

Titulo	Abstract
<p>Proposal of instruments to implement an early warning system for debris flow in the Pedregal creek, Lurigancho Chosica, 2020.</p>	<p>proponer un sistema efectivo de alerta temprana diseñado específicamente para el flujo de escombros en la en la quebrada Pedregal de Lurigancho-Chosica, centrándose en la comprensión de las características y la dinámica del examinando los sistemas de alerta temprana existentes, identificando los componentes necesarios para el sistema a medida, garantizando su detección precisa y capacidad de previsión, y abordando las consideraciones y consideraciones y desafíos prácticos para la aplicación del sistema en la zona de estudio.</p>
<p>Integral management plan to reduce damages caused by landslides, El Pedregal stream, Chosica.</p>	<p>Develop a comprehensive management plan to reduce landslide damage in El Pedregal, Chosica, Peru. The focus of the paper is to assess the risks associated with landslides, propose specific mitigation measures, involve the local community in the process, and support the plan with technical and scientific data. This work seeks to contribute to landslide risk reduction in the region and to serve as a guide for the management of similar natural hazards in other landslide-prone areas.</p>
	<p>Purpose To examine landslides in the Lurigancho-Chosica district of Lima, Peru, and explore their relationship with urbanization, social vulnerability, local culture and community resilience. The article focuses on understanding the frequency and causes of landslides. assessing how</p>

<p>Landslides in the Lima district of Lurigancho-Chosica: urbanization, social vulnerability, culture, and community resilience.</p>	<p>urban development influences the area's susceptibility to these events, and analyzing how the local population, especially those in unfavorable socioeconomic situations, is affected by landslides. In addition, it examines how local culture and community resilience influence community response and adaptation to these disasters. In summary, the article addresses a variety of aspects related to landslides in this region, with the objective of providing valuable information for natural risk management and community protection in Lurigancho-Chosica.</p>
<p>Sustainable urban drainage systems (SuDS) for flood control: A critical review</p>	<p>The main purpose of this paper is to provide a critical review of sustainable urban drainage systems (SuDS) in the context of their application for flood control. The article focuses on evaluating the effectiveness of these systems in managing excess stormwater runoff and reducing flood risk in urban environments. To achieve this goal, the article addresses key issues, such as the efficiency and sustainability of SuDS, their benefits, and limitations, and provides a critical overview of existing research in this field. In essence, the article seeks to provide an informed understanding of how SuDS can contribute to mitigating the problem of flooding in urban areas, highlighting their feasibility and challenges.</p>
<p>Nature-Based Solutions for Flood Mitigation: A Guide for Policy Makers</p>	<p>Main purpose to provide guidance to policy makers on how to use nature-based solutions to mitigate the effects of floods. The document addresses topics such as the definition of nature-based solutions, their benefits, practical examples of successful projects, policy guidelines, and implementation considerations. In essence, this guide provides information and practical tools for policy makers to understand and apply these solutions in their flood management strategies, highlighting their advantages and providing direction on how to implement them effectively.</p>

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<i>Proposal of instruments to implement an early warning system for debris flow in the Pedregal creek, Lurigancho Chosica, 2020. Gallo, C., &amp; Medina, J. (2021).</i>	<p>Lack of Community Participation: Successful implementation of a landslide early warning system often depends on the active participation and education of the local community. If this aspect was not addressed in the work, it could be a problem.</p>
	<p>Climate Change and Climate Variability: In the context of an early warning system, it is essential to take into account the influence of climate change and climate variability on landslide occurrence. If the work does not address these factors, it could be incomplete.</p>
	<p>Lack of Data and Previous Studies: One of the common problems in this type of work is the lack of accurate data and previous geological studies to support the need and effectiveness of the proposed early warning system. Without a solid base of information, the proposal may lack solid foundations.</p>
Integral management plan to reduce damages caused by landslides, El Pedregal stream, Chosica. Delgado, C. & Tamayo, G. (2020).	<ul style="list-style-type: none"><li>• <b>Landslide Risk:</b> One of the fundamental problems that this type of plan addresses is the constant risk of landslides in El Pedregal, Chosica. This can be caused by geological, climatic, and land use factors.</li></ul>
	<ul style="list-style-type: none"><li>• <b>Damage to Infrastructure and Housing:</b> Landslides can cause significant damage to local infrastructure such as roads, bridges, and housing. This can affect the quality of life of the community and their ability to access basic services.</li></ul>
	<ul style="list-style-type: none"><li>• <b>Social Vulnerability:</b> The local population may be particularly vulnerable to landslides due to socioeconomic factors. Poor housing and lack of resources can exacerbate the impacts of natural disasters.</li></ul>
Landslides in the Lima	<ul style="list-style-type: none"><li>• <b>Landslide Risk:</b> The district of Lurigancho-Chosica is exposed to landslides due to its geography and climatic conditions. These events can cause damage to infrastructure and endanger the lives of residents</li></ul>
	<ul style="list-style-type: none"><li>• <b>Unplanned Urbanization:</b> Rapid urban growth and the expansion of</li></ul>

