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Summary

This paper proposes an application of the analytical path assembled within my PhD research on Disaster Risk Creation (DRC) in humanitarian contexts, to Flood Risk Management (FRM) planning in Italy. The investigation concerns some key challenges, for spatial planning and disaster risk management, in understanding, evaluating, and addressing Disaster Risk (DR) drivers and pressures, those processes and land uses enhancing exposure, vulnerability and flood hazard itself. The reference methodological approach benefits from well-established theoretical models of causal analysis of Disaster Risk Creation processes as bridging analytical construct for reordering and coordinating flood risk management interventions. These theoretical and analytical reflections are build upon a gap between the European Water Framework and the Flood Directives that, despite their many interconnections and commonalities, differ in the focus (or lack of) on underlying causal factors. Thus, the Water Framework Directive provides a valuable operational reference for orienting flood risk management planning to the reduction of disaster risk creation components.

Keywords: Flood Risk Management, European Flood Directive, Risk Driver, Spatial Planning

JEL Classification: Q54, R58

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Orienting Flood Risk Management to Disaster Risk Creation: lessons from the Water Framework Directive

Giacomo Cazzola[1]

Abstract

This paper proposes an application of the analytical path assembled within my PhD research on Disaster Risk Creation (DRC) in humanitarian contexts, to Flood Risk Management (FRM) planning in Italy. The investigation concerns some key challenges, for spatial planning and disaster risk management, in understanding, evaluating, and addressing Disaster Risk (DR) drivers and pressures, those processes and land uses enhancing exposure, vulnerability and flood hazard itself. The reference methodological approach benefits from well-established theoretical models of causal analysis of Disaster Risk Creation processes as bridging analytical construct for reordering and coordinating flood risk management interventions. These theoretical and analytical reflections are build upon a gap between the European Water Framework and the Flood Directives that, despite their many interconnections and commonalities, differ in the focus (or lack of) on underlying causal factors. Thus, the Water Framework Directive provides a valuable operational reference for orienting flood risk management planning to the reduction of disaster risk creation components.

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The unattainable Disaster Risk Creation

Acknowledging disaster risk as socially constructed, as opposed to the "natural disaster" vision, attributes a large part of losses and damages to underlying processes resulting from societies' decisions and practices when facing a potentially damaging physical event, e.g., building in exposed areas, sealing soils, abusing and polluting natural resources, obstructing and reducing rivers' waterflow, "including the choice to ignore them or dismiss their significance" (Oliver-Smith et al., 2016). This approach argues that DR should be understood as "manifestations of unresolved development problems – and – indicators of unsustainable development processes" (Lavell & Maskrey, 2014; Wisner, 2016) – which have not been addressed nor reduced.

The advantages of this "Root Cause paradigm" relate not only to widen the focus from the "natural" element to the political, social, economic, and cultural drivers that contribute to DRC, but also to "share" and dilute blame for such processes: if looking at DRC bigger picture, responsibilities shift outwards and upwards, from exposed unsafe communities to the political and economic decisions of exclusion and exploitation that impoverished them or planned/allowed their settlement. Overcoming this inconvenient political taboo may also ease existing major contradictions related to the "sustainability, resilience, mitigation and adaptation" buzzwords and to their simplified adoption and usage, often avoiding problematic drivers of unsustainability. Particularly for hydrometeorological risk assessment and management, "without acknowledging the role of maldevelopment in creating new risk and in blocking the reduction of old risk, disaster managers and other development planners and practitioners provide no more than palliative care to terminally sick societies" (Wisner, 2016).

Understanding, addressing, preventing and reducing DRC processes represents the stepping stone for overcoming the international agenda's unattainable historical priority to "reduce the underlying risk factors" (commonly used from the 1994 Yokohama Strategy and Plan of Action for a Safer World until the 2022 Global Assessment Report on Disaster Risk Reduction), which have been less popular and successful than analogue international mottos such as "reduce waste at the source" and "reduce carbon emissions".

Theoretical and analytical references

Several theoretical models, above all the Pressure and Release (PAR) models (Blaikie et al., 2004; Wisner et al., 2012) drafted already in the Seventies (Blaikie et al., 2004; Davis, 1978), provide solid and established analytical tools for a causal understanding of the root causes, dynamic pressures and unsafe conditions that generate vulnerability and exposure to hazardous events. These methodological and analytical references, coming largely from the disaster studies "Root Cause paradigm", structured a glossary, recollected in the table below, defining the "anatomy of vulnerability" (Davis, 2014) key components.

