



# Mainstreaming Integrated Water Resource Management - Bhutan

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# Outline



- ❖ Country Context
- ❖ Climate Change /Projections
- ❖ Methodology /Tools
- ❖ Key Outcomes
- ❖ Key Lesson's Learnt



# Biophysical information

- 71 % forest cover
- 51 % under protected areas
- 60% of population dependent on farming
- Mixed farming widely practiced
- Carbon negative

# Potential areas impacts of climate change in Bhutan



## Human Health

Rising Temperatures may cause the spread of tropical diseases and heat stress into higher altitudes.



## Natural Disasters

Rapidly retreating alpine glaciers is increasing the risk of 'glacial lake outburst floods' endangering life and property downstream. Increasing flash floods may also be caused by intensifying



## Agriculture

80% of the Bhutanese practice subsistence farming. Climate Change can cause changes in temperature and precipitation patterns and increase the vulnerability of a large group of this population.



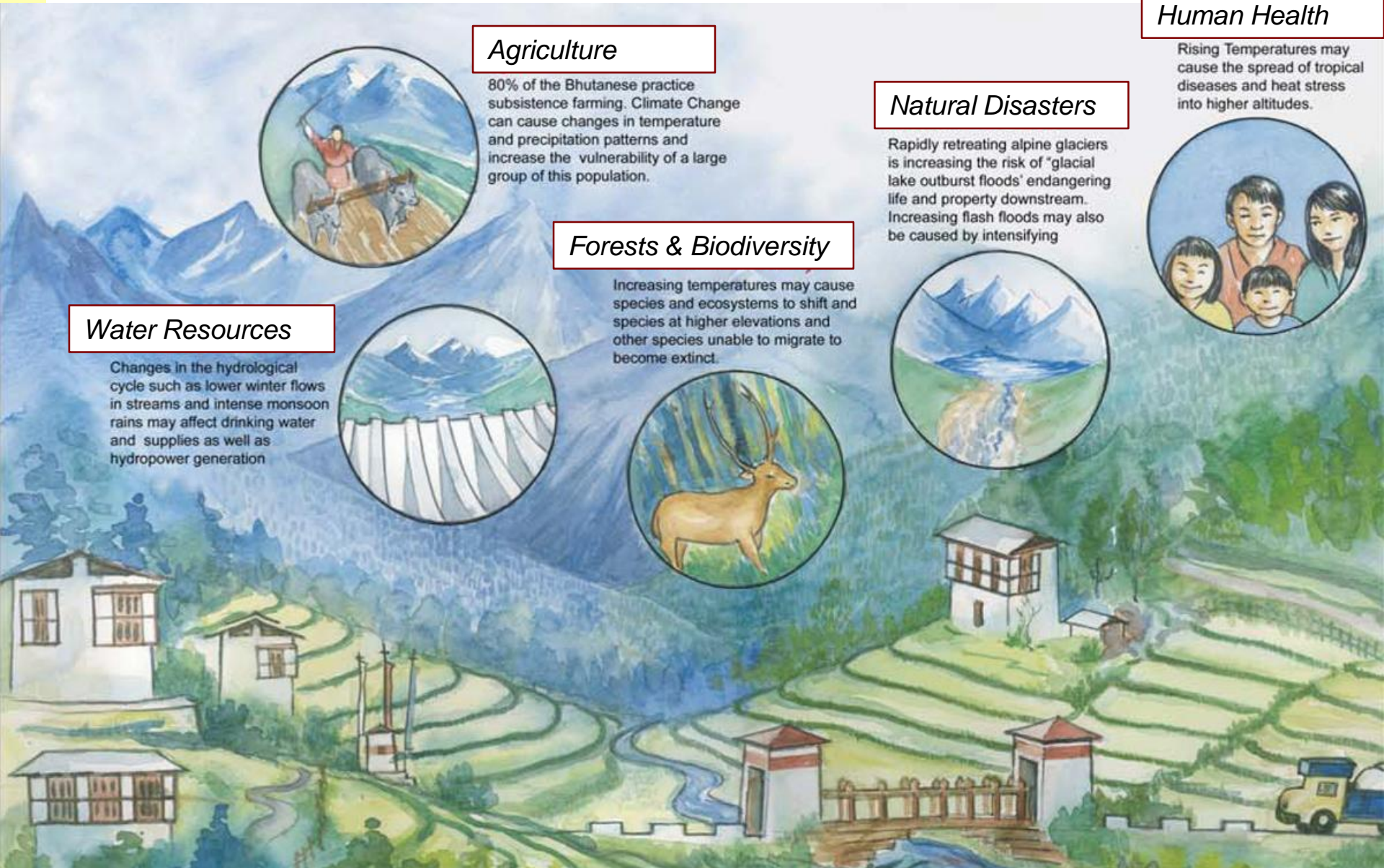
## Forests & Biodiversity

Increasing temperatures may cause species and ecosystems to shift and species at higher elevations and other species unable to migrate to become extinct.



