

*Many different phenomena could produce alteration, decay, depletion or loss of material and immaterial assets that mark out landscapes. In this Special Issue, "Landscape at risk" is understood as concerning all the phenomena that could alter or interrupt that relationship between community and places, which lead to landscape features creation. Therefore, the topic "Landscape at risk" is addressed considering its multiple meanings: Landscapes under environmental risk, climate change effects, but also landscape at risk of abandonment, or at the contrary landscape overexploited by tourism and other intensive activities. Landscapes endangered by environmental phenomena are analysed taking into account the way risk influences everyday life and the population-resources relationship underpinning landscape creation. Special consideration is given to climate-change related risk and to methodological improvements to develop criteria and tools to achieve the integration of mitigation and adaptation measures within landscape. In addition, landscapes suffering drastic depopulation are investigated and the most suitable management processes to prevent modification on landscape features are proposed. Finally, causes, effects and possible solutions are examined for landscapes where exploitation levels have reached saturation or where resources enjoyment is mainly based on an intensive consumption pattern and on the appropriation for commercial purpose, which lead to jeopardize the resources themselves, as mass tourism does.*

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## LANDSCAPE AT RISK - vol. 2

000\_ COVER AND INDEX

003\_ Notes on Landscape at risk and post-pandemic implications

*Marialuce Stanganelli, Carlo Gerundo*

006\_ BOARD AND INFORMATION

SECTION 1 – LANDSCAPE AT ENVIRONMENTAL AND CLIMATE CHANGE RISK

006\_ Emergency management and urban planning: policies and actions for the Vesuvian coastal area

*Marialuce Stanganelli, Carlo Gerundo, Maria Perillo, Beatrice Faggiano, Francesco Silvestri, Giovanni Forte, Giacomo Iovane*

013\_ Insights on risk perception: the case of Friuli Venezia Giulia

*Giorgia Bressan, Andrea Guaran, Gian Pietro Zaccomer*

016\_ The post-disaster temporary landscape. Reflecting on housing and tourism practices in the crater of central Italy

*Sara Cipolletti, Alessandro Gabbianelli*

020\_ The complex thinking to avoid the "reconstruction risk". A design methodological proposal for Inner Areas

*Giovangiuseppe Vannelli*

023\_ Advanced planning for urban landscape enhancement

*Roberto De Lotto, Caterina Pietra, Elisabetta Maria Venco*

027\_ Elements of integration of Regional Landscape Planning with Risk Management Planning in Abruzzo

*Donato Di Ludovico*

032\_ Small Rivers and Landscape. Nature-based solutions to mitigate flood risk

*Malena Magliocchetti, Valentina Adinolfi, Giacomo Viccione, Michele Grimaldi, Isidoro Fasolino*

037\_ Post-communist urban landscape at risk – challenge and innovation

*Tana Nicoleta Lasca, Cristina Victoria Ochinciuc*

SECTION 2 – LANDSCAPE AT RISK OF ABANDONMENT

041\_ Re-evaluating the distance: virus as a "great urban planner" in the rediscovery of inner areas at risk of depopulation

*Francesca Bruni*

044\_ On the relations between landscape and production. The case study of Rufoli in Salerno

*Guglielmo Avallone*

051\_ The landscape of the Amalfi Coast: an endangered paradise

*Giorgia De Pasquale, Lorenzo Nofroni, Serena Savelli*

055\_ Social ecology and traditional landscape enhancement. Some issues from a case study in the Gorizia Karst

*Alessandra Marin, Alfredo Altobelli*

061\_ Conservation through development: paths of innovation for protected areas

*Giovanni Ottaviano*

064\_ Circular economy as 'catalyst' for resilience in inner areas

*Marco Rossitti, Francesca Torrieri*

068\_ Designing the margins. A strategy for Lioni

*Chiara Barbieri, Giovanni Zucchi*

073\_ Landscapes at risk of peripheralization. A methodological framework for risk analysis to support planning strategies

*Roberto Gerundo, Alessandra Marra*

INDEX

080\_ Periurban landscapes, vulnerabilities and potentials for regeneration

*Anna Attademo, Maria Gabriella Errico*

SECTION 3 – LANDSCAPE AT RISK OF OVEREXPLOITATION AND TOURISM

084\_ Tourism in the time of COVID-19. A research on the behaviour and travel expectations of Italians

*Fabio Corbisiero*

089\_ Collaborative governance for coastal landscape integrated management. The Agro Pontino Coast Contract

*Stefano Magaudda, Serena Muccitelli, Carolina Pozzi, Cristina Palazzini*

093\_ Tourism in the Phlegraean Fields. Public perception and framing agenda of territorial public initiatives

*Salvatore Monaco, Carmine Urciuoli*

096\_ Environmental Hazard and Resource Use: a comparison Between Volcanic Landscape of Vesuvius and Stromboli

