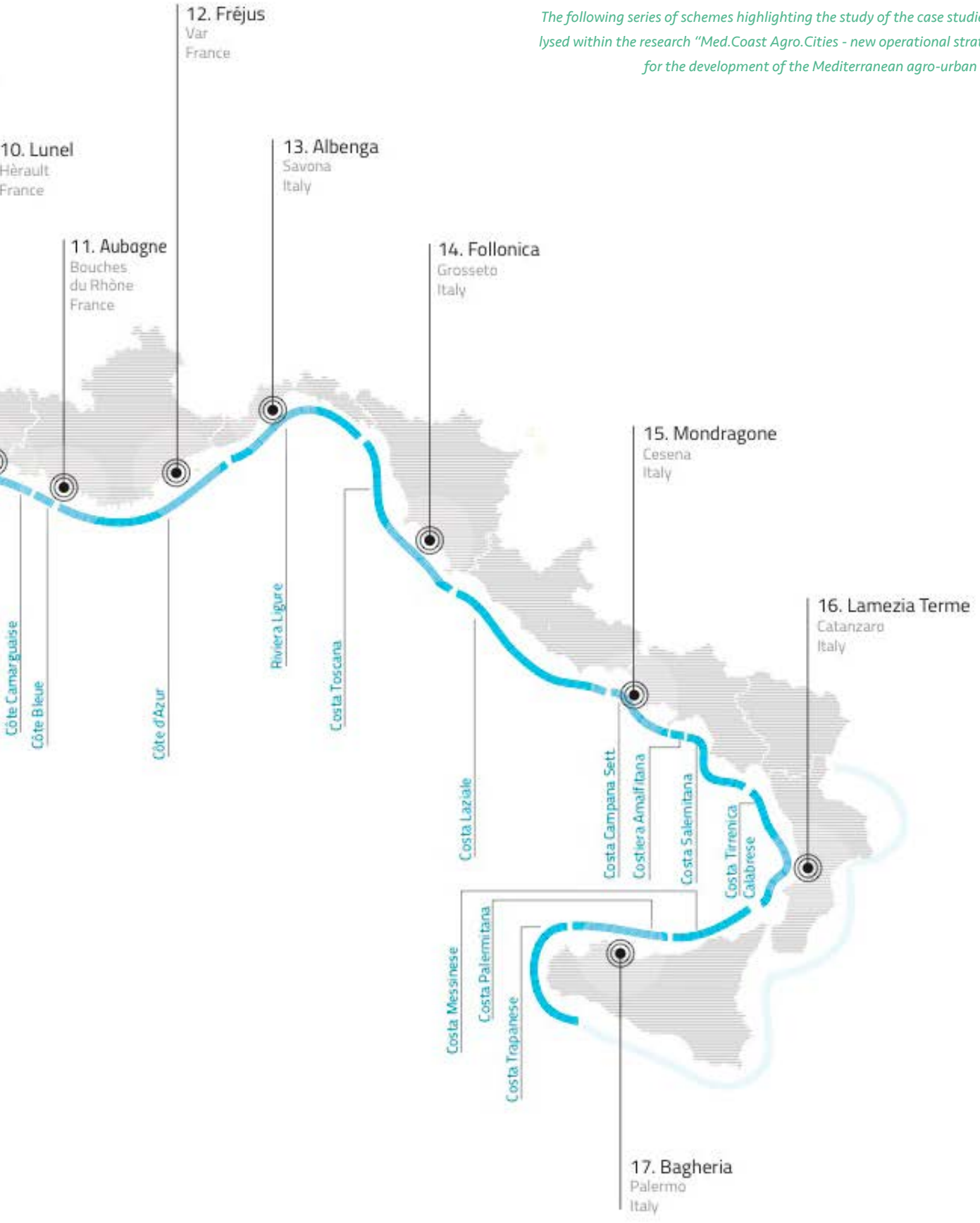
Over the last decade the interest in the identification of development scenarios for the local contexts, has renewed into the model of macro-regions, which encompass areas related conceptually to each other beyond the geographical localization. One of these is the Mediterranean area, intended as a theoretical concept that interprets the idea of "Mediterranean character".
The Mediterranean multi-city is the place of relationships and exchanges among different landscapes and cultures, "contaminated" by the wide networks of relationships that touch the shores of this sea, with ideas, styles, techniques and knowledge, which spread its effects along the whole costal areas. Thanks to this biodiversity along the Mediterranean coasts there are very heterogeneous urban centres, they keep changing and evolving with a continuous territorial consumption, which today has led to outline «the global shape of the Mediterranean city» as defined by Cardarelli (Cardarelli 1987, p.84).
The interest to focus on rural and coastal Mediterranean cities is not, however, a novelty, already more than a decade ago in the objectives of European projects (eg. 'Europe 2000+') the Arco Latino had been identified as one of the eight 'interested regions' to the development programs of "transnational perspectives of the European territory".
Among the issues it reads: "in the 80s, the demographic change has stabilized or even reversed for natural demographics reasons or for immigration of 'new rural dwellers' coming from the urban space. Rural areas have been able to attract inhabitants, but also economic activities, because of their proximity to highly urbanized areas and their tourist character." (Report Europe 2000+).
Through these on-going evolutionary processes, the Mediterranean coastal cities are – on one side - consolidated by decades of immigration and urban sprawl – and on the other, instead - in a complete change and difficulties to recover its own identity, especially where these have expanded and occupied chaotically peripheral areas by infrastructures and large commercial-industrial districts. They therefore are outlined, along the border bow, real spread cities, where the rural land has given way to a formless appropriation of the urban fabric.
Do not forget that agricultural and rural dimension of the Mediterranean has been - and still continues to be - a central and essential element for the economy and society of this landscape.
The wealth of natural resources and the diversity of landscapes make the Mediterranean a unique echo-region, however, the industrial development, the incessant building – in Italy, for example, from 1971 to 2010, about 5 million hectares of agricultural land were urbanized (datas Mipaaf, ENEA, Ispra) –, the unfair social habits, the constant increase of pollutants and the progressive reduction of primary resources, such as water resource, continue to undermine this fragile ecosystem.

# MED.COAST_Latin Arc

Mediterranean Coast (ES, FR, IT)

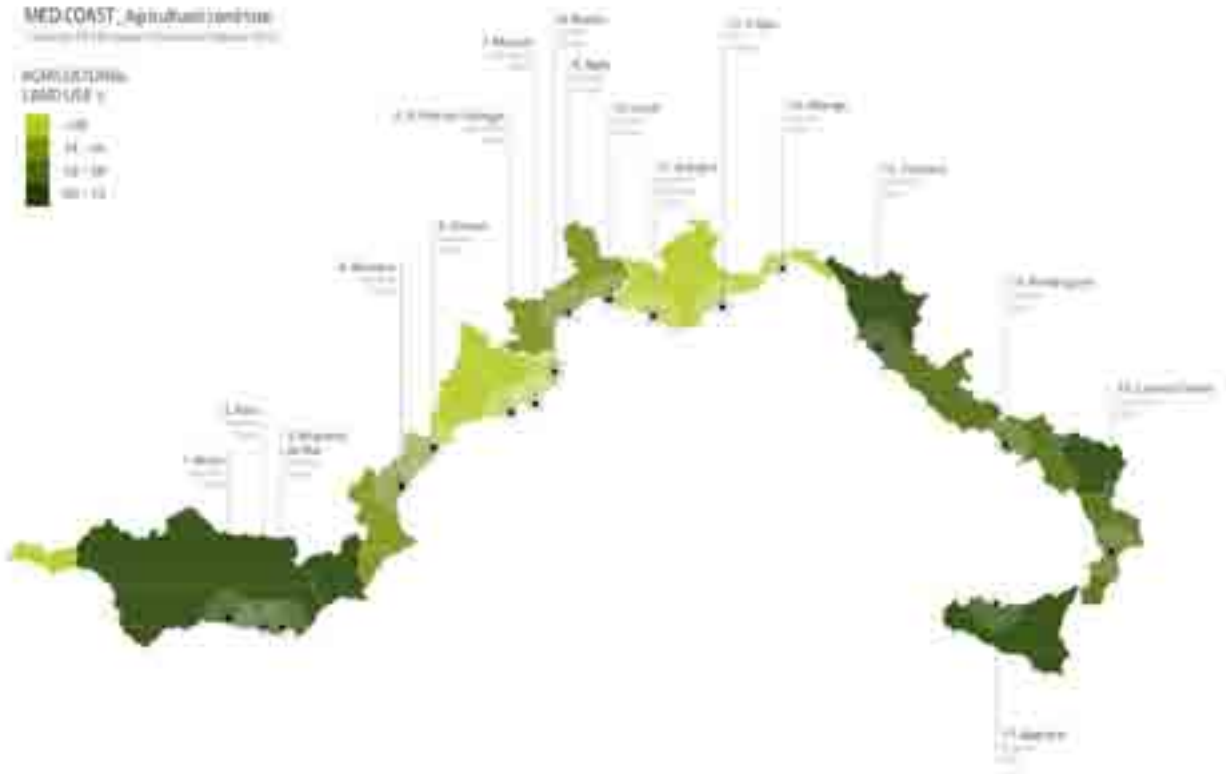


*The following series of schemes highlighting the study of the case studies analysed within the research "Med.Coast Agro.Cities - new operational strate- gies for the development of the Mediterranean agro-urban areas".*



