Assessing the Consequences of Natural Disasters on Sustainability in Rural Municipalities: Evidence from Loška Dolina

Vito Bobek[*a], Blanka Lipovac[b], Tatjana Horvat[c]
[a] *University of Ljubljana, Faculty of Social Sciences, Ljubljana, Slovenia*
[b] *DOBA College of Business, Maribor, Slovenia*
[c] *University of Primorska, Faculty of Management, Koper, Slovenia*
vito.bobek@guest.arnes.si, blanka.lipovac1@net.doba.si, tatjana.horvat@fm-kp.si

ARTICLE INFO

Original Scientific Article

Article history:
Received October 2024
Revised November 2024
Accepted November 2024

JEL Classification
Q54, O13, R58

Keywords:
Natural disasters
Sustainable development
Rural municipalities
Resilience
Loška Dolina
SWOT analysis

UDK: 502.131.1:504.4
DOI: 10.2478/ngoe-2024-0023

Cite this article as: Bobek, V., Lipovac, B. & Horvat, T. (2024). Assessing the Consequences of Natural Disasters on Sustainability in Rural Municipalities: Evidence from Loška Dolina. *Naše gospodarstvo/Our Economy, 70*(4), 49-60. DOI: 10.2478/ngoe-2024-0023

Abstract

This study examines the impact of natural disasters on the sustainable development of the rural municipality of Loška Dolina, focusing on the 2014 ice storm and subsequent floods. Through semi-structured interviews with seven key stakeholders, including local government, civil protection, and affected individuals, the research analyzes the disasters' effects on the economic, social, and environmental pillars of sustainability. The ice storm damaged forests and infrastructure, while floods caused soil contamination and habitat disruption. Despite these challenges, the community showed resilience and increased climate awareness. The SWOT analysis highlights both opportunities in the timber industry and challenges in disaster preparedness. The study emphasizes integrating disaster risk reduction into sustainable development planning.

Introduction

Natural disasters pose significant challenges to sustainable development, particularly in rural areas where economic, social, and environmental systems are often fragile and interdependent. As defined by the United Nations, sustainable development involves balancing economic growth, social equity, and environmental protection (United Nations, 1987). This balance is critical for building community resilience, yet natural disasters disrupt economies, displace communities, and degrade environments, challenging achieving sustainability (Cutter, 2016). Understanding the multifaceted impacts of such events is essential for devising effective strategies to mitigate their effects and promote resilience.

Rural municipalities like Loška Dolina, situated in Slovenia's Primorsko-Notranjska region, exemplify the vulnerabilities associated with geographic and climatic conditions. Renowned for its extensive forests, karst landscapes, and small settlements, Loška Dolina faces heightened risks from natural disasters. In 2014, the municipality

[*] *Corresponding author*

experienced two severe events: a destructive ice storm in January and catastrophic floods in November. These disasters caused extensive environmental, infrastructural, and economic damage, significantly impacting the municipality's sustainable development. The ice storm devastated forest ecosystems and infrastructure, leading to widespread power outages and ecological harm (ARSO, 2015). The floods exacerbated the situation, damaging homes, farms, and public infrastructure and creating long-term social and economic challenges (URSZR, 2014).

Despite the growing body of literature on disaster impacts, research has predominantly focused on urban areas, leaving a gap in understanding the unique challenges faced by rural municipalities (Birkmann et al., 2010). This study aims to address this gap by examining the effects of the 2014 natural disasters on Loška Dolina's sustainable development, specifically their impacts on the municipality's environmental conditions, local economy, and social dynamics.

The central research question guiding this study is: How did the 2014 ice storm and floods affect Loška Dolina's sustainable development? To answer this, the study sets the following objectives:

1. Analyze the environmental impacts of the 2014 disasters.
2. Assess the economic consequences and recovery opportunities.
3. Examine social effects and community responses.
4. Evaluate disaster prevention and mitigation measures.

Loška Dolina's experience provides a valuable case study for understanding how rural communities respond to and recover from natural disasters. By addressing this research gap, the study offers insights for policymakers seeking to integrate disaster risk reduction into sustainable development planning.

In conclusion, this research emphasizes the necessity of strengthening resilience by addressing economic, social, and environmental challenges holistically. The findings aim to inform adaptive strategies for disaster preparedness and recovery in rural municipalities, promoting long-term sustainability and resilience.

Literature Review

Natural Disasters and Sustainable Development

Natural disasters such as earthquakes, floods, hurricanes, and droughts arise from Earth's natural processes, causing extensive damage, loss of life, and socio-economic disruption (Smith, 2020). These events are categorized by the United Nations Office for Disaster Risk Reduction (UNDRR) into four primary types: meteorological, geological, hydrological, and climatological (UNDRR, 2020). Understanding these categories provides a foundation for assessing their impacts and developing effective responses.

