Making the intangible visible: a methodological framework for recognizing Non-Economic Loss and Damage in multi-risk urban regeneration.

Reflections from the Bagnoli-Coroglio SIN Area.

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This paper explores the multifaceted dimensions of loss and damage within urban contexts exposed to multiple risk factors, such as environmental pressures, while undergoing processes of site regeneration. A critical analysis grounded in the framework of Urban Political Ecology highlights that prolonged urban regeneration is often stalled due to unresolved

Introduction

This work explores the multifaceted dimensions of loss and damage in critical urban contexts exposed to multiple risks, such as environmental and climatic, and undergoing processes of transition and urban regeneration. The transition towards resilient and healthy urban environments for all represents one of the main goals of sustainable development policies. This goal becomes particularly challenging in multi-risk contexts where complex phenomena including contamination, social

conflicts over territorial risks and resources, leading to a profound disruption of the urban socio-environmental metabolism. This disruption results in significant, yet frequently ignored, immaterial "losses". To address this gap, this paper presents a systematic literature review of existing methods for estimating intangible non-economic loss and damage (NELD) The result is the proposal of a comprehensive methodological evaluation framework for NELD in urban studies. The Site of National Interest of Bagnoli-Coroglio will offer some preliminary considerations. Results demonstrate the need to critically reconsider the institutionalized concept of loss and damage, moving beyond economic metrics and extending the NELD framework beyond climate change. NELD, in fact, could be regarded as an opportunity to measure socio-environmental injustice and to enhance community resilience during urban transformation processes.

vulnerability, and institutional fragility overlap with anthropogenic and climate pressures.

Such complexity, if left unaddressed and not codified within a critical planning framework, poses a threat to public health and well-being. It is crucial, on the contrary, to overlook interdependencies between transformative processes, metabolic dynamics, and risk factors, considering mainly the latter to oppose consolidating sectoral approaches to risk. The challenge, therefore, lies in placing the social effects of multi-risk at the core of territorial planning to reduce loss and damage, especially for the most vulnerable population groups.

This position asks a critical review of the concept of Loss and Damage itself. In recent years, it has undergone a process of institutionalization, particularly in relation to climate risks, to the extent that since 2015, its compensation has been recognized as the third pillar of the Paris Climate Agreement, alongside mitigation and adaptation efforts. However, beyond the accreditation of economic metrics for measuring loss and damage, research has recently broadened to include Non-Economic Loss and Damage (NELD). While damages may be quantified, it is still challenging to establish evaluation criteria for measuring those intangible dimensions of loss which are tied to social perception, and remain fundamentally incommensurable (Centemeri, 2015). What we believe is that understanding loss in these specific domains not only improves assessment accuracy but can also serve as a critical input in the design process, enabling more informed and resilient planning strategies.

This work explores how losses and damages – particularly non-economic ones linked to the social and territorial dimension – influence urban transformation and regeneration processes in multi-risk contexts. The long-lasting remediation of Bagnoli-Coroglio Site of National Interest (hereafter SIN for Sito di Interesse Nazionale) serves as a paradigmatic example to propose a more inclusive approach to assessment and planning. Furthermore, unlike a research field predominantly focused on the Global South (Appadoo, 2021), the site is in the Global North.

The contribution builds on the critical framework of Urban Political Ecology (UPE), which conceptualized territorial metabolism as a socio-environmental process that can either enable or constrain different groups and communities (Heynen et al., 2006). From this perspective, implementing strategies for mitigation, adaptation and loss reduction requires a deeper understanding of the full life cycle of territories. This broadens the scope of urban planning and design beyond merely achieving optimal spatial configurations, demanding engagement with dynamics, potentials, and conflicts inherent in the transformation process. Prolonged and ineffective urban transformation processes can, in fact, erode the involvement and trust of communities living in crisis-affected territories–those who most directly endure the resulting economic, social, and spatial deprivations. Moreover, transformation processes are never socially or ecologically neutral. They produce forms of losses and damages that often exacerbate the existing disparities between those responsible for causing harm and those who suffer its consequences, across different scales. Nevertheless, loss can also be seen as an opportunity to react injustice by activating urban and territorial transformation (Roberts, Pelling, 2019) and reducing vulnerability and risk while fostering community resilience.

