



# **Initiative Approach in Integrated Water Resource Management in Nepal**

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# Location of Nepal





# Nepal – Water Availability

There are more than 6000 rivers and lakes within the territory of Nepal

Total drainage area: 194,471 km<sup>2</sup>

Nepal has 225 billion cubic meters of annually available

Only 15 billion cubic meter is used for economic and social purpose

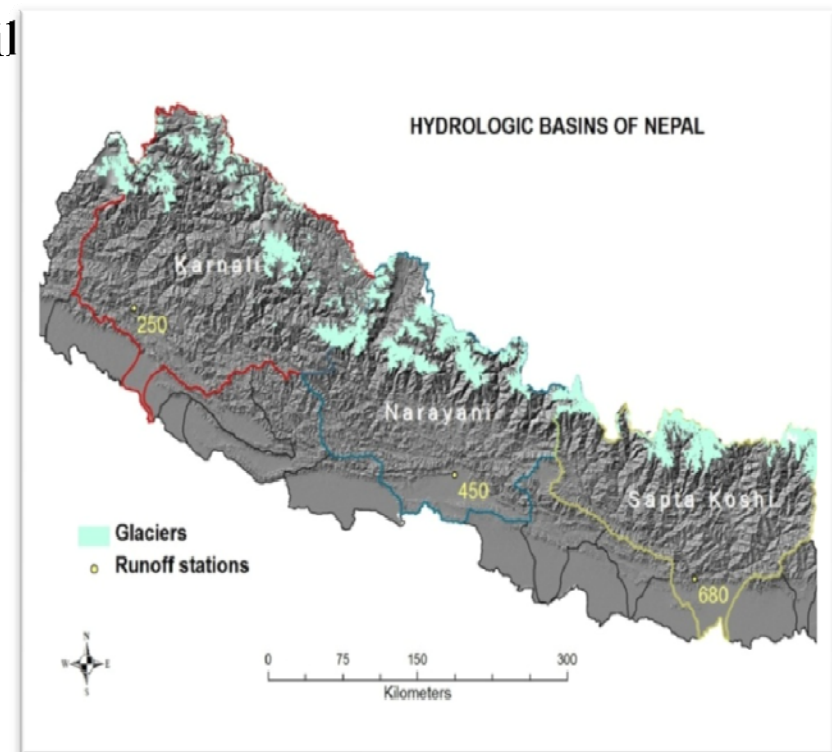
(96% -agriculture, 1% -industry & 3% -municipal use)

Water is regarded as the key strategic

Natural resources having the potential to be the catalyst for all round development and economic growth of the country.

Nepal Himalayas enjoy the possession of 7 mountain peaks higher than 8,000 meters 3,252 glaciers covering an area of 5,323

sq. km and ice-reserve of 481 cubic km 2,323 identified glacial lakes covering an area of 75.7 sq. km, 20 of them are highly vulnerable