In disaster impacts, the concept of vulnerability plays a central role. Vulnerability is a community's susceptibility to harm, determined by the degree of hazard exposure, sensitivity, and recovery capacity (Cutter et al., 2020). This susceptibility directly influences the socio-economic and environmental disruptions caused by disasters.

Resilience, closely linked to vulnerability, is a community's ability to adapt to and recover from disasters. Enhancing resilience is a critical component of sustainable development, as it ensures that communities can maintain economic growth, social inclusion, and environmental protection in the face of disaster risks (Adger, 2019).

As articulated by the Brundtland Commission, sustainable development seeks to balance these three dimensions—economic growth, social inclusion, and environmental protection—for long-term viability (United Nations, 1987; Adams, 2020). In this context, addressing vulnerability and building resilience are essential for reducing the adverse impacts of natural disasters and achieving sustainable development goals.

Impact of Natural Disasters on Rural and Urban Areas

Natural disasters affect rural and urban areas differently due to variations in population density, infrastructure, and resources. Urban areas often experience immediate, visible damage due to their dense populations and complex infrastructure. Meanwhile, less densely

populated rural areas face prolonged recovery due to limited resources (Birkmann et al., 2019).

In urban areas, robust emergency services and infrastructure help mitigate immediate effects. However, disruptions can cause widespread economic losses, as seen in Japan's 2011 earthquake and tsunami, which caused $235 billion in damages (World Bank, 2019). Conversely, dependent on agriculture and natural resources, rural areas suffer long-term consequences. The 2010 Pakistan floods, for example, devastated rural communities by destroying crops and displacing millions (Khan & Salman, 2019). Recovery is often slower due to inadequate infrastructure (Morton, 2019).

Cutter et al. (2020) developed the Social Vulnerability Index (SoVI), showing rural areas tend to have higher vulnerability due to lower incomes, aging populations, and dependence on agriculture. Wisner et al. (2019) highlight additional challenges rural communities face, such as limited access to healthcare and education, which hinder recovery efforts.

Current Policies and Strategies for Addressing Natural Disasters

Effective disaster management requires policies that address immediate responses and build long-term resilience. These strategies should be integrated into sustainable development plans to prioritize disaster risk reduction (DRR).

The Sendai Framework for Disaster Risk Reduction 2015-2030 emphasizes understanding disaster risk, improving governance, and integrating DRR into development policies (UNDRR, 2015). It advocates a multi-hazard approach to disaster management.

In the European Union, the Civil Protection Mechanism fosters cooperation in disaster response, while the EU Cohesion Policy funds resilience projects through sustainable land use and infrastructure (European Commission, 2020). National strategies, like Japan's Basic Act on Disaster Management and the United States' National Disaster Recovery Framework, emphasize community-based disaster management and public participation (Government of Japan, 2020; FEMA, 2019).

In Slovenia, the Administration for Civil Protection and Disaster Relief (URSZR) manages disaster responses, focusing on early warning systems and public awareness (URSZR, 2020). Slovenia's National Strategy for Sustainable Development includes resilience-building measures like sustainable land use (Government of Slovenia, 2020).

Integrating DRR into sustainable development policies presents challenges, especially in coordinating efforts across government levels and sectors. Effective disaster management requires a multi-stakeholder approach involving government agencies, NGOs, the private sector, and local communities (Blaikie et al., 2019). Developing countries especially need increased DRR investment (UNDRR, 2020).

Best practices for DRR include investing in resilient infrastructure, involving communities in disaster planning, and incorporating DRR into development strategies. For example, flood defences and earthquake-resistant buildings can mitigate disaster impacts (Hallegatte et al., 2020). Engaging communities in disaster planning strengthens social cohesion and meets local needs (Shaw, 2020). Environmental restoration projects can enhance natural resilience by buffering against future disasters (Burby, 2020; IPCC, 2022).

Urban areas suffer immediate and visible damage, while rural areas experience prolonged recovery due to weaker infrastructure. A comprehensive approach combining resilient infrastructure, community engagement, and sound land use planning improves disaster response and long-term resilience. Aligning with international frameworks like the Sendai Framework helps ensure communities are better prepared for future disasters.

Methodology

Research Design

This study uses a qualitative research design to examine the impact of natural disasters on the sustainable development of Loška Dolina. A qualitative approach is ideal for capturing the complexity of the interactions between natural disasters and sustainability's economic, social, and environmental dimensions (Creswell & Poth, 2018). Semi-structured interviews were chosen as the primary data collection method, as they allow for gathering detailed, nuanced information while maintaining flexibility for deeper exploration of relevant topics (Kallio et al., 2016).

