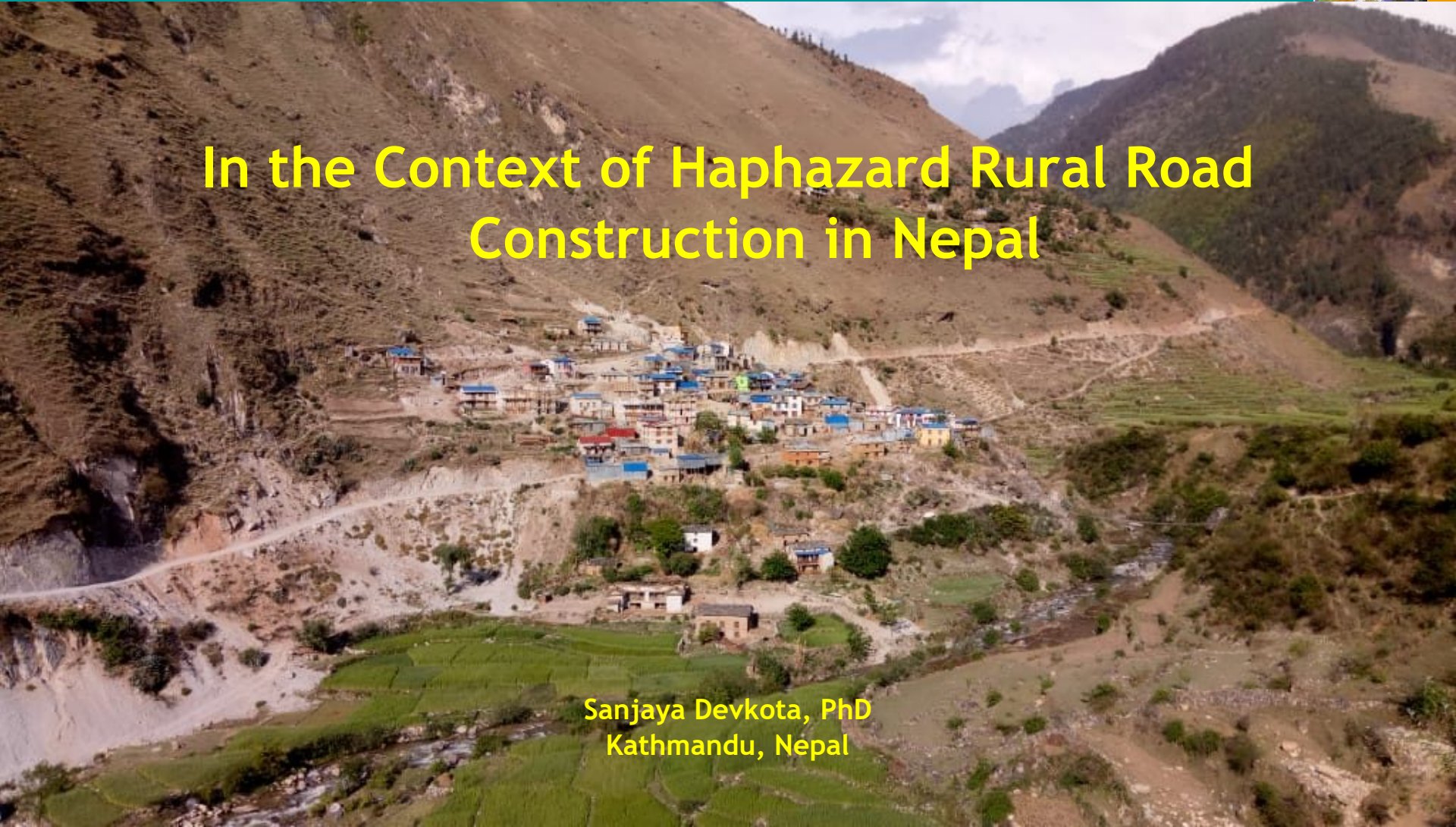


Climate Induced & Anthropogenic - Hazards, Vulnerability, Exposure & Risks



In the Context of Haphazard Rural Road Construction in Nepal

Sanjaya Devkota, PhD
Kathmandu, Nepal



Climate induced & Anthropogenic Hazards, Vulnerability & Risks



- **Over View of the Presentation:**
 - Climate & Climate Change;
 - Impacts of Climate Change;
 - Hazards;
 - Vulnerability;
 - Risks;
 - Capacity;
 - Resilience;

Climate & Climate Change:



- **Climate & Climate Change:**
 - **Climate:** Climate refers to the average weather condition & variations over a large area for a long period of time.
 - **Climate Change:** changes in **global or regional climate patterns**, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric green-house gasses (e. g. CO_2 , NH_4 , N_2O , etc.) produced by the use of fossil fuels & anthropogenic activities.

Climate & Climate Change:



- **Greenhouse Gasses:** greenhouse gas is the gas that **absorbs & emits radiant energy** within the thermal infrared range. Greenhouse gases cause the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. [Wikipedia](#).
- **Global Warming:** Global warming is the **long-term rise in the average temperature** of the Earth's climate system. It is a major aspect of climate change, & has been demonstrated by direct temperature measurements and by measurements of various effects of the warming. Global warming & climate change are often used interchangeably. [Wikipedia](#).

