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Measuring community disaster resilience in the Latvian context: an apply case using a composite indicator approach

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Abstract

Despite a growing and considerable interest and implementation of disaster resilience framework methods in research, policy programs and engineering design, metrics and standards for a quantitative measuring of resilience are still an open issue.
Recent literatures on hazard and disaster show that the resilience concept represents a guideline toward a valuable hazard risk management and mitigation. For the Latvian context this also represents a beneficial approach for the implementation of policy strategies based on (semi)quantitative framework aiming to enhance resilience within communities in order to properly and most efficient spend a limited availability of funds. In fact man-made and natural disasters are usually preceded by periods where communities develop toward increasing risk states until a loss occurred due to a specific disaster event. In regard to this aspect this study, principally based on the definition of the Community Disaster Resilience Framework (CDRF) developed by Mayunga, is aiming to evaluate the level of community resilience to disaster at the Latvian national level for a specific set of social, economic, human, physical, and environmental indicators. The method implements the concept of a composite-based, multi-criteria analysis aiming to measure baseline quantitative characteristics of the communities under investigation to potentially further enhance resilience within specific actions plans and/or policy mechanisms. The results are applied to the Latvian context and provide a tool to assess the variation in resilience in places giving a ranking from the most resilient region to the least.

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Keywords: community disaster resilience; composite indicator; multi-criteria; indicator; building resilience

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1. Introduction

The increase of disasters at EU and international levels due to both man-made (i.e. technological) and natural reasons (i.e. hazards due to extreme weather conditions induced by climate change or by other geological, oceanographic, hydrological biological conditions [1]) create important debates and questions within research and policy arenas [2].

The Swiss Re's report of year 2013 [3] encountered at world scale 308 disaster events in the year 2013 (of which 150 were natural catastrophes and 158 technological) with almost 26 000 lost lives. Europe has experienced a total amount of $ 33 billion of economic losses with about 50 % of insurance payments.

Figures from the UNISDR [4] show that the exposure of technological assets to earthquake with a 250 years return time is about US$ 71 trillion. In Europe economic loss per capita is higher than in the rest of the world due to the higher population density. According to UNISDR this trend "will probably continue to rise as natural disasters are expected to become more frequent and severe for Europe in the future". To increase society's resilience to disaster in Europe, ANDROID – an academic network was formed that aims to promote co-operation among European Higher Education institutions [5]. Nevertheless, further research is crucial to increase number of innovations on topic of disaster resilience.

According to the figures provided by the Centre of Research on the Epidemiology of Disasters (CRED) country profile of Latvia within the period from 1999 to 2016 storms caused 6 deaths and damages from around 450 thous. € in the year 1999 and around 300 mill. € in the year 2005 [6].

This situation indicates that communities, including Latvia, are not "resilient" enough to natural disasters. In other words, there is a lack of capacity to withstand disasters that require an in-sight effort from different key actors in fact including research, policy, and disaster risk reduction (DRR) fields of interests. This is the main target following the Sendai Framework for Disaster Risk Reduction to move to "building the resilience of nations and communities to disasters" within hazard planning and disaster risk reduction agenda [7].

The general definition of resilience can be identified as a system's ability to: i) withstand external and unexpected conditions within the minimum sustainable level performance, ii) further actively respond to these conditions and iii) recover after them [8] (see Fig. 1).

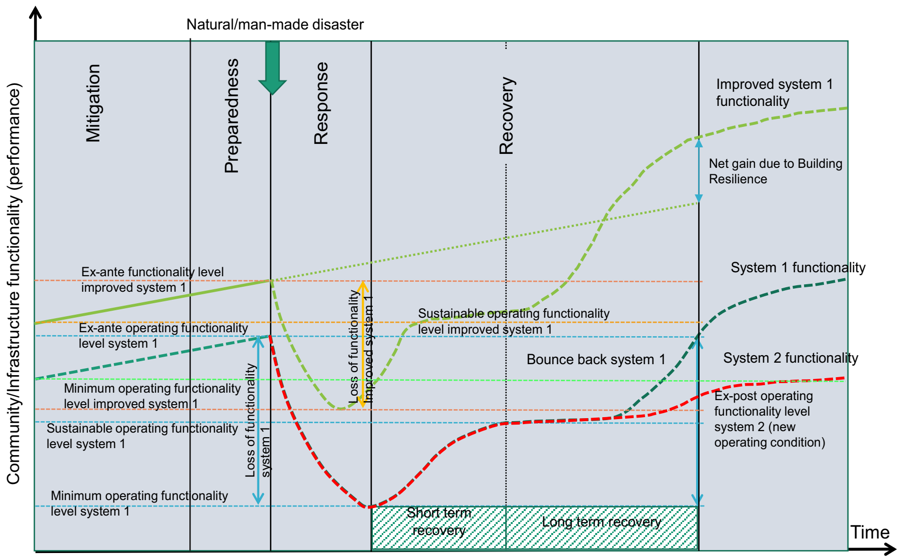

Fig. 1. The dotted dark green line represents the performance of a system (or society) without measures aimed to build resilience – i.e. system 1; the dotted light green line represents the performance of a system (or society) with measures aimed to build resilience – i.e. improved system 1; the dotted red line represents the performance of a system (or society) with low and a new operational level after the disaster – i.e. system 2.