Study Area

Loška Dolina, located in Slovenia's Primorsko-Notranjska region, covers 166.8 square kilometres with a population of around 3,500 (Statistical Office of the Republic of

Slovenia, 2020). The region features diverse natural landscapes, including forests and karst phenomena, with an economy based on agriculture, forestry, and tourism, alongside small and medium-sized enterprises. Its geographic and climatic conditions make it particularly vulnerable to natural disasters. In 2014, a severe ice storm hit the municipality in January, and catastrophic floods in November caused significant damage to the environment, infrastructure, and local economy, emphasizing the need for effective disaster management (URSZR, 2014).

Data Collection

Purposive sampling was used to select participants who could provide detailed insights into the impact of the 2014 natural disasters. Seven key stakeholders were chosen based on their direct involvement and expertise, ensuring diverse perspectives. The selection criteria included:

- Local government representatives involved in disaster response and policy-making,
- Civil protection authorities responsible for crisis management,
- Business owners whose operations were affected, and
- Residents who experienced the disasters firsthand.

Semi-structured interviews were conducted in person between March and May 2024, allowing for in-depth exploration of participants' experiences and ensuring a consistent time frame for data collection. Open-ended questions guided by the research objectives focused on the disasters' impact on sustainable development in Loška Dolina. Each interview lasted between 60 and 90 minutes, was recorded and transcribed with participants' consent, and followed strict ethical guidelines to ensure confidentiality. The interview procedure was designed and conducted in line with established qualitative research practices as outlined by Gill et al. (2008) and Saunders et al. (2015).

The semi-structured questionnaire used in this study was designed to address the research objectives and facilitate an in-depth exploration of the impacts of the 2014 natural disasters on Loška Dolina's sustainable development. It consisted of four thematic sections, each focusing on a specific pillar of sustainable development or related disaster management topics:

Introduction and Background Information

1. This section included demographic questions to collect basic information about the participants, such as their role in the community, profession, and direct experiences with the 2014 disasters. These questions helped contextualize the subsequent responses.
2. Environmental Impacts
3. Questions in this section explored the participants' observations of environmental damage caused by ice storms and floods. Topics included the extent of forest and soil degradation, water contamination, and the effectiveness of ecological restoration efforts.
4. Economic Consequences
5. This section focused on the economic repercussions of the disasters, including impacts on agriculture, forestry, and local businesses. It also examined opportunities for recovery, such as new economic activities and support mechanisms.

Social Dynamics and Resilience

6. Questions in this section addressed the social consequences of the disasters, such as displacement, emotional stress, and changes in community cohesion. Participants were also asked about the role of local authorities, civil protection, and community networks in disaster response and recovery.
7. Disaster Prevention and Mitigation Measures
8. The final section assessed the participants' perspectives on the adequacy of current disaster prevention strategies and suggested improvements for future preparedness. Topics included the role of early warning systems, public education, and land-use planning.

The semi-structured nature of the questionnaire allowed for flexibility, enabling participants to elaborate on their experiences and perspectives while ensuring that all key topics were addressed systematically. This approach effectively captured official responses and community experiences, providing a comprehensive understanding of the effects of disasters.

Data Analysis

The data collected from semi-structured interviews were analyzed using thematic analysis, a method for identifying, organizing, and interpreting patterns within qualitative data (Braun & Clarke, 2006). This process involved six systematic steps, each yielding specific

results that contribute to answering the research questions:

1. Familiarization: The initial step involved thoroughly reading and re-reading the interview transcripts to develop a deep understanding of the data. During this stage, we noted recurring topics such as the impact of disasters on community resilience and environmental degradation, which set the foundation for further analysis.
2. Coding: We systematically coded the transcripts, identifying relevant data points linked to the three sustainability pillars: environmental, social, and economic. For example, codes like "forest damage," "community support networks," and "economic disruptions" emerged as critical elements.
3. Theme Development: The codes were grouped into preliminary themes that represented overarching concepts. For instance:
    - Environmental Impact: Loss of biodiversity and increased soil erosion.
    - Social Impact: Strengthened community cohesion despite displacement.
    - Economic Impact: Short-term opportunities in construction alongside long-term challenges in agriculture.
4. Theme Review: The initial themes were reviewed and refined to ensure they accurately reflected the data. This step involved cross-referencing themes with interview excerpts, leading to adjustments such as combining related sub-themes like "economic challenges" and "post-disaster recovery activities" into a broader theme of "Economic Adjustments."
5. Defining Themes: Final themes were clearly defined and named, with detailed descriptions summarizing their essence. For example:
    - *Environmental Sustainability*: Highlights the dual impact of disaster-induced degradation and the potential for reforestation initiatives.
    - *Community Resilience*: Captures the social solidarity that emerged in disaster response efforts.
    - *Economic Adaptation*: Focuses on both the immediate economic disruptions and the subsequent opportunities in infrastructure rebuilding.
6. Report Production: The themes were organized into a coherent narrative addressing the research questions. This included presenting findings like the significant role of community networks in recovery and the need for sustainable land use practices to mitigate future risks.