The paper is organized as follows: after a review of the existing literature on loss and damage, focusing on intangible aspects, the paper analyses the relation between loss and planning and more in detail the role of loss in long-lasting environmental risk; it then considers different methods for assessing tangible and intangible impacts up to the proposal of a methodological framework to analyse NELDS; Section 3 introduces the case of Bagnoli-Coroglio as a possible case for testing the methodological framework. The final section discusses the findings and outlines the future research directions.

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1. Loss and damage: acknowledging an emerging concept in planning multi risk contexts

1.1. Framing loss and damage: intangible losses and territorial justice

Literature on risk evaluation and reduction defines Loss and Damage as the impacts of a risk that have not been, or cannot be, avoided through mitigation or adaptation efforts. Loss and damage can result from both sudden and slow-onset events (Jensen, Jabczyńska, 2022; Appadoo, 2021).

The concept emerged for the first time during the UN Framework Convention on Climate Change in 1991 but was institutionalized, in 2013 during COP19 with the establishment of the Warsaw International Mechanism (WIM) for Loss and Damage (Jensen, Jabczyńska, 2022). Nevertheless, it is worth noticing that neither the Paris Agreement nor the WIM have clarified the financing aspects of Loss and Damage principle which, to date, are still not defined. This is due to both the unwillingness of developed countries to acknowledge monetary value on the concept, and to the lack of consensus on the framing and definition of the concept, together with a more general uncertainty about who takes on economic accountability (Appadoo, 2021).

Damage involves reparable harm, loss indicates irreversible damage, a situation of no return. Furthermore, it is possible to identify a distinction between economic and non-economic loss. Economic losses refer to the loss of resources, goods and services commonly traded in markets, non-economic losses are understood as those that can impact individuals, society and/or the environment. To date, research focused on the impact of loss on physical cultural heritage, such as buildings or monuments, whereas there is still a gap on the investigation of the impacts of loss and damage on intangible cultural heritage (Markantonis et al.,, 2012; McNamara et al., 2021). Those are affecting people's physical and mental health, cultural heritage, identities, indigenous knowledge, traditions, or local biodiversity and are deeply tied to the values and cultures of the communities concerned (Centemeri, 2015). Implications of losses may also involve significant places for local communities, affecting people the same way as psychological wellbeing. In this sense places become a culturally significant category for loss estimation (Magee et al. 2016) and should be considered in urban planning and broader environmental risk management, particularly when the degradation or loss of shared collective spatial and territorial resources is at stake. More in general, not considering intangible loss in the evaluation of risk may potentially affect strategic decision-making for risk management as well as the design of strategies for mitigation and adaptation, worsening

its impacts. The geographical distribution of these differentiated impacts may intensify conflicts and territorial inequalities or generate new ones (Beck, 1992).

This is why intangible loss and damage estimation need to be considered in risk studies to deal with territorial justice while also emphasizing the spatial relationship between people, damaging events, and both measurable and non-measurable impacts. Several methods have been tested for evaluating loss and damage of natural disaster on human life (Kharb et al., 2022) although those are mainly replacement and treatment costs that minimize the experience of loss (Magee et al. 2016), focused on economic dimension and the insurance market. Long-term territorial and community-related issues, that are strongly linked to non-economic and not-measurable dimensions of loss, are less explored. Omitting the existence of intangible loss in risk assessment constitutes a deliberate political act, as it denies communities the agency to define what constitutes a loss in their specific context. Therefore, we argue that acknowledging the significance of community-experienced loss within risk evaluation frameworks—even if methods for its quantification continue to be refined—represents a critical step toward a more inclusive and context-sensitive approach to risk assessment and regeneration of multi-risk environments.

1.2. Loss and Damage: urban planning and metabolic perspectives

According to the FCCC's report (2013) non-economic losses manifest in societies when non-economic public or cultural goods are damaged, or when social networks are disrupted. These impacts can be observed across three distinct spheres: private individuals, society, and the environment. The primary forms of such losses include harm to cultural heritage, local knowledge, and further expressions of social capital. Crucially, from the perspective of urban and spatial planning, this loss also extends to the degradation or loss of shared collective spatial and territorial resources. Although these losses are ultimately experienced by individuals, their nature remains inherently_social, as these commons goods are shared across the entire community, profoundly impacting the collective well-being.