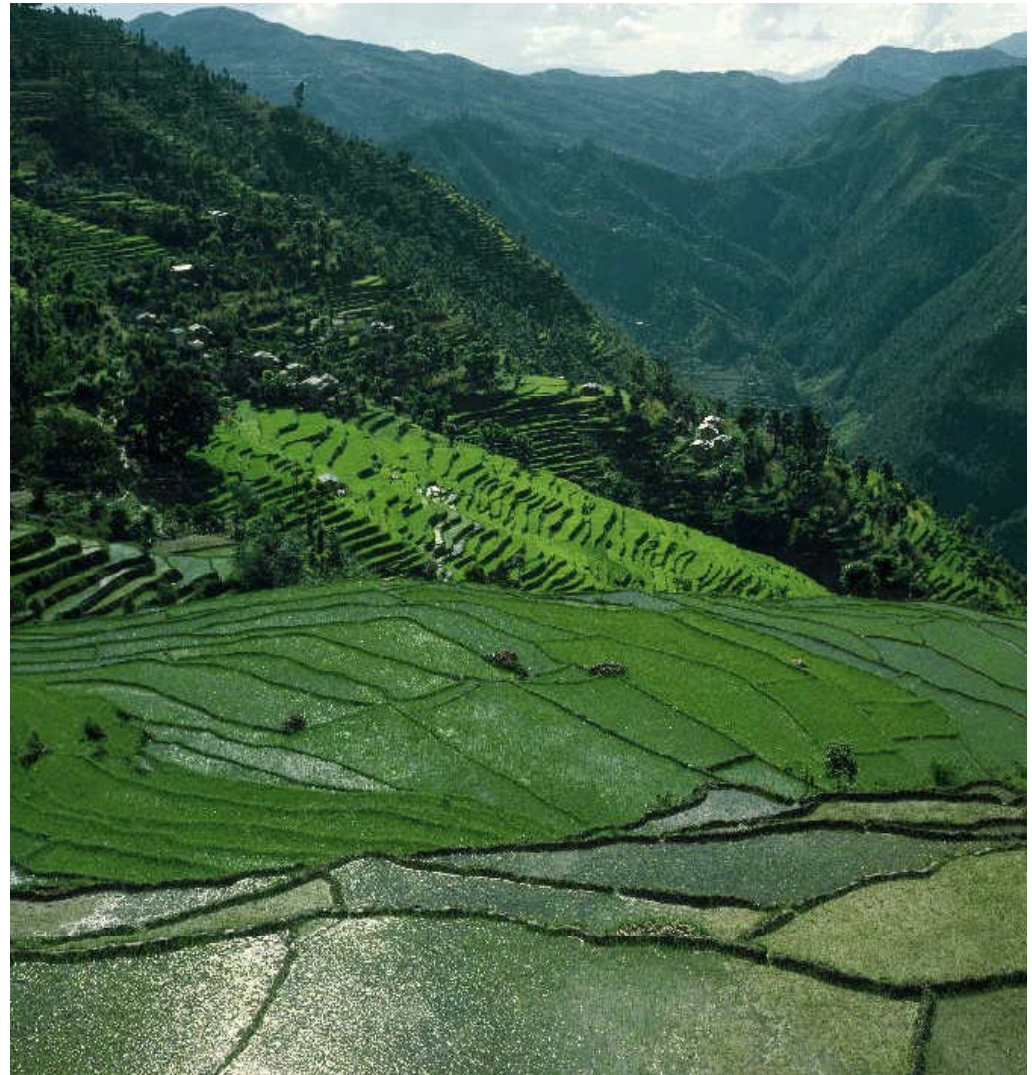




# Nepal – Water Availability contd.

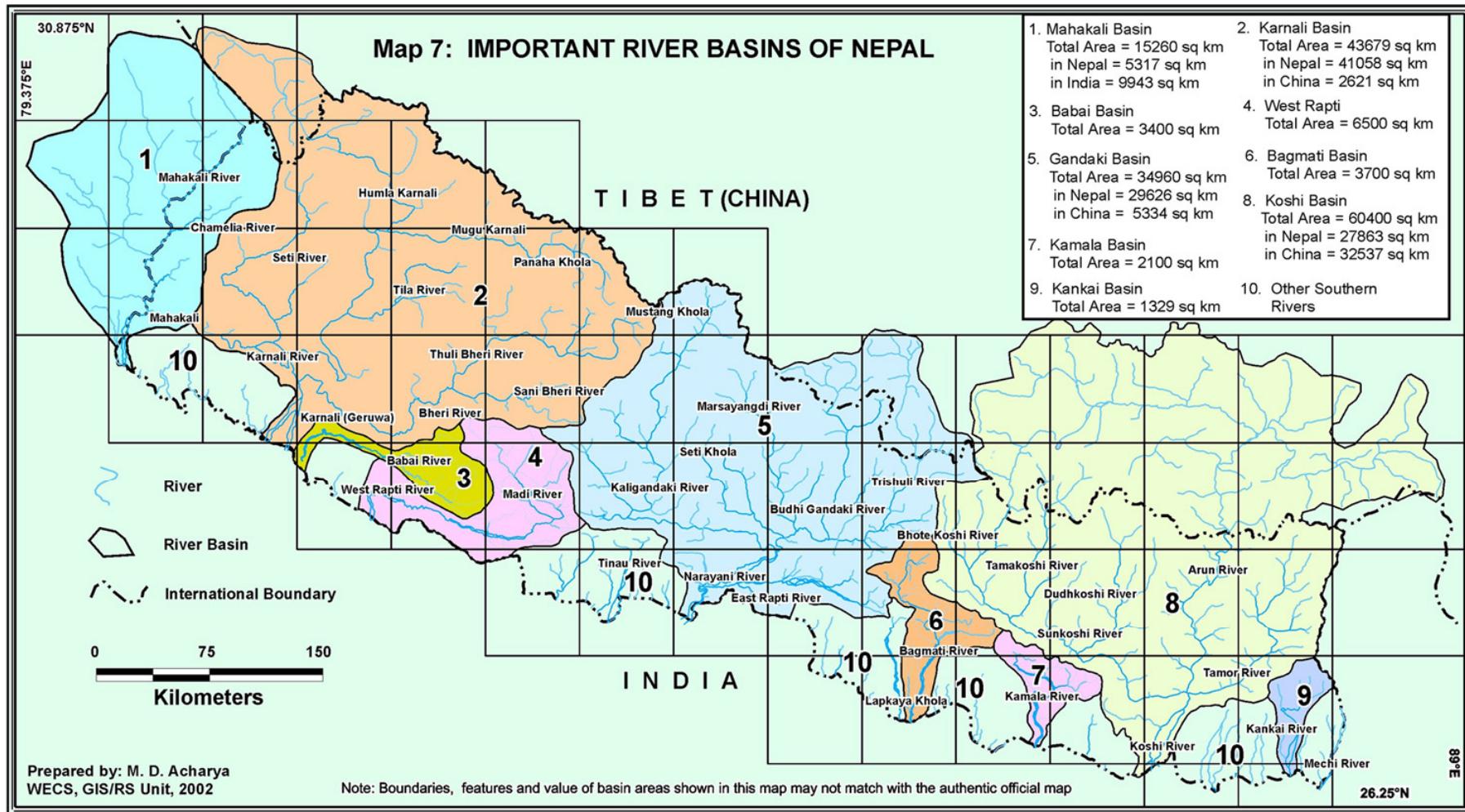
Only about 72% of the country's population has access to basic water supply while 75% of the population lacks proper sanitation facility.

Nepal has a cultivated area of 2,642,000 ha (18% of its land area), of which two third (1,766,000 ha) is potentially irrigable.





# Major River Basins of Nepal







## Hydrology

### Hydrology of Nepal

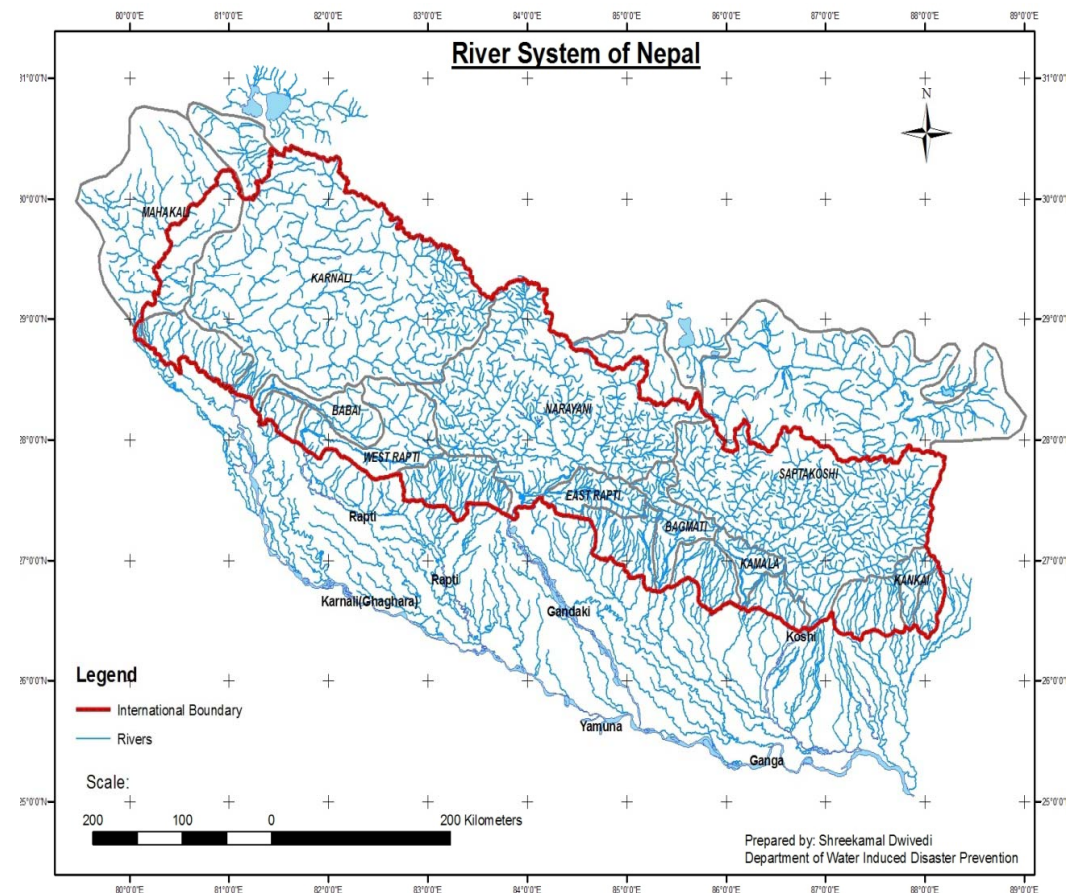
Total rivers within the territory of Nepal: >6000.

Total drainage area: 194,471 km<sup>2</sup>.

Snow covered area: ~14% of total area of the country.

High altitude variation : 60m in Terai (Jhapa) -8,848m in high Himalayas.

High Temporal variation (time) of annual rainfall, i.e., 20% of total annual rainfall from October to May (8 months) and 80% from June to September (4 months).





# Impact of climate change

Mean annual temperature is rising at a rate of  $0.06^{\circ}\text{C/yr}$  : high altitudes warming faster.

Days and nights are becoming warmer

Decreasing number of annual rainy days but increasing number of rainy days with equal to or more than 100 mm.

Rainfall pattern is changing (season, duration, amount).

Glaciers are retreating at an accelerated rate and glacial lakes are expanding fast.