By explicitly detailing these steps and their associated results, the analysis ensures a coherent progression, creating a 'red thread' that integrates the data with the research objectives. This clarity enhances the understanding of how disasters have shaped sustainability efforts in Loška Dolina.

Additionally, a SWOT analysis was conducted to assess the strengths, weaknesses, opportunities, and threats related to Loška Dolina's sustainable development following the 2014 disasters. SWOT analysis is a strategic tool for identifying internal and external factors influencing an organization's or community's resilience and vulnerability (Gürel & Tat, 2017).

Results

Findings from Interviews

The 2014 ice storm and subsequent floods caused significant environmental damage, particularly in forested areas, where widespread tree damage resulted in biodiversity loss and habitat disruption. Floods worsened the situation with soil erosion, water contamination, and destruction of agricultural land, putting additional stress on the environment.

Economically, the disasters severely impacted agriculture and forestry, with substantial losses in crops, livestock, and timber. Disruptions in transportation and communication further slowed economic activities, causing a temporary economic decline. However, recovery efforts created opportunities, such as increased demand for construction and repair services, offering a brief economic boost.

Socially, the disasters displaced residents, led to property loss, and caused emotional trauma, but they also strengthened community solidarity. Social networks and mutual support were crucial in helping residents cope and recover. Local authorities and civil protection agencies effectively coordinated relief efforts, though the interviews revealed a need for improved public education on disaster preparedness.

Loška Dolina's disaster management demonstrated strengths in communication and response coordination. However, stakeholders identified areas for improvement, including better infrastructure, more comprehensive risk assessments, and enhanced disaster preparedness education.

Impact on Sustainable Development

The 2014 disasters greatly impacted Loška Dolina's

sustainable development, affecting its economy, society, and environment. Agriculture and forestry were severely impacted, with financial losses from destroyed crops and livestock, while infrastructure damage disrupted access to markets and services. Nonetheless, the post-disaster period spurred temporary economic activity in the construction sector and encouraged discussions on resilient agricultural practices, such as agroforestry and soil conservation.

Socially, the disasters caused displacement and emotional distress. However, strong community bonds helped facilitate recovery. While local authorities were praised for coordinating relief efforts, the need for improved disaster preparedness and public education was evident, with suggestions for community drills and training sessions to reduce future vulnerability.

Environmentally, the loss of forest cover and soil erosion diminished land productivity. Contaminated water sources posed public health risks and threatened biodiversity. Stakeholders emphasized the need for reforestation projects, soil conservation, and water protection efforts to build resilience and mitigate future disaster impacts.

SWOT Analysis

The SWOT analysis provided a structured assessment of the strengths, weaknesses, opportunities, and threats to Loška Dolina's sustainable development following the 2014 disasters.

The SWOT analysis of the economic pillar highlighted the vulnerabilities in Loška Dolina's economy, such as its dependency on agriculture and forestry, which makes it particularly sensitive to environmental disruptions. However, the availability of local resources and the potential for more resilient agricultural practices present opportunities to mitigate these risks.

Table 1
SWOT Analysis of Loška Dolina Sustainable Development - Economic Pillar

Strengths	***Weaknesses***	***Opportunities***	***Threats***
Local solid businesses rooted in agriculture and forestry	*High dependency on agriculture and forestry*	*Development of sustainable agricultural practices*	*Recurring natural disasters and climate change*
Availability of local resources (e.g., timber)	*Limited financial resources for recovery*	*Demand for construction and repair services post-disaster*	*Loss of agricultural productivity due to environmental degradation*

Source: Own construction of the authors

Table 2
SWOT Analysis of Loška Dolina Sustainable Development - Social Pillar

Strengths	***Weaknesses***	***Opportunities***	***Threats***
Strong community cohesion	*Limited public awareness of disaster preparedness*	*Community-based preparedness programs*	*Emotional stress from recurring disasters*
Effective coordination by local authorities	*Emotional trauma from property loss*	*Strengthening social networks*	*Potential weakening of social cohesion if recovery efforts are uneven*

Source: Own construction of the authors

In the social pillar, strong community bonds were a major asset, helping residents cope with the disasters. However, limited public awareness and emotional trauma were identified as weaknesses. Community-based disaster preparedness programs were seen as a critical opportunity to build resilience.

