Role of Climate Resilient Transport Infrastructure and Climate Adaptation in Nepal in the Context of Post - 2015 Development Agenda

ENVIRONMENTALLY SUSTAINABLE TRANSPORT (EST)

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Presentation Outline

- MDG and Post – 2015 Development Agenda
- Climate Change Issues and Consequences
- Vulnerability Assessment & Adaptation Planning
- Resilient Transport Infrastructure
- Transport and Climate Change (TCC)
- Climate Change and Nepal
- Way forward

MDG and Post – 2015 Devt. Agenda

8 MDGs

- Eradicate Poverty and Hunger: MDG 1
- Universal Primary Education: MDG 2
- Gender Equality and Empower Women : MDG 3
- Reduce Child Mortality: MDG 4
- Improve Maternal Health: MDG 5
- Combat HIV/AIDS, Malaria and other Diseases: MDG6
- Environment Sustainability: MDG 7
- Global Partnership for Development: MDG 8

UN Conference on Sustainable Development (UNCSD) Rio+20

The Future We Want, 2012

- **Pt. 132 and 133 state sustainable transport**

Transport Commitment

- **Smart measures, clean energy and more sustainable & fair use of resources**

Other Policies

National Transport Policy, 2002

- To develop a reliable, safe and sustainable transport system……

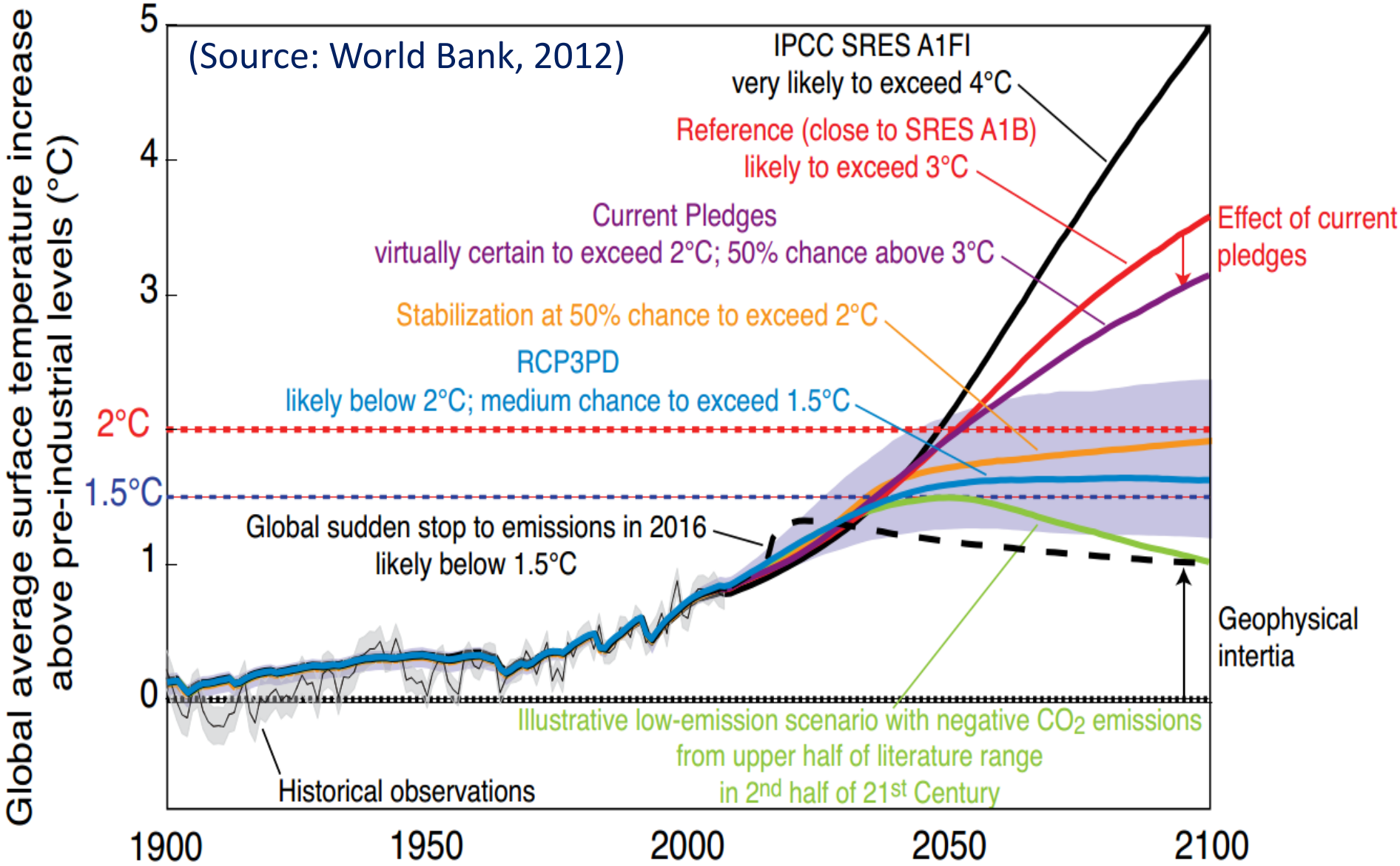
National Adaptation Program of Action (NAPA), 2010

