Climate Resilient Cities and Urban Environmental Sustainability of Palungtar /Bhimeshwor and Bagamati NEPAL

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INTRODUCTION

Nepal is located in the Himalayas and bordered to the north by the People's Republic of China, and to the south, east, and west by the Republic of India.

Nepal, in political maps, is one of the small countries in the world but has the amazingly diverse geography, landscapes, culture, and traditions.

Nepal is rich in scenic beauty, water resources, and forest. The north part consists of a beautiful range of mountains always covered with snow.

Nepal is one of the richest countries in the world in terms of bio-diversity due to its unique geographical position and altitude variation. The elevation of the country ranges from 60 meters above sea level to the highest point on earth, Mt. Everest at 8,848 meters, all within a distance of 150 kilometers resulting in climatic conditions from tropical and sub-tropical in the plains, temperate in the hills and Alpine in the Mountains.

The level of urbanization in Nepal remains low but the pace of urbanization has remained faster and is likely to remain so in the future. Only 17.1% of Nepal's population resided in 58 designated urban areas according to the 2011 census. However, with the addition of 159 municipalities in 2014/15, 40% of Nepal's population reside in 217 designated urban areas.

INTRODUCTION

The 2030 Agenda for Sustainable Development includes 17 SDGs and 169 associated targets. SDG 11 addresses urban areas, aiming to “make cities and human settlements inclusive, safe, resilient and sustainable.”

New Urban Agenda of Nepal is expected to secure renewed political commitment for sustainable urban development.

The New Urban Agenda will serve as an indicative umbrella framework for key sectors to work in a more coordinated and collaborative way for sustainable development through unified and collective commitment to sustainable urbanization with due consideration to the post earthquake rebuilding.

The Goal of the Agenda is to: Make cities and human settlements inclusive, safe, resilient, sustainable and smart in order to enhance their ability to provide decent jobs and adequate housing, infrastructure and services to the growing urban population.

The international protocols and commitments on climate change including the United Nations Framework Convention on Climate Change (UNFCCC) commitment and the SDG goals addressing climate change have been given due priority by the Government of Nepal.

INTRODUCTION

Nepal is one of the most vulnerable countries in the world to both climate change and natural disasters (MoPE, 2016).

Prime Minister-led Climate Change Council (CCC) and Ministry of Population and Environment (MoPE)-led Multi stakeholder Climate Change Initiative Coordination Committee (MCCICC) and Climate Change Program Coordination Committee (CCPCC) are in operation.

Nepal prepared National Adaptation Program of Action (NAPA) in September 2010, Nepal's Climate Change Policy, 2011 and National Framework on Local Adaptation Plans for Action (LAPA) to ensure integration of climate change adaptation in planning.

The Three Year Interim Plan (2007-10) recognized disaster as one of the major impediments to national development. Similarly, the Three Year Plan (2010/11-2012/13) was also responsive to disaster risk reduction (DRR).

The National Reconstruction Authority (NRA) was established on 25 December 2015, with the mandate to plan and coordinate implementation of the reconstruction and rehabilitation program and to rebuild infrastructures and settlements devastated by the earthquake of April 2015, and make Nepal more resilient to natural hazards.

The latest Environment Performance Index (EPI) 2016 released at the World Economic Forum puts Nepal nearly at the bottom assigning 177th position among 180 countries in terms of air quality.

INTRODUCTION

The Constitution of Nepal 2015 has guaranteed every person the right to live in a clean environment as a fundamental right and mandates the state to make necessary arrangements to maintain clean environment.