<p>district of Luriganchochosica: urbanization, social vulnerability, culture, and community resilience. Depaula, D. (2020).</p>	<p>housing in high-risk areas can increase vulnerability to landslides.</p>
	<ul style="list-style-type: none"> <li>• <b>Social Vulnerability:</b> The most vulnerable populations, who may have low incomes and precarious housing, are at greater risk during landslides. Lack of resources and safe housing options can exacerbate this vulnerability.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Climate Change:</b> Changes in weather patterns may increase the frequency and severity of landslides in the region</li> </ul>
<p>Sustainable urban drainage systems (SuDS) for flood control: A critical review. Smith, D. I., &amp; Bhawe, A. G. (2020).</p>	<ul style="list-style-type: none"> <li>• <b>Urban Flooding:</b> Urban flooding is a common problem in many cities due to soil impermeabilization and lack of adequate drainage capacity in conventional systems.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Environmental Impact:</b> Traditional urban drainage systems can contribute to the pollution of local water bodies due to the entrainment of surface pollutants.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Sustainability:</b> Lack of focus on sustainable water management practices can increase long-term costs and vulnerability to extreme weather events.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Space Scarcity:</b> In densely populated urban areas, the lack of available space to implement sustainable drainage systems can be a challenge.</li> </ul>
<p>Nature-Based Solutions for Flood Mitigation: A Guide for Policy Makers. The Nature Conservancy. (2019).</p>	<ul style="list-style-type: none"> <li>• <b>Flooding and Climate Change:</b> The increase in flooding and extreme weather events due to climate change is a significant problem in many regions of the world.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Impact on Communities:</b> Flooding can cause severe damage to infrastructure, properties, and communities, resulting in economic losses and risks to people's health and safety.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Unsustainable Urban Development:</b> In many cases, unplanned urban development and soil sealing have increased vulnerability to flooding.</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Erosion and Environmental Degradation:</b> Flooding can lead to soil erosion and environmental degradation, which negatively affects local ecosystems and water quality.</li> </ul>

## CONCLUSION

**Significance of Findings**

**Study Findings**

Provide a proposed framework for implementing an early warning system tailored for debris flow in the Pedregal creek of Lurigancho-Chosica. Such a system can contribute to reducing the risk and potential impact of debris flow events, enhancing the safety of the local population and infrastructure. The study's findings can inform decision-making processes, disaster management strategies, and infrastructure planning in areas prone to debris flow

description of debris flow characteristics and dynamics in the Pedregal creek, reviews existing early warning systems for debris flow, proposes specific instruments or components for an early warning system, evaluates its effectiveness in detecting and forecasting events, and discusses practical considerations and challenges in implementing the system in Lurigancho- Chosica, including cost, maintenance, community engagement, and integration with existing disaster management processes.

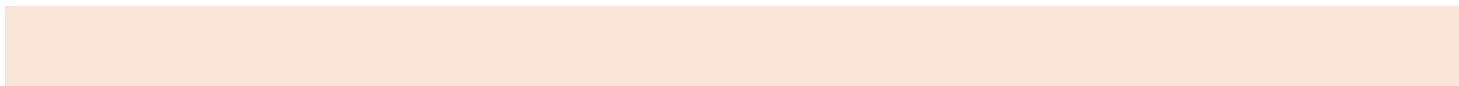
Provide a vital management plan for mitigating landslide damages in the El Pedregal stream area, offering valuable guidance to local authorities, stakeholders, and communities to implement effective measures, protect lives, and safeguard infrastructure, while also providing insights applicable to other landslide-prone areas.