Table 1 – *Glossary from my Ph.D. thesis resuming key components of the "anatomy of vulnerability" (Davis, 2014). Main analytical references: Pressure and Release (PAR) model (Blaikie et al., 2004; Davis, 1978), Disaster Crunch model (Davis, 2014), Progression of Safety (Blaikie et al., 2004; Wisner et al., 2012), the roadmap to hell (Wisner et al., 2012), the Disaster Risk Process Approach (Narváez et al., 2009), Vulnerability-Plus Theory (Zakour & Gillespie, 2013; Zakour & Swager, 2018) and the Forensic Investigation of disaster (FORIN project) methodology (Oliver-Smith et al., 2016).*

Terminology	Definition
Root Causes; Underlying Causes.	"An interrelated set of widespread and general processes" set as 'distant' both spatially (arising in a distant centre of economic or political power), temporally, as well as in the "sense of being so profoundly bound up with cultural assumptions, ideology, beliefs and social relations", perceived as 'invisible' and 'taken for granted' (Blaikie et al., 2004).
Dynamic Pressures; Drivers of Risk; Structural pressures and constraints.	"More contemporary or immediate, conjunctural manifestations of general underlying economic, social and political patterns" (Blaikie et al., 2004).
Unsafe Conditions; Unsafe livelihoods and locations.	"The specific forms in which the vulnerability of a population is expressed in time and space in conjunction with a hazard" (Blaikie et al., 2004). In disaster aftermath referred to as "patterns of loss and damage and their social impacts, their spatial and social distribution" (Oliver-Smith et al., 2016)
Capacities	"Capacities refer to the resources and assets that people possess to resist, cope with and recover from disaster shocks they experience. The concept of capacity also encompasses the ability to either use or access needed resources" (Blaikie et al., 2004; Wisner et al., 2012).
Marginalisation	Failure and/or delays in satisfying the needs emerged in the aftermath of a disaster (Wisner et al., 2012) and, more in general, to reduce the dynamic pressures and unsafe conditions.
Resources Typology, Vulnerability Dimensions.	Categories relevant in structuring the multidimensionality of Disaster Risk and Vulnerability, are usually Environmental, Physical, Technical, Economic, Social, Political, and Institutional (Blaikie et al., 2004; Davis, 2014; Wilches-Chaux, 1989, 1993; Wisner et al., 2012).
DRM life cycle's strategies	(a) Anticipatory or Prospective (Lavell & Maskrey, 2014) addressing and avoiding risk's development and increase; (b) Corrective and Compensatory addressing root causes, reducing dynamic pressures and achieving safe locations and sustainable livelihoods (the so-called Progression of Safety (Wisner et al., 2012)); (c) Reactive, responding to and recovering from emergencies, avoiding missing, failed, insufficient and build back the vulnerable situations (Davis, 2012).

These models and their components have been adapted and combined in an analytical tool (figures below) attempting an interpretation and outline of DRC processes' causality and functioning.