While the NELDs concept is extensively explored in the domain of climate change (McNamara, Jackson, 2019), its profound implications extend critically to urban planning and broader environmental risk management (Ambrosetti, Petrillo, 2016). This expansion is increasingly essential for understanding the multifaceted deprivations experienced by communities beyond purely climate-induced impacts, especially in complex, multi-risk urban contexts. In these areas, overlapping phenomena of contamination, social vulnerability, institutional fragility, and anthropogenic and climatic pressures demand

an approach that transcends sectoral simplifications integrating the territorial component with the social component of risk throughout the entire risk management cycle.

Urban metabolism can thus represent a key for interpreting such dynamics. While White's pioneering work from the 1940s already recognized how the severity of damaging events was deeply connected to human choices and actions, urban metabolism had offered a more profound perspective. It does not merely link impacts and actions, instead, it investigates the dynamics through which the urban environment actively reproduces specific socio-environmental conditions. Therefore, urban metabolism allows for the integration of spatial perspectives – focused on the life cycles of cities and flows (Kennedy et al., 2011; Pekdemir et al., 2025) – with social ones, which view the city as a product of socio-natural flows (Wachsmuth, 2012). Such a combined perspective is fundamental for developing an integrated understanding of risk.

Despite the definitional complexity surrounding NELDs, indeed, common patterns emerge. These patterns emphasize crucial forms of non-economic deprivation that significantly shape people's perception of the urban experience (Serdeczny et al., 2016). Among these, deprivation of territory represents a distinct and fundamental form of loss and damage. Beyond its economic value, in fact, the urban landscape holds significant non-economic importance as a source of identity and belonging for local communities (Manzo, 2003). Territorial loss can be physical (e.g., land inundation) or functional, where the ability to inhabit or utilize a specific area is severely reduced, for instance, due to contamination or lack of access. This directly relates to the deprivation of public or common space and can profoundly undermine a community's sense of place among inhabitants and their connection to the environment. Among the forms of territory loss, human mobility and displacement directly impact the security and agency of individuals and communities, threatening their ability to control their location and livelihood, and disrupting social networks and identity (Sedrez, 2014). Moreover, the non-economic losses of cultural heritage (both tangible and intangible) and indigenous/local knowledge alongside social capital are deeply intertwined with territory. Their degradation threatens to hinder a community's sense of belonging and local aspiration to participate in shaping urban futures and also undermines trust in public actors and urban policies. Indeed, unlike other types of loss and damage, NELDs are fundamentally context-dependent (Serdeczny, 2018) as they emerge from deep human-environment interactions that have simultaneously moulded the physical common space and associated value systems of communities.

For a long time, architecture and urban studies have been cultivated specific terms to grasp

and preserve these intricate social and spatial dynamics. This reflection is historically rooted in concepts like the *genius loci* (Vecco, 2020): drawing from ancient Roman belief, places, in the same way as living beings, were thought to be animated by a protective spirit. Indeed, even an urban neighbourhood or a residential settlement – the *locus* – could not be merely reduced to its quantitative dimensions. Rather, it possesses a distinct character, a *genius*, representing a unique and evolving balance of natural, anthropogenic, environmental, and social elements. Moving beyond this historical concept, the notion of "intrinsic value" (Turner, 1992, 1993; Fusco Girard e Nijkamp, 1997) further captures this special relationship between the land and its inhabitants, manifesting over time as organizational, autopoietic, and adaptive capacity that ensures its long-time preservation (Bosone, 2019). As emphasized by Norberg-Schulz (1979), this profound relationship with the environment and the identification with the place enable an indispensable feeling of safety—a condition constantly undermined in multi-risk contexts. This feeling of safety, in turn, forms the foundation of belonging for humans to truly thrive in a place.

While these concepts effectively capture the holistic identity of a place, they often overlook the relational and power-laden dynamics that characterize socio-ecological flows and urban conflicts, which is where the critical lens of Urban Political Ecology and Urban Metabolism offers a necessary theoretical step forward. Within this framework, inefficiencies in urban metabolism compromise urban and territorial sustainability and resilience (Mazzarella, Amenta, 2022). This outcome, in turn, exacerbates anthropogenic pressures, resource scarcity, risk conditions, and the marginalization of disadvantaged communities (Swilling et al., 2013). In Italy SIN Exemplify this condition. These urban areas had been historically sacrificed (Lerner, 2010) to intense industrial exploitation. Consequently, they are now confronting severe, legally recognized impacts on their unhealthy ecosystems and human populations (Art. 252, comma 2, D.Lgs. 152/2006). These impacts profoundly affect urban dynamics, leading to consequences including population displacement, loss of real estate value, and even intangible impacts such as stigma (Gemmiti et al., 2023).