- Resilient infrastructures, Disaster Management for Climate Adaptation

Climate Change Policy, 2011

- Low carbon development and climate resilient infrastructures

Climate change issue



Climate change issues

1. Climate variability and change

A. Temperature (consistent and continuous warming)

i) @ 0.06 °C/year (Shrestha et al., 1999) in Himalayas

ii) @ 0.04 °C/year (Practical action 2009) in Terai

B. Precipitation

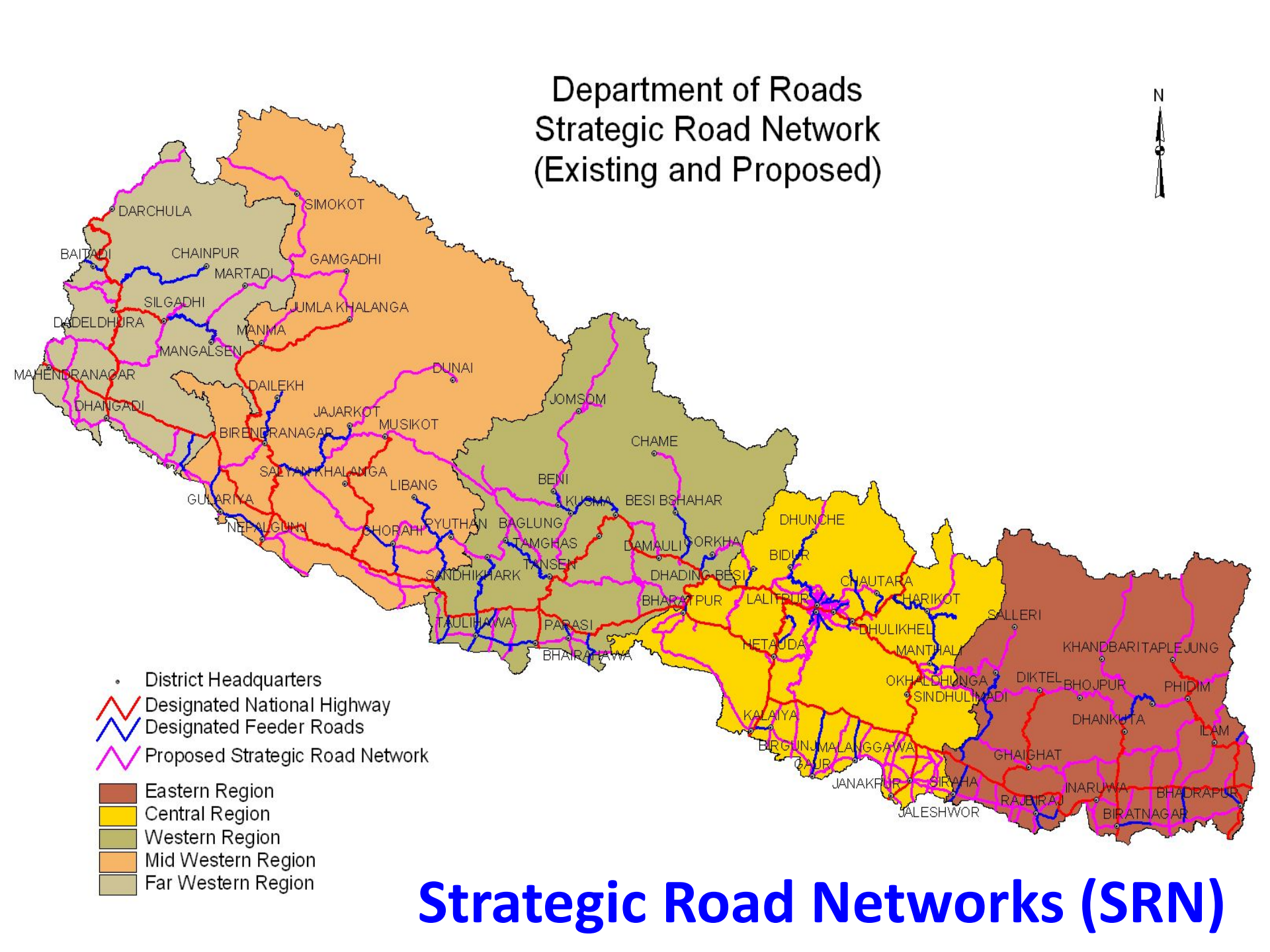
- 5 -10% increase in Eastern Nepal during winter
- 15-20% increase in whole Nepal in summer (NAPA, 2010)