Table 3
SWOT Analysis of Loška Dolina Sustainable Development - Environmental Pillar

Strengths	Weaknesses	Opportunities	Threats
Rich natural landscapes and biodiversity	Environmental degradation (loss of forest cover, soil erosion)	Reforestation and soil conservation projects	Ongoing environmental degradation and climate change
Established conservation efforts	Limited resources for environmental restoration	Sustainable land use practices	Increased vulnerability to future disasters

Source: Own construction of the authors

The environmental SWOT analysis underscored the importance of leveraging Loška Dolina's natural assets and conservation efforts to enhance resilience. While the region suffers from significant environmental degradation, there are clear opportunities for reforestation and sustainable land use practices. However, ongoing threats such as climate change and the potential for recurring disasters remain critical concerns.

The 2014 natural disasters profoundly and multifacetedly impacted Loška Dolina's sustainable development. While the community demonstrated resilience, particularly in its social cohesion, the economy and environment remain vulnerable. The findings from this study provide essential insights for local authorities and policymakers to enhance disaster preparedness, promote long-term environmental sustainability, and build economic resilience. Addressing the identified weaknesses and threats while leveraging opportunities in agriculture, forestry, and community engagement can significantly improve the region's capacity to withstand future disasters.

Discussion

Interpretation of Results

This study underscores the profound and multifaceted effects of the 2014 natural disasters on Loška Dolina's economic, social, and environmental pillars of sustainable development. These findings are consistent with prior research on the complex interplay between natural disasters and sustainability (Cutter et al., 2020; Hallegatte et al., 2019).

Economic Impact: Economically, the disasters caused widespread damage to critical sectors such as agriculture and forestry, which form the backbone of Loška Dolina's economy. The ice storm resulted in the loss of vast forested areas, reducing timber resources and biodiversity, while the subsequent floods destroyed crops, livestock, and infrastructure. These events disrupted livelihoods and posed significant challenges to long-term economic stability, particularly for a rural municipality with limited financial reserves. Nevertheless, the recovery phase revealed opportunities for economic diversification. The increased demand for construction and repair services following the disasters stimulated short-term economic activity and created jobs, demonstrating the potential of post-disaster recovery to catalyze specific sectors (Hallegatte & Vogt-Schilb, 2020). Efforts to integrate resilience-building into economic strategies, such as promoting sustainable forestry and agroforestry, could reduce vulnerability to future events and foster more robust economic foundations.

Social Impact: Socially, the disasters presented challenges and opportunities for community resilience. The displacement of residents, property loss, and emotional trauma highlighted the vulnerabilities of rural communities. However, the disasters also showcased the strength of social capital in Loška Dolina. Residents banded together, strengthening community bonds through mutual aid and support networks. This aligns with the findings that robust social networks are crucial in disaster recovery and resilience (Aldrich & Meyer, 2015). Local authorities were praised for coordinating relief efforts, though the lack of systematic disaster preparedness training and public education revealed significant gaps. Initiatives such as community disaster drills, awareness campaigns, and capacity-building programs were suggested as vital steps to empower residents and reduce future risks (Shaw, 2020).

Environmental Impact: Environmentally, the disasters severely damaged Loška Dolina's natural landscape. The ice storm devastated forest ecosystems, leading to biodiversity loss and disruption of habitats, while the floods exacerbated soil erosion, water contamination, and agricultural land degradation. These impacts not only threatened ecological balance but also jeopardized long-term sustainability. Restoration projects, such as reforestation and soil conservation, emerged as critical measures to mitigate the damage and promote ecological recovery (Birkmann et al., 2019). Furthermore, the

disasters underscored the importance of integrating sustainable land use practices and climate-adaptive strategies into regional planning to build resilience against future environmental shocks.

Overall, this study highlights the interconnectedness of economic, social, and environmental dimensions in the context of natural disasters. Addressing the vulnerabilities exposed by the 2014 events while leveraging the strengths demonstrated during recovery is crucial for promoting sustainable development in Loška Dolina. The findings underscore the need for a holistic, multi-dimensional approach to disaster risk reduction, resilience building, and sustainability planning.

Policy Implications

The findings point to several policy recommendations for Loška Dolina and similar rural areas. Economic diversification is crucial to reduce reliance on agriculture and forestry. Policies should encourage alternative activities such as agroforestry, which integrates trees into farming to enhance resilience (Schoeneberger, 2019). Promoting tourism and renewable energy can also open new economic avenues.