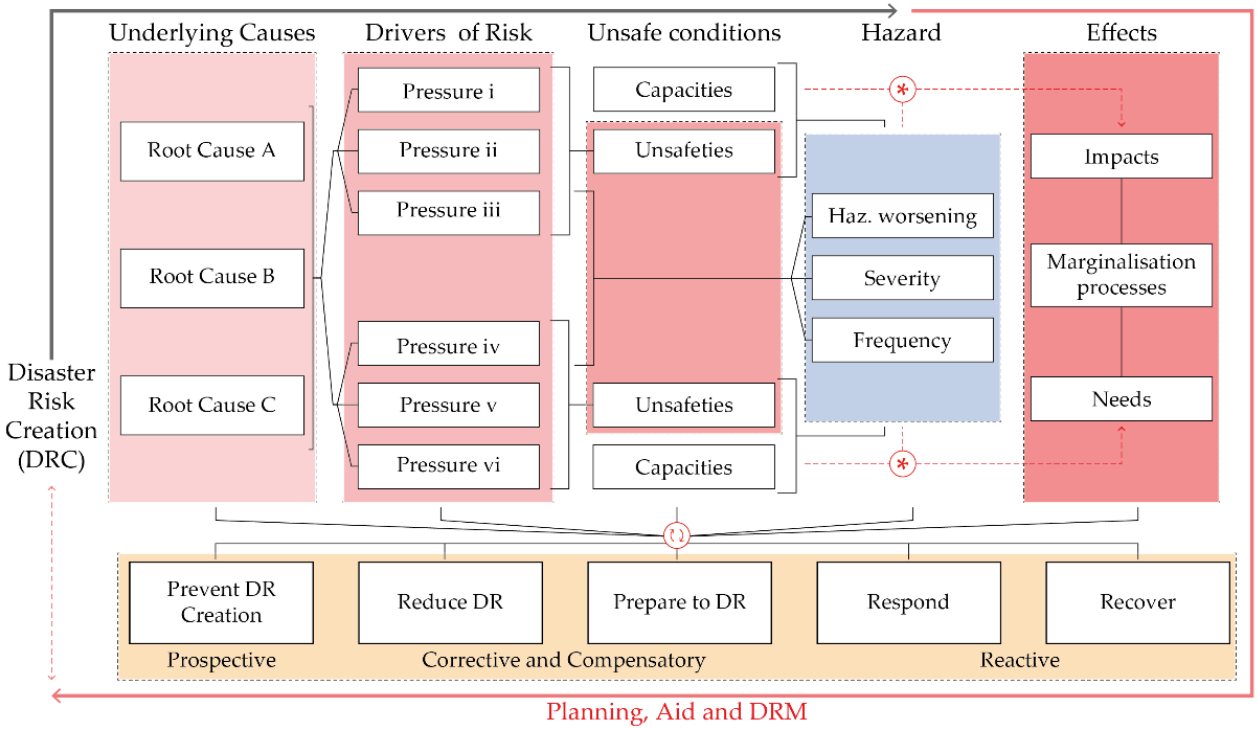

Figure 1 – *Analytical lens (adapted in my Ph.D. thesis from (Blaikie et al., 2004; Narváez et al., 2009; Ben Wisner et al., 2012; Zakour & Swager, 2018)).*

This glossary and analytical tool may orient flood risk assessment beyond the definition of conventional quantitative components and indicators of vulnerability and exposure, fostering a more in-depth understanding of past hazardous events, policies and urban development initiatives. The analytical process, which may involve expert authorities and stakeholders' risk understandings and gather existing assessments and evaluation, should target those drivers that exposed communities to a hazard, brought them to perform unsafe behaviours and worsen flood severity and magnitude. The table below exemplifies different disaster risk dimensions understood both as quantitative indicators and as underlying causes and risk factors.

Table 2 – *Disaster risk dimensions, linking disaster risk assessment components to risk drivers and pressures examples.*

Dimension of Disaster Risk	Disaster Risk Assessment - Quantitative components	Drivers of risk
Social dimension	Age - Population under 20 years, over 64 years Families with >6 components Health Disabilities – Mortality rates Employment / Unemployment Nationality and citizenship Education level Mean of subsistence – Low income Population density	Welfare state; Housing policies; (Dis)investment in health and school systems; Marginalization processes affecting the poorest sector of the population; School drop-out rates and patterns; (Lack of) integration of incoming migrant/foreign communities;
Economic and Services Dimension	Transport network: Highways - Primary Roads - Secondary Roads - Railway Economic activities and land uses Size of Companies – average occupation/building use	(Dis)investment in public facilities; (Dis)investment in infrastructures; (Dis)investment in health and school systems;

	School system	
	Hospitals	
	Cultural and religious spaces	
Physical Dimension	House ownership (Rent or owner)	Housing policies; Urban development patterns; Respect for building standards and regulations;
	Building - year of construction, materials, height, typology…	
	Empty apartments	
	Infrastructures conditions	
Environmental Dimension	Soil sealing and retention capacity	Polluting and contaminating individual and corporate practices; Urban sprawl, land consumption, permanent loss of natural and agricultural lands; Waste and wastewater management;
	Green areas	
	Soil and water bodies conditions (pollutants, waste, contamination…)	
	Exposed environmental services	
Hazard	Severe winds	Land uses, practices, and economic activities worsening hazard frequency, severity, and extension. E.g., soil sealing, river diversions, waterways culverts and channelling, contamination and pollution of water sources, urban development over rivers' courses, clogged drainage systems…
	Severe rainfalls and floods	
	Riverine floods	
	Storm surges	
	Landslides	
	Mudslides	
Coping capacities	Awareness of exposure to a certain hazard and risk	Communication and dissemination of Civil Protection guidelines and practices; Awareness campaign regarding disaster risk; (Lack of) integration of incoming migrant/foreign communities; Endangering behaviours and practices during emergencies.
	Experience and memory of past hazardous events	
	Knowledge and ability of emergency and evacuation activities	
	Knowledge of the Civil Protection Plan	
	Insurance against a given hazard and risk	

Regarding this analytical structure, it should be noted that the phases listed represent just a snapshot, a "freeze image" of DRC processes along with time flow: past pressures and unsafe conditions constitute nowadays problems rooted and overlapped, which constitutes a cognitive trouble in structuring a sounded causal analysis. The historical evolution of DR through root causes, risk drivers and unsafe conditions is cyclic and should be understood as a continuous growth with new forces compounding and "fattening up" the process over time.