*Maurizio Conte, Dora Francese, Giuseppe Vaccaro*

101\_ Archeological resources: a blended landscape with various hazard factors. The case of Bacoli

*Luca Buoninconti, Paola De Joanna, Dora Francese*

106\_ LIST OF AUTHORS

## LANDSCAPE AT RISK

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# THE COMPLEX THINKING TO AVOID THE “RECONSTRUCTION RISK”

## *A design methodological proposal for Inner Areas*

### Abstract

The seismic hazard is strongly related to the context. The areas with the highest seismic risk in Italy coincide almost totally with the Inner Areas. It is necessary to take into account the contextual vulnerability in post-disaster design to ensure the landscape safeguard. A four-dimensional design approach applied to Morin's *complex thinking* is proposed as a possible method for a variable temporality process design that considers the so-called *temporary phase* as strictly related to the reconstruction process. This is in order to safeguard the social dimension of the landscape and also to avoid what is here defined as the *reconstruction risk* represented by the permanent traces imposed in the landscape by the interventions answering to the temporary post-emergency phase. The design methodological proposal put forward is based on an ongoing PhD research.

**Keywords:** post-disaster, process, urbanity, temporary

### Introduction

The contribution refers to an ongoing PhD research on post-seismic reconstruction investigating it as a complex process. The objective is the definition of a design approach that would be able to interact in an adaptive way with the changing instances that emerge from the affected context in relation to the temporal parameter, this to preserve the landscape from possible damages caused by a wrong management of the temporary post-disaster phase.

Emergency is a substantially unpredictable manifestation determined by a catastrophe, i.e. an event that periodically upsets the natural order of human vicissitudes. A catastrophe is capable of producing effects comparable to the slow action of time. The action of extreme, sudden and destructive modification triggered by a natural disaster makes it comparable to an unexpected acceleration of time. A catastrophe is an interruption in the continuity of time of a landscape, it is a fracture with respect to evolutionary dynamics and determines a great gap between the historical time of destruction and pure time, that time without history, of which only the individual can become aware [1]. Therefore, working on post-disaster design means rethinking places by working with space but even more with time.

An earthquake is a highly local catastrophic

phenomenon and this requires a reflection that starts from the context in which it occurs. This interpretation of the disaster relative to the temporal parameter is accentuated if we consider the phenomenon of the earthquake in the Italian context. The areas with the highest seismic risk of the peninsula coincide for the most part with Italian Inner Areas. Nowadays, the Inner Areas are object of considerable attention because of the complex condition of their tangible and intangible heritage [2]. The long lasting depopulation and the consequent abandonment taking place in those fragile Apennine landscapes, which are both internal and marginal areas, is the contextual reality from which a conscious reconstruction design must start [3]. Thus, to the seismic hazard is added a high contextual vulnerability that determines an overall risk considerably higher than the only natural action. This shows how, while hazards are natural, disasters are man-made [4]. The time parameter acquires even greater value trying to contextualize the design issue of post-seismic reconstruction in Italy: the sudden acceleration of time, due to the catastrophe, almost always afflicts those Inner Areas characterized by a time that has extremely slowed down, almost rarefied. Therefore, it's important to stress that the issue of risk should be addressed simultaneously with a proactive approach, i.e. Disaster Risk Reduction, and a reactive one, post-disaster emergency relief and rehabilitation [4]. The research this contribution refers to focuses on the reactive approach to disaster, considering the disaster event as an opportunity [5], although dramatic, to rethink the damaged landscapes. The catastrophe represents a fruitful moment to think about possible adaptive scenarios for the affected contexts for which mutation and uncertainty become epistemological assumptions, making time a fundamental unit of measurement and, therefore, temporariness a design paradigm. In addition to the risk described above as the sum of seismic hazard and local vulnerability, the research identifies and focuses on a second risk, subsequent to the first, which will be called *reconstruction risk*. This risk materializes in the wrong management of the emergency, in the misunderstood handling of that design process that, after the first aid, gives shelter to the population waiting for the desired reconstruction. Time is again a fundamental unit of measurement, because with reconstruction risk we refer to those choices

that, not considering the time parameter, cause ballasts and scars for the landscape in which they are set; ending up with slowing down or definitively preventing the reconstruction process and the natural metabolism. Then, time, from a unit of measure for places interpretation, becomes a parameter for a project in which the notion of process becomes fundamental. It's necessary to relate to the different temporal phases that follow the seismic disaster but also to the typical slow time of the inner areas that, through the project, can be totally stopped or receive a propulsive force. Although it may appear contradictory, this happens because a disaster, if considered as an opportunity, has the strength to impose reflections with extreme urgency, to alter priorities in policies and to reverse established practices also thanks to extraordinary economic measures. The research focus on the phase following the first aid but preceding reconstruction, i.e. the intermediate phase generally defined as temporary, the one that has often exposed landscapes to the above-mentioned reconstruction risk.