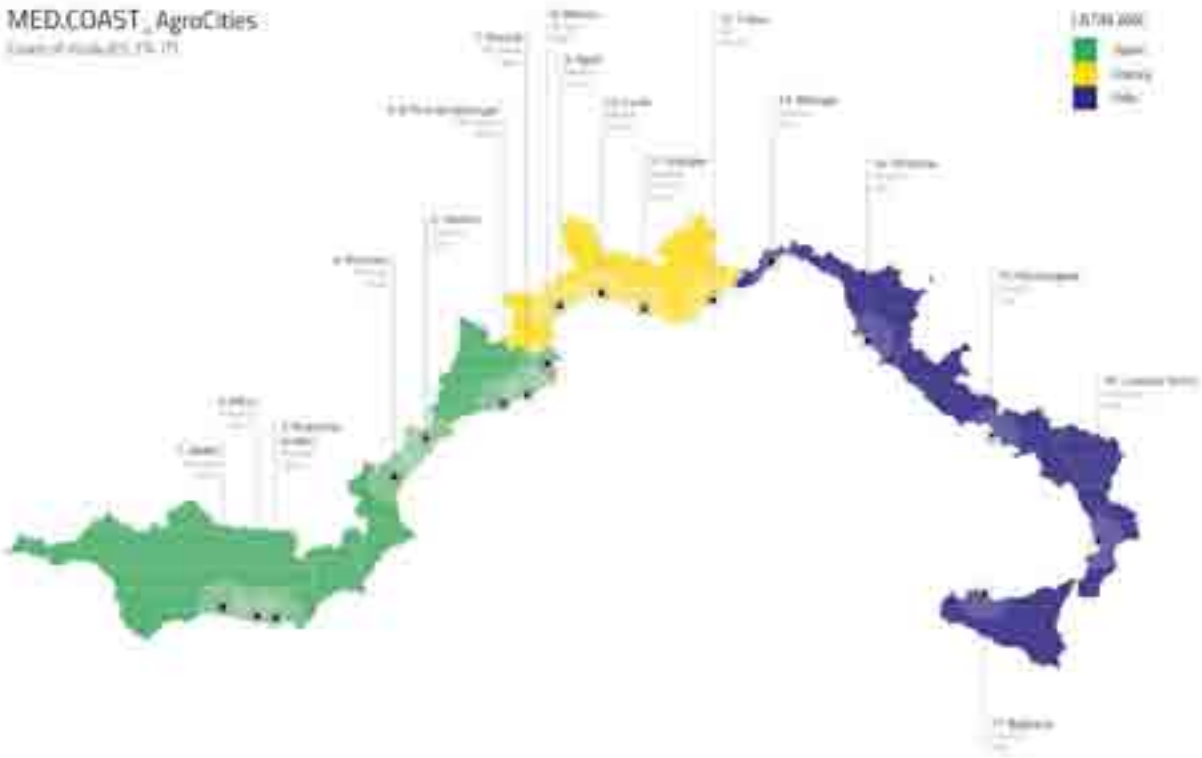
| STUDY CASES | LOCALIZATION | SIZE | POPULATION | DENSITY | RURAL ZONE |
|---|---|---|---|---|---|
| 1. Motril |  | 109,8 km² | 60.420 | 550,3 ab/km² |  |
| 2. Adra |  | 90,1 km² | 24.697 | 274,1 ab/km² |  |
| 3. Roquetas de Mar |  | 60 km² | 94.925 | 1556 ab/km² |  |
| 4. Burriana |  | 47 km² | 34.266 | 733,3 ab/km² |  |
| 5. Vinaròs |  | 95,5 km² | 28.292 | 296,4 ab/km² |  |
| 6. El Prat de Llobregat |  | 31,4 km² | 60.891 | 2034,9 ab/km² |  |
| 7. Mataró |  | 22,5 km² | 126.127 | 5598,2 ab/km² |  |
| 8. Blanes |  | 17,9 km² | 38.813 | 2169,5 ab/km² |  |
| 9. Agde |  | 50,9 km² | 26.946 | 529,4 ab/km² |  |

| STUDY CASES | LOCALIZATION | SIZE | POPULATION | DENSITY | RURAL ZONE |
| --- | --- | --- | --- | --- | --- |
| 10. Lunel | Occitanie<br>France | 23,1 km² | 25.178 | 1090 ab/km² | |
| 11. Aubagne | Bouches du-Rhône<br>Côte d'Azur<br>France | 54,9 km² | 45.410 | 827,1 ab/km² | |
| 12. Fréjus | Var<br>Côte d'Azur<br>France | 102,3 km² | 52.879 | 517,1 ab/km² | |
| 13. Albenga | Savona<br>Liguria<br>Italy | 36,6 km² | 24.042 | 657,2 ab/km² | |
| 14. Follonica | Grosseto<br>Toscana<br>Italy | 56 km² | 21.339 | 380,9 ab/km² | |
| 15. Mondragone | Caserta<br>Campania<br>Italy | 55,8 km² | 28.760 | 516,2 ab/km² | |
| 16. Lamezia Terme | Catanzaro<br>Calabria<br>Italy | 162,4 km² | 70.834 | 436,1 ab/km² | |
| 17. Bagheria | Palermo<br>Sicilia<br>Italy | 29,8 km² | 55.281 | 1853,6 ab/km² | |



Despite international efforts, made in the last thirty years or so, in order to protect and preserve this unique landscape, it continues to deteriorate as a result of increased pressure on the environment. The impact of climate change, the threats to the biodiversity of the area, the soil erosion and the emissions, caused by the energy consumption, are strong evidence of the increasing vulnerability of this space. To it is added the serious phenomena of drought and the desertification processes with dramatic consequences for the rural territories. To aggravate the conditions and disparities between the shores of this sea, there are also the social dynamics – as the scourge of poverty in the southern of the Mediterranean farmlands – the deficient collective infrastructures (access to water, access to services, access to education) – the lack of efficient management policies – such as law organization of producers – the weakness of civil society and the logistical gaps.

So, the need to "identify the common basic elements to frame cities, regions and Mediterranean networks into a unified perspective" – in order to – "define the models compared with the theoretical 'global' models and process, therefore, an urban theory that can combine the achievements of modern planning with the concepts and experiences related to the Mediterranean specificities" (Pace, 1998) it's an ambitious purpose as much as complex.




The risk of 'forgery' – and implementation of approximate general theories about the urban planning – represents a possible and dangerous element and it's necessary to must be careful. Even within the community strategies that incorporate macro-areas and 'multi-cities', it must maintain the principle that "each area is still a locus solus" (Rossi, 1972) with an inherent cultural, physical and local biodiversity and - therefore – it's difficult to frame it into common replicable models.

It is therefore clear that briefly framed the features of this complex landscape – as previously mentioned – "define the models compared with the theoretical 'global' models and process, therefore, an urban theory that can combine the achievements of modern planning with the concepts and experiences related to the Mediterranean specificities" it's a complicated goal, but nevertheless, if within the global framework fit realities as socially, culturally and economically different as the countries of the north and those of the southern Mediterranean the result can only belong to a purely theoretical sphere.

In order to 'restrict' the context within which this paper aims to investigate to provide new ideas and discussions it will focus on the countries of the Northern Mediterranean, that is the Latin Arc (Spain, France, Italy). This coastal area is particularly interesting because it has been, and still continues to be, subject of significant changes, mostly due to the incessant urbanization

brought caused by the Industrial Revolution, but also to the difficult socio-cultural integration – mostly arisen by the heavy immigration –, to the most critic recent economic conditions and the impact that globalization and the enormous technological advances have contributed to the development prospects of these realities.
Many of them, however, were able to reinvent and adapt to themselves the new requirements in terms of:
- socio-cultural aspects: promoting inclusion and social hybridization, such as the case of Jardin de Perpignan. Since 1997, the 45 companies in the area and more than 120,000 inhabitants in the south of France, started in Perpignan – one of the major agricultural town on the French coast – an agricultural development program, favoring the short chain and getting the creation of a recognizable brand in 2006;
- environmental issues: focusing new attention to issues relating to the consumption of resources and preservation of the landscape, as in the case of the Vega of Granada, for a long time it was the center of protection plans and programming strategies. In 2001 the drafting of the Plan General de Ordenación Urbana de Granada, PGOU has tried to solve the problems of the agricultural areas of the Vega proposing regeneration policies. In 2006 and in the following years started the proposal for the creation of the Parque del Milenio in order to safeguard the agricultural areas as an heritage of the city;
- economic activities: aiming to improve the seaside activities, as the Côte d'Azur in the southern France which is one of the leading examples of enhancement of the Mediterranean coast-

al-tourist industry. Famous all over the world this area has been able to promote itself, maintaining a specialization in the agricultural sector, especially the floral and horticultural business (it is produced in this area about one-third of the national production) and wineries activities, with over 19 productions DOC;
- agricultural programs: adapting to the rural development programs, such as the Huerta of Valencia. The Plan de acción territorial de la Huerta de Valencia is linked to the European territorial strategy, based on: polycentric development, structuring of dynamic, attractive and competitive urban regios and a conservation of the natural and cultural heritage. In Dobris report, the Huerta was defined as one of the last six experiences of existing Mediterranean gardens on the edge of the urban centers in Europe.

The strong rural character of these areas has, therefore, enabled many cities along several coastal portions to consolidating its economy on agricultural production – since the mid-twentieth century onwards – and to compete nationally and internationally in the global market with quality materials (for example, the Andalusian coast, has a considerable export of fruits, vegetables and olive oil, or the Ligurian Coast, with the export of flowers and pot herbs).

The progressive rapprochement to agricultural and rural dynamics is a phenomenon that affects especially the younger generation in recent years. It is constantly increasing, in fact, the number of under-30s who, despite the high educational attainment levels, choose the agricultural activity, consciously leaving the prospects of underground work to move in rural suburbs and reinvent themselves in the role of entrepreneurs-farmers, probably prompted by the economic crisis of this decade too.

Just think that only in Italy in 2013 were founded more than twelve thousand agro-startup and designed a huge amount of agricultural Apps, trading platforms and new technological devices and services developed for agricultural purposes1.

The amazing potential that today's technology offers, recently found a fertile development in the agribusiness (from the digital agronomist to the Big Data for farming) becoming an indispensable element for optimize the productions, reducing costs and better protecting the environment thanks to monitoring and automation devices and the awareness of this recent class of young farmers-entrepreneurs (commonly nicknamed farmers 2.0) with a strong propensity towards progress and innovation.

By promoting the innovation of tools and space in these new agricultural suburbs, will it be possible to align the objectives that the Mediterranean agriculture must impose oneself to become globally competitive, aiming to promote environmental sustainability, energy efficiency and the enhancement of production eco-friendly processes, keeping the identity character of this coastal landscape but approaching new prospects for sustainable development?

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# (NEW) RESILIENT LANDSCAPES
# The architecture of the "micro smart grid" as a resilience strategy for landscape.