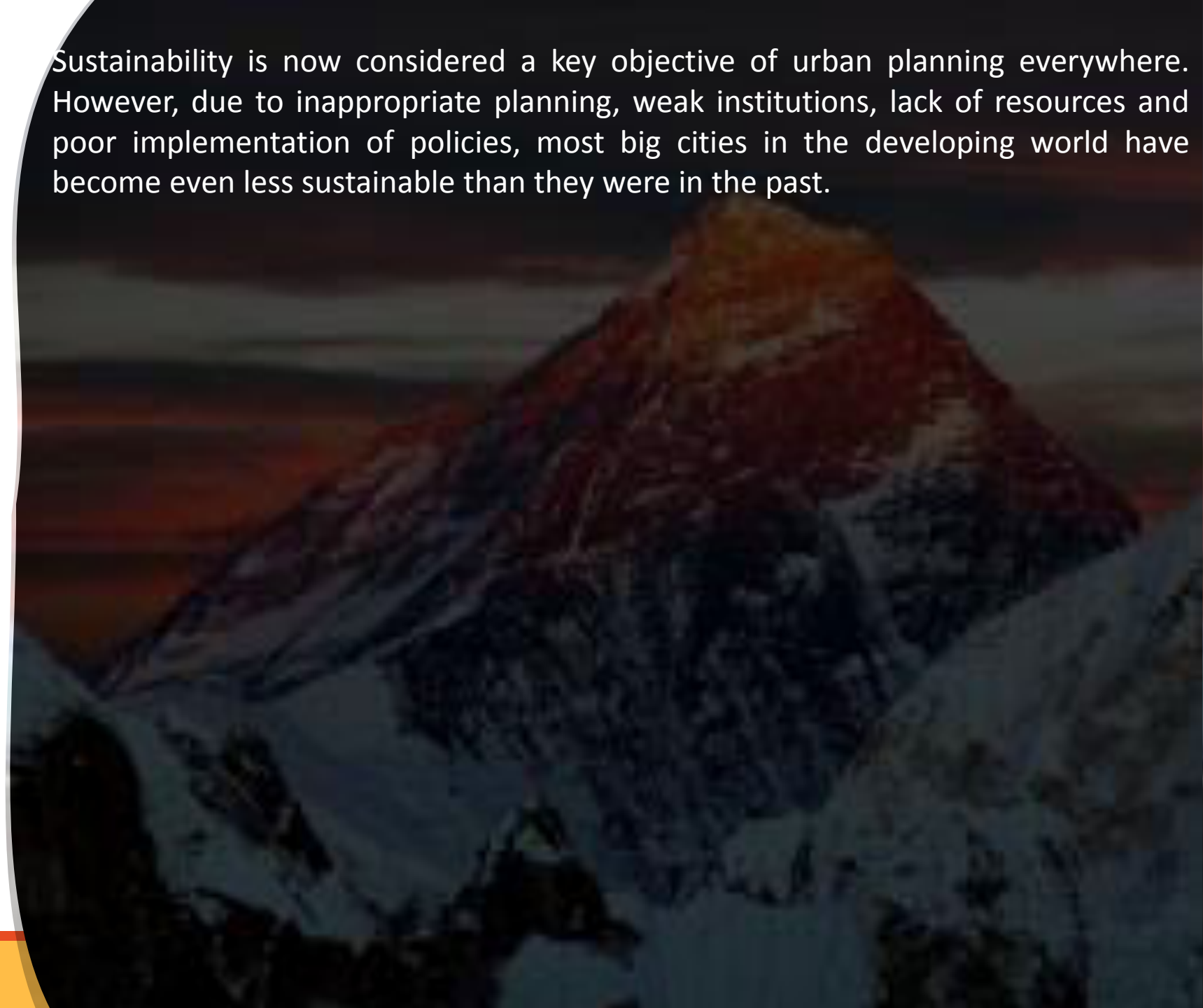
The Industrial Enterprises Act was introduced in 1992 whereas the Environmental Protection Act was introduced in 1997 providing legal provision to maintain clean and healthy environment by minimizing adverse impacts as far as possible.

The overall capacity of the sector ministry as well as other scientific and administrative bodies including Department of Hydrology and Meteorology, Alternative Energy Promotion Centre, National Academy of Science and Technology, Department of Environment, among others, needs to be enhanced in order to deal with climate change issues in an efficient manner.

Strengthened resilience of city systems enables households, communities, institutions and states to resist, absorb, accommodate to and recover from the effects of a hazard, including shocks or latent stresses, in a timely and efficient manner. A resilient city helps to protect its residents, their cohesion as a community, and their habitat by responding, adapting, and transforming whilst taking advantage of reduced risk exposure in ways that restore, maintain, and even improve its essential functions, structures, and identity.

INTRODUCTION

Sustainability is now considered a key objective of urban planning everywhere. However, due to inappropriate planning, weak institutions, lack of resources and poor implementation of policies, most big cities in the developing world have become even less sustainable than they were in the past.



RATIONAL

- With the Constitution of Nepal promulgated in 2015, Nepal is poised to move towards a federal system of governance which will have significant implications for urban growth and development.

- There are wide deficits in basic urban infrastructure (roads, water supply, sewage & drainage, solid waste, energy, urban open space, basic physical amenities, housing etc) and quality benchmarking.

- Weak institutional and legal framework and institutional and human resource capability for urban planning and management.

- Precarious urban finance and revenue base and capability to mobilize resources in existing urban areas, and wide gap between urban investment needs, sources of financing and capability for implementation.

- Lack of coordinated national, regional, municipal urban investment vision and plan.

- Poor urban data base and monitoring of urban developments.

RATIONAL

•Long-term research and comprehensive data are needed to plan adaptation and mitigation program to deal with future changes. There is a lack of research and proper documentation of the sectorial impacts of climate change

•Lack of comprehensive policies on DRR and management is one of the crucial challenges that Nepal faces along with the lack of strategic planning for prevention and preparedness.

OBJECTIVES

The goal of this training course is to contribute to an enhanced vision of Asian city leaders and senior managers in making their cities healthier, more resource efficient and climate resilient. The training course that focuses on;

- Improved practical knowledge of urban climate change planning,
- Good-practice and solutions in environmental sustainability and resilience from Asia and Pacific region as well as worldwide,
- Improved participants' awareness of the state of the art of available urban resilience and low carbon development options, and
- Strategies to influence policy-making process in sustainable urban planning and management as part of the implementation of the New Urban Agenda, and climate SDG indicators.