## Impact of climate change (cont..)

- Floods, landslides, sedimentation, drought, decline in agricultural products, and degradation in water quality.
- Shifting of ELA
- Scarcity of water
- Retreat of majority of glaciers and thinning of the glacier surface
- Risk of Glacial lake Outburst Flood (GLOF).  
Growth of Imja lake (1956 – 2007)

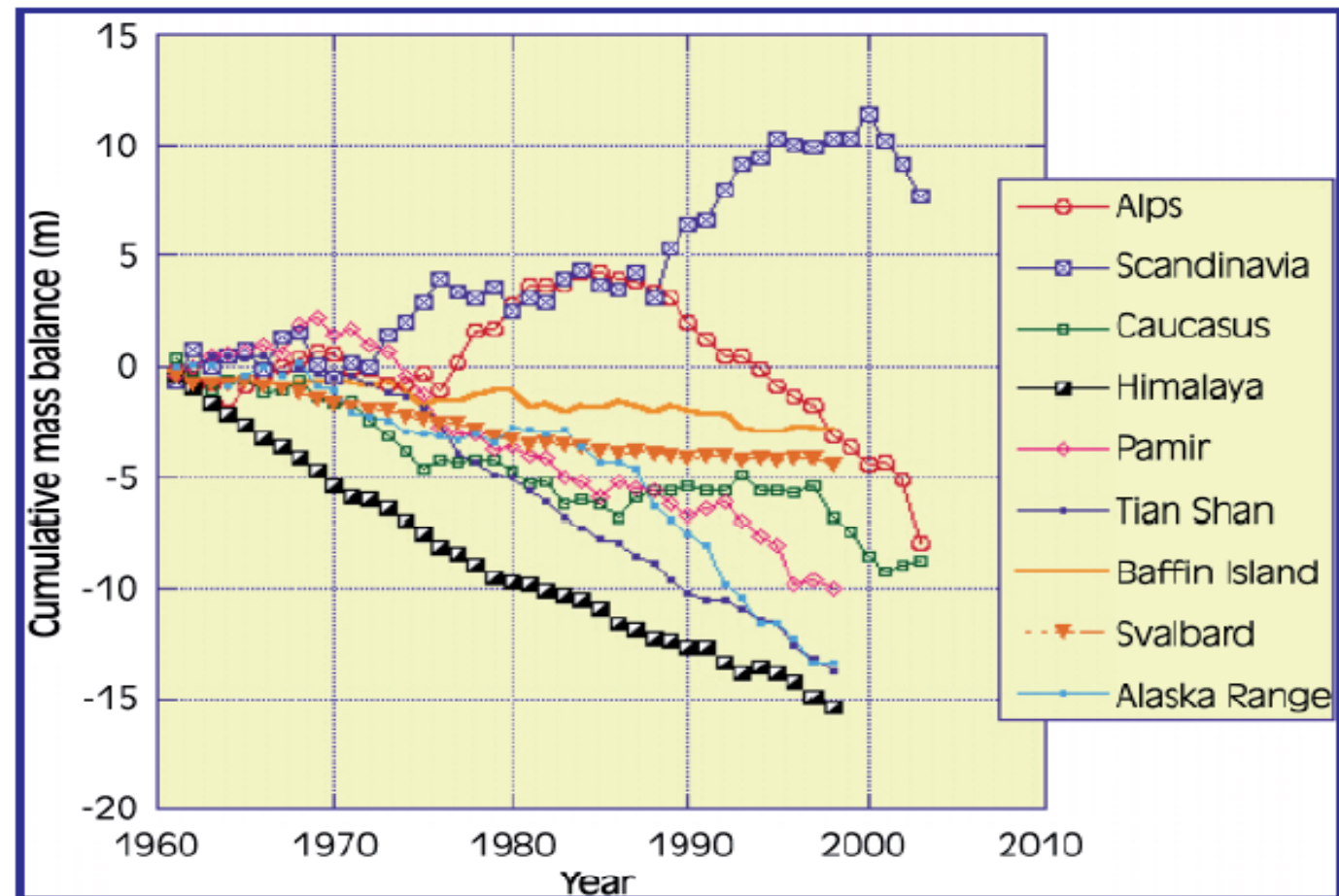
Flood in Saptakoshi (2008)







**Himalayan  
glaciers  
retreating  
very fast...**



**Figure 2: Rapid retreat of greater Himalayan glaciers in comparison to the global average (Dyurgerov and Meier 2005)**

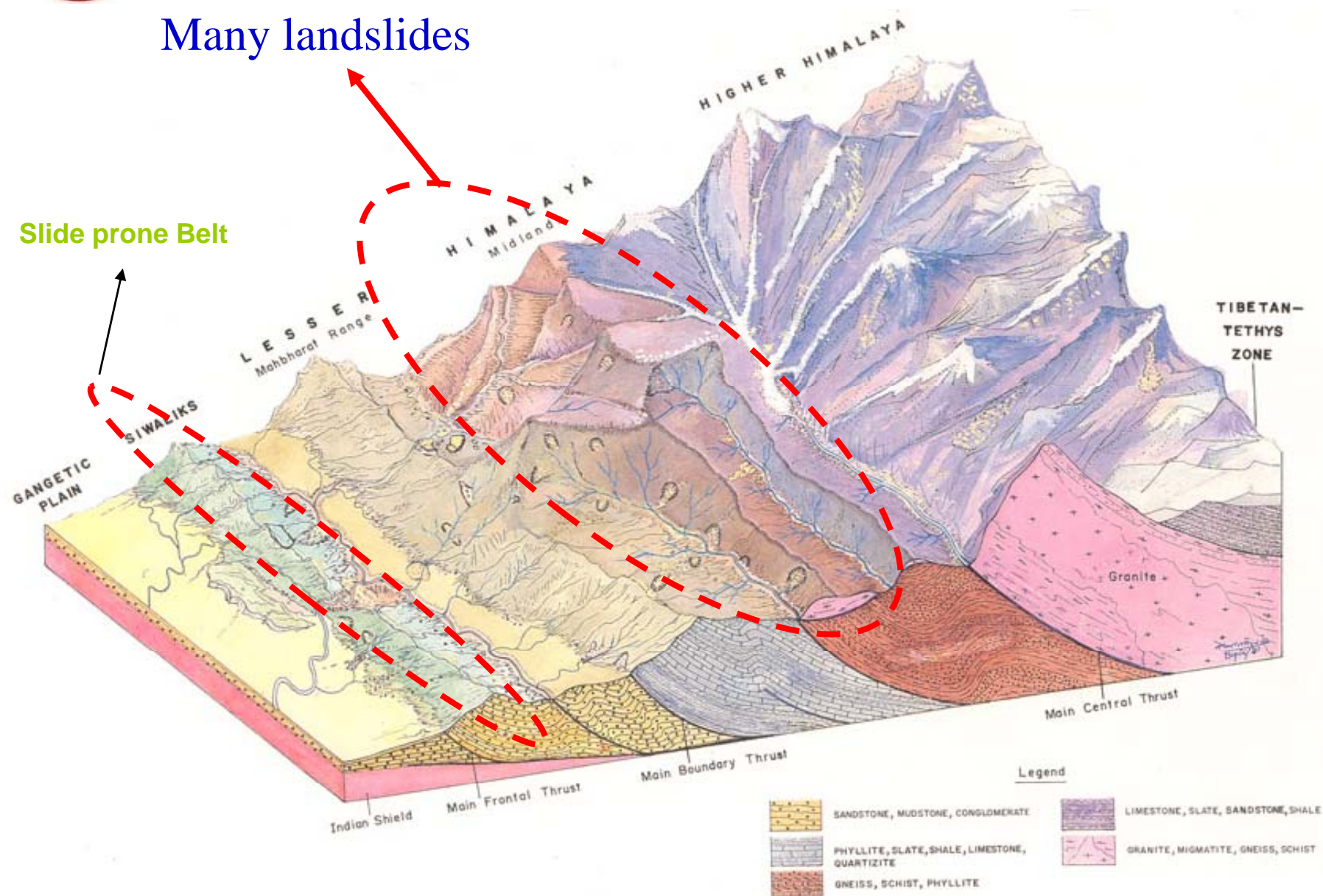


# Physiography on a 3- Dimensional View

After MRE (1996)