Climate Change Impacts in Nepal:



■ Possible Impacts:.

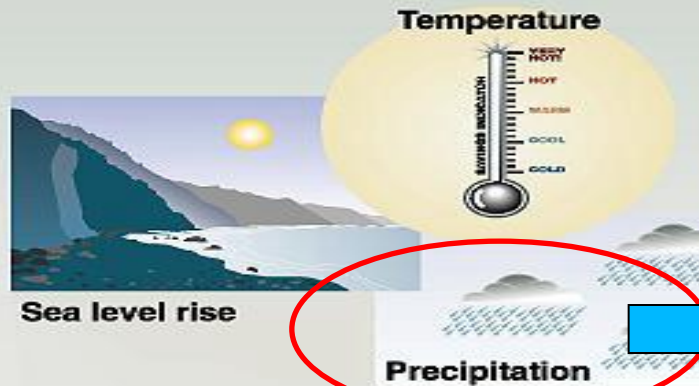
- Nepal's unique geo-climatic condition makes it highly susceptible to climate change & natural hazards.
 - Intense & unpredicted rainstorms - landslides & flash flood;
 - Longer dry spells - drought: impact in food security;
 - Heat and cold waves - health issues;
 - Drying-up of springs - scarcity of drinking water;
 - Epidemic - health hazard;
 - Forest fire - damage of resources & biodiversity;
 - What else?

Climate Change & Impacts in Nepal



Likely Impacts of Climate Change:

Potential climate changes impact



Impacts on...

Health



Weather-related mortality
Infectious diseases
Air-quality respiratory illnesses

Agriculture



Crop yields
Irrigation demands

Forest



Forest composition
Geographic range of forest
Forest health and productivity

Water resources



Water supply
Water quality
Competition for water

coastal areas



Erosion of beaches
Inundation of coastal lands
additional costs to protect coastal communities

Species and natural areas



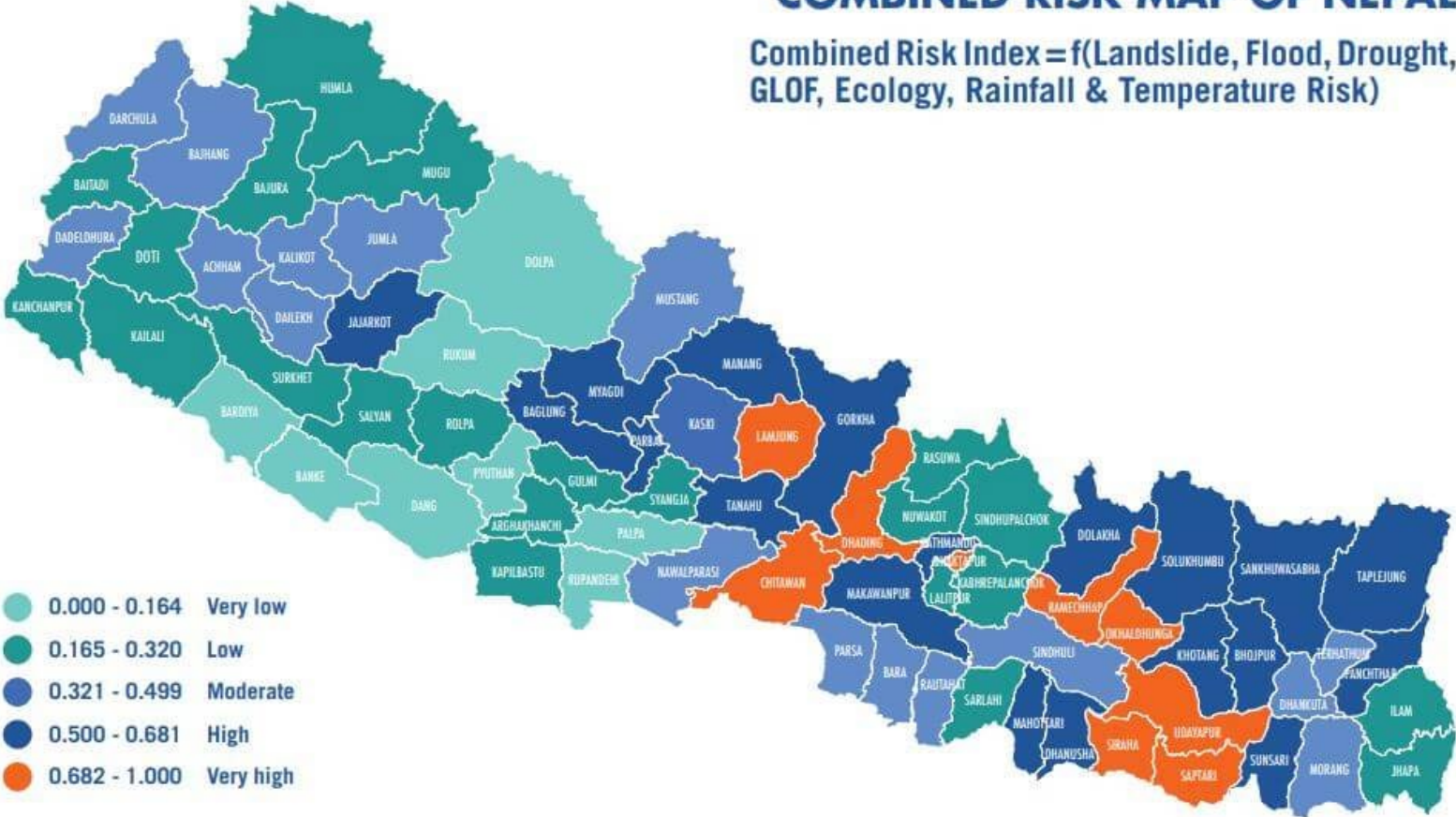
Loss of habitat and species
Cryosphere: diminishing glaciers