Strengthening social networks is vital for building resilience. Disaster preparedness programs, regular community drills, and training sessions should be prioritized (Shaw, 2020). Establishing community-based disaster management groups could also enhance emergency coordination.

Reforestation and soil conservation projects should be prioritized to restore ecosystems and strengthen resilience (IPCC, 2022). Encouraging sustainable agricultural practices like organic farming can mitigate environmental damage and enhance long-term sustainability (Garnett et al., 2013).

Disaster risk reduction (DRR) should be integrated into land use planning and infrastructure development. Policies should discourage construction in high-risk areas, such as floodplains, and promote resilient building materials (Burby, 2020). Additionally, improved early warning systems and emergency response capabilities can mitigate future risks.

Limitations of the Study

This study has limitations. The small sample size of seven stakeholders may not capture the full range of perspectives in the community. Future studies with more extensive and more diverse samples could offer broader insights. Additionally, the focus on one rural municipality limits the generalizability of the findings. Comparative studies across multiple regions could provide a more comprehensive understanding.

The qualitative approach, while providing valuable insights, is subjective. Triangulating these findings with quantitative data, such as economic assessments and environmental monitoring, would improve validity.

Finally, this study focuses on short-term disaster impacts. Long-term effects may evolve, and future research could explore how resilience develops. Longitudinal studies would provide deeper insights into long-term sustainability and resilience.

Despite these limitations, the study emphasizes integrating disaster risk reduction into sustainable development strategies. Addressing economic, social, and environmental dimensions will help policymakers build more resilient rural communities and reduce vulnerability to future disasters.

Conclusion

Summary of Findings

This study examined the impacts of the 2014 natural disasters on Loška Dolina's sustainable development by interviewing key stakeholders. It analyzed the effects on economic, social, and environmental dimensions, highlighting the challenges and opportunities for resilience building.

Economically, the disasters severely affected agriculture and forestry, critical sectors for Loška Dolina’s stability. The area's reliance on these sectors increased vulnerability, leading to significant losses. However, the recovery phase revealed opportunities for economic diversification, particularly in construction, indicating the potential for innovation-driven resilience.

Socially, the disasters strengthened community cohesion, with mutual support crucial for recovery. Local authorities and civil protection agencies played a significant role in coordinating responses. However, the lack of public awareness of disaster preparedness revealed the need for more robust community-based education programs.

Environmentally, the disasters caused severe damage, including deforestation and soil erosion. This emphasizes

the importance of sustainable land use and restoration efforts, reinforcing the need to integrate disaster risk reduction with sustainable development (IPCC, 2021; Shaw, 2020).

Recommendations

Based on the findings of this study, a series of recommendations are proposed to strengthen resilience and promote sustainable development in Loška Dolina and comparable rural municipalities. These recommendations are organized according to the economic, social, environmental, and disaster risk reduction dimensions of sustainable development:

1. Enhancing Economic Resilience
    - Economic Diversification: Encouraging diversification of economic activities, such as fostering tourism development, renewable energy projects, and small enterprises, can reduce reliance on agriculture and forestry, thereby increasing economic stability (Schoeneberger, 2019).
    - Sustainable Agricultural Practices: Promoting resilient agricultural approaches, including agroforestry and organic farming, can enhance the sustainability and adaptability of local agricultural systems (Garnett et al., 2013).
2. Strengthening Social Resilience
    - Disaster Preparedness Programs: Regular community disaster preparedness drills and training sessions are essential to enhance public awareness and improve the community's response capabilities in future disasters (Shaw, 2020).
    - Community-Based Management: Strengthening social cohesion by forming community-led disaster management groups can enhance collective resilience and ensure effective response coordination (Aldrich & Meyer, 2015).
3. Promoting Sustainable Environmental Practices
    - Reforestation and Soil Conservation Initiatives: Prioritizing reforestation and soil conservation projects is crucial for restoring degraded ecosystems and mitigating the risks associated with future natural disasters (IPCC, 2022).
    - Sustainable Land Use Policies: Developing and enforcing policies that discourage construction in high-risk areas, such as floodplains, and promoting using resilient building materials can significantly reduce environmental vulnerability (Burby, 2020).
4. Integrating Disaster Risk Reduction into Development Planning
    - Comprehensive Disaster Risk Reduction (DRR) Strategies: Integrating DRR measures into all levels of development planning can ensure that long-term sustainability and resilience objectives are systematically addressed (Hallegatte et al., 2019).
    - Improved Early Warning Systems: Enhancing early warning systems and strengthening emergency response infrastructure can play a critical role in reducing the impact of future disasters (UNDRR, 2015).

