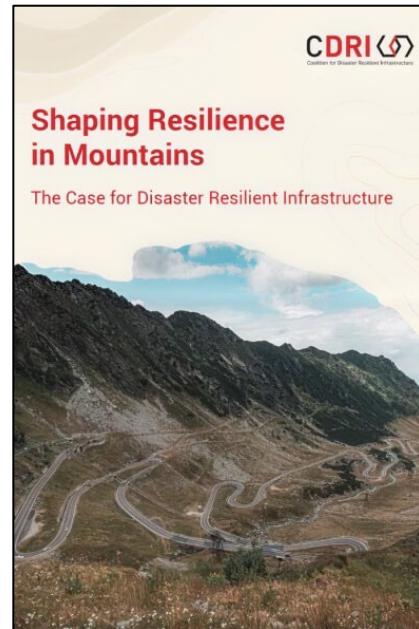


CDRI、UNU-EHS による山岳地域の災害レジリエンスに関するグローバルレポートの刊行に協力しました（2025/11/14）

テーマ：災害レジリエンス、山岳地域、山間地、国際防災、国連気候変動枠組条約 COP30  
URL：<https://cdri.world/shaping-resilience-in-mountains/>

国連気候変動枠組条約第30回締約国会議（COP 30）に合わせて、山岳地域の災害レジリエンスに関する新たなグローバルレポート『Shaping Resilience in Mountains: The Case for Disaster Resilient Infrastructure』が、災害レジリエントなインフラに関するコアリション（政府連合）（CDRI : The Coalition for Disaster Resilient Infrastructure）から刊行されました。

Lead author を国連大学環境・人間の安全保障研究所（UNU Institute for Environment and Human Security）グローバル山岳安全研究プログラム（GLOMOS）のLina Rodriguez 研究員、Stefan Schneiderbauer 博士（Head of GLOMOS Division）が務め、本学から永見光三特任教授（2030 国際防災アジェンダ推進オフィス、本務：グリーン未来創造機構）、原裕太助教（2030 国際防災アジェンダ推進オフィス）が 24 名の Contributions member の一人として貢献しました。特に下記のページでは、ネパールでの日本政府の資金協力によるシンズリ道路建設を通じた長年の技術移転・人材育成が、地震被害からの迅速な復旧も経て、同国初の道路トンネル建設協力につながった事例（永見特任教授）や、能登の里山里海の暮らしと令和 6 年能登半島地震の知見（原助教）が、名前を添えて紹介されています。本レポートは、上記サイトから無料でダウンロードできます。





**Nepal**

**Construction of the Sindhuli Road & Nagdhunga Tunnel in Nepal through Japan's Development Cooperation**

Sindhuli Road Construction Project | Nagdhunga Tunnel Construction Project

**9** Sindhuli Road: Kavrepalanchok, Sindhuli and Ramechhap district, Nepal  
Nagdhunga Tunnel: Kathmandu and Bhaktapur District, Nepal

**Hindu Kush Himalaya**

**Scale** Regional

**Implementation**  
Sindhuli Road: 1995–2015  
Nagdhunga Tunnel: 2020–2025

**Intended Beneficiaries**  
Local Communities

**Local Population**

**Key Livelihoods**

Sindhuli Road: Approximately 2.6 million people in the Terai (serving 3 million people in the Kailali, Kanchanpur, and Lamjung districts).  
Nagdhunga Tunnel: 3 million people in the Terai, toward the west, and trade with India

**Rockfalls**

**• Multi-hazard events (fountain-collapse after the earthquake)**

**Planning of resilient infrastructure**  
Guidelines, standards, and guidelines  
System-based approaches for DRR (incl. EAP approaches)

**Case study contributed by** Kazuo Nagamu (Tohoku University), Tetsuo Igarashi (JICA), Mototsu Iwamura (Nippon Koei Co., Ltd.)