Introduction of Nepal

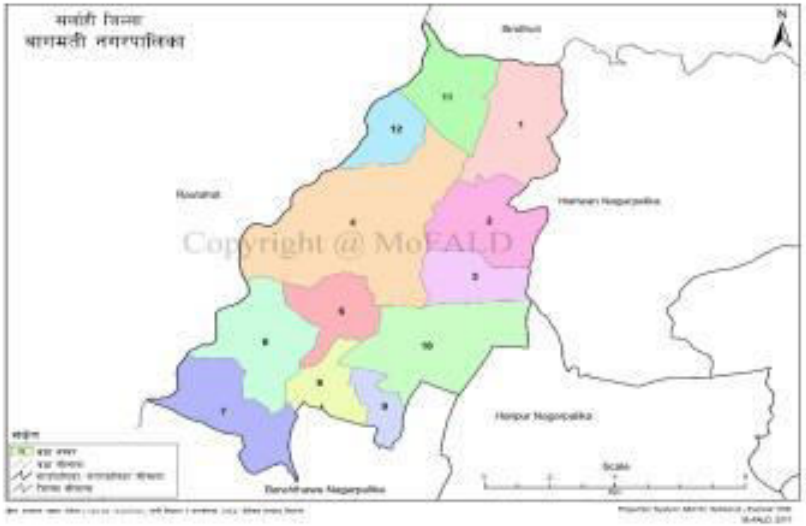
Location map
Bhimeshwor Municipality
Province -3, Dolakha Nepal

Brief Driscription

Bhimeshwor Municipality is situated at Dolakha district, Pradesh No. 3, Nepal. The municipality has been named after the very ancient and sacred destination Dolakha Bhimeshwor Temple. The municipality was declared by Nepal Government on 27th of Falgun, 2073 B.S. combining 3 different previous VDCs (Suspa Chhemawati, Boch and Lakuridanda) and 1 Municipality (Bhimeshwor Municipality).

The region is bordered by the Sun Kosi River on the west and the Khimti Khola River on the east. It is divided unequally by the River Tama Koshi, proportionately two thirds to the west of the river and one third to the east. To the north east lies the impressive Rolwaling Himal to the western edge of which are such peaks as Gauri Shanker and Melungtse. Gauri Shanker is synonymous with the god Shiva and his consort Parvati

Location map
Bagmati Municipality
Province -2, Sarlahi Nepal



Characteristics of the city

-Population : 40,000

-Area : 101.1 sq km

-Demographic density : 395 /sqkm

-Height above sea level : 700 m

Location map
Palungtar Municipality
Province -4, Gorkha Nepal

Brief History of municipal

In Lig Lig Kot (the part of the Palungtar)it was decided that whoever won the race from Chepeghat to the Ligligkot top will be the king for next year . The race would be organized every Dashain Tika day i.e greatest festival of Nepal . The race was started in 1604 BS. The races were always won by the local Ghales. In 1616 BS(1558AD), the race was won by the Drabya Shah. Since then, the Shah dynasty was established in the Ligligkot kingdom and his descendant's established the Gorkha kingdom and one of the Shah descendent Prithvi Narayan Shah established Nepal winning small kingdoms scattered around the Nepal.

Sport tourism

- A democratic method of electing leader (Becaming king of Liglig by winning a race practiced in 1558 AD
- The race culture was re introduced in 2010 AD, which has now become an attractive national event.