Inputs and lessons coming from the Water Framework Directive

The DPSIR (drivers, pressures, states, impacts and responses) causal framework, generally used to analyse society-environment interactions, resembles the reference analytical framework based on the PAR model (Blaikie et al., 2004), although nudging toward a more circular and cyclic functioning and mindset. Surprisingly enough, and contrarily to the Flood Directive (Directive 2007/60/EC), such a mindset is already foreseen by the Water Framework Directive (Directive 2000/60/EC) which requires it in the form of a quantitative causal analysis assessing the involved drivers, pressures and impacts affecting ground and surface waters' quality and status. Below are reported some examples of the pressures and drivers categories from the Water Basins Management Plans guidance (https://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm).

Table 3 – *Water Framework Directive examples of pressure types and drivers.*

Pressure	Main Driver(s)	Description
Urban wastewater	Urban development	Includes discharges from non-manufacturing commercial areas which can largely be assimilated to urban wastewater.
Contaminated sites or abandoned industrial sites	Industry	Pollution resulting from an abandoned industrial site or a site contaminated due to past industrial activities, illegal dumping of industrial waste or a pollution accident.
Discharges not connected to the sewerage network	Urban development	Pollution resulting from urban wastewater not connected to sewers.
Mining	Industry	Pollution from mining activities.
Abstraction or flow diversion	Agriculture - Urban development – Industry - Energy	Includes water transfers and abstractions for irrigation, livestock breeding, desalination plants for public water supply, industrial processes, cooling water, and hydropower plants.
Physical alteration of channel/bed/riparian area/shore	Flood protection – Agriculture – Navigation - Energy hydropower	Refers largely to longitudinal alterations to water bodies. Includes land drainage to enable agricultural activities
Dams, barriers and locks	Flood Protection - Urban development - Agriculture irrigation - Tourism and recreation – Industry - Energy	
Hydrological alteration	Agriculture - Transport - Energy – hydropower - Urban development	A change in the flow regime, e.g. due to agricultural land drainage or inland navigation.
Hydro-morphological alteration - Physical loss of whole or part of the water body	Flood protection, Climate change	Dry river beds etc.

The Water Framework Directive categories constitute a relevant reference as Water Basins Management Plans have been linking clusters of pressures (which in the DRC glossary would be the unsafe conditions) with specific drivers of economic activities that contribute to them, all over Europe, for the past decade. Furthermore, flood protection measures themselves are listed and foreseen as potential pressures as they could contribute in a harmful way to water quality and status.

Following the Water Framework Directive example, the proposed goal for flood risk management strategies would be to define and assess flood-related (1) drivers (and related economic activities), (2) pressures (with subtypes and indicators), (3) impacts, and (4) key measure types needed (and related indicators). Defining relevant drivers and pressures impacting flood's hazard, exposure, vulnerability and coping capacities, might prioritize certain FRM approaches, highlighting overlapping and forgotten matters as well as synergies among policies, plans and interventions.

Conclusions

As a result of this theoretical shift, the aimed target for flood risk assessment would also be understanding the causality of DRC diffuse and long-standing processes (Oliver-Smith et al., 2017), including key endangering land uses and counterproductive human behaviours that enhance flood risk components. Building on this understanding, flood risk management plans may orient long-term strategies coordinating and integrating existing interventions, and avoid "investment decisions and DRR measures that reinforce unsustainable development pathways" (Johnson et al., 2016). Having an overall wider and more structured understanding of DR complexity would imply to:

- Assess and map risk drivers' trends and extent concerning hydrometeorological hazards;
- Compile and catalogue a flood risk drivers and pressures database at the basin and national level;
- Define and distinguish nuanced and neglected drivers and pressures from more internationally acknowledged ones, highlighting those that may be easier to reduce and address;
- Assess and map policies and plans' coverage and prioritization of such problems, highlighting neglected and less beaten matters;
- Assess policies and plans' strategy regarding risk drivers and pressures, as they could either criminalize, tackle and reduce or allow and reinforce them.
- Coordinate and integrate planning efforts and initiatives not directly related to flood risk management;
- Support plans' monitoring processes, and assess their performance and effectiveness.

In conclusion, acknowledging disaster risk creation may orient flood risk management mainstreaming and coordination in development and urban planning, rethinking interventions usually deemed exogenous to DR governance, rewarding measures with multiple positive externalities in terms of risk reduction and drivers effectively addressed, and enhance their current prioritization.

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