

Post-Disaster Shelter and Housing

Sound Environmental Practices for Long-term Safety and Wellbeing

When planning, designing, and implementing shelter and housing reconstruction programs, it is important for shelter and construction agencies to consider the environment throughout the program cycle for relief, recovery and reconstruction. This includes site selection, material selection and procurement, and reconstruction practices undertaken by agencies, communities, households and contractors. To support environmental integration, training and awareness raising are needed, along with practical demonstrations of good practices.

Projects with good environmental planning support disaster risk reduction and reduce exposure to natural hazards in the future, and therefore decrease household and community vulnerability.

Nepal's legislation requires compliance with environmental regulatory frameworks at the national and local levels, as listed below. At the international level, the *Sphere Handbook*, *The Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief*, and the *Sendai Framework for Disaster Risk Reduction* address the need to prevent over-exploitation, pollution, and degradation of the environment, and encourage sustainable use and management of ecosystems.

This guidance is designed for humanitarian workers, non-governmental organization staff, government officials, community groups and private sector operators involved in supporting affected populations for temporary recovery and longer-term reconstruction of buildings.





A woman from Pairebesi working on her potato field as her house stands vulnerable next to the landslide
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1. Site selection, planning, and preparation

- a. In cases where Government has decided that resettlement is necessary, make a quick appraisal of the size, type and nature of settlement needed, and estimate likely population density. Aim to avoid high population density.
- b. Review any available settlement planning documents with local authorities, and identify information on safe site locations.
- c. If this information does not exist, undertake new surveys with expert inputs to identify safe areas protected from natural hazards such as landslides, floods, earthquakes, and wildfire.
- d. As far as possible avoid land with a slope greater than 30% for settlement.
- e. Plan any new settlements well outside national parks; ensure that settlements are not located in or close to ecologically sensitive areas, or major religious/cultural sites.
- f. Avoid areas with wildlife that will lead to increase in human-wildlife conflict.
- g. Select locations that already have access to existing infrastructure rather than opening new access, wherever possible.
- h. Select areas that have reliable water supplies, good potential for rural-urban linkages, and livelihood opportunities such as agriculture and small business enterprises, which will have low environmental impact.
- i. While site-planning buildings and infrastructure, include open spaces that can be used for safe shelter during disasters, and for multipurpose community activities at other times.
- j. Consider gender dimensions while planning public facilities and buildings in order to promote gender friendly public spaces for women, and reduce the risk of violence against women and girls.
- k. Ensure that sites for housing projects meant for the poor and marginalized are given equal emphasis and are not located near dump sites, unstable slopes or other areas which will pose health, safety or environmental risks.
- l. Retain vegetation cover around and uphill from settlement and building sites as much as possible, to improve water quality, natural resources, conservation value, shade, and protection from landslides and floods.
- m. Take into account drainage and surface water flows by observing flows in the monsoon and/or consulting with local people; avoid sites which may flood.
- n. Reduce runoff from the site and access roads by minimizing hard surfaces, and using environment-friendly materials such as porous paving where feasible; maintain vegetation cover in other areas to promote water recharge and reduce runoff.
- o. Consider climatic factors, including monsoon, heavy rains, temperature extremes and drought in site planning; allow for the intensification and increased frequency of climate extremes as climate change advances.

Consultations

- Department of Urban Development and Building Construction
- Municipal water authority
- Community forest user groups
- Department of Forests
- Department of Soil Conservation and Watershed Management
- Department of National Parks and Wildlife Conservation



Metallic improved cook stoves heat rooms as well as cooking food; they use less firewood, reducing pressure on forests and saving women time and work
 © WWF Nepal, Hariyo Ban Program/ Samir Jung Thapa

2. Energy efficiency and waste management

- a. Consider site-specific climatic features when planning, designing and constructing buildings to promote energy efficiency, orienting buildings to limit or increase solar heating, provide wind protection if needed, and take advantage of available shade.
- b. Design buildings to be energy efficient in terms of interior spaces, building materials and construction technology, drawing on local knowledge.
- c. Incorporate energy and water efficiency measures such as improved cook stoves, biogas, solar power, micro-hydro, low-flow plumbing devices, rain water harvesting and multiple use water systems.
- d. Consider clustering spread-out buildings to enable efficient shared facilities and protection from wind.
- e. Incorporate locally and culturally appropriate designs; use local construction technology as much as possible while ensuring safety.
- f. Develop environmentally responsible solid waste management plans for all settlements and housing construction projects at the municipality, village development committee and ward levels in consultation with district and local government.
- g. Dispose of building rubble and construction waste in designated areas away from streams, wetlands, housing, schools etc. Pay special attention to hazardous materials such as electrical waste and hazardous construction materials.