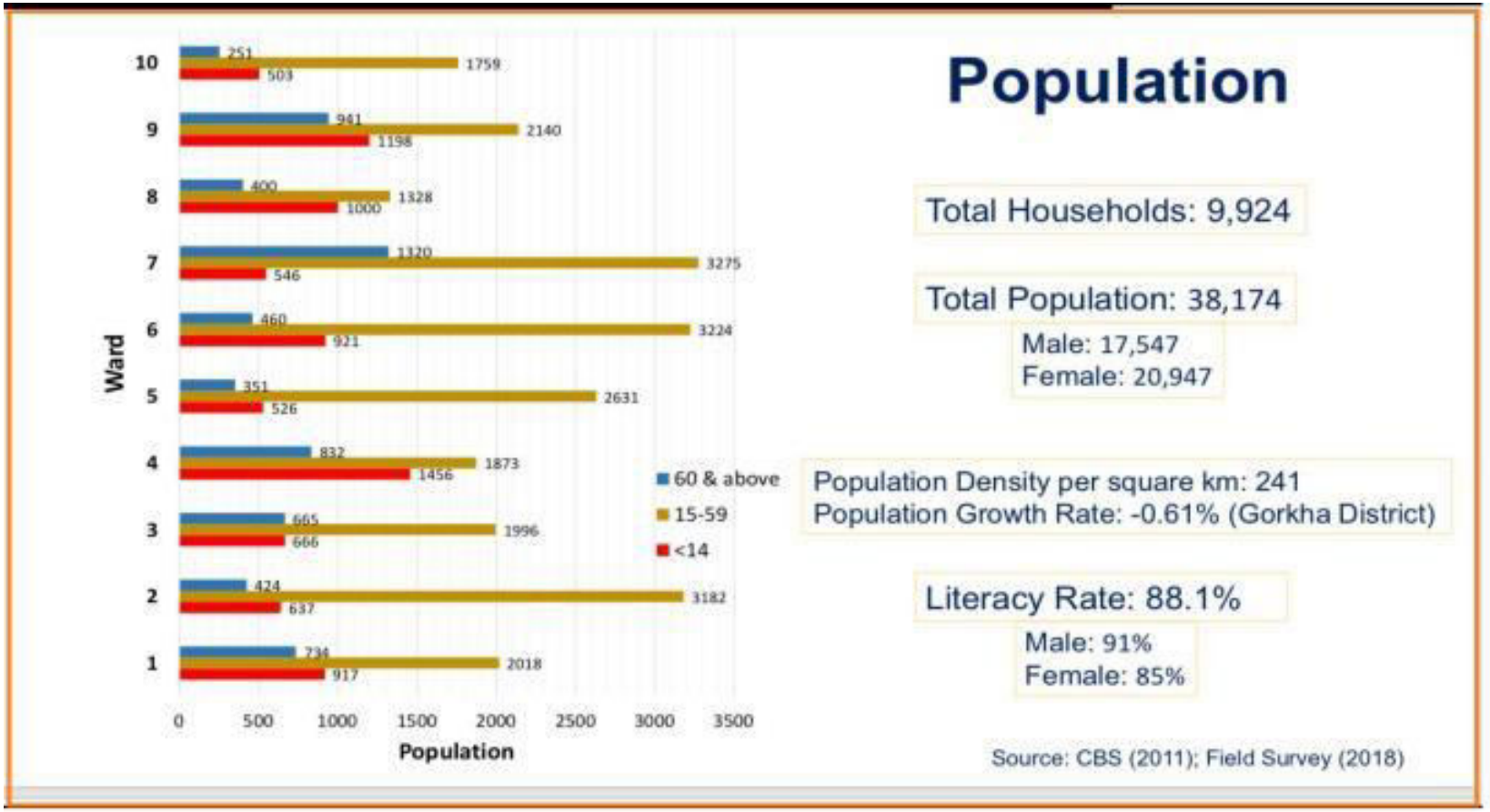
A brief information of Liglig Kot

- top of the peak 1450 meters ,
- A historical, religious, cultural, archeological and tourist attraction point.
- The starting point of modern Nepal