## • 1| *(New) resilient landscapes* •

**Today, the devices for production and distribution of renewable energy should not only be appropriate to the context, but they should have the possibility of adapt to it, in a way that, the landscape itself being in continuous evolving, our task would be to make these landscapes resilient to climate change, proposing proactive landscapes and the ones that imply new technologies. What types of adaptive landscapes are ready or suitable to house the systems of production of renewable energies?**

### • 1.1 Introduction to (NEW) resilient landscapes •

"*(...) a convention, now ratified by most European Union countries, abolished (...) the idea of the territory, turning it by law in the landscape. (...) it is also the territory, such as landscape, an object of perception.*" Franco Farinelli[1]

Farinelli in his article discusses transition from a modernist concept of territory, identified as a spatial system, in which the surface of the planet is represented by providing an objective view of what is around us, to a concept, previously being in decay, according to which the landscape managed to be resilient to chang-

[1] Franco Farinelli, in an article entitled "The Return of the landscape"

es in action and therefore returned to be the central topic in the contemporary debate, itself becoming an invisible infrastructure that connects us to a system of interconnected networks.
At this stage it can be argued that over the years the meaning of landscape has been transformed from its most classic and static ("heritage") to the one that identifies it as a productive surface, which can benefit from and exploit natural resources in a particular context. During the period of modernism there happened a profound and peaceful transition of the definition of landscapes, which turned them into production areas, which, basing on needs or location, exploit the natural and spatial context in order to become productive surfaces. A productive surface[2] may depend on thorough understanding of the context, climate, and natural processes. It can run either on a regional scale or at the level of a building due to its logical system of networks.
The question that we are asking to conclude this reasoning is whether or not further transition of the concept of landscape may take place in the current context of climate change and policies that cover the projection of adaptation plans. Energy production systems consume and transform into energy not only the natural resources extracted from the territory but also our own landscape. It would be interesting to refer to these territories in a context, in which even renewable energies, certainly being more sustainable than other systems but still leaving an impact on the environment, are conforming different landscapes and at the same time representing an era. A landscape approach would guide us in urban and regional contexts towards creation of new contemporary landscapes passing from a landscape seen neither as a resource nor as a mere production area to the new understanding of it as an energy landscape, which is resilient to the current era of big changes with an intrinsic landscape quality.
If we want to observe the theoretical context from this point of view, we must concentrate our attention on the most advanced experiences of resilient cities, where vulnerabilities are absorbed and subsequently returned in perspective of a system that is able to react to changes. Speaking of these metropolitan areas, however, we must not only make these scenarios adaptable to climate change but also equip them to face energy challenges that are in front of us. In this context one should be working on the creation of the above mentioned energy landscapes, linked to different forms of renewable energy, which in the coming decades are expected to make a significant contribution to the process of sustainable development[3] and energy self-efficiency[4].
The devices for the production and distribution of renewable energy must not only be more appropriate to the context, but also adapt to it. Because landscapes itself are in flux, our task will be to make them resilient to climate change, proposing proactive landscapes and using new technologies. The new energy landscape models will have to become not only mere actors but also to trigger new modalities of approach. Concentrating the focus of the research only on certain properties present in different ru-

[2] Mason White, "The Productive Surface", www.placesjournal.org, consulted on 20.04.2015

[3] Twidell, J.; Weir, A.D. Renewable Energy Resources, 2nd ed.; Taylor & Francis: Oxon, UK, 2006. [Google Scholar]

[4] Brundtland, G.H. Report of the World Commission on Environment and Development: "Our Common Future"; United Nations: New York, NY, USA, 1987. [Google Scholar]

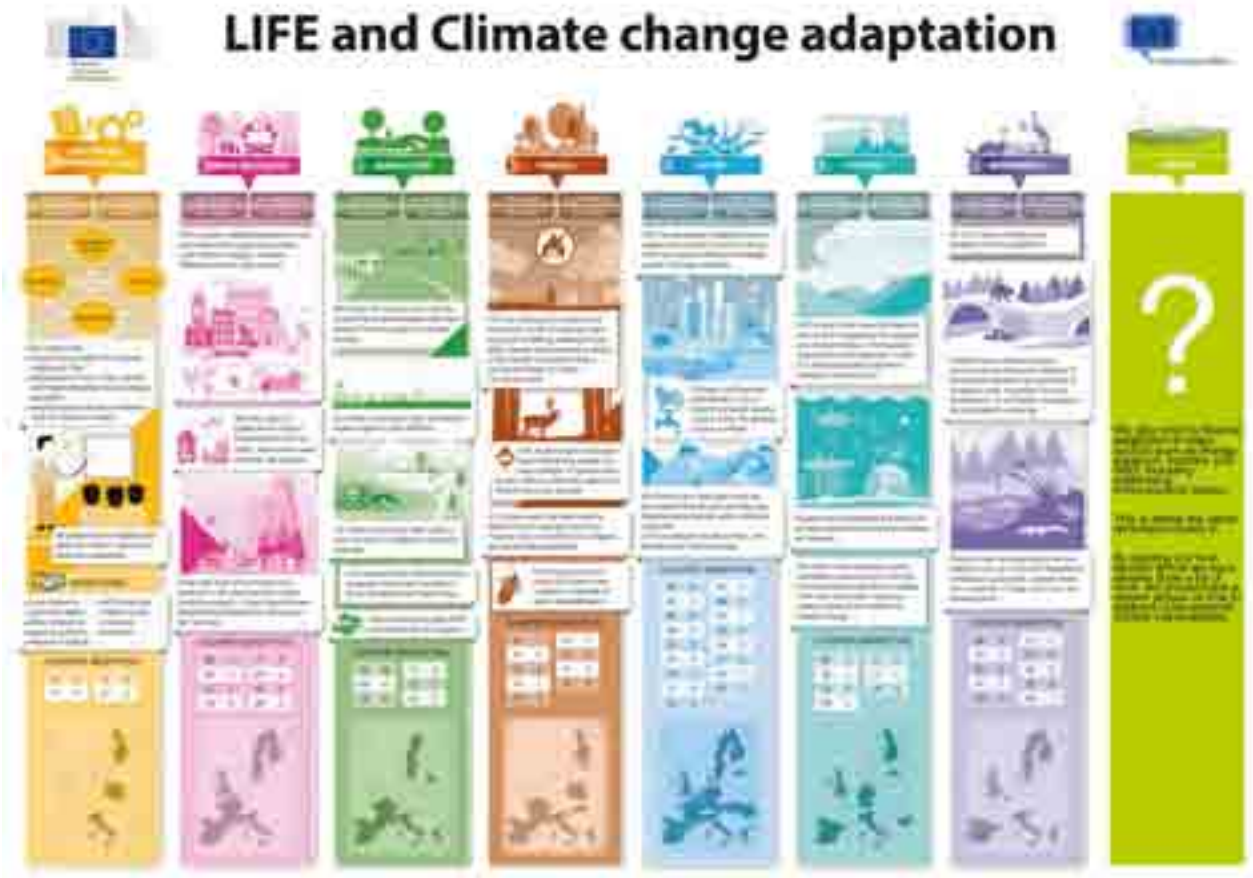


*Image 1 | LIFE's Impact of Adaptation Publication: LIFEENVIRONMENT | LIFE and Climate Change adaptatIon - http://bookshop.europa.eu*
*Graphic design: Daniel Renders, Anita Cortés (NEEMO GEIE) Edit by: Giulia Garbarini*

ral territories, taking advantage of the quality of self-similarity of fractals, we hope to find a correlation between different parts, thus creating a network (smart grid) of the whole landscape, from rural to urban areas. The thesis aims to cover the use of renewable energy with a focus on wind energy, while using different scales and creating new forms of landscape that are able to explore different contextual conditions in order to obtain new kinds of agricultural urban (or rural) landscapes, which have a deep connection with the sources of renewable energy.

## • 1.2 Construction of a NEW urban architecture •

The European Union, like other major industrialized economies of our planet, has committed to supporting a massive expansion of renewable energies with a view of achieving the international goals of reducing carbon gas emissions. Critical awareness of these goals remains fundamental, and the need to take adaptive actions in the energy field is recognized. The climate changes underway, along with their inevitable impacts and consequences not only in the environmental field, suggest that the appearance and the spatial organization of urban and rural landscapes will undergo influences and far-reaching changes. Since the production of renewable energy is seen as one of the fundamental objec-

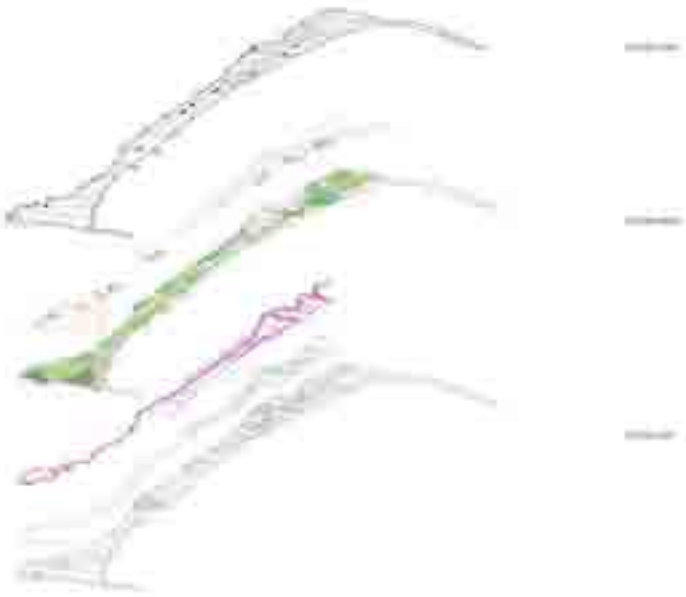

*Image 2 | Concept Smart Grid Island _ Project L.I.D.O. Venezia.*
*Image source: Giulia Garbarini*

*Image 3 | Catalyst Vision _ Project L.I.D.O. Venezia.*
*Image source: Giulia Garbarini*

tives of our era, our task is to reintegrate it into the energy landscapes in which it is located or created, making a qualitative and quantitative contribution.
To do this, we chose Climate Adaptation Plans[5] to be one of the application fields of the thesis in relation to changes taking place and the use of renewable energy sources, with the scope of understanding how our contribution could lead to the development of the Climate Adaptation Plans "Project". This could be done by interpreting the concept of adaptation as a process of anticipating negative effects of climate change and as a "design" of action, which purpose is to prevent and reduce damages caused by the climatic conditions that accompany our era. The goal of the research will be to keep the current tendency in the European geopolitical framework, which is to direct the disciplines - landscape and urbanism - towards a "post-fossil"[6] context. This is a distant goal, but it can be attained gradually through a smart and technologically advanced process. It arises taking into account the need to detect and use appropriate policy-planning strategies in the landscape and in urbanism, with these strategies spreading from the energy market to legislation, to the concept of adaptation, and to technological development. We should therefore be allowed to operate in a transdisciplinary approach, which is able to bind and develop both technology and urban design at the same time.

This thesis wishes to attract attention, through a transdisciplinary framework, to existing links between the urban and landscape design and renewable energy, and their local (urban and district) energy network systems, thus facilitating our approach and inclusion in the present era of hyper technology. This becomes possible thanks to a new perspective, connecting the most technologically advanced disciplines with those - like the landscape - that have learned to be resilient to changes, thus becoming the central point in the contemporary debate. All this is happening in a system of interconnected networks, which become invisible infrastructures to connect us to the territory and - we hope - to guide us toward a positive outlook. Our intent is to make use of these models and tools that the engineering disciplines (and not only) develop to meet and respond to climate change, and transform them into instruments that turn urban rural and social landscapes of high quality proactive.

The recent experiences connected to these reflections have led us to develop a line of reasoning articulated at different scales using (micro and macro) smart grid[7] as a design model of architecture. As tools we used renewable energy production plants, such as wind turbine generators, considering them as elements of urban and landscape processes due to their different possible application scales. The idea is to possibly combine a distribution model (smart grid) and renewable energy production instruments. This idea derives both from a general reflection on the European Strategic Energy Technology Plan (SET-plan)[8], the promoter of

[5] GREEN PAPER, "Adapting to climate change in Europe - options for EU action", Brussels, 29.6.2007 COM (2007) 354 final.

[6] Dirk Sijmons, Jasper Hugtenburg, Fred Feddes, Anton van Hoor, "Landscape and Energy Designing Transition", Published by NAI010 Publishers, Rotterdam hardcover, 2014.