In these multi-risk urban areas, completing remediation and regeneration processes is often complex, frequently necessitating extraordinary state intervention, as implied by their designation. Difficulties in addressing and completing lengthy interventions, due to both resource scarcity and governance and technical issues, amplify over time and concentrate spatially the damage linked to the SIN's risk condition (Mahlkow, Donner, 2017). Consequently, a pure technical remediation may not be sufficient to fully "compensate" inhabitants for the deep losses and damages incurred.

Instead, to effectively address these intertwined challenges that encompass the long and complex implementation process, slow loss and damage awareness and people-centred responses to risk are crucial to foster urban resilience (FCCC, 2017). Urban planning can leverage its instruments to significantly advance research and tools. However, current practices often struggle to find inclusive, context-adaptable tools for identifying and treating non-economic losses (McNamara, Jackson, 2019). This recognized gap in methodological tools underscores the central aim of this paper: to propose a systematic framework capable of translating NELDs theory into operational domains for assessment and urban planning.

1.3 Dealing with communities as a strategy to address loss in contaminated sites

As previously discussed, in multi-risk planning processes, losses and damages cannot be always monetarily compensated nonetheless they can be addressed – or even repaired – through engagement with local communities.

When considering the impact of risk on local communities, an extremely sectoral and technical approach can disregard the complex interdependencies among risks, transformative processes, metabolic dynamics, and lifestyles, intensifying stratified geographies of chronic risk–territories and increasing conflict, creating additional, unforeseen social risks. Additionally, the governance approach may be further challenged with the onset of new events that could trigger such conflicts, in already complex and fragile territories. According to Nixon, this chronic condition may be considered as the result of "slow violence" (Nixon, 2011), that is a long-term, often invisible process characterized by "a violence of delayed destruction that is dispersed across time and space" (Nixon, 2011, 2), resulting in significant loss for local communities.

The concept of "slow violence" was developed through analytical studies on losses and damages due to environmental and socio-ecological degradation in the frame of the so called "environmentalism of the poor" (Martinez-Alier, 2002; Barca, Leonardi, 2018). These processes particularly affect disadvantaged workers – mainly located in the Global South –who are denied occupational health and daily living conditions guarantees. Nixon defines slow violence as the result of gradual, invisible deterioration processes that progressively unfold, accumulating over time, more precisely with "calamitous repercussions playing out across a range of temporal scales" (Nixon, 2011, 2).

Therefore, in risk assessment alongside conventional approaches focused on risk prevention and mitigation, there must be equally rigorous attention to individual and collective loss dimensions. Such attention is critical for identifying forms of reparation that may be activated, on a case-by-case, through the engagement with the affected communities. Ad-

dressing the effects of loss is also a mean for restoring the circularity of urban metabolism in areas where community resilience is undermined by long-term accumulation of shocks and traumas that aren't readily measurable, including trauma associated with denied rights to housing, health, employment, and future hope.

From an operational perspective, dealing with experiences of loss can facilitate those peculiar patterns of transformation that must necessarily go hand in hand with remediation processes, even considering immaterial flows as the social side of urban metabolism. To this regard, engaging with local communities through participative policies works as a strategy to strengthen environmental justice by sharing narratives of loss that encompass the analysis of traumatic events and the local aspirations for the future. In this way local stakeholders can be involved in defining their own compensation strategy, also including non-monetary measures such as ecosystem restoration, and the enhancement of human rights.

2. Beyond a definition: how to evaluate loss and damage for planning urban metabolism

Despite its relevance, the inclusion of intangible loss and damage into urban planning processes is still a developing field. To address this gap, this section provides a review of the main existing tools and methods for the evaluation of intangible loss and damage. The objective is to explore how these methodologies can be applied to estimate territorial and community-specific losses, transforming a theoretical topic into a concrete approach for regeneration.