C. Warming (Nepal GHG Emission Contribution 0.025%)

- Reducing snow and ice coverage at mountains
- Increased climatic variability
- Extreme events and
- Increasing rain in the wet season but decreased rainfall in the mid hills (NAPA 2010)

CLIMATE VULNERABLE INFRASTRUCTURES

VULNERABLE INFRASTRUCTURES



Strategic Road Networks (SRN)

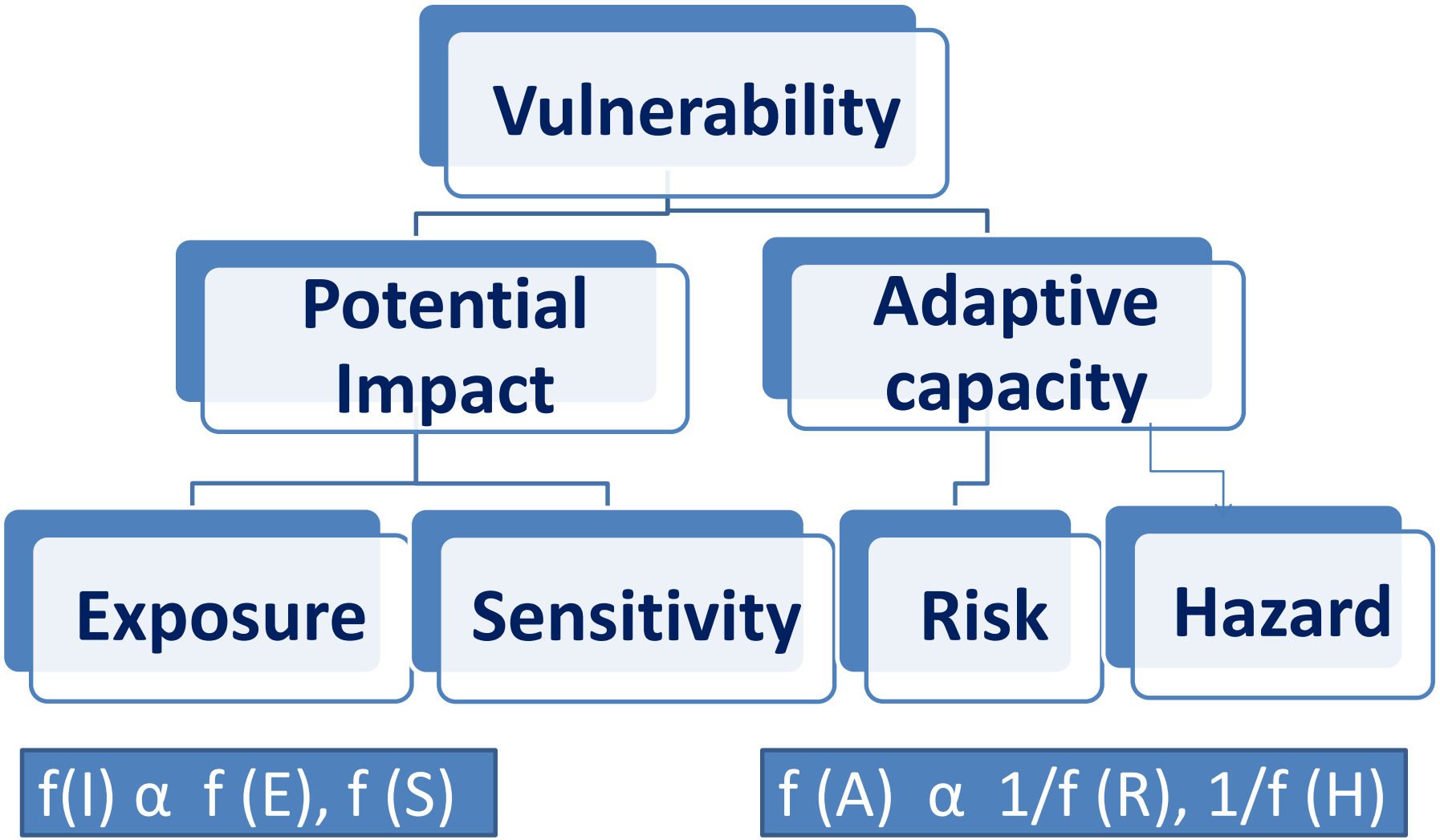
Road Network

- **Strategic road Network (SRN) – National Highways, Mid-Hill road, Feeder Road (Major), Feeder Road (Minor), Postal Road, Urban road**
- **Average growth of road network is 4%/yr Strategic road network - 5,000 km in 2001, 11,000 km in 2012, 11879.35 km in 2013**
- **Rural road Network (RRN) – District road, village road – total length 50,943 km (2012)**

Definition

- **Climate Vulnerability:** Systems have degree of inability or susceptibility to withstand the adverse effect
- **Climate Adaptation:** Systems that absorb / adopt the shocks or the changes occurred already or may occur in future
- **Climate Resilience:** Systems absorb changes / shocks and also tries to self-renewal state (having dual functions)

Vulnerability Assessment and Adaptation Planning (VA & AP)



$f(I) \alpha f(E), f(S)$

$f(A) \alpha 1/f(R), 1/f(H)$

Vulnerability Assessment and Adaptation Planning (VA & AP)