3. Seismic safety

- a. Improve seismic performance of new housing construction in urban and rural areas of Nepal by adopting prevailing building codes, by laws and other regulations enforced by national and local government.

- b. Advocate for seismic safety requirements including for owner-built houses.
- c. Plan for safe multi-purpose shelters in earthquake-prone areas and places subject to other hazards such as flooding, wind storms and landslides.
- d. Design short-term structures built after emergencies to be adaptable for longer term use, for efficiency of building materials.
- e. Create awareness that leads to increased demand for safer buildings, and skills to design and build them.

4. Environmentally responsible sourcing of building materials

- a. Reuse and recycle construction and disaster debris for building materials as much as possible to reduce the environmental impacts of producing new materials.
- b. Evaluate the building material life cycle including origin, production, use, and disposal; select materials that are environmentally friendly with low embodied energy requirements. This can include locally produced materials with small environmental footprint; sustainably harvested timber; lightweight materials; and advanced technologies such as compressed stabilized earth blocks. Refer to: *Building Material Selection and Use: An environmental guide*.
- c. When sourcing timber, follow Nepali laws and regulations, including community forestry rules. Ensure that timber is collected from the national and/or community forest in compliance with the provisions of the *Forest Act 1993, Forest Regulations 1995, and Timber Production, Import and Management Guideline for Earthquake Affected People 2016*.
- d. If possible, treat newly harvested softwood timber (e.g. with borate) to protect against insect attack before using it for construction. Sal timber is resistant to insects but make sure that it is protected from

contact with damp or it will rot. These measures will prolong the life of the building and reduce the need to harvest timber in the future.

- e. Procure sand, gravel and boulders from legal areas where there is no risk of causing safety and environmental hazards such as landslides, flooding, downstream sedimentation or degradation of wetlands; and do not damage infrastructure.

5. Training and participation

- a. Involve local communities in all stages of conceptualization, planning, design and construction for temporary shelters, settlement and housing.
- b. Provide training to the workforce including contractors and masonson best environmental practices in site management and construction, includingsound and efficient selection, procurement and use of construction materials, to reduce risk of environmental damage.
- c. Raise awareness among house-owners of environmentally sound practices, since much reconstruction will be owner-managed.
- d. Monitor resettlement and construction work and make recommendations as needed to improve practices on-site.

Relevant Nepali laws and regulations

- *Forest Act 1993 and Forest Regulations 1995*
- *Timber Production, Import and Management Guideline for Earthquake Affected People 2016*
- *National Parks and Wildlife Conservation Act 1973*
- *Conservation Area Government Management Regulations 2000*
- *Solid Waste Management Act 2011*

- *Building Bye Laws and Regulations*
- *Planning Norms and Standards, 2013*
- *Local Self Governance Act and Regulations, 1999*
- *Settlement Development, Urban Planning and Building Construction, Basic Bylaws-2072, GON/ MOUD/DUDBC, Kathmandu*

References

- *Green Recovery and Reconstruction Toolkit:* <http://green-recovery.org/>
- *Timber as a construction material in humanitarian operations:* <http://www.humanitarian-timber.org/>
- *WWF Keep It Legal: Best Practices for Keeping Illegally Harvested Timber out of Your Supply Chain:* www.panda.org/forests/keepitlegal/
- *Nepal Earthquake 2015: Rapid environmental assessment.* Ministry of Population and Environment. www.wwfnepal.org
- *Mason Training Manual for Earthquake Resistant Building Construction Technology for Urban / Rural Areas.*
- *Building Material Selection and Use: An environmental guide.* Hariyo Ban Program, WWF Nepal, Kathmandu, Nepal. www.wwfnepal.org
- *The Humanitarian Charter and Minimum Standards in Humanitarian Response (Sphere Handbook).* The Sphere Project 2011. www.sphereproject.org/handbook/
- *The Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief.* <http://www.ifrc.org/Docs/idrl/I259EN.pdf>
- *Sendai Framework for Disaster Risk Reduction 2015-2030.* United Nations. <http://www.unisdr.org/we/inform/publications/43291>

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