Landslide Treatment in Nepal:
by DWIDP/DSCWM

Consultative Workshop on
Landslide Inventory, Risk Assessment and Mitigation in Nepal
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Shanmukhesh C. Amatya,
Department of Water Induced Disaster Prevention (DWIDP),
Jagannath Joshi,
Department of Soil Conservation and Watershed Management (DSCWM)
Background
Geology and geomorphology of Nepal

Flood & Inundation
Prone Area 17% (Teral Plain)

Landslide Prone Area >80%
(Hills and mountain)

Altitude >8000m

60m

200km
Loss of Human Lives from Disasters
2070 (2013/14) Total Death=436

- Thunderbolt: 25%
- Flood: 30%
- Landslide: 18%
- Fire: 13%
- Air Crash: 4%
- avalanche: 1%
- Drowning: 2%
- Others: 8%
- Others, Boat Capsize: 3%

**Gorkha Earthquake 2015:**
Casualties=8,856, injuries=22,309

*Others: Wind Storm, Rainfall, Epidemic, cold wave*

*Source: MoHA*
Major problems caused by landslides

- Sedimentation of reservoirs
- Destruction of houses
- Expand landslide area causing damage to surroundings (Land, habitation and road)

Sedimentation of reservoirs
Ham landslide damaged road
Damaged Bridge at Khahare Khola at Ch.11+300 Km due to Debris flow
Jure Landslide Dam
Sindhupalchowk  August 2, 2014

Burried Houses/Villages

Landslide Dam

Jure Bazar

Sunkoshi Hydropower Dam

156 casualties, buried >40 houses
3 Types of Mass movement are most common in Nepal

Deep seated landslide (slowly moving)

Shallow seated landslide (slope failure)

Debris Flow
Government agencies (DSCWM/DWIDP) are trying to reduce the damages and destructions due to landslides by implementing:

Preventive Measures and Landslide Treatments

**Structural Mitigation Measures**
- Engineering Technology
- Bioengineering Technology

**Non-structural Mitigation Measures**
- IEC (information, education and communication), Roving Seminar, Audio Visual for local residential
- Early Warning System
DSCWM has been treating mostly shallow seated landslides as a package:

- **Catchment treatment:** Appropriate land use improvement in the catchment
- **Water management:** Drainage management - Surface and subsurface drainage management
- **Bioengineering/structural techniques:** Fascines, Palisade, Retaining wall, Check dam etc.
- **Excavation and filling**
- **Toe protection**
- **Protection of the landslide area from livestock.**

**DWIDP is involving in mainly deep seated Landslide and Road Corridor landslide Treatments:**
1. Deep seated Landslide Treatment (moving slowly)

Tinthana Landslide, Kathmandu, September 2012
Retaining Toe wall
(to protect movement, Okharpauwa Landslide, at 48km along Ktm.-Trishuli road, 2006)
Landslide Mitigation works in Kabilas VDC, Mu-Na Highway

Toe protection work ch 21+900

Catch drain ch 23+760 Km

Bin wall, Naubise Highway
Surface Drainage work
Gajuri, Prithiwi Highway, 1996

Surface and Sub-surface Drainage works,
DWIDP/JICA

Surface drain management,
Okharpauwa
Horizontal drainage boring

Horizontal Drilling Drainage works, DWIDP/JICA
Anchoring works

Anchoring works, Naubise
DPTC/DoR

Anchoring works, Sindhuli Road
DWIDP/DoR /JICA
2. Shallow seated landslide (slope failure) treatment

Kerabari, Sindhupalchowk, Aug. 2015 due to Gorkha Earthquake 2015
Surface drainage management
Naubise 13+000 (DPTC)

Sabo Dam
Panthali Khola, Lothar

Masonry Retaining wall
15+100 Km, N-M Highway
Sindhuli Road
Sec II 17+400,
Dhungre Bhanjyang
(DoR/JICA/DWIDP)

Before

Rock bolting works,
Dhungre Bhanjyang, Sindhuli

After
3. Debris flow treatment
Matatirtha Debris Flow, Matatirtha-4, Kathmandu

2002
Rainfall more than 130mm in 24 hours

2004

DPTC, CFUG, DSCWM and local people carried out landslide treatment

2008

2011
Debris Mitigation works in Kabilas VDC, Mu-Na Highway

Slit type Sabo dam in Das Kholo

Gabion Check dam, Gaighat, Ch 18+460 Km

Masonry checkdam, Gaighat, Ch 18+460 Km
Kerunge Landslide Mitigation
Landslide and gully treatment
Pipaltar, Nuwakot

1990

1998

2009
Sisnighari Landslide Treatment Site
Gagalphedi-3, Kathmandu
Bio-Engineering Solution
Structural Countermeasures

- Jute Netting, Dahachowk
- Bamboo fencing works, Dahachowk
Bioengineering and Hillside work
Kerunge Landslide
Awareness Training,
Roving Seminar, Audio Visual, information, education materials to local people
for Preparedness and
Early Warning System
Piloted in Kabilas VDC, Chitwan
Recent innovations and technologies of Landslide treatment are expected from this Workshop
Tinthana Landslide,
Kathmandu, Sept. 17, 2012

Thank You