[7] The Smart Grids Task Force advises the European Commission on the development and deployment of smart grids.

[8] The SET-Plan, adopted by the European Union in 2008, is the first step to establish an energy technology policy for Europe. It is the principal decision-making support tool for European energy policy.

an energy policy that indicates technological change as a part of the reconfiguration of the living space of European people, and, at the same time, from the European Landscape Convention[9], which interprets transformation as one of the ways to improve the characteristics of the landscape. This brings out a decent margin for a possible integration of the landscape in energy policies; this integration may go beyond the instrumental dimension of the landscape leading to a more beneficial construction of energy/landscape policies. Recommendation CM / Rec (2008) 3 of the Committee of Ministers[10] to member states on the guidelines for the implementation of the European Landscape Convention introduces the idea of integration of the landscape into sectorial policies and thus in energy business.

Also considering the latest meeting on the EU's climate change and energy policy objectives for 2020 and beyond, the current situation will require a major transformation of our electricity infrastructure. Strengthening and upgrading of existing networks is of paramount importance for integration and increase of the amount of renewable energy production; thus grid security, development of the internal energy market, significant energy saving, and efficiency of the system will be enhanced. To achieve these goals it is not only necessary to build new lines and substations, but it is essential to make the overall electricity system smarter through the integration of Information and Technologies (ICT)[11]. Smart Grids can be described as an upgraded electricity network enabling two-way information and power exchange between suppliers and consumers thanks to the pervasive incorporation of intelligent communication monitoring and management systems. In the last few years, initiatives on Smart Grids, with different aims and results, have been growing in number and scope throughout Europe (image1).

By analyzing these strategies and technological models designed to address the questions of our future from the point of view of landscape change to that of the project, will it be possible to integrate the landscape, urban or rural, into energy policies with the use of urban, landscape and social devices, which are able to make a hypothesis feasible?
If we can imagine a schedule, we will not only be able to offer technical benefits but also help cities to become more sustainable and even more attractive. The answer is "yes". Smart grids could deliver power infrastructure, which is convenient, reliable and efficient. They could facilitate and support sustainable growth processes allowing urban planners, designers and landscapers to make the most efficient use of the potential that they have through exploiting a model of interconnected networks that will become a track for the creation of places - catalysts of values.

[9] The European Landscape Convention is a document adopted by the Committee of Ministers of Culture and Environment Council of Europe July 19, 2000.ELC,Firenze

[10] The CM / Recommendation Rec (2008) 3 of the Committee of Ministers to member states concerning the guidelines for the implementation of the European Landscape Convention (adopted by the Committee of Ministers on 6 February 2008).

[11] ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application. According to the European Commission, the importance of ICTs lies less in the technology itself than in its ability to create greater access to information and communication in underserved populations. Many countries around the world have established organizations for the promotion of ICTs, because it is feared that unless less technologically advanced areas have a chance to catch up, the increasing technological advances in developed nations will only serve to exacerbate the already-existing economic gap between technological "have" and "have not" areas.

The future changes and transformations, which are projected from a sustainable point of view, will change the smart grid model, and all this will be made with the ambition to engage further compatible and enabling technologies that are capable of integrating the levels of innovation (ICT) in terms of "smart communities" for the best quality of life perceived by the residents and visitors of the sites, and also to regenerate spatial configurations on urban and landscape level through physical and non-physical networks, as well as to improve environmental conditions and energy level guaranteed and provided by a "smart" and "green" model. It will be the outcome of various trims of interconnection between different transdisciplinary approaches that will lead to innovation of "smart grids". Then one will turn to a different vision of the wind potential and the creation of existing or potential nodes (catalysts)[12] through connections in the network leading to a different kind of urban and landscape design, which can be activated according to intervention and study scenarios specific for different places of interest.

[12] The difference between the catalyst and these redevelopment strategies is that catalytic redevelopment is a holistic approach, not a clean-slate approach, to revitalizing the urban fabric.

## • 2 | Perspectives towards a smart and adaptive landscape •

Often, the widespread resistance to installation of wind farms, solar-biomass plants etc. is caused mainly by the perception that people have of this systems, seeing them as incompatible with the context that hosts them; however if these were to be seen and studied from the perspective of "resilient landscapes"[13], it could radically change this impression. In fact, seen as described, the landscapes would not only be resilient to objective changes but also to various recognitions of sense of belonging in a human being towards the territories that he or she inhabits, mainly due to the technological revolution, which has transformed wind power turbines into a real instrument and design object.

[13] There are criteria that allow us to redefine, in a resilient landscape-centered perspective, those urban standards, which date back to the modernist period, founded on "wildfire expansion" of urban settlements and on "car-based" policies, which now result inadequate, if applied to present contexts. (Proceedings of the Resilient Cities 2013 congress).

The present thesis aims to investigate and further elaborate a concept based on the model and architecture of "micro smart grid", which is generally related to the territorial urban and district power grids being a reference for configuration of a process / project that are able to regenerate existing and elaborate new scenarios. The smart grid of resilient landscapes proposed in this thesis would use the existing system, transforming it into a set of steps in production of the environmental, cultural, economic, and landscape values, which are named and identified as real catalysts. Triggering creation of an adaptive structure with respect to strategies, visions, and short-term, medium-term and long-term projects in fact transforms wind farms, solar-biomass plants etc. into true and proper energy parks, connected with urban design not only from the perspective of energy production but mainly in the vision of landscape and quality creation.

The output of the research will be to create a set of tools that are derived from the case studies and good practices related to the theme of wind power and other forms of renewable energy, as well as to the theme of micro smart grid, which will be read and analyzed according to the main characteristics of a catalyst in terms of usability, accessibility, frequency and services in order to deduce and subsequently articulate an explicative prototype.
The prototype in question will be developed on the island of Venice Lido[14], to which the concept and structure of the "micro smart grid" will be applied, trying to follow analyses and pilot projects aimed at the creation of the research project called "L.I.D.O. - Venice: Learning Island Design Opportunities - Venezia. Sustainable scenarios for Venice Lido". As previously announced, the architecture of the "micro smart grid" will be used to follow the sustainable scenarios in the area of L.I.D.O. research project. This method has been widely used for the territorial power grids, urban and district, but in the case of the Venice Lido this "smart grid model" will be a reference for configuring a process / project to regenerate the existing scenario and project it to the new ones. During the preparation of the project we will refer to the technologies that make possible a transition from a traditional network model to the one in which the production takes place through sources spread all over the distribution network.

Similarly, the smart grid proposal for L.I.D.O. systematizes the existing grid and context by transforming the current contexts into nodes that produce values. And by doing so it transforms the island into an adaptive structure as regards strategies, visions and projects in the short, medium and long term (for 2020/2030, for 2050). This transformation refers to the technologies and tools that, through the activation of processes / projects, enable the existing prototype and produce a new one, which, referring to Global Initiative for Sustainability in the Islands (Greening The Islands)[15], can be defined as a "green island". The prototype of a "green island" is and will be, in our case, a successful outcome of various trims that the "micro smart grid" will produce through connections in the network of existing or potential nodes (catalysts), which can be activated according to the three identified and not oppositional scenarios (New islanders / Bland Mobility / Zero Consumption ).

Based on the assumption "island as smart grid", the scenarios become instruments through which it is possible to interpret the existing context (urban, rural and landscape) in order to reveal its potential and therefore direct its transformations.
From this point of view, the development of visions emerges based on the assumption that any energy system could become an application system of devices (image 2) or tools that will lead us to an urban rewriting.
Operating in different contexts and identifying new network

[14] Research project: L.I.D.O. Living Island Design Opportunities - Venezia. Scenari sostenibili per il Lido di Venezia. University of Trento and Sinergo Spa.
WORKING GROUP: SINERGO SPA: ing. arch. Alessandro Checchin - DT Sinergo Spa; arch. Enrico Dusi - architecture industry Sinergo Spa; arch. Alberto Muffato - Scientific coordinator of research and DT Sinergo Spa; ing. Philip Bittante - DT Sinergo Spa. SCIENTIFIC COORDINATOR FOR UNIVERSITY OF TRENTO: prof. arch. Mose Ricci prof. arch. Pino Scaglione; Executive Coordination: PhD. arch. Chiara Rizzi; Supervision For Environmental and Energy Aspects: Prof. arch. Consuelo Nava; Working group: arch. PhD Candidate Giulia Garbariniing; Ing. Anna Giulia Metrini; External collaborators for UniTn: arch. Paesaggista Francesca Fasanino; arch. Andrea Procopio.

[15] "Greening the Islands" is a traveling international conference aiming at finding sustainability solutions for islands. http://www.greeningtheislands.com

points that become true and proper design / project nodes with greater clarity of predictions compared to other project visions, this project vision may refer specifically to a scenario but at the same time should contain them all inasmuch as the scenarios are not contradictory.
To sum it up, the project L.I.D.O. is structured as follows: the hypothesis ISLAND AS A SMART GRID is structured through a PROCESS characterized by INTEROPERABILITY and ACCOUNTABILITY, where SCENARIOS AS DRIVERS AND PLACES AS CATALYST converge. From this point one can elaborate PROJECTS that anticipate the VISION of change (image 3).

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# NATURE BASED SYSTEMS INNOVATIVE DESIGN URBAN MUSHROOM FARM

**During last decades new planning paradigms have been shaping our cities: urban areas have been competing to reposition themselves in the global economic framework, starting the so called "Urban Regeneration" process that lead to the renovation of public space and to the construction of innovative neighborhoods; cities started the implementation of new technological systems, such as transport management systems, water and contamination monitoring systems, smart energy grids and energy efficient buildings, leading to the implementation of the "Smart City";**

the demand for new environmental sensitivity in urban planning has led to a new sustainable approach: the words "Regeneration", "Recycling", "Re-Naturalization" and "Recovery" tend to identify the new-urban territorial agendas of the beginning of this century (Gausa, 2018).
Even though, thanks to the implementation of these planning paradigms, European cities have strengthened their economy, efficiency and livability, in order to respond to the latest challenges, as defined by the United Nations Sustainable Development Goals (SDG) 2016-30, it is necessary to work on cities with a new holistic approach. At the Habitat III Summit, the New Urban Agenda,

in line with the SDG, has been defined and includes the following objectives: providing basic services for all citizens; ensuring that all citizens have access to equal opportunities and face no discrimination; promoting measures that support cleaner cities; strengthening resilience in cities to reduce the risk and the impact of disasters; taking action to address climate change by reducing their greenhouse gas emissions; improving connectivity and support innovative and green initiatives; promoting safe, accessible and green public spaces (UN-Habitat, 2018).

Nature Based Solutions are living systems providing cities with multiple ecosystems services and represent a way to address the UN New Urban Agenda: especially in the last years, there is growing recognition and awareness that nature can help to provide viable solutions that use and deploy the properties of natural ecosystems and the services that they provide in a smart, 'engineered' way (European Commission). Natural ecosystems services are defined as the multiple benefits provided by nature to human beings and are divided into four main categories: life support, such as soil formation and oxygen production; procurement, such as the production of food, drinking water, row materials or fuel; regulation, such as climate control and tidal waves, water purification, pollination; and cultural values, including the aesthetic, educational and recreational values (Millennium Ecosystems Assessment, 2005). These services have also a considerable impact on social welfare, economic development, and resilient performances of urban environment.