Identify the main contributing factors to landslides in the El Pedregal stream area, assess the resulting damages, analyze existing policies and regulations, identify best practices for mitigation, and develop an integral management plan outlining specific measures and actions to reduce landslide damages in the area

Provide crucial insights into the complex relationship between landslides, urbanization, social vulnerability, culture,

Identify the impact of urbanization on increased landslide risk, assess social

<p>and community resilience in Lurigancho-Chosica, informing holistic approaches for mitigating landslide risk, enhancing community resilience, and improving the well-being of the affected population through policymaking, urban planning, and community engagement strategies.</p>	<p>vulnerabilities, explore cultural aspects, document community resilience practices, and provide recommendations for policies and interventions to enhance landslide prevention and community resilience in Lurigancho-Chosica.</p>
<p>Review that informs decision-making, urban planning, and infrastructure development, enhancing flood resilience by understanding the principles, benefits, limitations, and challenges of SuDS and promoting environmentally friendly approaches to urban drainage for more sustainable and nature-based flood management</p>	<p>Provides a comprehensive description of the principles and characteristics of SuDS, evaluates their effectiveness in mitigating flood risk, outlines the different types and components of SuDS, analyzes the benefits associated with their implementation, and discusses the challenges and considerations in the design, implementation, and maintenance of SuDS for flood control in urban areas</p>
<p>Provide valuable guidance for policymakers, informing policy development, decision-making, and investment strategies in flood management, promoting sustainable approaches that enhance resilience, protect ecosystems, and offer multiple benefits to communities.</p>	<p>Provides a comprehensive understanding of nature-based solutions for flood mitigation, including their definition, effectiveness in reducing flood impacts, different types and examples, associated benefits, challenges, and considerations, informing decision-making processes and policy frameworks for integrating nature-based solutions into flood management strategies.</p>



**opportunities**

Long-term Risk Assessment: In addition to detection and early warning, it is important to assess the long-term risks associated with landslides and take appropriate preventive measures. If the work focuses only on detection, there may be a lack of focus on mitigation and preparedness.

- Risk Mitigation: A comprehensive management plan provides the opportunity to strategically identify and address the underlying causes of landslides, which may include measures such as reforestation, erosion control and appropriate urban planning.
- Community Participation: Involving the local community in plan development and implementation can strengthen resilience and disaster response capacity. Community participation can lead to more effective and sustainable solutions.
- Use of Data and Science: Advances in geological, hydrological, and climate data collection can support evidence-based decision making. The opportunity to leverage this data to support the plan is critical.
- Education and Awareness: A comprehensive plan can include education and awareness programs to inform the community about landslide risks and actions they can take to protect themselves.

- Urban Planning and Management: Adequate urban planning could be implemented to avoid construction in areas of high landslide risk and promote safe housing.
- Early Warning Systems: Early warning systems could be established to notify the population about the threat of landslides and allow for timely





evacuations.

- Education and Awareness: The community could be educated about the risks and the importance of following safe practices in the event of landslides.
- Mitigation Measures: Mitigation measures, such as slope stabilization and reforestation, could be developed to reduce the risk of landslides.
- Community Resilience Building: Promote community resilience through psychosocial support programs and disaster management skills development.
- Scientific Research: Promote scientific research to better understand the factors that contribute to landslides and develop more effective prevention and mitigation strategies.