Many landslides

Slide prone Belt





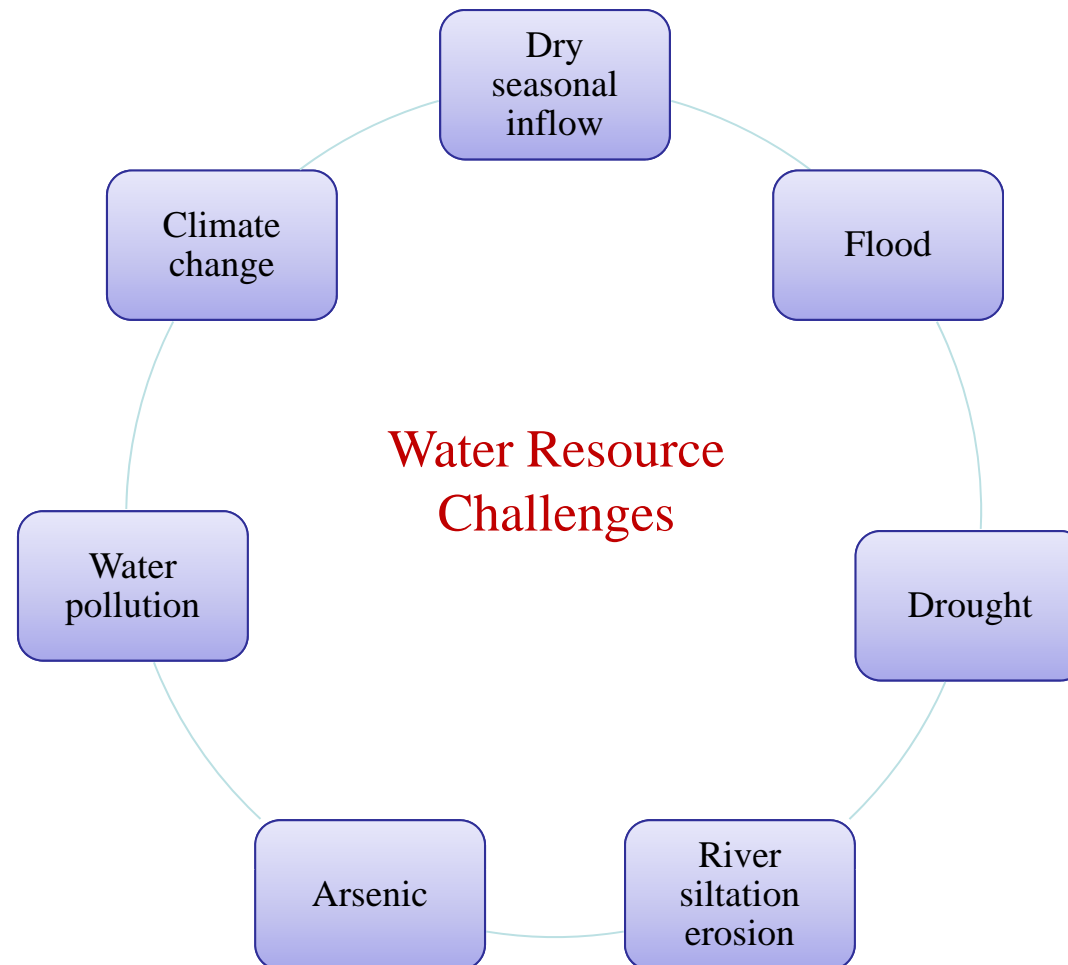
## Annapurna Range







# Challenges on Water Resources





# Water Resources Strategy (2002), Nepal

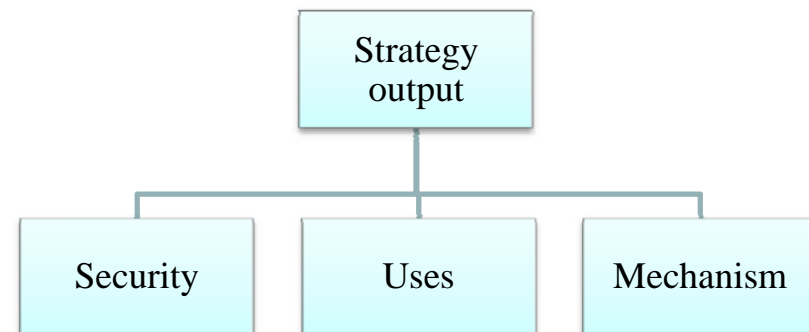
Nepal's national goal has been defined as “living conditions of Nepali people are significantly improved in a sustainable manner”.

## Strategy Foundation:

Every Nepali Citizen, now and in future, should have access to safe water for drinking and appropriate sanitation, as well as enough water to produce food and energy at reasonable cost.

The Water Resources Strategy outputs will contribute to this goal through the achievement of:

- Short-term (5-year) Purpose
- Medium-term (15-year) Purpose
- Long-term (25-year) Purpose





# National Water Plan 2005

The major doctrines of National Water Plan are integration, coordination, decentralization, peoples participation and implementation of programmes within the of good governance, equitable distribution and sustainable manner





# Integrated Water Resource Management (IWRM ) Principles

- Development and management of water resources shall be undertaken in holistic and systematic manner.
- Water utilization shall be sustainable to ensure conservation of resources and protection of environment.