If Nature Based Solutions seems quite efficient tools to address latest urban challenges, advances in digital technologies open new chances to enhance urban design: the possibility of developing new design protocols elaborated through computer aided technology allows to re-configure urban spaces processing data related to flows, environment and social behaviors and to combine them creating a physical space responsive to climatic conditions and to people activities.

Bullivant (2006) states that if architects aim to create a responsive environment, they are required to think like designers of operating systems, arguing also that the development of complex, comprehensive and informed design process are fundamental procedures that generates new relations, narratives and potentialities.

The use of digital technologies to enhance Nature based Solutions can lead to an increase in the number and quality of ecosystems and social services provided and in the integration of NBS in urban environment. This means working on cities with a multidisciplinary approach, at the intersection of design, technology and biology. As stated by Negroponte (1995), we are not waiting on any invention about technology. It is here. It is now. It is almost genetic in its nature, that each generation will become more digital than the preceding one.

## • Urban mushroom farm •

The European Commission is fostering the implementation of Nature Based Solutions in urban and peri-urban areas and to this aim is co-financing research and implementation projects on Nature Based Solutions within the H2020 programme. One of the projects approved for financing on 2017 and currently ongoing is URBINAT, which focuses on European urban neglected areas regeneration through the implementation of Nature Based Solutions in public space. The solutions are developed within the framework of a participatory process including co-planning, co-design, co-implementation, co-monitoring and co-management.
The Advanced Architecture Group (part of the Institute for Advanced Architecture of Catalonia - IAAC) is one of the partners of URBINAT and its main role is to lead the development of Technological Nature Based Solutions, which make use of digital technologies and advanced manufacturing techniques to innovate the solutions design and implementation process, enhancing participation and optimizing the system performances.
In order to better clarify the approach, it follows the description of the URBAN MUSHROOM FARM project, one of the Advanced Architecture Group Technological Nature Based Solutions part of Urbinat project.

The URBAN MUSHROOM FARM aims at defining innovative design protocols, demonstrating the potentials of parametric design and digital fabrication supporting the development and implementation of systems for urban food production, responding to local environmental conditions and making a sustainable use of local resources. It is a modular system which supports the growth of edible mushrooms in the urban environment (public space / facades / rooftops), producing both food and construction materials. It consists of modules to locate the mushroom substrate (straw and mycelium) and an external surface, parametrically designed, tailored to control the environmental conditions supporting mushrooms growth.
The essential conditions that has to be controlled are temperature, humidity and shade. In order to generate an external surface pattern, helping to control these conditions, a parametric script has been created. The elements that has been distributed along the surface are: holes to allow mushrooms fruiting, semi-spheres collecting air humidity and narrowing the temperature, and volumes creating shadows and increasing the thickness of the external surface, thus favoring the temperature control of the area where the straw and the spores are placed.
The project makes use of digital technologies to control the system performances, creating a passive environment where environmental conditions are optimized through design towards mushrooms growing. According to site-specific conditions, the parameters in the script can be changed and the final design is tailored to the specific environment.

The project brings the following social and economic benefits:
Providing neighborhood families with fresh food;
Strengthening social cohesion: being a shared vegetable garden, the project fosters the creation of new communities.
As the design of the external surface relies on a parametric script, it is possible to redefine and customize it according to citizen needs: during the participatory process citizens can give suggestions about the parameters that should be considered, quickly visualizing the shape resulting from their suggestions.
The URBAN MUSHROOM FARM system final design will be different for each location where it is applied, as it adapts to the local environmental conditions and to the local community suggestions and wishes; therefore, it is not possible to fabricate the tiles with standardized processes. The system is fabricated using numerical control equipment (CNC machine), that allows the production of non-standardized parts.
URBAN MUSHROOM FARM tests innovative design protocols for the development and implementation of Nature Based Solutions in Urban environment in order to enhance and optimize the process increasing cities environmental, social and economic sustainability.

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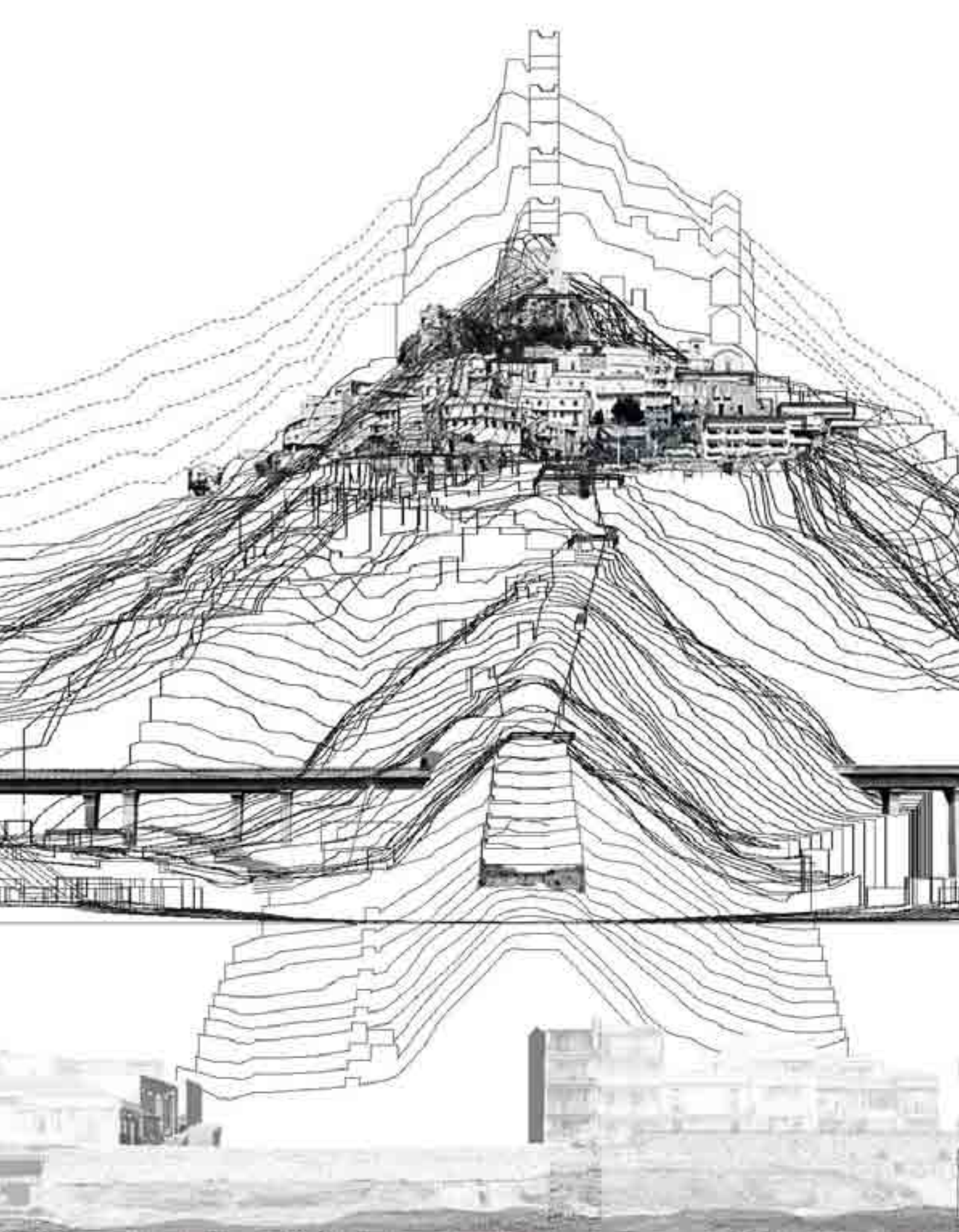

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# ARCHITETTURA PER TERRE FRAGILI.
# Un esempio: Giampilieri.

## • *1. L'evento* •

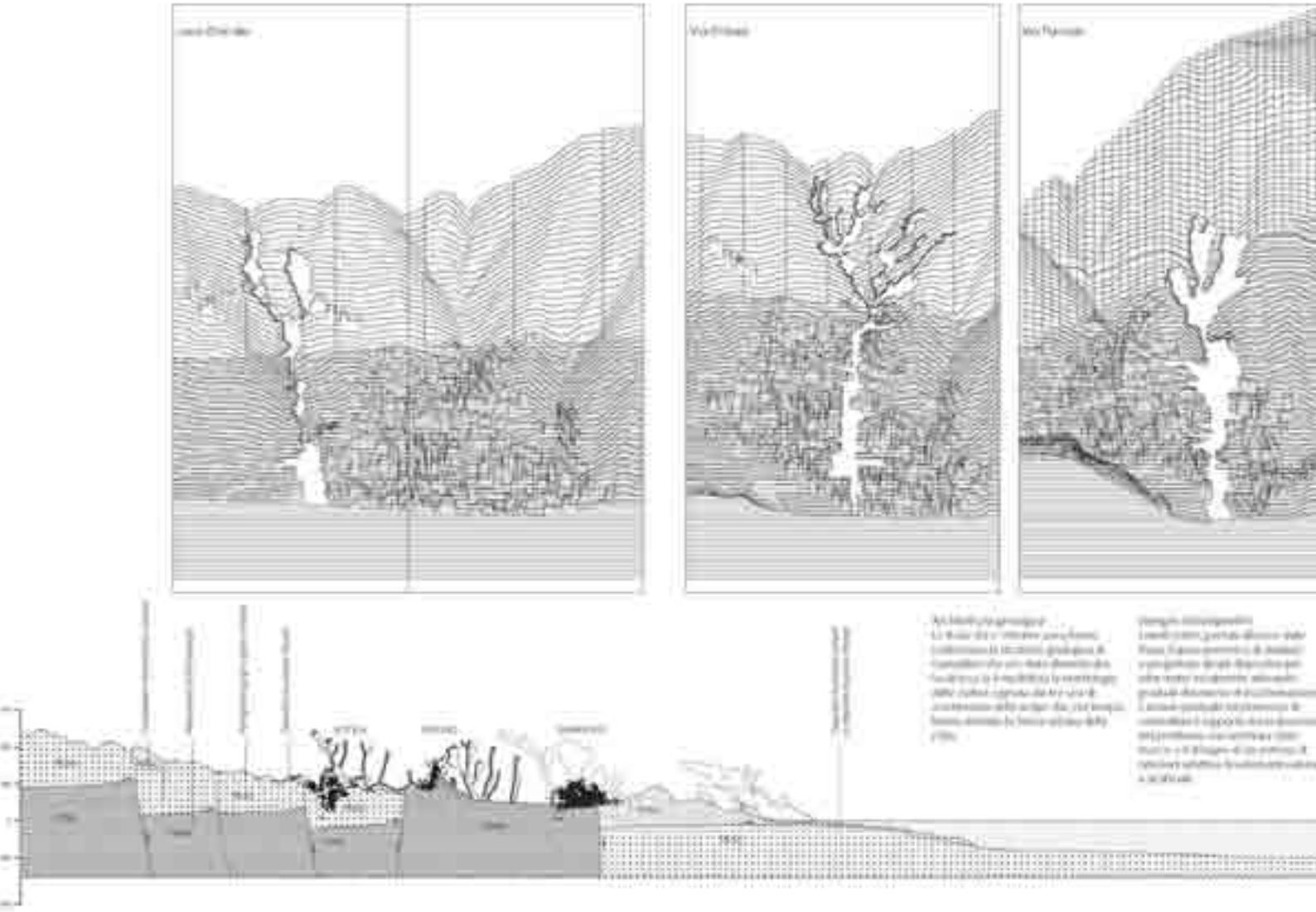
**Il primo ottobre 2009 un evento traumatico inaspettato ha colpito il territorio di Messina. Un violento nubifragio provocava una serie di frane che travolgevano i centri urbani di Giampilieri, Scaletta Zanclea e Itala. Nei giorni successivi, sotto un pallido sole autunnale, oltre a constatare gli ingenti danni si sarebbero contati trentuno morti e sei persone disperse. La calamità, irrompendo improvvisamente nella quotidianità di una comunità, scardina l'equilibrio di luoghi la cui condizione sembrava bloccata nel tempo.**

