

Climate Adaptation Pathways for Cities in Albania

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Abstract: The paper aims to provide insight on the level of risk and hazards that municipality of Shkodër is exposed of. Shkodra is one of the municipalities in Albania most exposed to natural hazards with floods, landslides, and wildfires emerging as critical risks. The municipality's geographic position, surrounded by rivers, lakes and mountainous terrain, makes it particularly vulnerable to climate-related shocks. Seasonal floods have historically disrupted communities and infrastructure, while slope instability in mountainous areas creates frequent landslide risks. In addition, hotter and drier summers have contributed to an increasing incidence of wildfires, threatening forests, agricultural land and settlements. Vulnerable groups in urban Shkodër will face overheating risks, while upland villages may experience water shortages and loss of pasture productivity. Shkodër's ecosystems face significant threats, especially wetlands around Lake Shkodër and Velipojë, which are vital habitats for migratory birds and fish. Rising temperatures, fluctuating water levels, and invasive species will continue to undermine biodiversity, with knock-on effects for tourism and fisheries that depend on healthy natural systems. Landslides and soil erosion in mountain areas such as Theth, Shalë and Dukagjin are expected to increase due to heavy precipitation events.

Key words: Climate change adaptation, risk and hazards, climate adaptations pathways and options.

1. Introduction

Cities are increasingly at the forefront of climate change impacts, as extreme heat, flooding, water scarcity, and infrastructure stress are experienced most directly in urban environments [1]. Unlike rural areas, cities concentrate population, assets, and services, which amplifies both exposure and vulnerability to climate-related hazards [2]. In mid-latitude regions, recurrent heat-wave conditions, with 93 events recorded over the past forty years, show a strong positive association between air temperature and aerosol loads [3]. At the same time, urban decision-making is challenged by uncertainty regarding the magnitude, timing and interaction of future climate risks [4]. Traditional climate adaptation planning often relies on fixed long-term strategies that assume relatively stable future conditions. However, such approaches may become

ineffective when socio-economic development, climate projections, or governance capacities change over time [5]. In response to this limitation, climate adaptation pathways have emerged as a flexible planning approach that emphasizes sequencing of actions, identification of decision points, and continuous learning [6]. Rather than prescribing a single optional solution, pathways approaches support robust decision-making under deep uncertainty by keeping multiple options open [7].

Over the past decade, the DAPP (Dynamic Adaptive Policy Pathways) framework has been applied across a range of climate adaptation contexts, including flood risk management, urban planning, and infrastructure development [8]. Empirical evidence shows that pathways thinking helps planners anticipate lock-in risks and better align short-time actions with long-term adaptation goals [9]. Nevertheless, translating pathways concepts into practical urban governance remains

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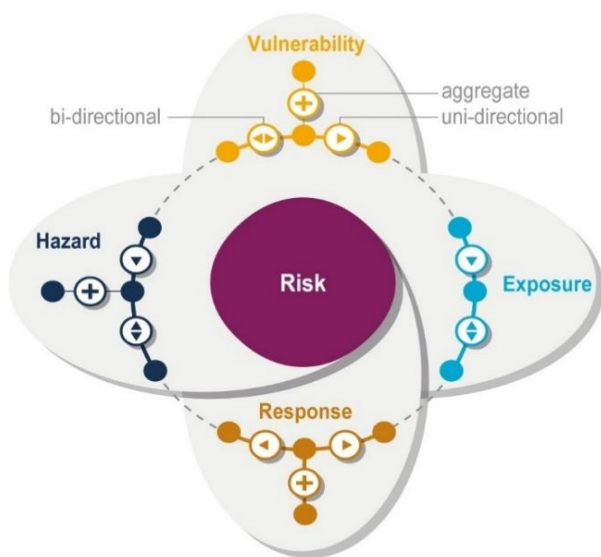


Fig. 1 Risk assessment components.

challenging, particularly in cities with limited institutional capacity or fragmented planning systems [10].