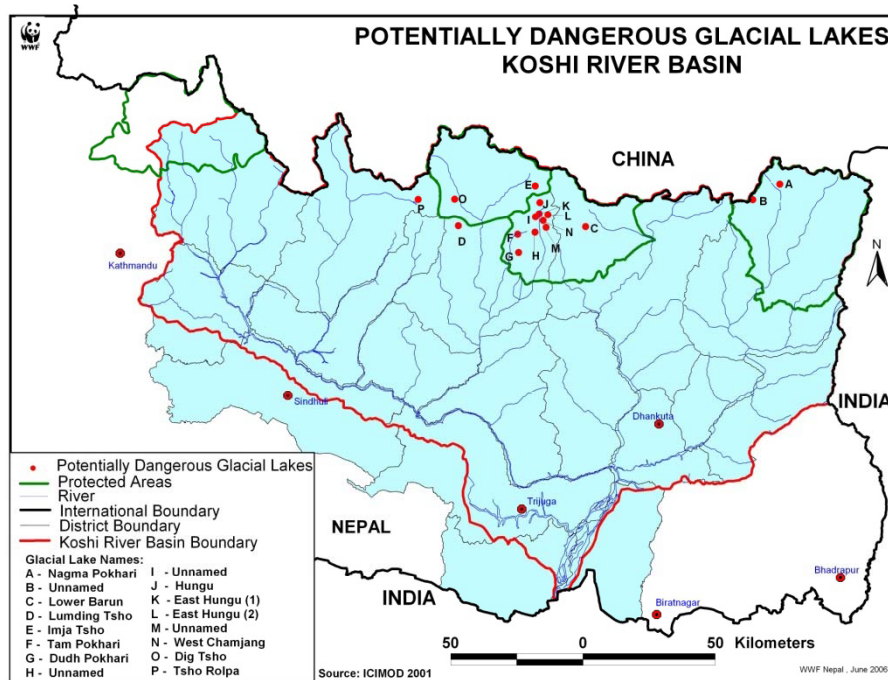
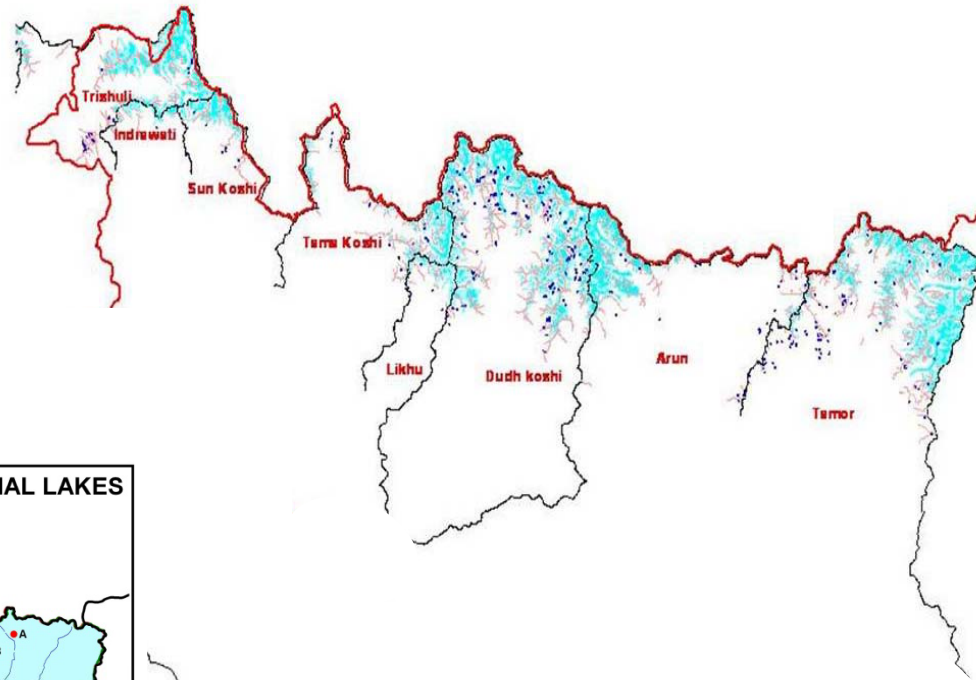
# KOSHI RIVER BASIN

- It is a **transbounday river** flowing from Tibet, Nepal, India and Bangladesh feeding the Bay of Bengal
- The total catchment of the Koshi River up to the Koshi Barrage in NEPAL is estimated to be 60,400 sqkm out of which **45.6% lies in Nepal** and remaining 54.4% lies in Tibet
- **Koshi basin in Nepal** contributes almost 10% of the average discharge of Ganga basin.

The tributaries of Nepal contributes to:

- ~ more than 45 percent of the total flow of the Ganges
- ~ nearly 70 percent of the Ganges flow in dry-season
- ~ **87 percent** of the Ganges flow in the three critical non-monsoon months (March to May)

# Freshwater



**779 glaciers with an area of 1,410 km<sup>2</sup>**

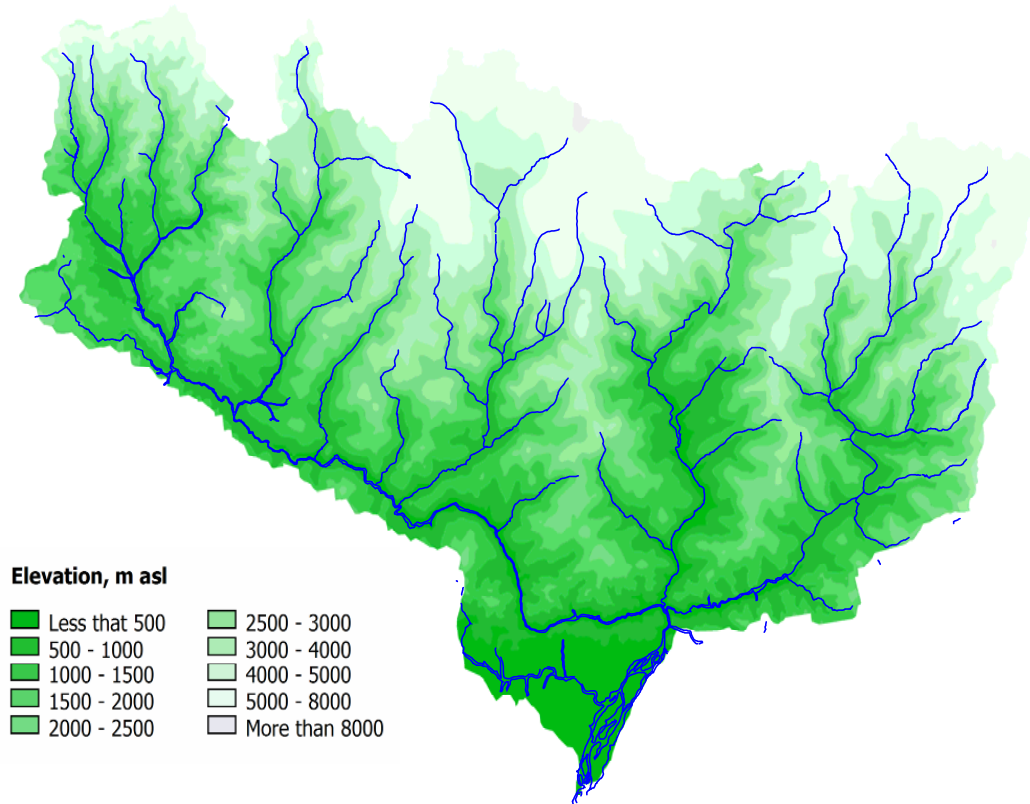
**Estimated ice reserve of 152 km<sup>3</sup>**