Several studies, such as CONHAZ (Costs of Natural Hazards) introduced the necessity of integrating intangible costs into decision-making processes even without being expressed in monetary terms. They are related to those impacts that are not easily monetised (e.g. on health, the environment, cultural heritage). Quantification of these intangible costs is rooted in welfare and environmental economics and the theory of Total Economic Value. This approach distinguishes between use values, such as the benefits derived from the direct or indirect use of a good (e.g. living in a safe house or enjoying a natural landscape), and non-use values, which include the value of a good's existence, the willingness to preserve it for future generations, or for others, even in the absence of immediate personal utility. This distinction allows for the incorporation of affective, moral or symbolic dimensions that often emerge in contexts of loss associated with disasters, as demonstrated by numerous empirical studies focusing on residential, coastal, rural and urban contexts.

Scientific research has progressively broadened its focus from tangible impacts – easily quantifiable in economic terms – to intangible

impacts. Interest in these impacts has grown, especially with the realisation that, many of the losses associated with natural disasters escape traditional metrics but are central to decision-making and to the evaluation of the effectiveness of adaptation and mitigation measures.

From a methodological point of view, numerous studies use established economic techniques for monetising intangible impacts, which can be divided into two main categories: methods based on stated preferences and methods based on revealed preferences. In both cases, the quality of the results depends on the design of the questionnaire, the representativeness of the sample and the clarity of the scenarios presented.

Methods based on revealed preferences, such as the hedonic approach (hedonic pricing), analyse variations in market prices – for example, real estate prices – as a function of the presence of environmental risks or proximity to vulnerable elements. Although these techniques are based on real data rather than hypothetical simulations, they have limitations in capturing the value of intangible components alone, as observed prices reflect the interaction between multiple and often confounding variables.

Several applied studies offer concrete examples of how these techniques have been adapted to specific contexts. Chiba et al. (2018) applied the Analytic Hierarchy Process (AHP) to analise NELD caused by climate-related disasters in Bangladesh and Japan through a community-based participatory approach (Chiba, Prabhakar, 2017) and to identify risk reduction strategies able to address NELD.

The XtremRisK project has developed an approach to estimate social (victims, injuries, cultural assets) and environmental (ecosystems) losses associated with floods in Germany, combining hydraulic models and spatial analysis on high-resolution grids, from a probabilistic perspective (Burzel et al., 2015). Other integrated approaches, such as the one proposed for Calabria Region (South of Italy) through the Support Analysis Framework (SAF), have attempted to translate qualitative descriptions of impacts (direct, indirect, intangible) into numerical indices, with the aim of supporting local authorities' decisions, even in the absence of a direct monetary assessment (Petrucci, Gullà, 2009). The application has highlighted how intangible impacts, such as psychological distress due to displacement or transport disruption, significantly affect risk perception and the demand for preventive measures.

In urban areas, methodologies such as GIS-based Fuzzy Comprehensive Evaluation (FCE) have proven particularly effective in assessing flood risk by integrating socio-economic variables (e.g. loss of production efficiency, psychological impact) with hydrodynamic models and geospatial data (Li et al., 2023). The use of fuzzy logic allows the uncertainty and sub-

Domains	Factors	Indicators
Physical and mental health	D	Death and injury
	I	Level of fatigue or physical stress in carrying out daily activities
	I	Level of satisfaction for life
	D	Level of worry over future hazard events
	D	Mental health disorder
	D	Chronic diseases
Material living standards	D	Loss of family economic stability
	D	Loss of housing protection
	D	Disruption to living, including isolation and evacuation
	D	Loss of income-generating activities
	I	Disruption to utility services
	I	Increased demand on existing services
	I	Loss of access to networks, services and assets including recreation areas
	I	Forced displacement
Functioning ecosystems	D	Damage to ecological sites
	D	Disruption of habitats and landscape
	I	Perceived non-use values of lost heritage and environmental sites
	D	Reduced land values
	I	Loss of biodiversity and ecosystem
Social capital	I	Loss of perceived social cohesion between individuals, family and community members after a catastrophic event
	I	Level of willingness of people to be volunteers
	I	Level of willingness of people to collaborate in informal safety nets
	I	Loss of sense of belonging to a place
	I	Diminished community activity as effort goes to individual recovery
Cultural heritage and identity	I	Loss of local narratives and memories
	I	Loss of the cultural community practices
	D	Loss of the historic buildings
	D	Loss of places in which festivals, norms and creative arts take place
	I	Loss oh the local, indigenous and community knowledge
	I	Loss of the local handicraft skills
	I	Loss of community awareness about local cultural identity
Knowledge and education	D	Loss of educational places
	I	School discontinuity
	I	Perceived loss of social cohesion and identity
Governance and participation	D	Level of respect for human dignity
	I	Opportunity to lead legal and just lives
	I	Level of community participation in decision-making
	I	Level of collaboration between local government and community
	I	Loss of community capacity to activate self-managed recovery initiatives;
	I	Loss of perception to be valued, respected and treated-equally
	D	Level of perceived efficiency of recovery regulations
A desirable future	I	Level of trust in the future
	I	Perception of still being able to realise own dreams