Climate Change & Impacts



COMBINED RISK MAP OF NEPAL

Combined Risk Index = f(Landslide, Flood, Drought, GLOF, Ecology, Rainfall & Temperature Risk)



Source: Government of Nepal, Ministry of Environment, September 2010.

Climate induced Hazards:



- **Hazard:** A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. ISDR

.....hazards of natural origin & related environmental & technological hazards & risks.” Such hazards arise from a variety of geological, meteorological, hydrological, oceanic, biological, & technological sources, sometimes acting in combination. In technical settings, hazards are described quantitatively by the likely frequency of occurrence of different intensities for different areas, as determined from historical data or scientific analysis.

Climate induced Hazards:



- **Hydro-meteorological Hazard:** Process or phenomenon of atmospheric, hydrological or oceanographic nature that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. **ISDR**

Hydrometeorological hazards include tropical cyclones (also known as typhoons and hurricanes), thunderstorms, hailstorms, tornados, blizzards, heavy snowfall, avalanches, coastal storm surges, floods including flash floods, drought, heatwaves and cold spells.

Hydrometeorological conditions also can be a factor in other hazards such as landslides, wildland fires, locust plagues, epidemics, and in the transport and dispersal of toxic substances and volcanic eruption material.

Anthropogenic Hazards:



- **Anthropogenic Hazard (or human-induced hazards):** are induced entirely or predominantly by human activities & choices. Several hazards are **socio-natural**, in that they are associated with a **combination of natural and anthropogenic factors**, including environmental degradation & climate change; such as haphazard construction of rural roads in the mid-hill region of Nepal.
- **Anthropogenic Hazard (or human-induced hazards):** are induced entirely or predominantly by human activities & choices. Several hazards are **socio-natural**, in that they are associated with a combination of natural and anthropogenic factors, including environmental degradation & climate change.

Disaster, Vulnerability, Exposure & Risk:



Disaster: A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. ISDR

Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with the potential negative consequences.

Disaster, Vulnerability, Exposure & Risk:



Vulnerability: The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard (ISDR). In simple vulnerability is the degree of damage to an object (e.g. building) exposed to a given level of hazard intensity (e.g. water height, ground shaking, impact pressure).

There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures, and disregard for wise environmental management. Vulnerability varies significantly within a community and over time.

Disaster, Vulnerability, Exposure & Risk:



Capacity: The combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals.

Capacity may include infrastructure and physical means, institutions, societal coping abilities, as well as human knowledge, skills and collective attributes such as social relationships, leadership and management.

Disaster, Vulnerability, Exposure & Risk:

- **Exposure:** Th situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.



Measure of exposure can include the number of people or types of assets in an area. These can be combined with the specific vulnerability and capacity of the exposed elements to any particular hazard to estimate the quantitative risks associated with that hazard in the area of interest.

Disaster, Vulnerability, Exposure & Risk:



Risks: The combination of the probability of an event and its negative consequences. **ISDR**

$$\text{Disaster Risks (R)} = \frac{\text{Hazard (H)} \times \text{Exposure (E)} \times \text{Vulnerability (V)}}{\text{Capacity (C)}}$$

The word “risk” has two distinctive connotations: in popular usage the emphasis is usually placed on the concept of chance or possibility, such as in “the risk of an accident”; whereas in technical settings the emphasis is usually placed on the consequences, in terms of “potential losses” for some particular cause, place and period.

Disaster, Vulnerability, Exposure & Risk:



Resilience: The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Resilience means the ability to “resile from” or “spring back from” a shock. The resilience of a community in respect to potential hazard events is determined by the degree to which the community has the necessary resources and is capable of organizing itself both prior to and during times of need.

Impact of Haphazard Rural Road Construction:

- Landslides - damaging lives, livelihood activities & biodiversity;
- Sedimentation - water pollution, damage agri. Land, **loss of water sources**;
- Air and water Pollution - health hazard;
- Road accidents - caused lives;
- Forest clearance - degrading environment & loss of resources;
- Others??





Thank You !!!