**16 potentially dangerous glacier lakes**





# Freshwater Significance



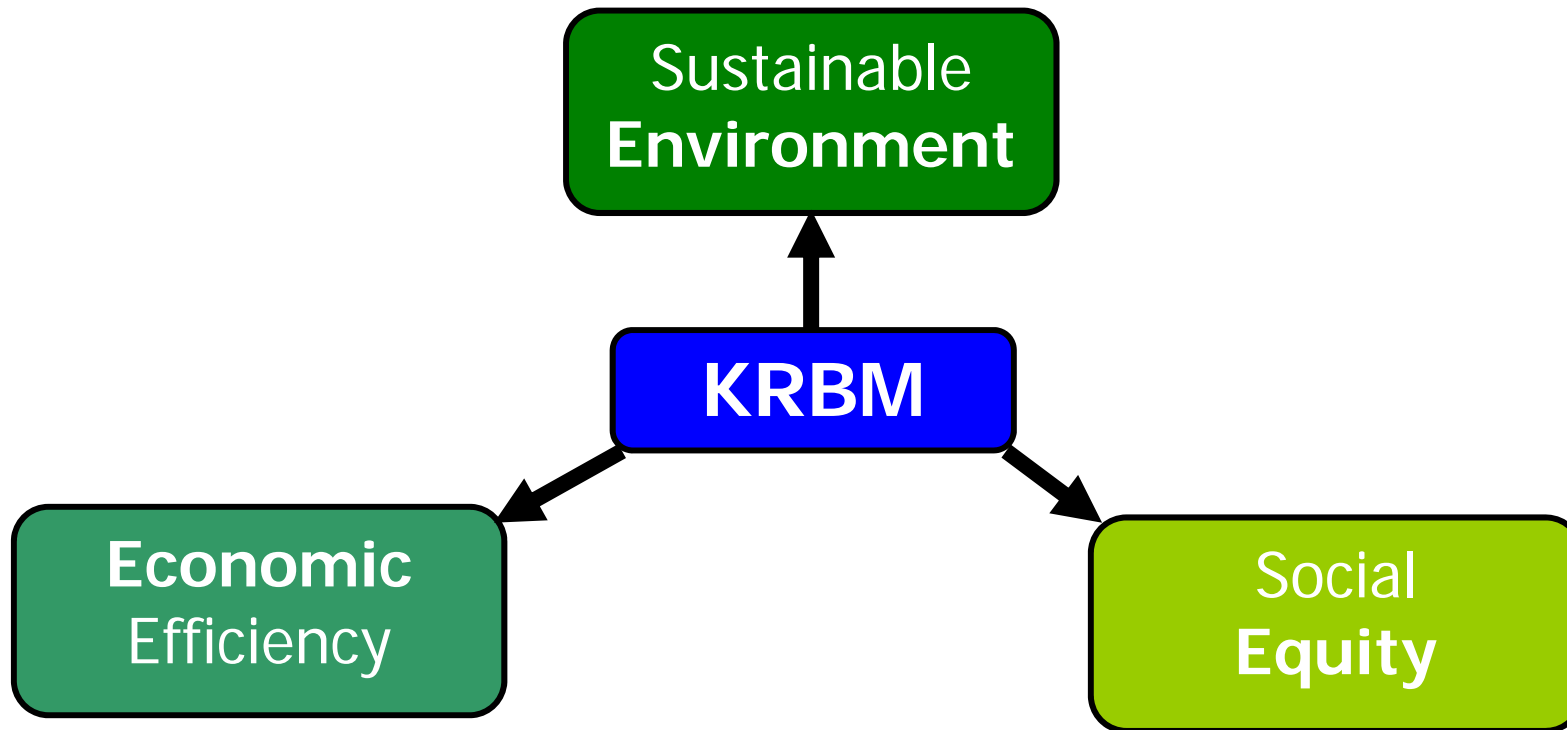
**Second largest sedimentation in  
the world (8848m – 75m)**