Future Research

To advance the understanding of disaster resilience and inform policy development, future research should address several critical areas:

- Longitudinal Studies: Investigating the long-term impacts of natural disasters through longitudinal studies would provide insights into the evolution of resilience over time and the effectiveness of recovery strategies (Cutter et al., 2020).
- Comparative Analyses: Cross-regional comparisons of rural municipalities can help identify shared challenges and practical strategies, offering a broader basis for generalizing findings and developing targeted interventions (Birkmann et al., 2019).
- Interdisciplinary Approaches: Integrating socio-economic and environmental factors is essential to comprehensively assess the multifaceted effects of natural disasters on sustainable development (Garnett et al., 2013).
- Quantitative Evaluations: Employing economic and environmental assessments to measure the outcomes of resilience strategies can enhance the evidence base for disaster risk reduction (Hallegatte & Vogt-Schilb, 2020).
- Policy Evaluation: Systematic evaluations of existing disaster risk reduction (DRR) policies are necessary to identify strengths, address shortcomings, and ensure alignment with sustainability objectives (UNDRR, 2015).

This study emphasizes integrating disaster risk reduction with sustainable development strategies in rural communities such as Loška Dolina. Addressing economic, social, and environmental factors is crucial for

strengthening resilience and mitigating the impacts of future disasters. Future research should prioritize interdisciplinary, comparative, and longitudinal approaches to provide a robust foundation for adaptive policymaking and effective disaster management.

References

Adams, W. M. (2006). *The future of sustainability: Re-thinking environment and development in the twenty-first century*. Report of the IUCN Renowned Thinkers Meeting. Gland, Switzerland: International Union for Conservation of Nature.

Adger, W. N. (2019). Social and ecological resilience: Are they related? *Progress in Human Geography, 43*(3), 347–364. https://doi.org/10.1191/03091320070154046

Aldrich, D. P., & Meyer, M. A. (2015). Social capital and community resilience. *American Behavioral Scientist, 59*(2), 254–269. DOI: https://doi.org/10.1177/0002764214550299

ARSO. (2015). *Environmental Report 2015*. Slovenian Environment Agency. Retrieved from https://www.arso.gov.si

Birkmann, J., von Teichman, K., Welle, T., & Witting, M. (2010). The role of socio-economic factors in the vulnerability of rural communities to climate change: Implications for adaptation planning. *Mitigation and Adaptation Strategies for Global Change, 15*(2), 205–222. DOI: https://doi.org/10.1007/s11027-009-9164-7

Birkmann, J., von Teichman, K., Welle, T., & Witting, M. (2019). The role of socio-economic factors in the vulnerability of rural communities to climate change: Implications for adaptation planning. *Mitigation and Adaptation Strategies for Global Change, 24*(2), 205–222.

Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (2019). *At risk: Natural hazards, people's vulnerability, and disasters* (2nd ed.). London: Routledge. DOI: https://doi.org/10.4324/9780203428764

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. DOI: https://doi.org/10.1191/1478088706qp063oa

Burby, R. J. (2020). *Cooperating with nature: Confronting natural hazards with land use planning for sustainable communities*. Joseph Henry Press. DOI: https://doi.org/10.17226/5785

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.

Cutter, S. L. (2016). Resilience to what? Resilience for whom? The emergence of the social resilience perspective. *Environmental Science & Policy, pp. 61*, 1–6. DOI: https://doi.org/10.1016/j.envsci.2016.03.001

Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., & Webb, J. (2020). A place-based model for understanding community resilience to natural disasters. *Global Environmental Change, 30*(4), 598–606. DOI: https://doi.org/10.1016/j.gloenvcha.2008.07.013

European Commission. (2019). *Cohesion policy and the European Structural and Investment Funds*. Retrieved from https://ec.europa.eu/regional_policy/en/policy/what/glossary/c/cohesion-policy

European Commission. (2020). *EU Civil Protection Mechanism*. Retrieved from https://ec.europa.eu/echo/what/civil-protection/mechanism_en

FEMA. (2019). *National Disaster Recovery Framework: Strengthening disaster recovery for the nation*. Federal Emergency Management Agency. Retrieved from https://www.fema.gov/national-disaster-recovery-framework

Garnett, T., Appleby, M. C., Balmford, A., Bateman, I. J., Benton, T. G., Bloomer, P., ... & Herrero, M. (2013). Sustainable intensification in agriculture: Premises and policies. *Science, 341*(6141), 33–34. DOI: https://doi.org/10.1126/science.1234485

Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: Interviews and focus groups. *British Dental Journal, 204*(6), 291–295. DOI: https://doi.org/10.1038/bdj.2008.192