### Methodology

First of all, the research investigates some design approaches adopted for post-seismic reconstruction with reference to the unit of measure of time. This phase is supported by the observation of recent examples from which criticality and potentiality are drawn. In this way, after the redefinition of the design theme through theoretical and practical observations, it is possible to investigate the post-earthquake reconstruction design in its most concrete dimension. A learning by doing approach, driven by direct contact with the production sector, structures a second phase in order to define the advantages that can be found in the new digital processes of the AEC sector through which the post-emergency project is reconsidered.

The research approach is rooted in *complex thinking*, since it's believed that the major critical points that can be found in post-seismic reconstruction projects lie in the attempt to simplify, which - if not aimed at reconstituting complexity - leads to a reduction and unidimensionalisation of reality [6]. This is shown by the fact that until now the emergency management phase has relied on logistics and organizational science and very little on design culture [7].

The effort to accept the complexity is considered necessary in order to propose a project that would be contemporary, where contemporaneity means that singular relationship with its own time that adheres to it but takes distances from it [8]. Therefore, contemporary is the dynamic system that accepts the incompleteness and uncertainty [6] that lies precisely in the aforementioned distances. Incompleteness and uncertainty are those characters that, for a long time, the architectural project has rejected by barricading itself in the dream of permanence [9]. Reasoning on these issues, concerning the design theory in post-disaster reconstruction context, means to put itself in the borderline case, through which we want to verify hypotheses that are pushed to the extreme by an event marked by a character of exceptionality.

Thus, the question has been raised regarding the attribution of the term *temporary* to the intermediate stage between the first aid and the definitive reconstruction. The term temporary evokes the sense of instability, with an opposite and negative meaning with respect to the stability, always considered proper to architecture [7]. But in post-disaster reconstruction context, the meaning of temporary can also be seen as a simplification (that kind criticized by Morin) that does not aim to describe the complexity of the reconstruction process, but rather responds univocally to issues related to a limited but undefined time. In the last century in Italy the reconstruction processes have shown how the duration of temporariness undergoes heteronomic dynamics. This simplification, that lies in the concept of temporary attributed to post-emergency houses, accentuates the social risk that is perceived in relation to post-trauma stress, which is inevitably and strongly conditioned by the management of relief. A long-term strategy seems to be necessary to define temporariness as an opportunity and not only as the simple response to the emergency. Temporary and permanent reconstruction are used to be considered as separated phases, instead they should be seen as consequential parts of the same process of landscape reconstruction. For that reason, the word *transitional* is considered more appropriate than temporary because it refers to the idea of bridging the gap between disaster and reconstruction. For the damaged landscapes, the post-earthquake reconstructions are a meaningful legacy, both material and immaterial. On one side, they determined a new landscape structure, on the other side they created a crucible of knowledge, experiences, lessons learnt and mistakes [10].

Flexibility of use and reversibility are two of the main paradigms generally applied in post-emergency design. Two strategies were employed in response to the severe damage caused by the 2009 disaster in L'Aquila. On the one hand, one- and two-storey reversible housing, M.A.P. (Moduli Abitativi Provvisori), dotted the central Italy landscape in proximity to the small villages struck by the earthquake. The length of stay of the MAP demonstrates the

temporariness and reversibility concepts fragility, since still today part of the emergency housing is inhabited on the edge of urban areas, rarely establishing relations with them. On the other hand, the C.A.S.E. (Complessi Antisismici Sostenibili ed Ecocompatibili) project has emblematically shown how the paradigm of flexibility of use is not sufficient to respond to the complex problem posed by the disaster while respecting the landscape. The C.A.S.E. project perfectly represent the reconstruction risk to which a disaster-prone landscape is subject. In L'Aquila a sort of dromocracy of the emergency has led to the realization of a huge program of new buildings completed in the emergency times, defining durable neighbourhoods - for which a conversion into student residences or tourist accommodations is foreseen [11] - neither temporary nor definitive. The unique procedure set in response to the significant earthquake damage has triggered a simplification mechanism that has led to the creation of a double landscape due to the extreme increase in residential supply, calculated on people who were in need of temporary housing and not on the housing lack referred to normal times [12]. The reconstruction risk effects on the landscape are twofold, firstly a multiplication of suburbs has been caused by the new settlements location far from the centre, and, secondly, the old town is still empty because of the even more slow reconstruction.

Somehow, in contrast to the C.A.S.E. model, it seems of interest to investigate the incremental housing approach that is the most common strategy of the informal sector in most developing countries to overcome the problems of insufficient unit size and customization of housing units to individual needs and expectations [13].