## Water Resources

Changes in the hydrological cycle such as lower winter flows in streams and intense monsoon rains may affect drinking water and supplies as well as hydropower generation





# Water Resources

- Water resource availability per capita is 94,500 m<sup>3</sup>/capita/annum
- Most of the River system is fed by glacial melt and rainfall (2-12%), snow melt 2%
- Total annual flow of Water is ~70,576.01 million m<sup>3</sup>



# Climate Change Projections

## Temperature changes compared to present (1980-2009)

### – Mean Annual temperatures

- Increase of ~ 0.8 °C - 1.0 °C by 2010-2039
- Increase of ~ 2.0 °C - 2.4 °C by 2040-2069

### – Summer/monsoon season temperatures

- Increase of up to ~ 0.8 °C by 2010-2039
- Increase of up to ~ 2.1 °C by 2040-2069

### – Winter season temperatures

- Increase of ~ 1.2 °C by 2010-2039
- Increase of ~ 2.8 °C by 2040-2069





# Climate Change Projections

## Rainfall Changes compared to present (1980-2009)

### Annual Mean rainfall

- Increase of ~ 6% by 2010-2039
- Increase of ~ 21% by 2040-2069

### Seasonal changes

- Summer are wetter for both future periods
- Winters will be drier in 2010-2039 and increasing slightly in 2040-2069

# Approaches

- Bhutan Water Partnership-2001:
  - Sub-regional entity-strong link to GWP
  - Inter-ministerial organisation
  - co-ordinate & prepare policy documents, strategic vision and action plans