Government of Japan. (2020). Essential Act on Disaster Management. Retrieved from https://www.bousai.go.jp/en/documentation/basic_act.html

Government of Slovenia. (2020). National Strategy for Sustainable Development. Retrieved from https://www.vlada.si/national-strategy-for-sustainable-development

Gürel, E., & Tat, M. (2017). SWOT analysis: A theoretical review. *Journal of International Social Research, 10*(51), 994-1006. DOI: 10.17719/jisr.2017.1832

Hallegatte, S., & Vogt-Schilb, A. (2020). *From Poverty to Disaster and Back: A Review of the Literature*. World Bank. DOI: 10.1596/1813-9450-9166

Hallegatte, S., Rentschler, J., & Walsh, B. (2019). *Building Back Better: Achieving Resilience through Stronger, Faster, and More Inclusive Post-Disaster Reconstruction*. World Bank. DOI: 10.1596/31362

IPCC. (2022). *Climate change 2021: Impacts, adaptation, and vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. DOI: https://doi.org/10.1017/9781009325844

Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: Developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing, 72*(12), 2954–2965. DOI: https://doi.org/10.1111/jan.13031

Khan, M. R., & Salman, A. (2019). A simple human vulnerability index to climate change hazards for Pakistan. *International Journal of Disaster Risk Science, 10*(3), 163-176. DOI: 10.1007/s13753-019-0218-2

Morton, J. F. (2019). The impact of climate change on smallholder and subsistence agriculture. *Proceedings of the National Academy of Sciences, 116*(50), 19680–19685. DOI: https://doi.org/10.1073/pnas.1909208116

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research, 42*(5), 533–544. DOI: 10.1007/s10488-013-0528-y

Saunders, B., Kitzinger, J., & Kitzinger, C. (2015). Anonymizing interview data: Challenges and compromise in practice. *Qualitative Research, 15*(5), 616-632. DOI: 10.1177/1468794114550439

Shaw, R. (2020). *Community-based disaster risk reduction*. Emerald Group Publishing Limited. DOI: https://doi.org/10.1108/9781780524869

Smith, K. (2020). *Environmental Hazards: Assessing Risk and Reducing Disaster* (7th ed.). Routledge. DOI: 10.4324/9780429324950

Statistical Office of the Republic of Slovenia. (2020). Population and migration. Retrieved from https://www.stat.si

UNDRR. (2015). *Sendai Framework for Disaster Risk Reduction 2015–2030*. United Nations Office for Disaster Risk Reduction. Retrieved from https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030

UNDRR. (2020). Terminology: Disaster Risk Reduction. United Nations Office for Disaster Risk Reduction. Retrieved from https://www.undrr.org/terminology

URSZR. (2014). Report on the floods in Slovenia in November 2014. Administration of the Republic of Slovenia for Civil Protection and Disaster Relief. Retrieved from https://www.urszr.si

URSZR. (2020). Report on the floods in Slovenia in November 2014. Administration of the Republic of Slovenia for Civil Protection and Disaster Relief. Retrieved from https://www.urszr.si

United Nations. (1987). *Report of the World Commission on Environment and Development: Our Common Future*. Retrieved from https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2019). *At Risk: Natural Hazards, People's Vulnerability and Disasters* (2nd ed.). Routledge. DOI: 10.4324/9780203428764

World Bank. (2019). *World Development Report 2019: Risk and Opportunity - Managing Risk for Development*. World Bank. DOI: 10.1596/978-1-4648-1328-3

Ocena posledic naravnih nesreč na trajnost v podeželskih občinah: Primer Loške doline

Izvleček

Študija preučuje vpliv naravnih nesreč na trajnostni razvoj podeželske občine Loška Dolina, s poudarkom na žledu leta 2014 in kasnejših poplavah. S polstrukturiranimi intervjuji s sedmimi ključnimi deležniki, vključno s predstavniki lokalne oblasti, civilne zaščite in prizadetimi posamezniki, raziskava analizira vpliv nesreč na ekonomski, družbeni in okoljski steber trajnosti. Žled je povzročil škodo na gozdovih in infrastrukturi, medtem ko so poplave povzročile onesnaženje tal in motnje v habitatih. Kljub izzivom je skupnost izkazala odpornost in povečano ozaveščenost o podnebnih spremembah. SWOT analiza izpostavlja tako priložnosti v lesni industriji kot tudi izzive na področju pripravljenosti na nesreče. Študija poudarja potrebo po vključevanju zmanjšanja tveganja nesreč v načrtovanje trajnostnega razvoja.

Ključne besede: Naravne nesreče, trajnostni razvoj, podeželske občine, odpornost, Loška dolina, SWOT analiza