V α E x S

V α 1/A

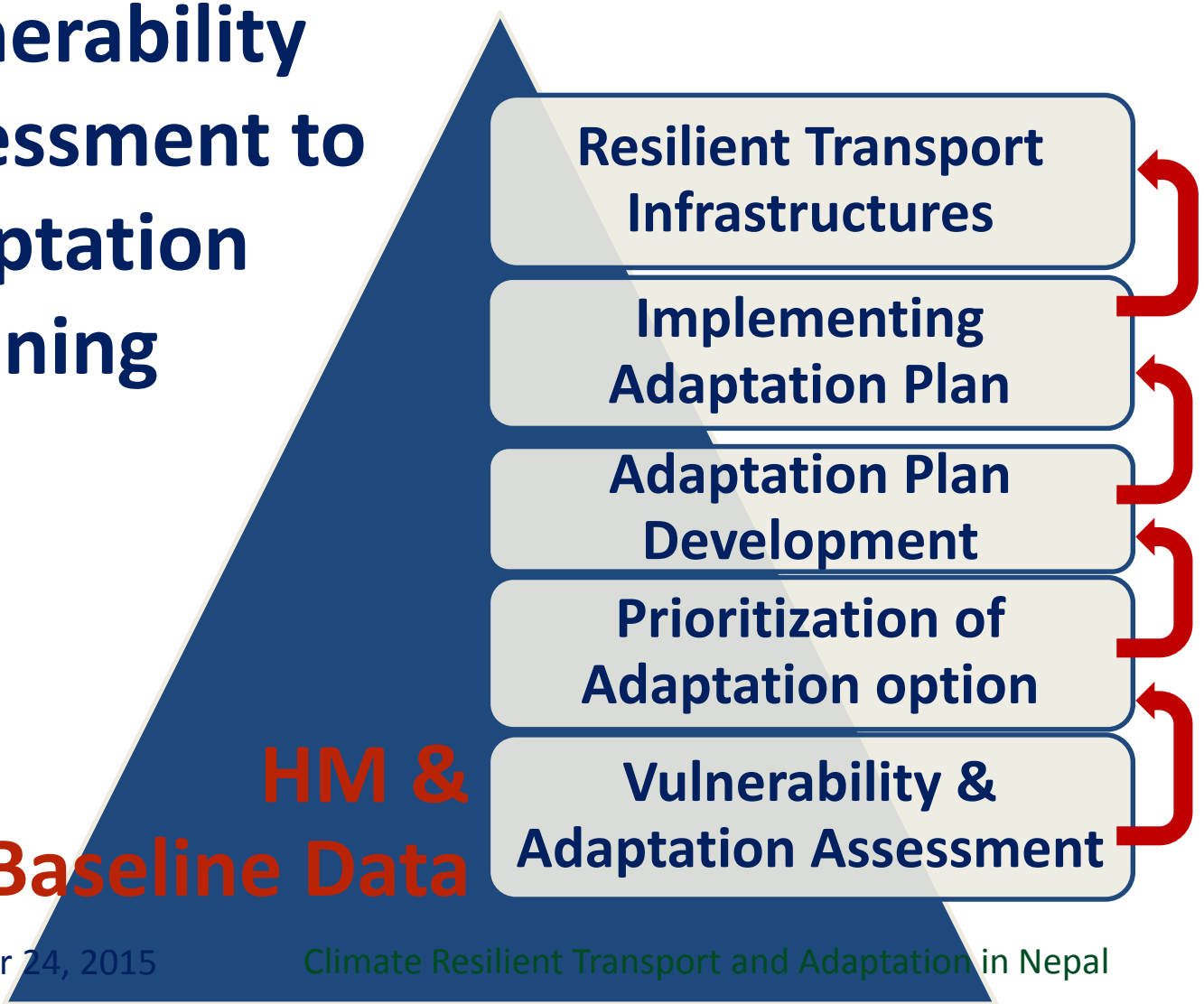
$$V = E \times S \times \frac{1}{A}$$

Hydrometeorology & Baseline Data

- Temperature
- Precipitation
- Floods, Flash floods
- Icing
- Debris flow
- Sedimentation
- River bed rise
- Fatigue
- Landslide
- Scouring
- Flood Discharge
- Return period
- Hill toe erosion
- Inundation
- Weakening the bond
- Other Impact