NELDs evaluation framework. The developed framework proposes operative domains, impacts, and indicators for the identification and analysis of the intangible dimensions of NELD in multi-risk urban contexts.

Source: Authors' own elaboration.

Tab. 1

jectivity inherent in non-material impacts to be represented, improving risk representation and communication with decision-makers. Studies of flood-prone areas in Sardinia Region (Italy) show the effectiveness of combining models for estimating material damage (e.g., JRC depth-damage functions) with human safety simulations based on the Life Safety Model (LSM), which is useful for assessing the impact of evacuation times and accessibility on expected mortality. Such simulations not only identify infrastructure criticalities, but also estimate intangible implications related to distress, fear or prolonged discomfort.

Finally,in culturally sensitive contexts, such as Pacific Islands communities, ethnographic studies and artistic analyses have documented how the loss of territory, identity and spiritual continuity, is experienced as an existential loss that cannot be assimilated into conventional economic metrics (McNamara et al., 2021). Clissold et al. (2023) highlight the importance of including emerging categories of loss – identity, belonging and agency – in damage assessment, and propose an integration of qualitative approaches, local narratives and climate planning tools.

Taken together, these contributions highlight how the assessment of intangible impacts requires the integration of economic tools, spatial models, psychological approaches and cultural perspectives. The main challenge for research and institutions remains to harmonise quantitative and qualitative methodologies, translating the invisible dimensions of loss into operational elements capable of guiding disaster resilience and adaptation strategies in a fair and sustainable manner.

Furthermore, it is possible to distinguish between direct and indirect, tangible and intangible dimensions. Direct intangible impacts include loss of life and injury, disruption of life, loss of leisure and recreational time and concern about future events, also including the loss of memorable objects (WMO 2013; Molinari et al. 2014), limited evacuation options, limited access to transport, delays in getting to and from work, road closures and children missing school (Bhuyian et al., 2021).

Indirect intangible impacts include those related to health, loss of community, loss of trust in authorities and service providers (Bhuyian et al., 2021;(EMA 2002; Meyer and Messner 2005; Jonkman et al. 2008; Merz et al. 2010; Meyer et al. 2013; Kousky 2014; Lee et al. 2014). People may lose trust in authorities and service providers because they are often affected by catastrophic events (Romali et al. 2015). In indirect intangible impacts, it is assumed that disruption of public utilities, health problems and loss of community reduce the income opportunities of those affected. This is because, due to health problems, people may refrain from going to work (Chiba and Prabhakar, 2017).

Based on these studies, an evaluation framework (Table 1) for including non-economic as-

pects into the assessment of NELDs is proposed. In particular, the domains are identified following the research of Menk et al. (2022) and Fankhauser et al. (2014), Gough (2017), Verma (2017), and Tschakert et al. (2019). Intangible impacts are here distinguished in Direct (D) and (Indirect), in line with the existing state of the art. Indicators were identified and elaborated by the authors starting from the studies collected in the literature review, focusing on Bhuiyan et al. (2022), Menk et al. (2022) and Prabhakar et al. (2024).

3. Loss as a transformative opportunity for the Site of National interest Bagnoli-Coroglio

The Bagnoli-Coroglio area, located in the tenth Municipality of Naples (Southern Italy), is one of the largest Italian SIN. Those are heavily contaminated areas, designated for remediation due to risks to human health and the environment, and are regulated by the Legislative Decree 152/2006. Currently, there are 42 SINs in Italy, covering approximately 149,000 hectares of land and over 77,000 hectares of marine areas (ISPRA, 2023). The Bagnoli-Coroglio SIN was established by ministerial decree on 08/08/2014 and includes 249 hectares of land and 1,453 hectares of water.