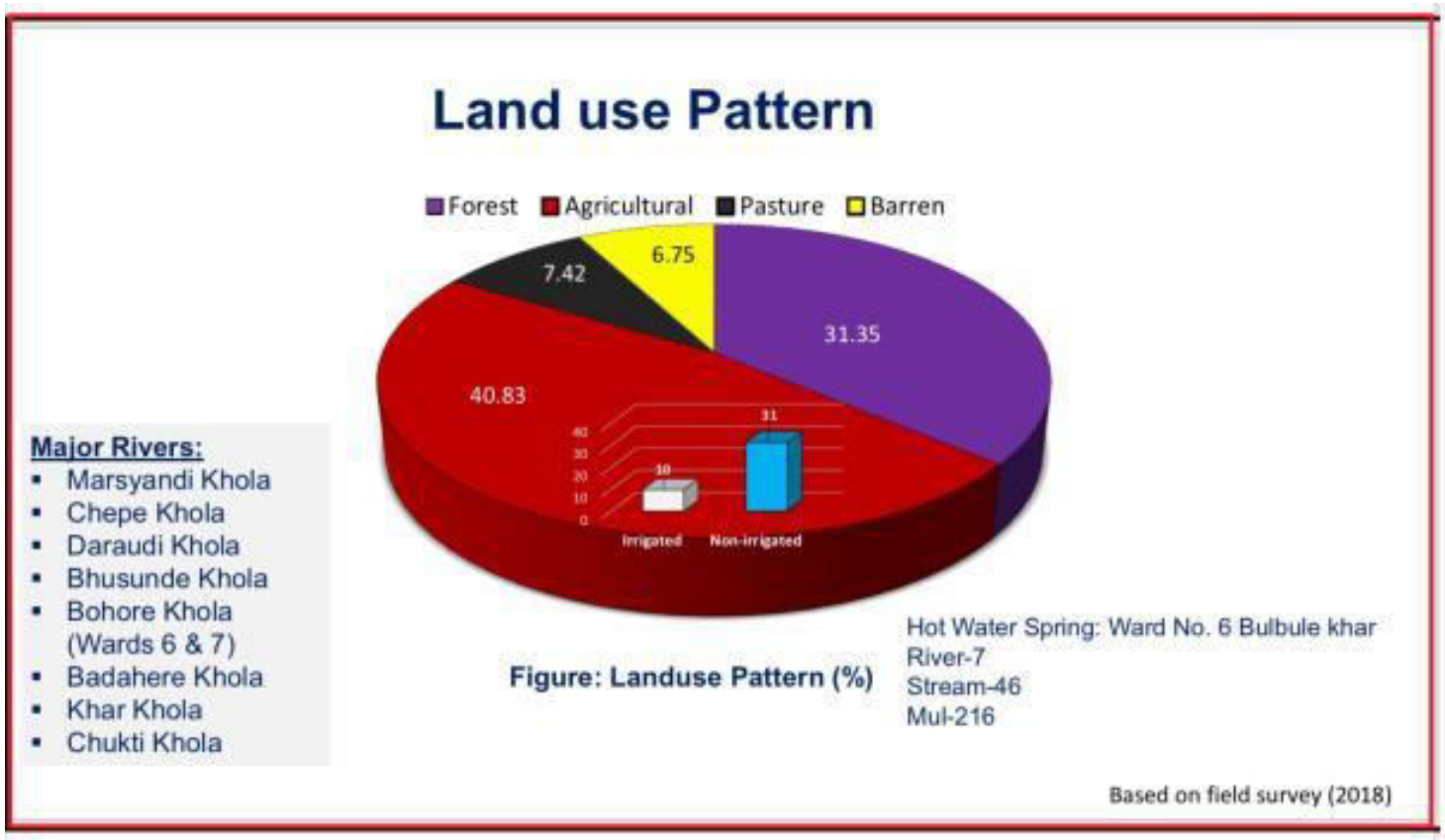

he peak where royal palace
was situated


Temple and mor infrastructure

Population Distribution



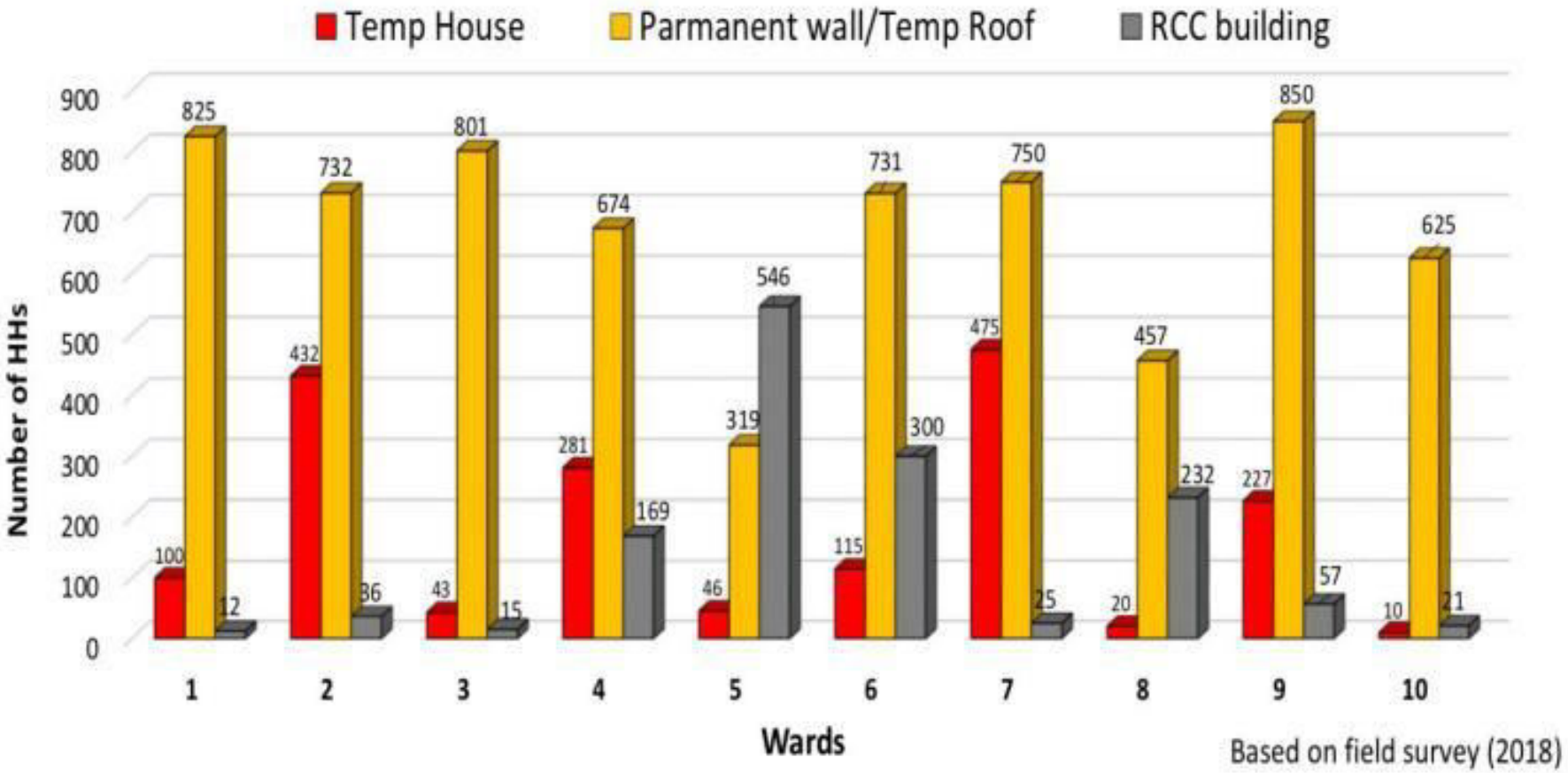
Land Used Pattern



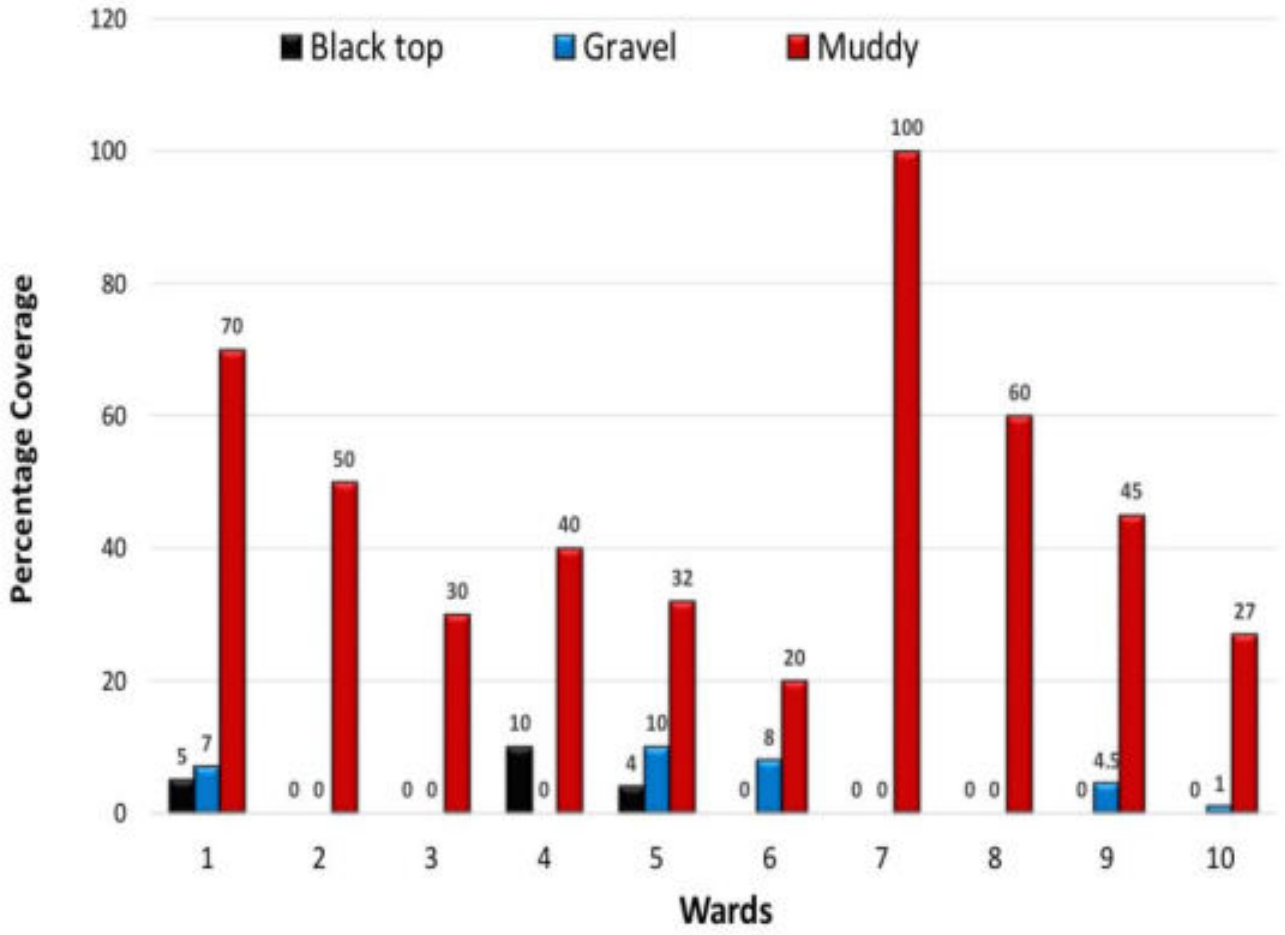
Infrastructures

Type of House

Temporary House: 18%
Permanent wall/GI Roof: 68%
RCC Building: 14 %



Road Network



Road Network (Km)	
Blacktop	19
Gravel	31
Muddy	474
Total	524

Based on field survey (2018)

Vulnerabilities

- It is contributing mostly to the rise in air temperature. Leading to rapid melting of glaciers and increment of glacier lakes.
- Exploitation of natural resources and growing population has led to increasing pollution, declining water quality, land degradation, etc.
- Extreme climate events including flooding, heavy rainfall, droughts, heat wave and cold stream etc. are also the consequences of climate change in Nepal.
- This leads to rapid melting of glaciers and Glacier Lakes (e.g. Tso Rolpa, Dolakha).