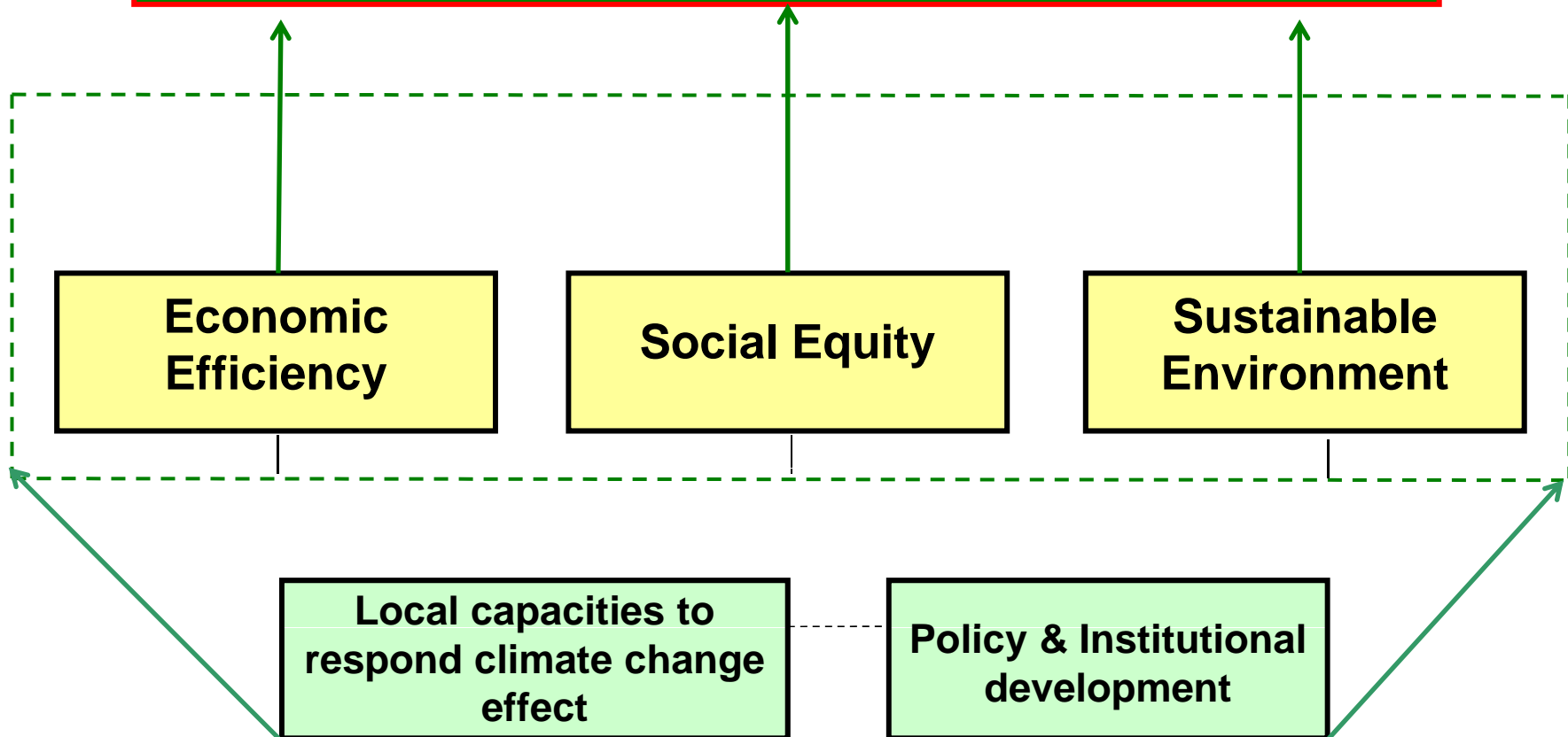
## IRBM Approach

- KRBM will be based on 3 strategic principles



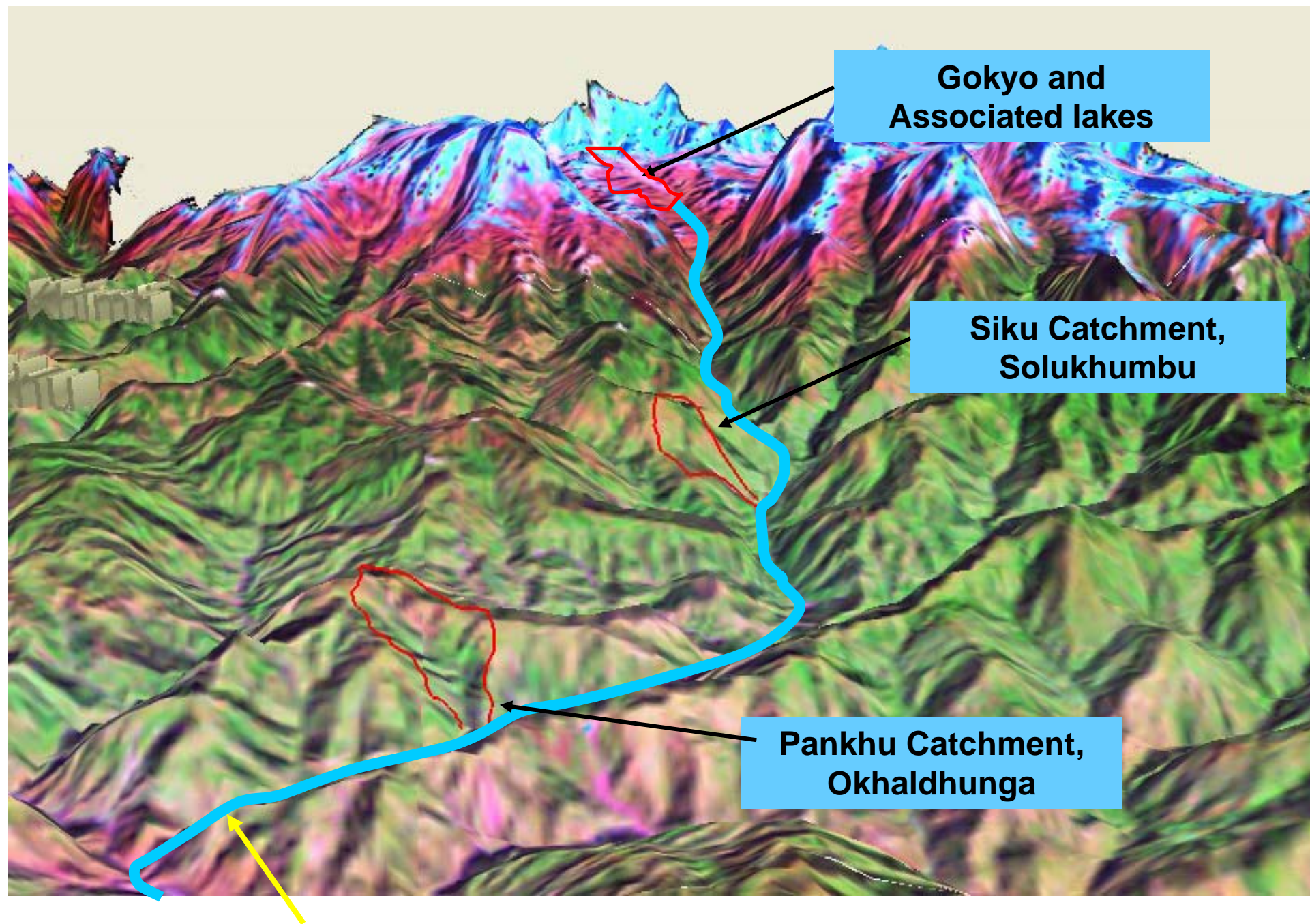
# Strategic Plan Framework

## Koshi River Basin Management (KRBM) Strategic Plan



**3 E Pillars of KRBM Strategy with Two Overarching Components**





**Gokyo and  
Associated lakes**

**Siku Catchment,  
Solukhumbu**

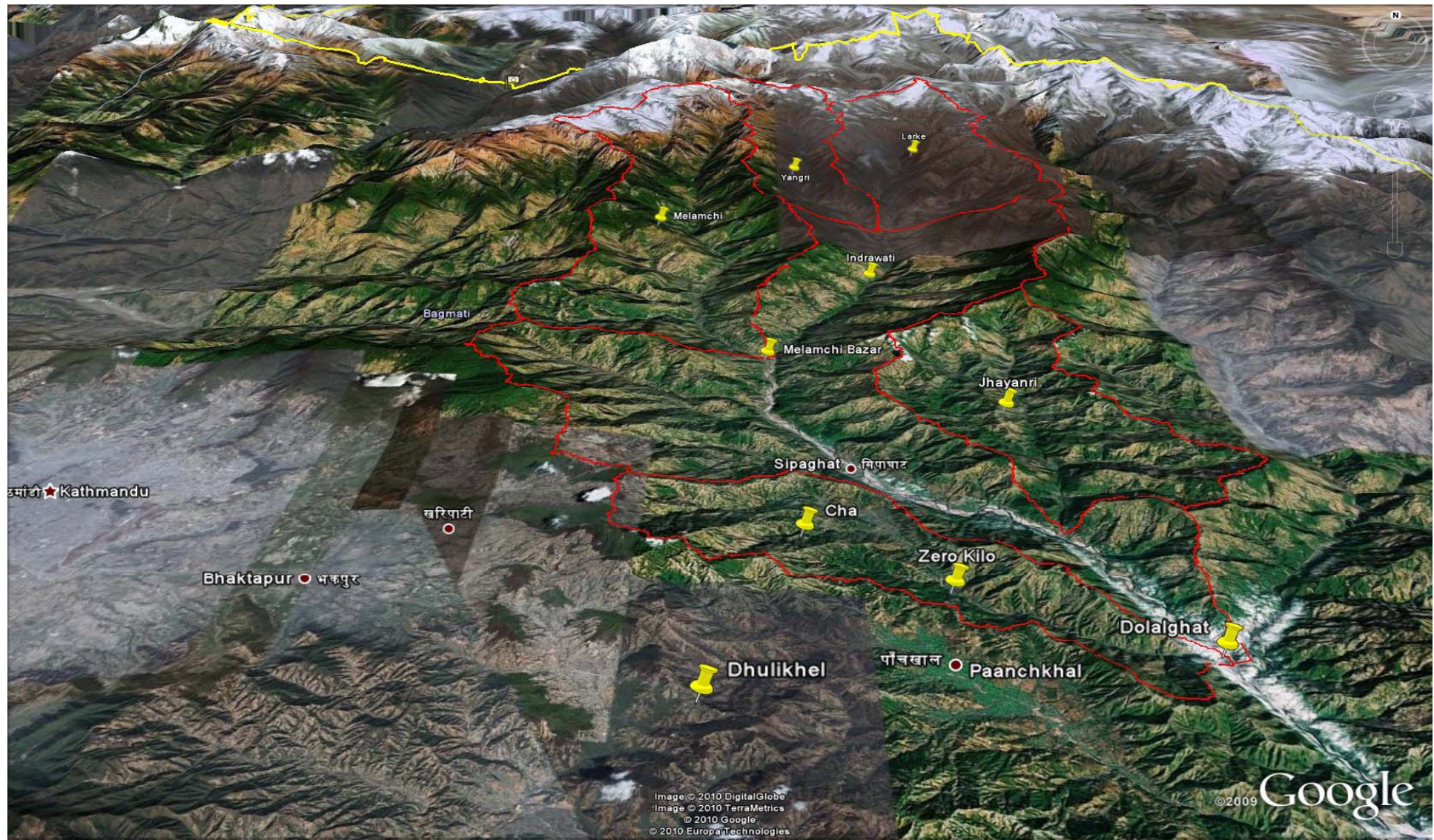
**Pankhu Catchment,  
Okhaldhunga**

**Dudh koshi river**





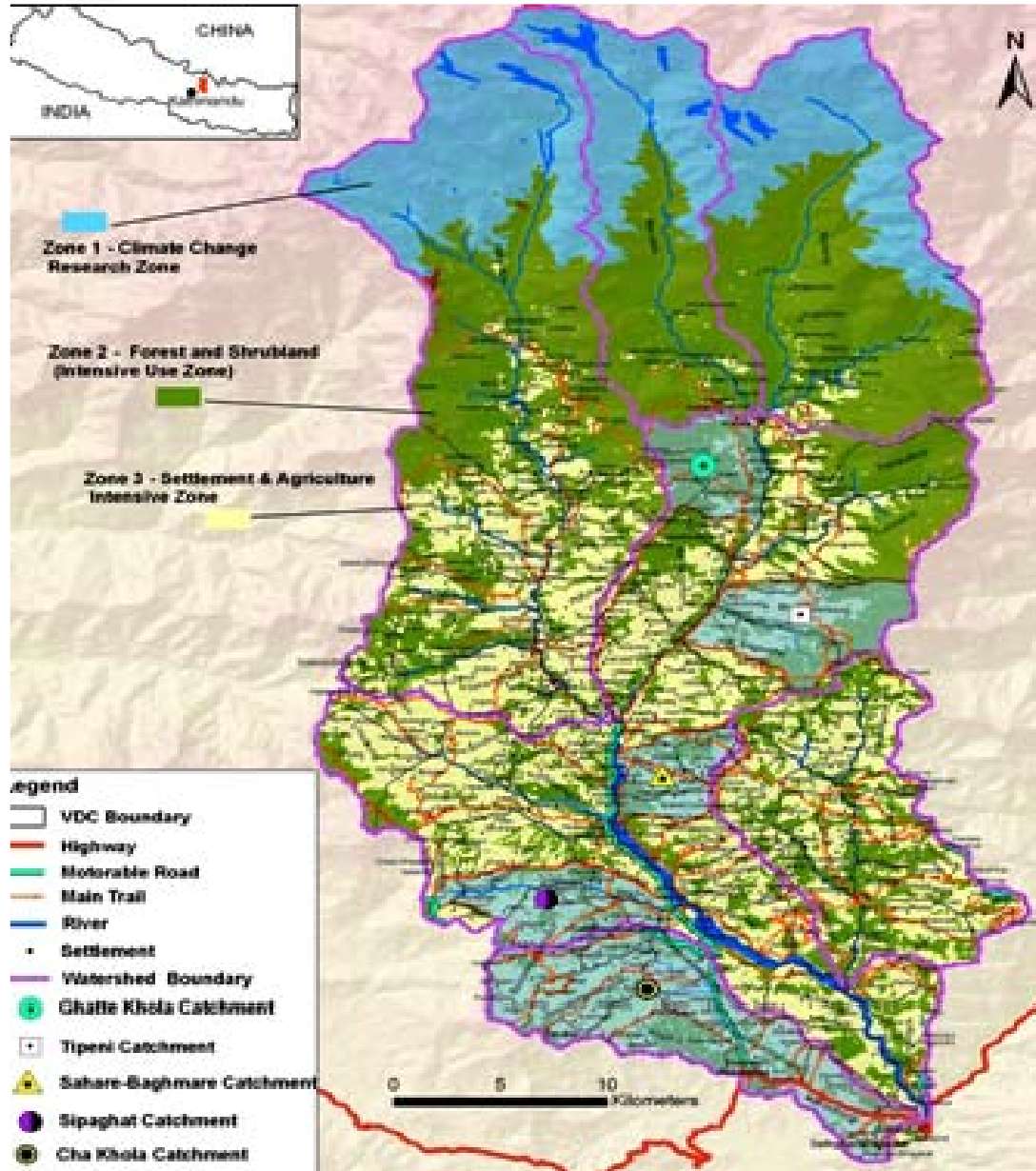