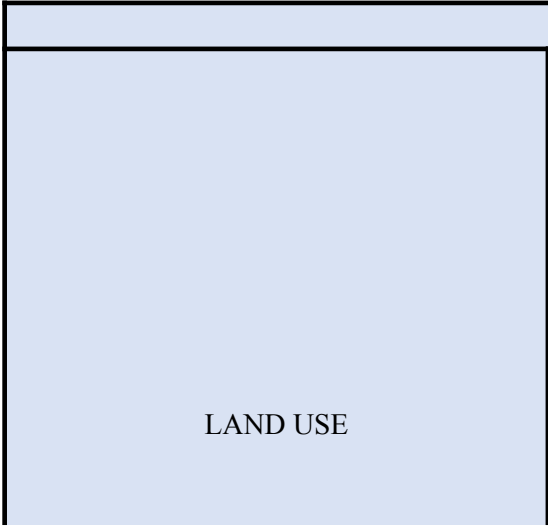
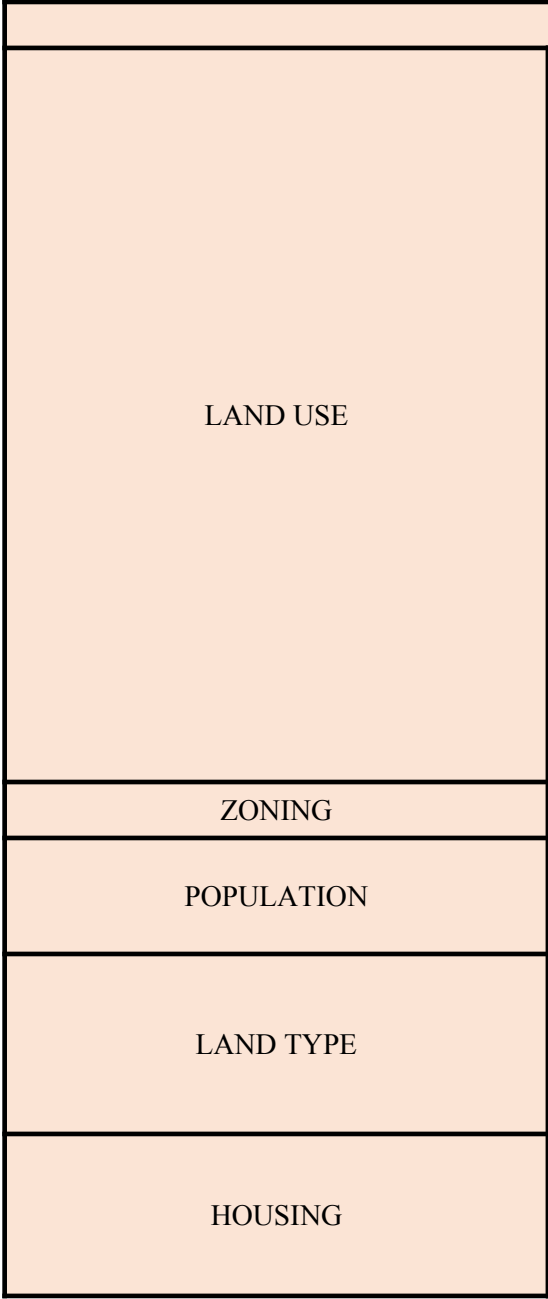
- Effective Flood Control: SuDS offer the opportunity to manage excess stormwater effectively, thereby reducing the risk of flooding in urban areas.
- Environmental Improvement: SuDS can improve water quality and contribute to the preservation of local aquatic ecosystems by filtering pollutants and reducing polluted water runoff.
- Sustainability: SuDS align with sustainability principles by leveraging natural water management practices and reducing reliance on costly infrastructure.
- Climate Resilience: Implementing SuDS can increase a community's resilience to climate change by helping to manage heavy rainfall and more frequent flooding.
- Urban Green Spaces: SuDS, such as green roofs or green infiltration areas, can contribute to the creation of green spaces in urban environments, improving the quality of life for residents.