The area had hosted the ILVA steel plant since the early twentieth century. Production was shut down during the 1990s, and the site has since remained inaccessible. Bagnoli-Coroglio represents a paradigmatic context for illustrating the functioning of loss when environmental risk acts upon local regeneration and affects inhabitants and the working community.

This is a multi-risk context, where soil and water pollution overlap with climate risks associated with a coastal plain entirely exposed to extreme weather events. There is also the volcanic risk linked to the bradyseism of the Phlegrean area, which in the last twenty years has been manifesting frequent and intense surface tremors and earthquakes. In addition, the Bagnoli-Coroglio SIN, together with the Eastern Napoli SIN report the highest average index of social and material vulnerability in Italy. Even though indicators from further Southern Italy SINs are slightly lower, economic deprivation and social fragility remain particularly concentrated in the two Neapolitan sites (Gemmiti et al., 2022), amplifying social risks. This is why several wicked problems emerge (Rittel, Webber, 1973), related to the try of planning resilience in contexts inhabited by communities exposed to multiple risks.

After the factory closure, between the late 1990s and the early 2000s, a promise was made by local politicians concerning the return to the original beauty of the site, with the prospect of reclaiming access to the sea and promoting tourism-based development. The failure of these promises still generates feelings of frustration and injustice among the local population, worsened by the fact that this vision had

been even endorsed in the 1996 urban plan of western Naples (Comune di Napoli, 1996).

The illusory promise of reconfiguring the everyday landscape has been nurturing a wearisome wait, progressively eroding the community's psycho-physical equilibrium. Although losses and damages to health resulting from industrial activity are monitored at the national level (see, for instance, the SENTIERI epidemiological project[1]), little attention has been paid to risks associated with prolonged times of remediation and regeneration. Remediation processes provided by law occur over extremely extended periods, due to both the length of administrative procedures[2] and the uncertain durations of remediation.

These prolonged timelines are incompatible with local populations' needs and aspirations and increase social distress. If environmental risks related with toxicity affects human and non-human health, risks tied to waiting and the betrayal of expectations has been producing, in Bagnoli, significant social vulnerability and symbolic losses. Consequences of losses are a perceived subalternity toward Neapolitan citizens, and a wish to struggle and vindicate the legacy of the former working-class, still alive in neighbourhood associations such as Circolo Ilva, Lido Pola, and Villa Medusa.

The sectoral and technocratic approach adopted in restoring the former ILVA plant neglects historical, socio-cultural, and economic risks, ignoring the community's loss of identity and the erosion of trust in institutions at various governance levels. Moreover, excluding the local community from decision-making threatens the effectiveness of a just transformation strategy.

In the Bagnoli long-lasting remediation process, the lack of recognition by the overall city and the public administration for feelings of loss prevents the achievement of circular urban metabolism. It is therefore necessary to overcome governance models resistant to dialogue with local communities, questioning how to strengthen community resilience where structural fragilities emerge.

An effective strategy would consist in multi-voiced narratives aimed at discovering feelings of loss and damage by "natives", and critically spatialise a century-long process of industrial consumption. The idea would be to facilitate the sharing of territorial diagnoses in which the new interpretation of past memories becomes the breeding ground to regenerate the present neighbourhood, while closing the recovery stage. Such reconstruction would offer a starting point for actively triggering the "power of place" (Hayden, 1997) and involve the people's vision through participation. Narratives should complement spatial disciplines – such as collective mapping – and social science methodologies using the temporal dimension as a key to co-design change.

Looking at cities as the result of a historical-geographical process of the "urbaniza-

tion of nature" (Swyngedouw, Kaika, 2011), it becomes crucial to collectively represent the steel plant settlement on the Coroglio beach, aiming at analysing the original landscape consumption step by step. The initial cautious development of ILVA in the early 1900s was followed by increasingly rapid growth, culminating in the 1960s–1980s, when the artificial infill invaded the sea, effectively erasing any right to health and good living conditions (Andriello et al., 1991; Andriello, Palestino, 1992).