# Overview of Indrawati River Basin







# Indrawati sub\_basin



## Length

– 59 KM

## Total area

– 124,000 Ha

## Major tributaries

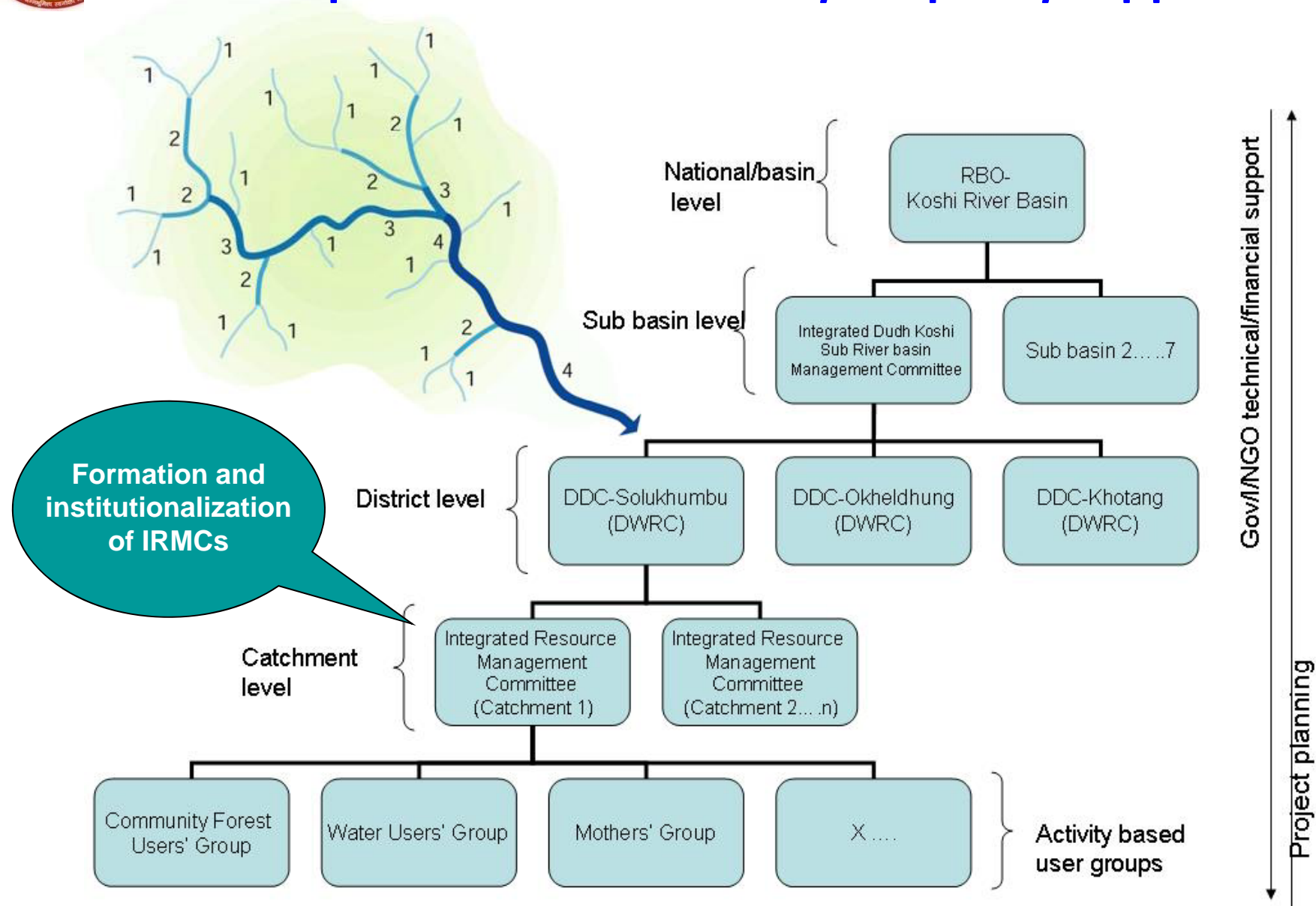
– Yangri, Larke, Melamchi, Jhyandi, Cha Khola, Aanshi Khola Mahadev Khola

## Districts

– Sindhupalchok, Kavrepanchok and Kathmandu



## Field implementation modality for policy support







# Way Forward

- Establishment of River Basin Offices in Koshi, Gandaki and Karnali Rivers.
- Drafting of Integrated Water Resource Policy.
- Establishment of Knowledge base River Basin information Center.



**Thank you**