Nel caso di Giampilieri, a determinare l'alluvione, con colate di fango e detriti, sono intervenuti una serie di fatti concomitanti che ne hanno segnato la drammaticità: innanzitutto le condizioni meteorologiche, caratterizzate da un'eccezionale concentrazione, in un brevissimo tempo, di piogge, poi la geografia segnata da una forte acclività dei rilievi e infine il cattivo stato di manutenzione dei corsi d'acqua. Per comprendere l'entità dei fenomeni è sufficiente immaginare che il fango, sceso dalle montagne in poco tempo, avrebbe potuto riempire per undici volte il Colosseo.

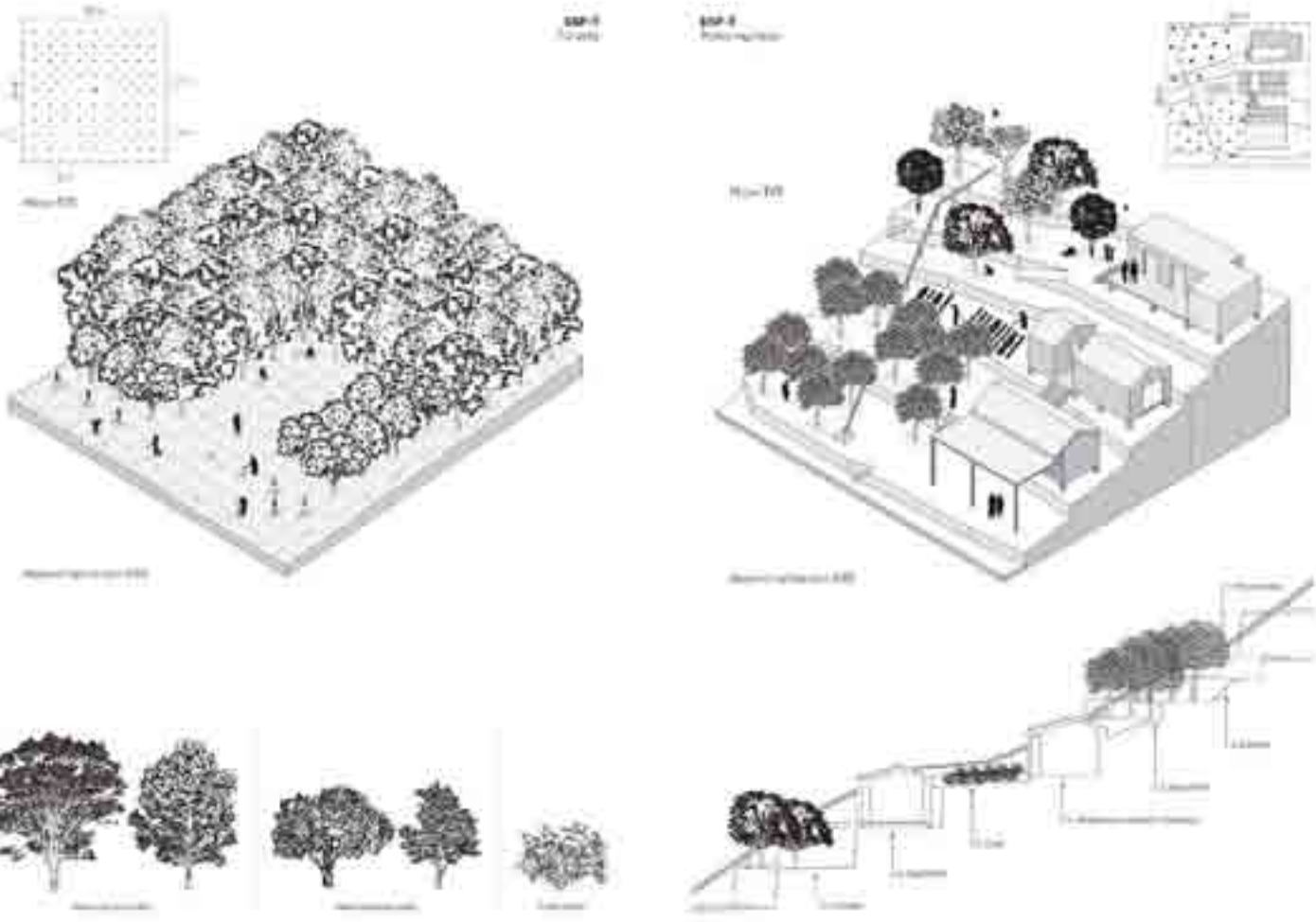
La ricerca *Terre Fragili* nasce dalla mia esperienza diretta sulle aree colpite dall'alluvione nella fase post-emergenziale e di ricostruzione.

## • 2. La risposta della tecnica riduzionista •

La riflessione critica, che accompagna il racconto del lavoro sul campo, è legata al ruolo di consulente tecnico del commissario delegato per l'emergenza, che mi ha permesso di seguire per due anni le attività di progettazione degli interventi post-alluvione su tutte le aree interessate.
In particolare l'attività di coordinamento si è confrontata continuamente con quella degli ingegneri e geologi che hanno lavorato per mettere in sicurezza il territorio subito dopo l'alluvione.
Attraverso questo impegno quotidiano ho potuto verificare in presa diretta i metodi di analisi e le risposte tipiche che, articolando una vera e propria retorica della tecnica, vengono applicate alle emergenze naturali (frane, alluvioni, terremoti).
Osservare i progetti sviluppati dagli ingegneri idraulici e geotecnici è stato molto utile per comprendere, non solo una metodologia di lavoro, ma soprattutto un paradigma culturale, che si mostra, con evidenza, nei disegni elaborati per questi interventi.
Si tratta quasi sempre di disegni astratti e, privi di contesto, finalizzati a delineare esclusivamente le opere tecniche da realizzare.
Pur occupandosi di interventi su corsi d'acqua che dalla montagna scendono al mare attraversando, a valle, centri urbani densamente abitati, i progetti non si preoccupavano minimamente di considerare le conseguenze che le opere idrauliche avrebbero generato nell'immediato intorno.
Da questi esempi si capisce come la risposta alla messa in sicurezza coincida spesso con una soluzione puntuale a problemi specifici avulsi dal contesto, che non tiene in considerazione nient'altro se non l'intervento stesso. In realtà ogni punto dell'opera idraulica o geotecnica ha relazioni precise con contesti articolati che però i progetti nascondono nell'esclusiva preoccupazione di risolvere l'unico problema individuato. Questo modus operandi non solo nega la complessità di sistema del territorio insediato, ma produce degli effetti collaterali negativi che possono generare, come nel caso di Giampilieri, una nuova frammentazione della città. Infatti in questo caso i canali fugatori, necessari per la sicurezza idraulica, se realizzati nella loro prima versione di progetto, avrebbero spezzato in tre parti il centro urbano con una deleteria conseguenza sulla vita della comunità.
Di fronte a questa impostazione il nostro lavoro ha avuto come primo obiettivo quello di contestualizzare le opere di ingegneria idraulica attraverso dei disegni d'insieme che mostrassero, accostando planimetrie e sezioni, la complessità e l'articolazione di questo territorio.
Se l'impostazione tecnica poneva questi interrogativi, altrettanti dubbi erano sollevati dagli aspetti politici ed economici legati