Adaptation Planning

Vulnerability Assessment to Adaptation Planning



Climate Resilient Transport Infrastructures

Documentation

- Adaptation policy, comprehensive strategies, programs, plans and measures
- operations and management strategies of infrastructures
- Geoengineering, geomorphology, geoscience, geostructure, topography, atmosphere, etc

Activities

- HM, Weather information and warning
- Identifying possible impacts and mapping of natural hazards

Climate Resilient Transport Infrastructures

Design Standards (Bridge)

- Location
- Max flood discharge for a given return period
- Type of depth of foundation
- Total span & No. of piers
- Bridge deck level
- River training works near to bridge

Climate Resilient Transport Infrastructures

Design Standards (Road)

- Alignment
- Cross Drainage
- Side drainage
- Return period
- Retaining wall
- Toe wall
- Bioengineering

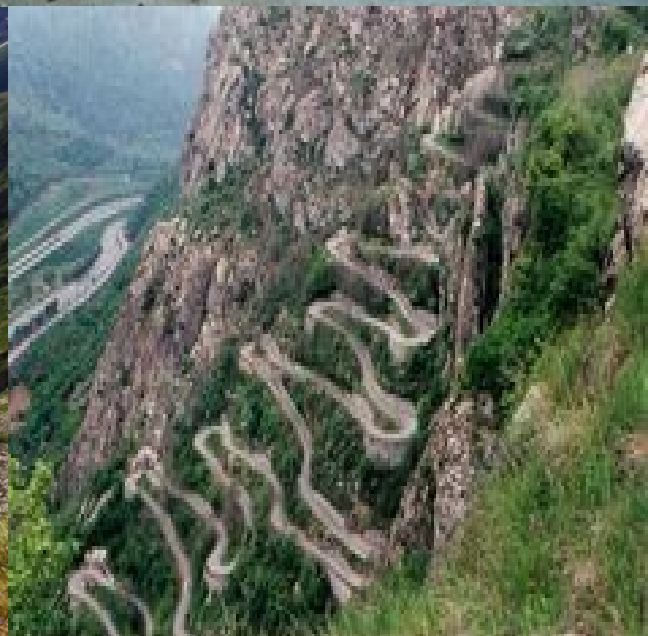
Other parameters

- V&H Alignment, Gradient
- Camber, Curves, Radius, Bends
- Right of Way
- Cross section
- Width of Road, Carriageway, Shoulder
- Quality & innovative materials