Risk of Glacier lake burst

Change in Himalaya Range in Nepal

North part of Himalayan

- Melting ice of Himalaya
- Decreasing in drinking water source and ponds
- Declining rate of average rainfall and snowfall
- Flowering Rhododendron before its time
- Adapting of lowland vegetation in highland
- Some species of bird are lost from our area

Vulnerabilities Bagmati

- Trimming of forests for cultivation.
- Hunting wild lives.
- Water sources Reservation
- Soil Erosion and Land slides
- Protection Chure Mountain.
- Smoke Controlling
- Flood

Burning of jungle


© AP

In plain area (TERAI)

Challenges for Sustainable Palungtar

- **Development induced disaster like landslide**
- **Climate change Induced disaster like dry up of water sources**
- **Unplanned building construction**
- **Municipal waste management challenges**
- **Weakening of social , community , religious ,cultural infrastructure**

Change in Hilly Range

In Hilly area

At last Gorkha Earthquake epicentre

Before earthquake

After Earthquake

GOAL/OBJECTIVE

- Make city energy efficient
- Green and environment city
- Preserve the water resource
- Manage waste
- Max utilization of renewable energy
- Prepare land used plan
- Make rule and regulation for settlement
- One village one pound i.e rain water harvesting
- In Bagmati municipality make lake 2 sq km

CLIMATE CHANGE ADAPTATION

- All Nepal annual maximum temperature trend is significantly positive (0.056oC/yr). All Nepal annual minimum temperature trend is also positive (0.002oC/yr) over the period 1971-2014 A.D. but it is insignificant. Coherent but insignificant precipitation patterns might be associated with short term variability in atmospheric phenomena. Further analysis/longer period data is necessary to understand these patterns.
- Despite bestowed with an abundance of water resources (enough to generate 83,000 megawatts of hydroelectricity), rainfalls, and precipitation, Nepal seems to be a country in dire need of clean drinking water and irrigation for its people.
- Many households in Nepal's mid-hills suffer from water shortages during the pronounced dry season. Some parts of Nepal have been following the roof-top rainwater harvesting. The harvesting system consists of a catchment roof, conveyance pipes, and a storage jar.
- The harvested water has a huge potential to solve the current problem of water shortage and depletion arising from continuous climate change. Not only for drinking and household purposes, this can be a solution to the irrigation water required in the field, recharging the groundwater, fulfilling the basic water requirement of crops and livestock and many other purposes.

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CLIMATE CHANGE ADAPTATION

- **Rainwater Harvesting Capacity Centre (RHCC)** established in 2006 has been promoting the technology of Rainwater Harvesting in Nepal. RWH Guideline Draft_2015_DWSS can be used as reference for design purpose
- Japan's Kochi Technology University (KTU) surveyed over a 1000 farmers in Nepal's western mid-hill agro-ecological zone. They found that vegetable production and income could increase more than 30 per cent by simply deploying water-conservation techniques like lining ponds with plastic. This will also help alleviate poverty in the mid-hills region in Nepal.

- Plastic-lined conservation ponds store water for irrigation more efficiently than the traditional earthen ponds which lose much water to seepage.

- Drip irrigation is a very water-efficient irrigation system. Water is dripped to individual plant root zones at low rates (2.25 l/hr) from emitters embedded in small diameter plastic pipes.

Low cost micro-sprinkler irrigation, Low cost drip irrigation (LCDI) has been introduced in the Jhikhu Khola watershed, Nepal, as a cost effective way of making the best use of the limited available water.