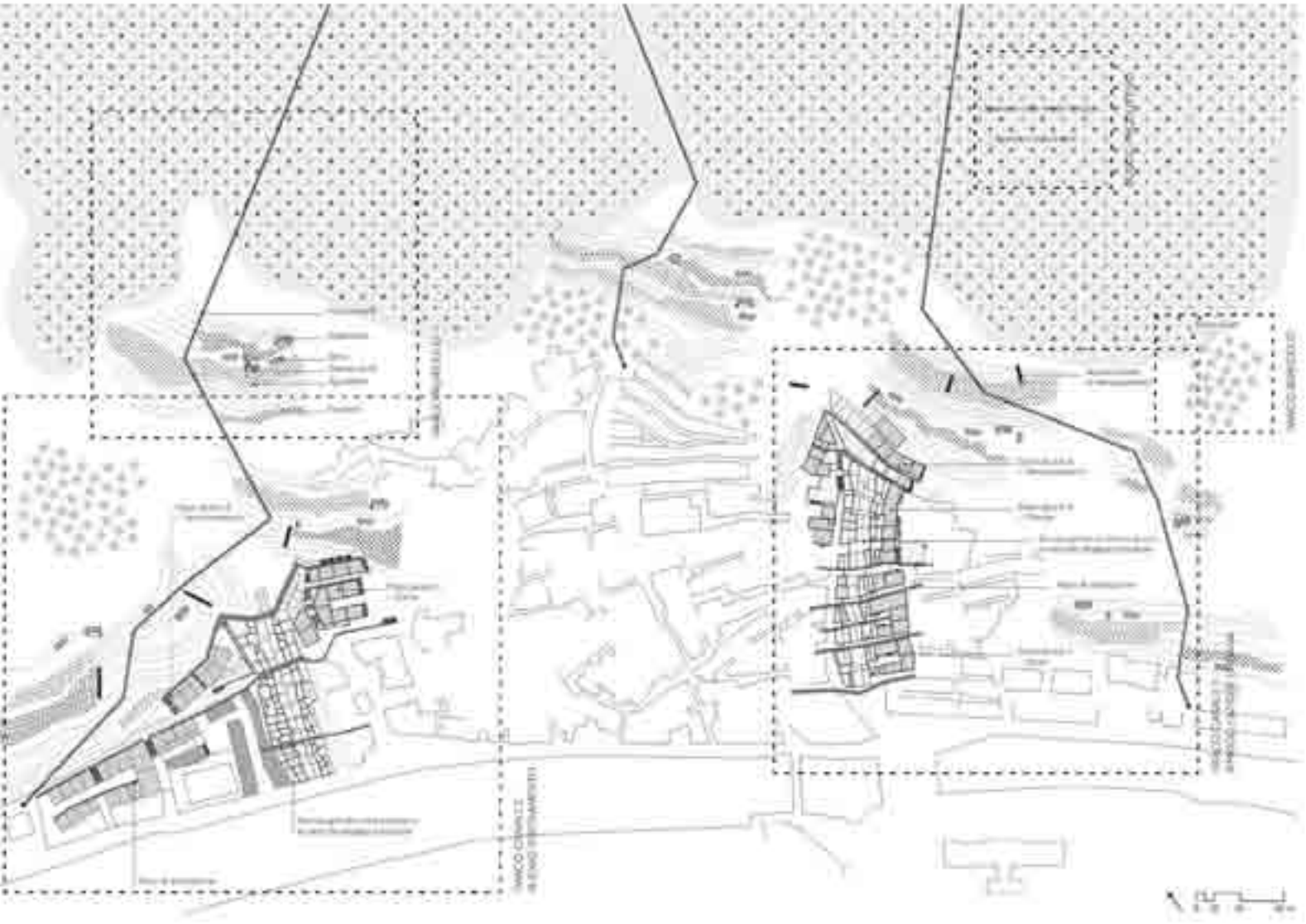
alla gestione dell'emergenza e della ricostruzione: ad esempio nel caso di Giampilieri il costo degli interventi si aggirava intorno a 320 milioni di euro e, osservando in dettaglio la distribuzione degli investimenti, si notava come il costo complessivo delle opere di ingegneria raggiungesse 212 milioni, mentre la ricostruzione degli alloggi con gli spazi pubblici connessi impegnasse solo 10 milioni. Questa differenza dimostra, in modo evidente, come la retorica della tecnica sulla messa in sicurezza, facendo leva sulla paura collettiva scatenata dall'evento traumatico, diventi funzionale a concentrare ingenti risorse economiche esclusivamente sulle opere tecniche senza pensare che queste occasioni possono essere utilizzate per costruire nuovi equilibri e nuove relazioni. In molti casi si perde di vista l'opportunità di una significativa rigenerazione urbana e territoriale che gli interventi di ricostruzione potrebbero attivare con le stesse risorse economiche, ma con un'attenzione in più all'intreccio di relazioni possibili capaci di rinnovare lo spazio pubblico.



## • 3. Un disegno strategico come progetto •

Il metodo messo a punto e i materiali raccolti ci sono serviti per elaborare un progetto urbano per Giampilieri - il centro più colpito - che è stato il luogo su cui abbiamo avuto più spazio per lavorare e tradurre gli eventi in un Disegno Strategico di Ricostruzione (DSR). Questo progetto sviluppato con le comunità locali, attraverso l'"urbanlab" (laboratorio fatto con i bambini e con i genitori), ha indagato e descritto la città con gli strumenti dell'architettura: sono stati definiti gli elementi portanti - l'asse centrale che scende da monte alla fiumara con la chiesa madre – per poi entrare nella specificità del tessuto urbano, di cui è stata studiata la morfologia connessa alle tipologie abitative residenziali, che si sono adattate, nel tempo, alla topografia del suolo.
Si è cercato, dunque, di capire come questi materiali potevano dare risposte diverse rispetto ai progetti esclusivamente tecnici e come li si poteva ricomporre con i ruderi e i vuoti lasciati dall'alluvione.
L'obiettivo più importante è stato quello di individuare i modi per realizzare una rimodellazione del centro urbano che si integrasse con i due canali di scolo delle acque progettati dagli ingegneri idraulici, evitando un taglio netto del tessuto residenziale. Ciò ha portato a ipotizzare uno scenario in cui i canali, trasformati in

giardini, diventano i nuovi assi portanti della configurazione urbana, tenendo insieme gli insediamenti residenziali progettati.
Il punto di confronto decisivo con gli ingegneri si è concentrato sulla forma del canale di scolo dentro il centro urbano; questo è stato il nodo dei conflitti e delle negoziazioni. Il progetto idraulico si caratterizzava per una sezione unica che si sviluppava per tutta la lunghezza del canale con la stessa sagoma su un contesto non omogeneo. Mettere in discussione questa impostazione ha significato immaginare una nuova condizione in cui l'esigenza di smaltimento del fango e dell'acqua poteva essere soddisfatta, attivando, nello stesso tempo, una relazione diversa con ciò che esisteva attorno. Così, lavorando empiricamente (ovvero mettendo in relazione le formule matematiche degli ingegneri con il lavoro di simulazione sui modelli fisici), è stato progettato un canale integrato all'impianto urbano originario articolando la sua forma e immaginando alcuni usi collettivi compatibili con la sicurezza.
Il progetto si è fondato sull'idea portante di riprendere, in chiave archeologica, i ruderi delle fondazioni, provocati dalla frana, per riordinare e organizzare dei giardini urbani a diversi livelli, prevedendo alcune parti inaccessibili (quelle più basse) e rendendo fruibili le parti più alte e più sicure che sarebbero diventate un sistema urbano pubblico. In questo modo l'area si definisce anche con la riorganizzazione delle parti demolite sostituite da nuove costruzioni residenziali che formano un nuovo fronte urbano sulla destra del canale.
Questo sistema ha permesso di ripensare e migliorare la viabilità di accesso alla parte alta, e di ricostruire un sistema di isolati che reinterpreta le tipologie abitative affacciate sul canale, trasformando quello che tipicamente è un retro, in un fronte privilegiato della città.
Il risultato di questo lavoro è stato un Disegno Strategico di Ricostruzione (DSR), che da un lato ha riorganizzato gli interventi individuando i soggetti che li avrebbero gestiti (pubblici e privati), e i tempi in cui sarebbero stati realizzati, (interventi immediati - di integrazione, legati alle opere infrastrutturali- e gli interventi invece di residenza privata); e dall'altro ha fissato una nuova configurazione della città attraverso tre assi: l'asse storico della chiesa Madre e i due nuovi segmenti caratterizzati dai giardini urbani che ospitano i nuovi canali fugatori per l'acqua e il fango di un vento eccezionale.
La messa a punto del Disegno Strategico di Ricostruzione è stata accompagnata da un processo di comunicazione e condivisione continuo con le comunità locali. In occasione del primo anniversario è stato realizzato un padiglione temporaneo che utilizzava l'infografica, i disegni (le pareti interne ed esterne erano pannelli illustrativi) e il modello fisico come racconto del processo in corso.
In questo modo l'architettura è diventata, uno strumento di partecipazione civica, e di trasparenza sui processi in corso.
L'esperienza decisiva, che ha confermato le ipotesi del programma "Riparare fiumare", è stata la realizzazione di uno dei progetti ipotizzati per Giampilieri. La costruzione ha dimostrato la fattibi-



lità della nostra proposta di modifica della sezione-tipo definita dagli ingegneri idraulici per il canale di scolo.
Un semplice muro di sbarramento è stato trasformato, senza aumento di spesa, in una nuova connessione urbana tra il centro storico e la parte nuova della città, che ha mutato il significato dell'intervento ottimizzando l'investimento.
Questo esempio dimostra come sia possibile, attraverso la pratica del progetto urbano su interventi infrastrutturali, modificare il senso e l'utilizzo dei fondi, che di norma vengono impiegati esclusivamente per delle opere tecniche. Diventa centrale il ruolo dell'architettura, come disciplina capace di mettere in atto nuove relazioni e di indirizzare al meglio le risorse economiche che si stanno impegnando, al di fuori di quella che è semplicemente una logica tecnica.

Il Disegno Strategico di Ricostruzione (DSR) nasce dall'intreccio e dallo scambio continuo tra il lavoro sul campo (azioni tattiche), l'elaborazione di studio (disegno critico) e la ricerca teorica (costruzione e definizione delle questioni).

Il Disegno Strategico di Ricostruzione (DSR) è stato definito a partire dai punti in cui si è manifestato con maggiore evidenza l'evento traumatico. Prendendo in considerazione gli indizi rilevati in questi luoghi, descritti con una serie di disegni critici e discussi nei laboratori Urbani partecipati (Urbanlab), sono stati progettati alcuni dispositivi di modificazione territoriale impostati come interventi locali che, rispondendo ad un urgenza, provano ad attivare alcune dinamiche in una progressione di successivi adattamenti. Il complesso di azioni conseguenti, che compongono il canovaccio del Disegno Strategico di Ricostruzione (DSR), si fonda sulla relazione dinamica tra tempo istantaneo, tempi ciclici e lunga durata. In particolare, considerando il centro urbano maggiormente colpito - Giampilieri Superiore - sono stati delineati due dispositivi urbani (parco urbano su canale idraulico e piattaforme pubbliche sospese sul letto della fiumara) e quattro dispositivi territoriali (parco agricolo, foresta alimentare, bosco produttivo, foresta)

I Dispositivi urbani trasformano alcune opere infrastrutturali, necessarie alla mitigazione del rischio, in nuovi spazi pubblici capaci di ridefinire il carattere e la specificità dei luoghi della città.

I Dispositivi territoriali riscoprono le antiche vocazioni agricole e naturali di questo territorio e le ripensano in una diversa logica organizzativa e produttiva capace di rispondere in modo sistemico alle criticità manifestate dall'evento critico delle frane. In questa prospettiva i dispositivi rispondono a più problemi contemporaneamente e la loro configurazione fisica è arricchita e potenziata da questo approccio multidimensionale e polifunzionale.

I Dispositivi, a seconda del punto in cui si posizionano ed agli elementi esistenti con cui si relazionano costruiscono, come tasselli, delle Texture generative che le linee di movimento (strade, percorsi ciclo pedonali, sentieri) assemblano in quadri dinamici. Le sequenze percettive e le cornici visive, che si generano in progressione, trasfigurano le Texture in paesaggi.