# Approaches



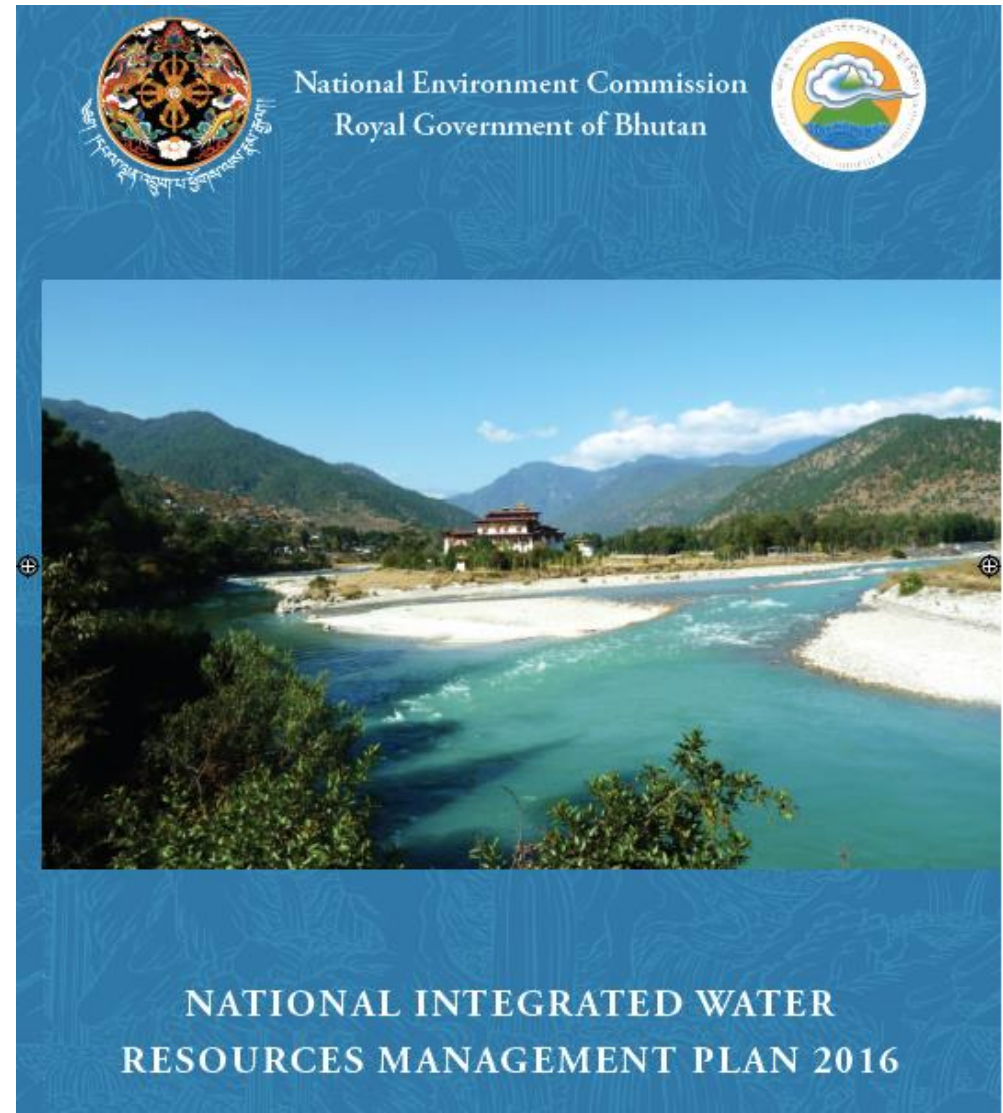
- Bhutan Water Policy-2008
- Bhutan Water Act-2011
  - Mainstream IWRM framework in Bhutan