CLIMATE CHANGE ADAPTATION

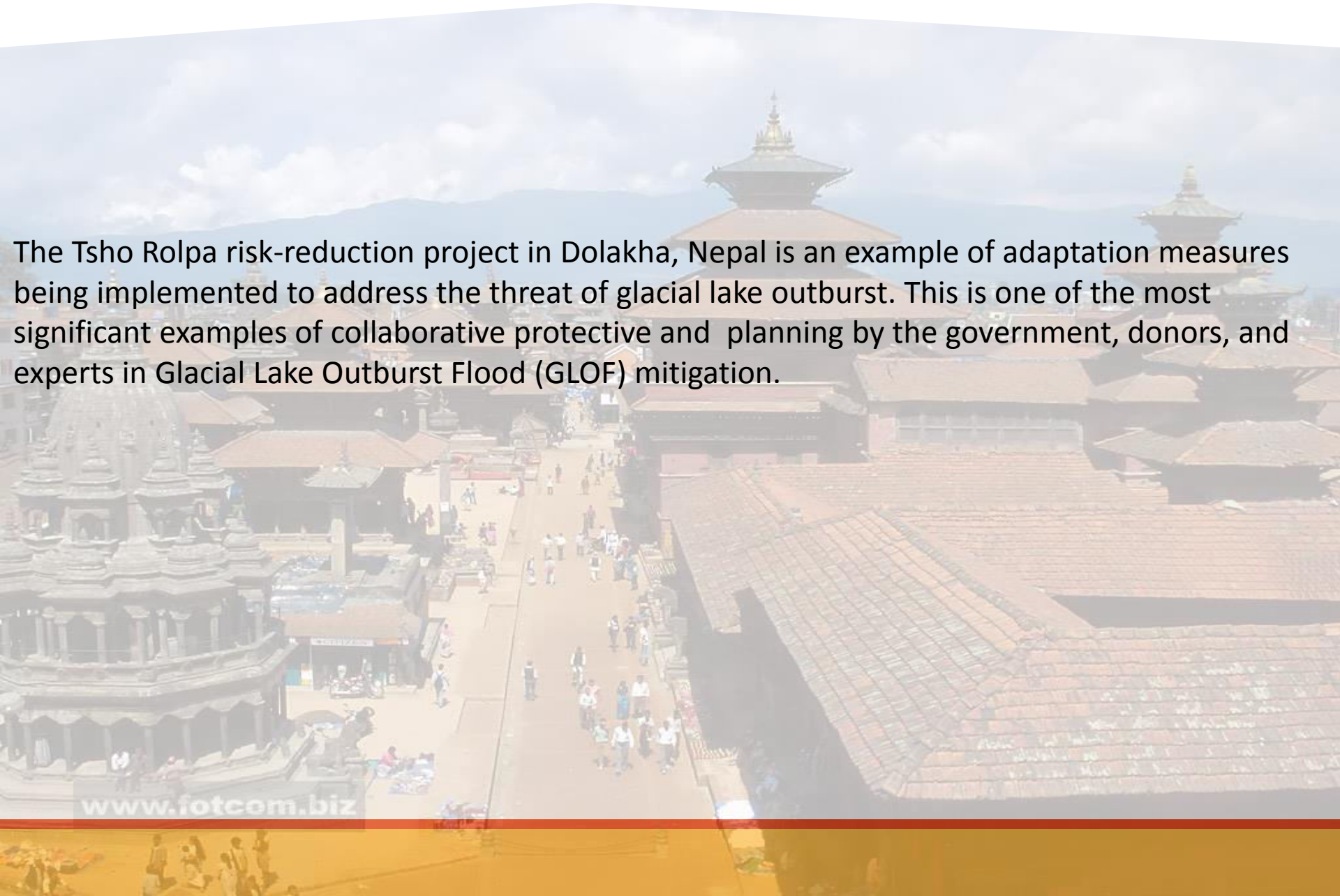
Both structural and vegetative measures can be used to control and protect both agricultural land and settlement areas from flooding due to climate change impact. Check dams are placed at intervals to divert water, additional support is provided by spurs. Bamboo rhizomes are planted between them and Napier grass (Pennisetum purpureum) is planted at the back of the structures so that as the plants grow their roots help to anchor the structure

A demonstration plot was established by the District Soil Conservation Office (DSCO) in Dang, and the technology needs to be replicated in other areas with action research and experience.

A solar based water pump system does not result in greenhouse gas emissions. Extensive use of solar water pumps would lead to substantial greenhouse gas emission reductions.

Nepal plans to formulate the Low Carbon Economic Development Strategy that will envision country's future plan to promote economic development through low carbon emission with particular focus on: (i) energy; (ii) agriculture and livestock; (iii) forests; (iv) industry; (v) human settlements and wastes; (vi) transport; and vii) commercial sectors

CLIMATE CHANGE ADAPTATION



The Tsho Rolpa risk-reduction project in Dolakha, Nepal is an example of adaptation measures being implemented to address the threat of glacial lake outburst. This is one of the most significant examples of collaborative protective and planning by the government, donors, and experts in Glacial Lake Outburst Flood (GLOF) mitigation.

CLIMATE CHANGE MITIGATION

1. Switching to low-carbon energy sources such as wind power, solar, geothermal, hydroelectric for lowering the emissions of greenhouse gases in the atmosphere
2. Bio-mass is the main source of energy instead of fire wood and LPG.
3. Bio engineering and plantation are the preserved the slope land .

Model of park of Bagmati

- Awareness campaigning
- Communication
- Sustainable Forest Management
- Community based forest management support
- Plantation in barren land
- Biodiversity conservation
- Conservation of vulnerable species
- Awareness against Forest fire
- Certified forest are preserved

Stakeholder analysis

1. Potential Internal Partners within State or Local Government Organization
2. Province government and federal government
3. NGO ,Industrial
4. Hospital ,school and many more.
5. Share climate change impact and analyse reducing it challenge.

Financial Resource

- Coordinate the Province and federal government
- Utilizing local resource
- Local level tax who produce green house gas pay more money
- Used renewable energy and reduced cost

TARGETS

By 2050, Nepal will achieve 80% electrification through renewable energy sources having appropriate energy mix. Nepal will also reduce its dependency on fossil fuels by 50%

By 2020, Nepal intends to expand its energy mix focusing on re- newables by 20% and diversifying its energy consumption pattern to more industrial and commercial sectors.

By 2020, Nepal aims to increase the share of electric vehicle up to 20% from 2010 level.

By 2050, Nepal will decrease its dependency on fossils in the transport sector by 50% through effective mass public transport means while promoting energy efficient and electrical vehicles.

Nepal will pilot a sub-national project on REDD+ to reduce about 14 million tons of CO_2-eq by 2020 by addressing the drivers of deforestation and forest degradation and strengthening governance mechanisms in all types of forests and protected areas.

By 2025, Nepal will strive to decrease the rate of air pollution through proper monitoring of sources of air pollutants like wastes, old and unmaintained vehicles, and industries.


THANK YOU