With reference to the Aravena's project in Iquique, it is considered useful to make two remarks about this design approach. First, the context is fundamental. Aravena's design action finds its reason in the landscape it fits into and in the wish to allow the inhabitants to remain in that place where a strong network of sociality was preserved. It's fundamental to underline this in order to avoid eventual misunderstandings in exporting some models. The second reflection is related to the word *incremental* considered not sufficient to respond to the complexity of post-disaster because in itself there is a unidirectional meaning of the arrow of time that just alludes to addition as a possible modification. Then, seeing the post-disaster theme as transcalar and transdisciplinary, the research focus on a second methodological step, which influences each other with the former. It is carried out in a phase of ongoing project experimentation in close contact with the production sector in order to verify how the new digital context can facilitate innovative processes for reconstruction.

The PhD research finds in the experimentation with off-site systems in Light Steel Frame a premise and at the same time an opportunity. Considering the transience as an occasion, the proposal refers to the possibility offered by

such systems - for the lightness, modularity and reversibility requirements - to be useful material for the different phases of reconstruction thanks to dry-construction advantages. The design, managed through digital Bim-based processes, has the opportunity to speed up, refine and simplify the realization of the components in Cold Formed Steel (CFS) through a file-to-factory process, to favour the interoperability of the actors and the circular management of the construction. Temporary houses provided for the post-emergency phase is, on the one hand, a moment of innovation and integration of material cultures and, on the other hand, a depot of material (*un deposito in-sito*) subject to possible modifications and reconfigurations. The dry-assembled temporary structures modification processes can be carried out with different purposes and degrees of intervention. On one side, performance upgrades, recompositions or additions of new elements are possible with an incremental approach to temporary settlements. On the other side, by disassembling the components, the temporary dwellings become a depot of material that can be reused elsewhere for the construction of definitive houses, other types of buildings or for a partial reuse in destroyed buildings reconstruction processes. Thus, a con-temporary patrimony - also in the economic meaning - that can be reused in different perspectives is set out, until to foresee also an eventual return if demographic or urban dynamics do not determine the conditions of need for permanence or reuse.

The methodological proposal of an in-situ depot prefigures an incremental, adaptive and reversible project in order to make possible complex and dynamic scenarios through the digital innovation tools for the open residential systems implementation and management. Furthermore, the chance for architectures and settlements recycle, upgrade and upcycle is supported by the possibility of establishing temporary CFS production facilities. This opportunity could trigger the definition of a widespread laboratories for research and innovation network, following the FabLab example, in order to structure a production ecosystem for open and advanced manufacturing, experimenting an industrial model integrated in the territorial system. This is supposed both in order to contribute to the reactivation of the production chains and therefore to test new models for an economic revitalization of fragile Inner Areas. Moreover, it'd be an expedient for an active involvement of local stakeholders with the aim of experimenting with iterative and recursive customization processes. In fact, the CFS production and construction method are here seen as an occasion to define a mass customisation process that provides a strong top-down framework to enable bottom-up creative interpretation, improvisation, and execution [14]. Customization is also proposed in order to determine a collective self-recognition in the transitory estate. The aim is to make the community part of the process of landscape reconstruction through a

democratization of production and the simple sharing of the needed know-how for building with CFS structures.

Considering that the community is the most compromised thing after a disaster, the proposed scenario results to be useful to take into account one of the bigger issues: the urbanity matter [15]. In fact, a first problem in post-emergency settlements is referable to the inadequate relational spaces not responding to the inhabitants' needs and increasing the sense of discomfort and disorientation caused by the earthquake trauma [16]. A second issue concerns the importance of a non-rhetorical interaction with the communities affected by the catastrophe. Without this involvement, interventions will always be marginal and meaningless [17].

A careful design of urban settlements together with the possibilities of mass customization and houses modification by users is believed to favorise a better management of landscape modification processes in the post-emergency phase avoiding an alienation from contexts, both physical and social.

## Results

In conclusion, the research aims to define a design methodological proposal for Inner Areas, from one side, looking at the architectural project as an open system - flexible, changeable, incremental, feasible in phases for sociological and technological reasons and for reasons related to the organization and quality of forms [18] - and, from the other side, foreseeing the reconstruction taking place through dynamic urban systems, designated by complexity and capable of changing in relation to time. The needs of the place struck by the earthquake change abruptly, therefore the project is expected to be not temporary but characterised by a variable temporality allowed by a process design defined to change according to the time parameter. Thus, the process design should adopt a four-dimensional design approach that seeks to understand and plan the temporal as well as the physical elements [9]. Moreover, it holds together incrementability, disassemblability and transience in the attempt of responding to contextual mutations - geographical, urban and demographic dynamics - that cannot be foreseen because they are triggered by the catastrophe itself. This, with the aim to avoid the reconstruction risk that extremely increases the vulnerability of physical and social landscapes.

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