# National Integrated Water Resource Management Plan (NIWRMP)



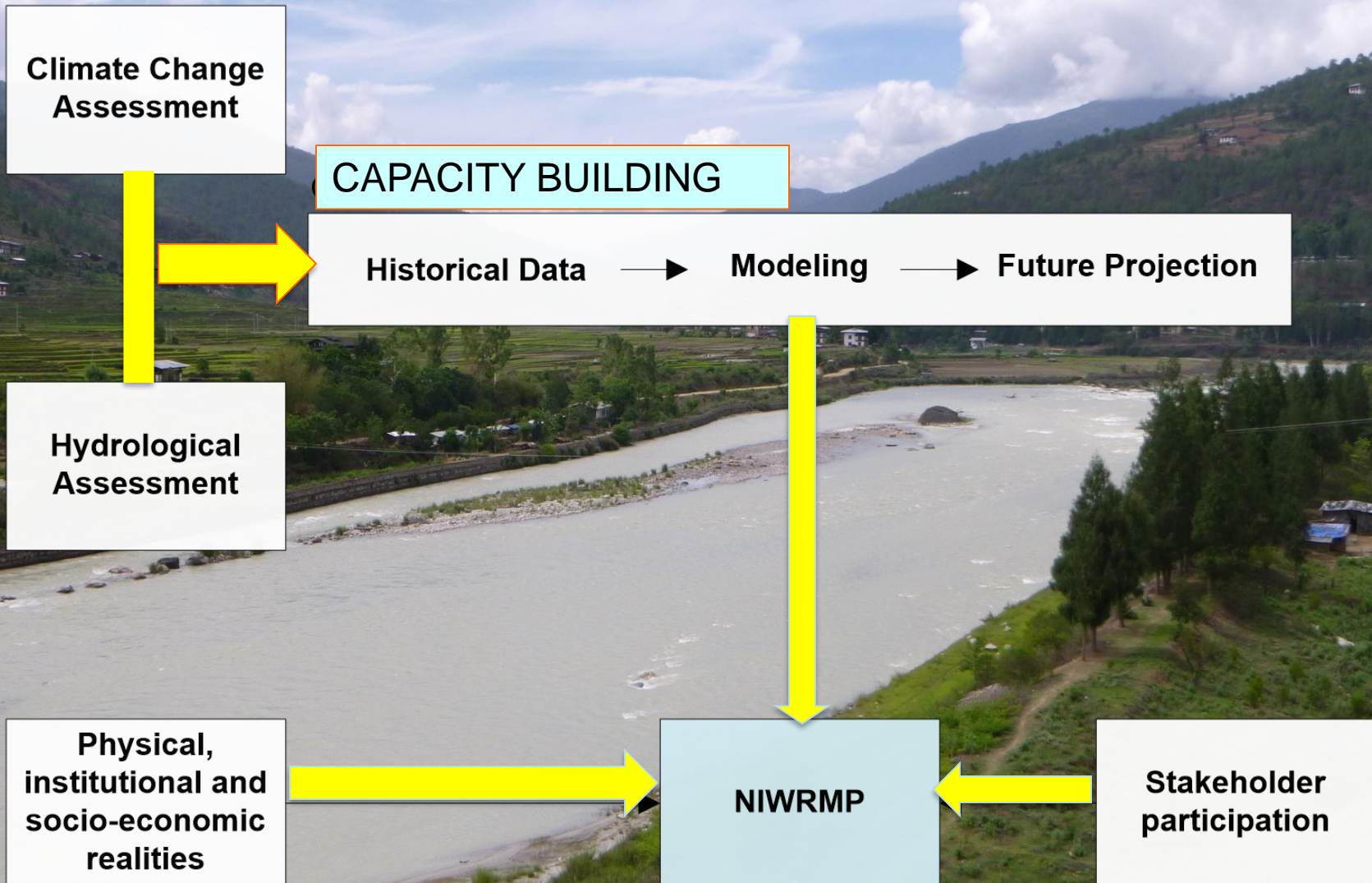
- Emanated from Water Act, 2011
- 11<sup>th</sup> five year plan target
- National Technical Advisory Committee (multi sector)







# NIWRMP- Methodology



# Inter-agency Coordination Framework Water Security Index



## Water Security Index

- 5 dimensions.

- 57 indicators





# Key Outcomes



- Pilot River Basin Management Committee
  - Wangchhu Basin Committee formed
  - Wangchhu Basin Management Plan, 2016
- Committee Members
  - Local Government (Governors, Env. Officers, Chairman of DYT,
  - Mayor & Env.Officer(Municipality)



# Key Outcomes

- **Adoption of Water Security Index in the 12<sup>th</sup> FYP**
  - NKRA 8, KPI 8.8
  - NEC –Lead Agency: Coordination
- **Enhanced Multi-Sectoral co-ordination**
  - institutional linkages/coordination mechanism
  - Data and information management – between agencies/institutions/researchers/local government
  - Laboratories
  - Formation of a separate agency for Water Resources/strengthen





# Key Lessons Learnt

- Support of International Institutions
- Involvement of all stakeholders –for any planning and implementation
- Strong political will & support and enabling environment
- Understand Local dynamics
- Data and information
- Prioritization: Water as Flag ship program for the 12<sup>th</sup> FYP

감사합니다.  
Gamsahamnida !.  
Thank you !