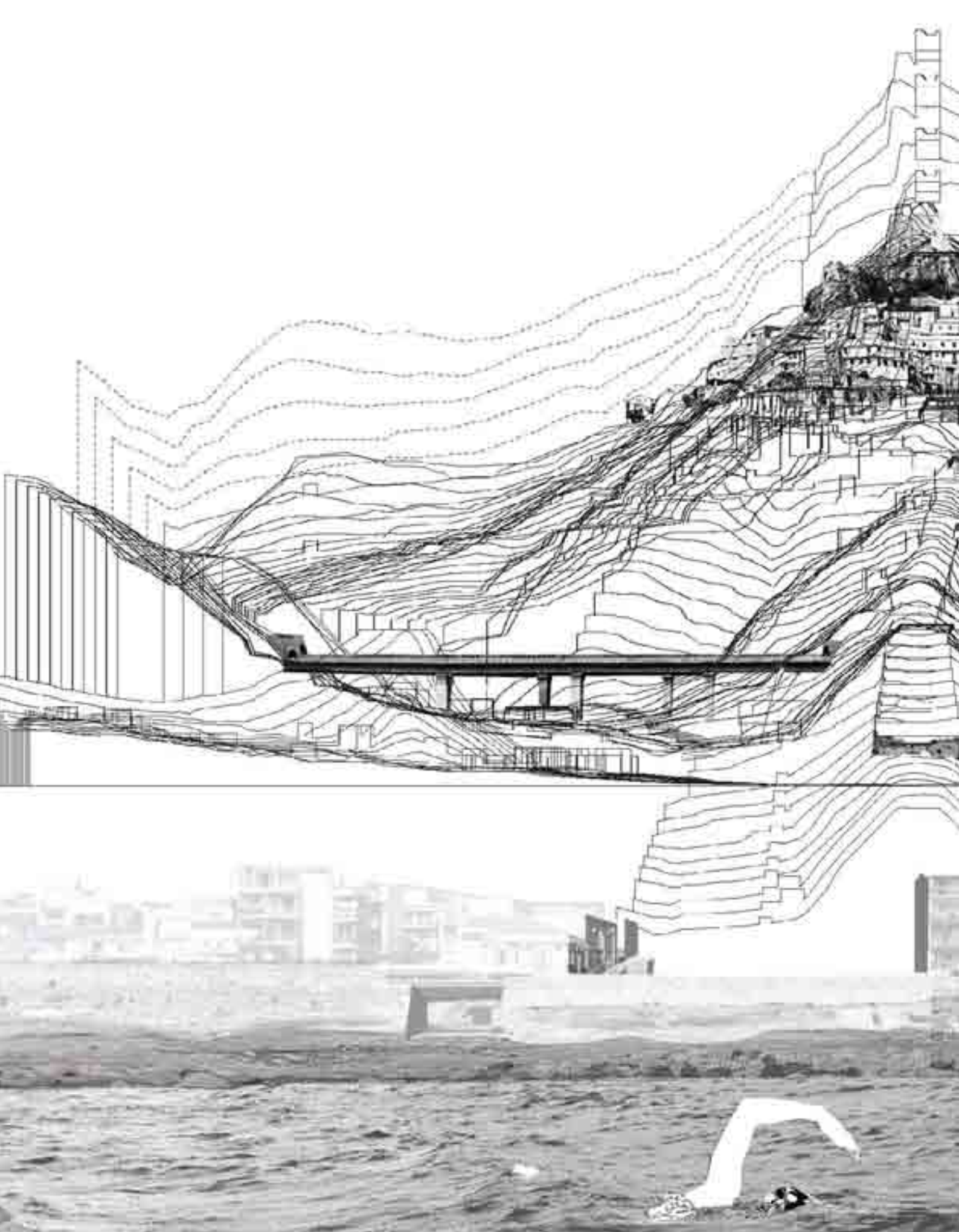
Le sezioni tomografiche permettono un controllo rigoroso delle modificazioni considerando i rapporti tra posizione dei dispositivi, morfologia dei luoghi e linee di movimento e di uso.

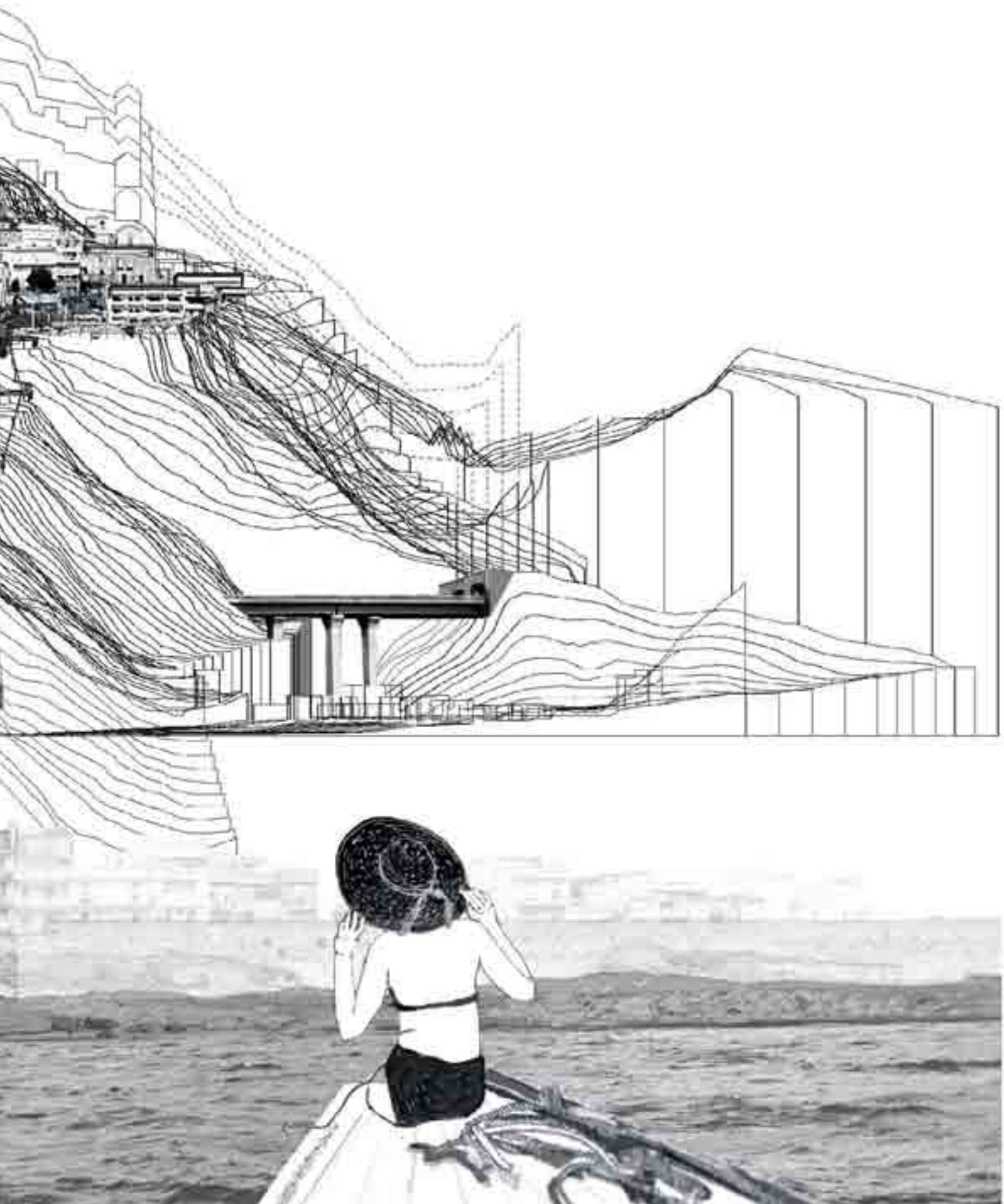
Uno dei possibili giochi combinatori delle Texture, realizzate dall'intreccio di alcuni Dispositivi, risponde all'esigenza di ricostruire il bosco nelle colline sopra il paese, come risorsa ecosistemica fondamentale. Senza il bosco il suolo più produttivo viene perso con il conseguente affioramento delle rocce nude e la perdita dei terrazzamenti agricoli residuali, gli acquiferi sotterranei si asciugano amplificando la condizione di aridità e sterilità funzionale, per cui, durante gli eventi piovosi, l'acqua diventa violenta e trascina il fango in basso alla fiumara.

Le Texture generative di Giampilieri Superiori ricostruiscono un sistema naturale, agricolo e urbano a partire dalla definizione di nuove relazioni verticali che rimettono in rapporto il letto della fiumara con le cime delle colline che delimitano l'ambito spaziale del bacino idrografico.

Queste relazioni sono basate sull'attivazione di nuove linee di

mobilità (linee di concatenamento) per gli uomini e i mezzi di lavoro che rendono possibile una cura continua dei terrazzamenti e delle pendici delle colline.
I Dispositivi urbani da un lato trasformano le fiumare a contatto con la città in parchi urbani, dall'altro, sulla costa, generano ampi spazi pubblici pedonali riutilizzando le piattaforme sospese sull'alveo dei torrenti che diventano, in questo modo, nodi di intensità connessi alla rete della mobilità urbana (viabilità urbana carrabile, trasporto pubblico, percorsi pedonali e ciclabili).
Il disegno strategico si realizza e sviluppa attraverso concatenamenti che permettono ampi margini di adattamento nel tempo mano a mano che vengono realizzati i dispositivi in punti diversi dell'area di intervento.
L'individuazione e la descrizione delle criticità, messe in evidenza dall'alluvione nei punti di maggiore discontinuità, e dalla definizione locale di microinterventi sviluppati attraverso la sperimentazione dei dispositivi hanno permesso di definire gli obiettivi e gli scenari possibili. Sulla lunga durata si è indicata una riconfigurazione radicale e il ri-posizionamento delle infrastrutture (autostrada e ferrovia) accompagnato da una loro maggiore articolazione e differenziazione (nuove strade locali ottenute dal declassamento della vecchia autostrada, potenziamento della tranvia esistente a Messina, piste ciclabili territoriali lungo la costa, funicolari o funivie dalla costa verso l'interno).
La strategia è fondata da un lato sul recupero dell'affaccio a mare della città lineare (reso possibile dalla dismissione della ferrovia attuale e il suo spostamento a monte già programmato da tempo da RFI) e dalla rciconfigurazione delle fiumare con la riorganizzazione dei terrazzamenti agricoli sulle colline, il rimboschimento alle quote più alte con un articolazione complessa del Bosco (dal bosco selvatico, al bosco produttivo, alla foresta alimentare) e la riattivazione del ruolo dei piccoli centri sull'interno.
Questi scenari a lunga scadenza non sono vincolanti e limitativi rispetto alla possibilità di costruire e sviluppare i dispositivi e le texture di assemblaggio in modo autonomo e locale adattando la progressione alle risposte e ai feedback ottenuti dai risultati raggiunti.
Il Disegno Strategico di Ricostruzione è stato adottato dalla Protezione civile regionale e ha guidato alcuni interventi costruiti tra il 2010 e il 2012. Ma con la fine dell'emergenza agli inizi del 2013 è stato abbandonato e molti progetti di messa in sicurezza sono stati realizzati e completati secondo vecchie logiche autoreferenziali radicalmente lontane dalla filosofia del Disegno strategico e del Manuale di intervento proposto all'inizio del processo di ricostruzione.





**Resili(g)ence aims to combine a new "intelligent city" (information, knowledge, projection and adaptation) with a "resilient city" (resistance and recycling, reaction and recovery, renovation and adaptation) in a new responsive and sensory condition, sensorized and sensitive at the same time.**