**Services**

**Planning the Resilient Infrastructure**

**Altitude of infrastructure assets addressed**  
Sindhuli Road: 200–1,600 m asl.  
Nagdhunga Tunnel: 1,300 m asl (approximately)

**Name of implementing agency(ies)/organization(s)**  
Department of Road, Ministry of Public Infrastructure and Transportation of Nepal; Hazama Auto Corporation, Nippon Auto

**Funding sources**  
Japan International Cooperation Agency (JICA)

**Actors involved in design and implementation**  
Private sector, Government/authorities

**Planning immediate shelter for medical teams and displaced villagers.**

**Engineering approaches that consider vegetation with structural elements, further enhance slope resistance by utilizing natural materials and physical reinforcement techniques, such as stone walls and gabions, along the Raingardi river in the inland region of Assam, geotextural mattresses were placed to reduce soil erosion, and check dams to reduce erosion, delivering effective protection (Indian Geophysics Society, 2022).**

**In Note: Japan, people have built terraced paddy fields on relatively stable slopes formed after repeated landslides and have utilized the valuable geological features that have risen due to historical tectonic movements as materials for crafts. These resources are also used for environmental education in the region.**

**• Resilient techniques to mitigate the risk of causing landslides, such as elevated or cantilevered roads, can reduce direct exposure to flooding and landslides. In mountainous regions, landslides may contribute to an estimated average annual economic loss of \$25 billion globally (UNDRR, 2014).**

**Advanced materials capable of withstand extreme weather conditions, such as high performance concrete (HPC), fibre-reinforced composites, and corrosion-resistant steel are used to ensure infrastructure can resist conditions such as extreme temperatures and freeze-thaw cycles (Liu et al., 2024; Xu et al., 2025; Grandori-Silz, Sandoli, & Fabrocino, 2022). The Nagdhunga Tunnel Portal of the Gotthard Base Tunnel employed HPC to meet the structural demands of the tunnel, which includes high groundwater, and severe thermal variation?**

**• Early warning and monitoring systems using remote-sensing data, the internet of things (IoT), radars, and artificial intelligence provide real-time information to prevent landslides and other hazards.**

**5. EU Solar Resilience and Emergency Preparedness, Solar-powered emergency shelters: life-saving power when disaster strikes**

**6. Sea Moving Reservoir – the tunnel that conquered the Alps**  
<https://www.mastertunnel.com/en/master-tunnel/the-tunnel-that-conquered-the-alps.html>

**local hazard patterns (Reidold et al., 2022), recognize active slopes and use them to soil stabilization and water retention (Allen, 2023), and apply traditional land and**

**alongside agriculture and food and water supply infrastructure flows to developing countries remain 12% (INEP, 2025), highlighting a significant adaptation other sectors.**

**In Note: In developing countries after major issues, public finance should play a leading role. The G7 agreed at UNFCCC COP29 in 2024, commits every year to 2035 for climate action in developing nations, and the private sector can lead and needs and is unlikely to meet the adaptation finance significant contributions from both domestic and the international community to protect local livelihoods, ecosystems, and biodiversity—public finance (IECD, 2022). By contrast, the infrastructure will be commercially viable returns on adaptation projects for private sector engagement to help close**

**Planning and Designing Resilient Mountain**

**water management practices that have proven functionality and durability over centuries (Sharma & J. C. Garnett, 2022).**

**Knowing this knowledge risks producing infrastructure that is unusable to local edge communities, less effective in reducing edge zone risks, and less effective in reducing disaster risk (IECD, 2022).**

**• During the 2024 Noto Peninsula earthquake in Japan, knowledge of traditional Japanese engineering techniques, Greenhouses also served as a private emergency shelter. Strong social connections proved as mutual aid during this time.**

**– Dr Hito Hara, Assistant Professor, International Research Institute of Disaster Science (IRIDS), Tohoku University**

永見特任教授ら（左）と原助教（右）の知見・コメントが収録されているページ

文責：永見光三、原 裕太（2030国際防災アジェンダ推進オフィス）