In the context of Albanian cities, these challenges are especially pronounced. Urban areas in Albania face increasing risks from heatwaves, flooding and water stress, while simultaneously undergoing rapid spatial development and economic transition [11]. Existing vulnerability assessment and adaptation initiatives, such as those conducted in Tirana, highlight the need to integrate adaptation considerations into everyday urban planning processes rather than treating them as isolated climate policies [12]. Moreover, national adaptation planning emphasizes the importance of iterative implementation, monitoring, and learning-principles that closely align with adaptation pathways thinking [11]. Against this background, this study explores climate adaptation pathways for cities in Albania, aiming to adapt the pathways approach to the specific institutional and planning context of Albania municipalities.

2. Methodology

The methodology applied in this study is based on the EU (European Union) climate risk assessment framework and the IPCC (Intergovernmental Panel on Climate Change) risk concept as outlined in the Sixth

Assessment Report (AR6) [13, 14]. A standardized climate risk assessment was employed, combining internationally recognized guidelines with nationally available data for Albania. Climate risks were assessed through a stepwise process including vulnerability, exposure, impact, and risk evaluation. Vulnerability assessment was conducted by analyzing sectoral sensitivity and adaptive capacity, while exposure was assessed in relation to current and projected climate-related hazards.

3. Results and Discussion

The high flood risk in this region is linked not only to the effects of deforestation, the construction of cascades and climate change, but also to the historical diversion of the Drin River's course in the 19th century. Until 1848, the Drin flowed toward the Adriatic Sea through Bushat and Gramsh (where it joined the Gjader River) and discharged near Lezhë. Sea level change is another factor affecting the southern part of the Drin-Buna lowland. Coastal erosion is particularly evident along the Viluni Lagoon shoreline and extends to the lower course of the Buna River. In some areas, especially near the Buna River delta, seawater has advanced inland by about 2 meters. Wildfires are becoming more frequent, straining public health and natural landscapes. Fires are a recurring and often accepted occurrence within the territory of Shkodra Municipality. They are particularly frequent in the administrative units of Velipojë and Ana e Malit, especially during the summer months. Repeated incidents are also noted along the lakeshore, where reed beds are regularly burned. These fires contribute to biodiversity loss and environmental degradation in the affected areas. According the information collected, the wildfires are common in the municipality of Shkodra where in 2022 were more frequent than in 2023 and mostly in the Administrative Units of Shkoder, Berdicë, Dajç, Velipojë and Guri i Zi. In Velipojë wildfires pose a significant risk since it is a Protected Landscape (IUCN category V). Fires in this region pose a dual

threat: they endanger the safety and livelihoods of local communities, while also placing the park's protected habitats, rare plant species and vulnerable wildlife at serious risk of degradation or loss. The impact is particularly concerning given the ecological sensitivity of the alpine ecosystems and the role they play in regional biodiversity. Landslides are a frequent hazard in Shkodra Municipality, particularly in the mountainous regions and flat area of Velipoja. As highlighted in the sections above, the steep and elevated terrain causes large rocks to fall from the mountains, posing significant risks to local residents, not only to their homes but also to the limited road infrastructure in the area. According to information from the Municipality of Shkodra, the road sections affected by landslides include: Theth-Nderlysaj Road, Boge-Theth Section, Prekal-Kir Segment. In Shkodra, heatwave is classified as a medium hazard based on available climate models. This indicates that within the next five years, there is a greater than 25% probability of experiencing at least one period of prolonged extreme heat, leading to heat stress. Such conditions pose risks not only to public health, particularly for vulnerable groups such as the elderly, children and people with chronic illnesses, but also to urban infrastructure, agriculture, and water resources. Across all scenarios and seasons, Shkodra is expected to experience a steady rise in temperature throughout the century. Both average and extreme values for summer and winter will continue to climb, with consequences for ecosystems, water systems and the well-being of communities. Warmer winters are projected to reduce frost days and snowfall events, altering river regimes and putting additional stress on species and habitats currently adapted to colder conditions. Shkodër Municipality is highly vulnerable to climate hazards due to the interplay of demographic, infrastructural, ecological and economic factors. The municipality is experiencing population decline and aging, with rural areas at risk of depopulation and socially vulnerable groups concentrated in low-lying, flood-prone zones.

Its transport network, including mountainous and coastal roads, informal settlements and hydropower infrastructure, faces frequent disruption from landslides, floods and extreme weather, affecting access to schools, health services and markets

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