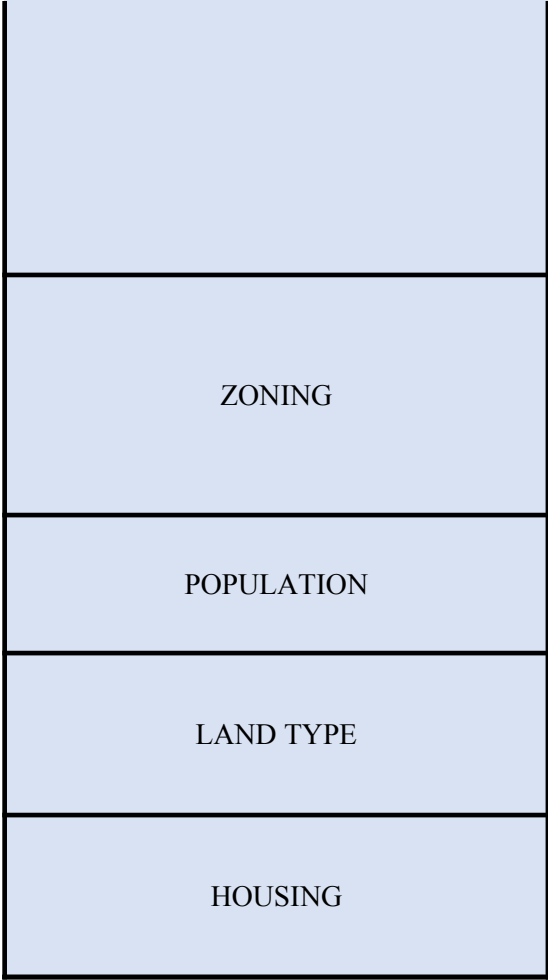
- Nature-Based Solutions (NBS): NBS, such as wetland restoration, reforestation and watershed management, offer opportunities to address flooding problems in a sustainable manner.
- Climate Change Mitigation and Adaptation: NBS can play a role in climate change mitigation by sequestering carbon and helping communities adapt to extreme weather events.
- Improved Community Resilience: Implementation of NBS can improve community resilience by reducing flood risk and protecting critical infrastructure.
- Environmental Benefits: NBS can improve water quality, conserve natural habitats, and promote biodiversity.
- Smart Investment: NBS investments can provide a long-term economic return by reducing disaster recovery costs and improving people's quality of life.

"Green Infrastructure in Use" in landslide prevention. This includes details on projects that incorporate tree planting, natural ecosystem restoration or other green infrastructure techniques.

"No Green Infrastructure Used" in landslide prevention. This could include parts of the table that discuss traditional or conventional approaches that do not incorporate green infrastructure.

"Green Infrastructure Not Directly Related" to landslide prevention. This can be useful for identifying projects or information on green infrastructure that does not have an obvious connection to landslide prevention.





## CHOSICA

- Residential: single-family homes, apartments, condominiums, and settlements
- Industrial: factories and companies
- Education and health: schools and hospitals
- Natural areas: parks
- Agriculture: crops, e.g., corn, potatoes, vegetables, and fruits
- Recreation and tourism: hiking, mountain biking and water sports

• Residential area, education, health, puvluca recreation, neighborhood commerce, recreational facilities.

- Middle and lower class

- Very rigid soils: rocky or altered, sandy gravels.
- Intermediate soils: soil S1 and S2

- Quincha
- Brick
- Prefabricated
- Concrete

## CIENEGUILLA

- Residential: single-family homes and settlements
- Commercial: stores, restaurants, and businesses
- Industrial: factories and companies
- Education and health: schools and hospitals

- Natural areas: parks
- Agriculture: crops
- Recreation and tourism: hiking and mountain biking

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• Residential area, education, health, neighborhood commerce, recreational facilities.

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• Middle and lower middle class and very low class

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- Alluvial
  - Rocky
  - Sandy
  - Clayey

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- Adobe
  - Brick
  - Prefabricated
  - Concrete
-

<b>Name of news item</b>	Chosica: landslide after activation of 15 creeks
<b>Place</b>	California, Yanacoto y La Cantuta
<b>Date</b>	2023
<b>Damage level</b>	serious
<b>Problem</b>	There was no place for the mudslide to drain.
<b>Affected people</b>	only victims
<b>Affected buildings</b>	central road, housing
<b>Link</b>	<a href="https://www.infobae.com/p">https://www.infobae.com/p</a>

2017 El Niño victims fear a repeat of the disaster: "For us drinking water is a luxury".	Landslide in Chosica affected four houses and one school	Chosica: five thousand seedlings planted to prevent landslides due to rainy season
Carapongo, pedregal, carosio, quirio	vallecito	Alto Huampani
2017	2023	2020
serious	Slight	Slight
lack of water and aid, houses on the river's edge	a landslide (mud and rockslide) in the community of El Vallecito	Vulnerability of the area to natural disasters, particularly landslides (mud and rockslides) during the rainy season.
total casualties. Deaths	no personal injuries	----
homes completely destroyed	four houses, a school, the premises where a soup kitchen used to operate and another where the "Vaso de Leche" (Glass of Milk) operated.	----
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