Under the lens of environmental justice (Schlosberg, 2007), two intertwined processes can be observed: on the one hand, the natural plain erosion due to increasing industrial expansion; on the other, the effects of wild urbanization on local communities. What emerges is a twofold violence on people and places: the structural violence of the forced coexistence with toxicity (Galtung, 1969) – which turned Bagnoli into a subaltern enclave within the city – and the slow violence (Nixon, 2011) responsible for the chronic stagnation (Davies, 2020) together with the collapsing of productive economies, the never-ending remediation timelines, and administrative inefficiencies.

With such a dense natural past, uncertain present, and still unwritten future, risk planning and management must also assume public conflicts and collective distrust as something to inevitably treat. While the site original beauty, the working-class pride, and the collective well-being are getting lost, distress is growing among the young generations. The latter have experienced neither the industrial era nor the original landscape beauty, consequently living a suspended space-time dimension where Bagnoli-Coroglio seems to be forgotten. The opportunity to communicate the legacy of their grandfathers by selecting collective memories of loss and damage and actively taking part in the still ongoing remediation process could be crucial for the local youth, to reactivate the circularity of urban metabolism.

4. Discussion and conclusion

This paper aims to understand and recognize the dimensions of intangible loss and damage in multi-risk contexts by extending the application of the concept of NELD from the traditional climate change domain. The research highlights how loss is a relevant issue not only in the Global South (Appadoo, 2021) but also in developed countries, as evidenced by the Bagnoli-Coroglio case.

In such contexts, the effects of community loss are evident in the deprivation of public spaces (Magee et al. 2016; Manzo, 2003) and the erosion of public memory due to the removal of collective identity. These are manifestations of territorial deprivation and represent the inability to share future-oriented narratives for the area. Such dynamics weaken human agency and diminish community participation in decision-making processes both as consequence of both structural (Galtung, 1969) and slow violence (Nixon, 2011).

Omitting the dimension of loss from risk management is a political act, as it denies affected communities the agency to build their own narratives and to define what constitutes loss in their specific context. Acknowledging community-experienced loss within risk evaluation frameworks proves essential for promoting a more inclusive and context-sensitive approach to regeneration.

Although combining quantitative/qualitative methodologies remains a challenge, a territorial planning approach that takes loss seriously can become, if supported by committed policymakers, a strategic driver for inclusive regeneration, moving beyond a mere tactical tool for conflict management. In fact, recognizing loss as an integral element of regeneration may enable more inclusive strategies, calling for a shift beyond traditional models of economic compensation toward holistic, community-centered responses such as participatory urban planning. Those approaches support both environmental and spatial justice and facilitates the development of concrete and fairer policies and programs.

In order to consider nontangible losses as part of the planning process, the main contribution of this article lies in the definition and proposal of the NELDs Methodological Evaluation Framework. The framework was elaborated thanks to a thorough literature review. Its proposed evaluative approach is specifically articulated for making visible intangible dimensions of loss and damage, providing useful tools for understanding and elaborating more equitable and inclusive regenerative strategies.

The next research step will consist in the experimental application of the framework to the Bagnoli-Coroglio case study. This process will involve further fieldwork investigation, including surveys and interviews, and a participatory approach, engaging with local actors and fostering intergenerational dialogues. The final aim will be to build collective narratives which prove to be essential for rediscovering the community's sense of place. The framework will allow to translate collective experiences into operational planning tools, activating crucial processes for reconstructing the *power of place*.

Author Contribution

The contribution is the result of a joint reflection among the authors, although the introduction is attributed to all authors, paragraphs 1.1 and 4 are attributed to B. V., paragraph 1.2 to F.V., paragraph 1.3 and 3 to M.F.P., paragraph 2 to M. B.

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Notes

[1] For more details, please refer to the sixth SENTIERI report – National Epidemiological Study of Territories and Settlements Exposed to Environmental Pollution Risks: Zona, A., Fazzo, L., Pasetto, R., Benedetti, M., Bruno, C., De Santis, M., Iavarone, I. (2023).
[2] For further information on this topic, please refer to the technical report Mettiamoci in Riga: Analysis of the timelines required for the authorization of remediation projects within Sites of National Interest (S.I.N.), their causes and consequences for stakeholders (2023), available at: https://bonifichesiticontaminati.mite.gov.it/presentazione-dei-due-documenti-tecnici-curati-dalla-linea-l3-del-progetto-mettiamoci-in-riga/

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