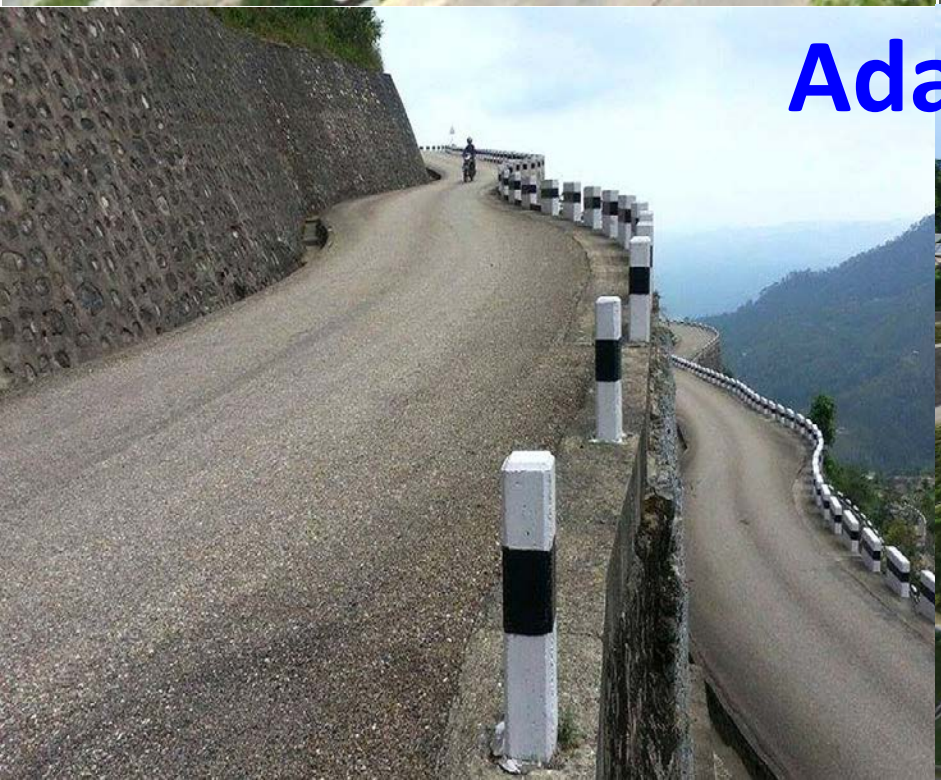
Adaptation

Adaptation

Adaptation

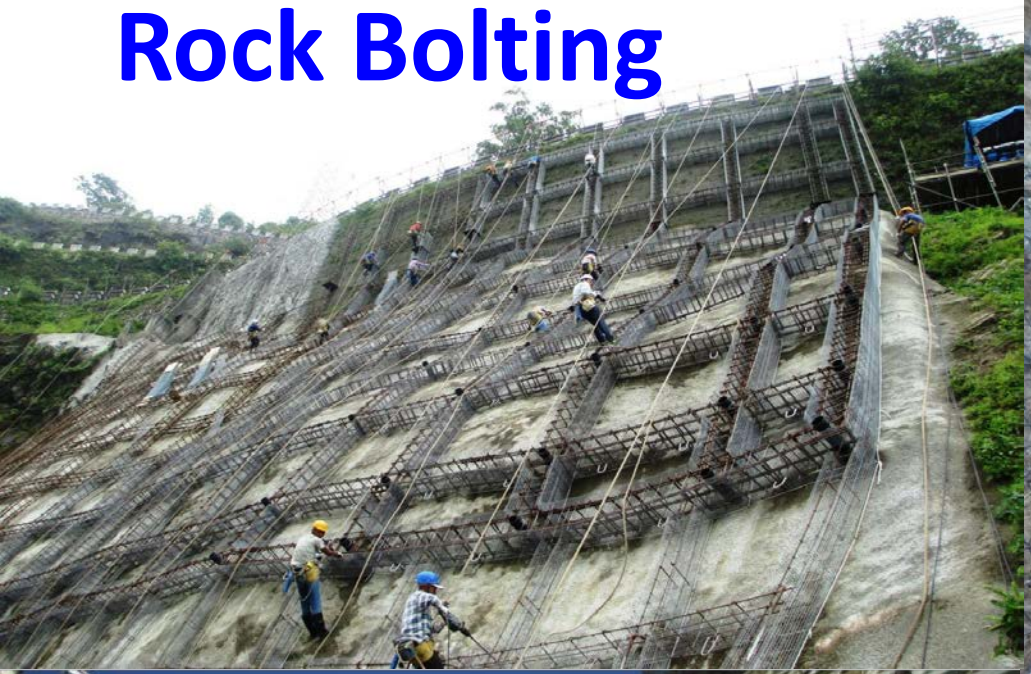


Adaptation

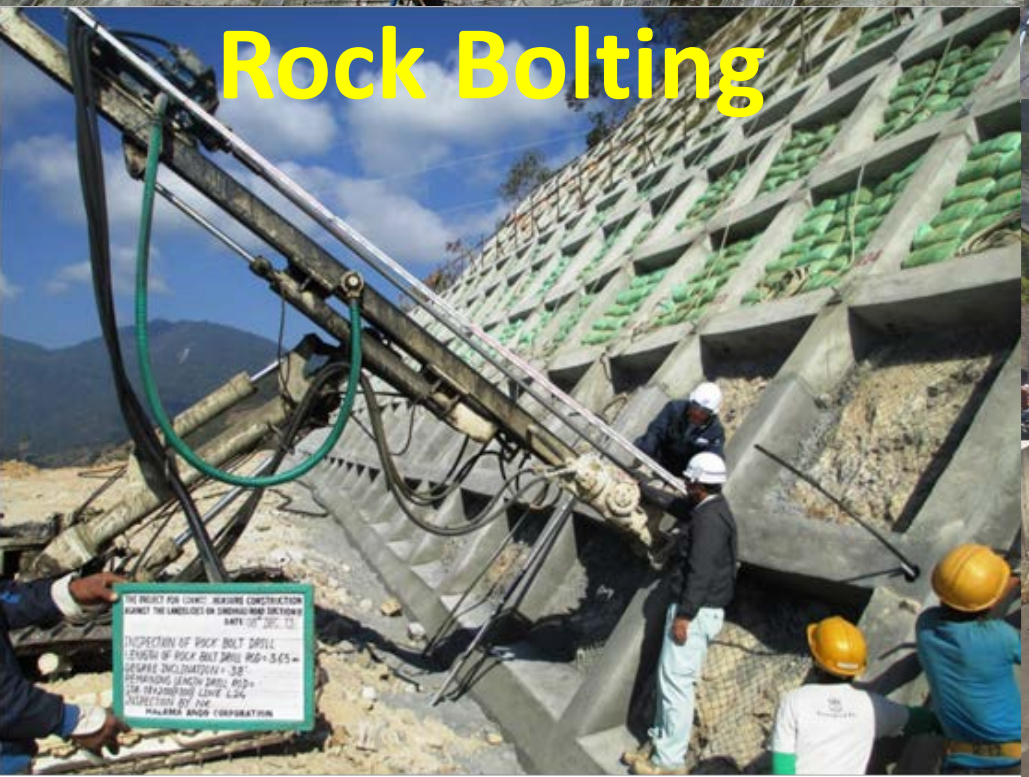


Adaptation

Adaptation


Rock Bolting


Netting


Rock Bolting


Slope Protection

PLAN OF GON
Low Carbon Emission Transport

- Renewable energy railway transportation, rope ways, cable car
- Mass and public transportation
- Urban electric mobility vehicle initiatives
- Fuel efficient vehicle and higher quality fuel
- Green freight goods movement
- Pedestrian and cycling

PLAN OF GON
Low Carbon Emission Transport






Kathmandu Sustainable Urban Transport (KSUT)

- NVMES – 2013 (Euro 3)
- Digitized Embossed Number Plate
- Smart Driving License
- Vehicle Fitness Testing Centre
- Public Transport
- Traffic management
- Walkability
- Air quality monitoring

Transport and Climate Change (TCC)

- 23% GHGs emitted by transport sector
- To limit global average temp. rise to less than 2^{o} C above in pre-industrial era

Sustainable Transport in Climate Change Issues

- Low carbon emission / renewable energy transport
- Watt Road / Smart Road / Solar Road / Innovative Road
- To strengthen transport infrastructure resilience

Climate Change and Nepal

- **Lima-Paris Action Agenda (LPAA) UNFCCC**

✓ **To catalyze action on CC, to contribute objective of UNFCCC reducing GHGs**

✓ **To further increase ambition before 2020 and support 2015 agreement**

✓ **To limit global average temp. rise to less than 2^{o} C above pre-industrial era**

✓ **2015 – Optimistic to have Global Agreement on CC at COP 21**

Climate Change and Nepal

- 2^{o} C is achievable

✓ Reduce global emission within boundaries of science

✓ Clean energy generation

✓ Mitigation contribution

✓ Urgent adaptation measures

✓ Government ambition to integrate resilient transport

Way Forward

- CC Vulnerable assessment (VA) of transport infrastructures
- Adaptation Planning (AP) for new and existing infrastructure
- Climate change Design, construction and alignment standards
- Incorporate innovative materials and technology to construct transport infrastructure


Thank You