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MCR 2030 Making Cities Resilient

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With support from

Ministry of the Interior and Safety

Incheon Metropolitan City

Residential Workshop on Urban Resilience and Making Cities Resilient 2030 (MCR 2030)

5th – 8th December 2022
SAARC Disaster Management Centre (IU)
Gandhinagar, Gujarat, India

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Bhutan

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State of Urbanisation

1. Land Area: 38,394 sq.km
2. Forest Cover: 71%
3. Arable Land: 8%
4. Human Settlement : 1%
5. Projected Population 2022: 763,249
6. Rate of Urbanization, 2017: 22.3%
7. Projected Urban Population Percentage 2050 :50%
8. Local Governments: 20 Districts and 4 city governments
9. Number of Hospitals, 2021 : 58
10. Number of Schools, Institutes and Centers,2022: 1707
11. Total Road length: 18,210.16 km

Source: Statistical Yearbook of Bhutan 2022, NSB

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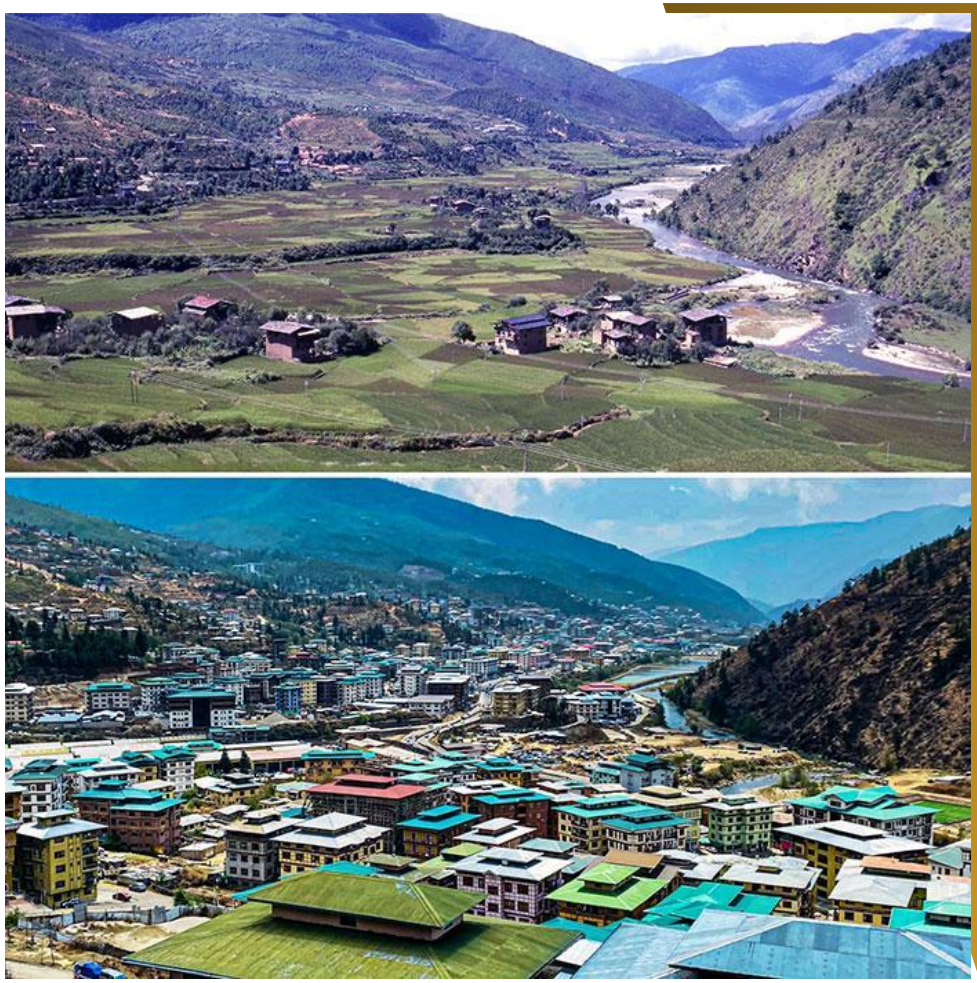
State of Urbanisation

Country, region	Percentage urban		Urbanization rate
	2005	2017	
Bhutan	30.9	37.8	22.3
Bangladesh	26.8	35.9	34.0
India	29.2	33.6	15.1
Nepal	15.1	19.3	27.8
Asia	41.2	49.2	19.4
World	49.2	54.8	11.4

Sources: For Bhutan – Population and Housing Census 2005 and 2017; for other countries and regions – (UNDESA, 2018)



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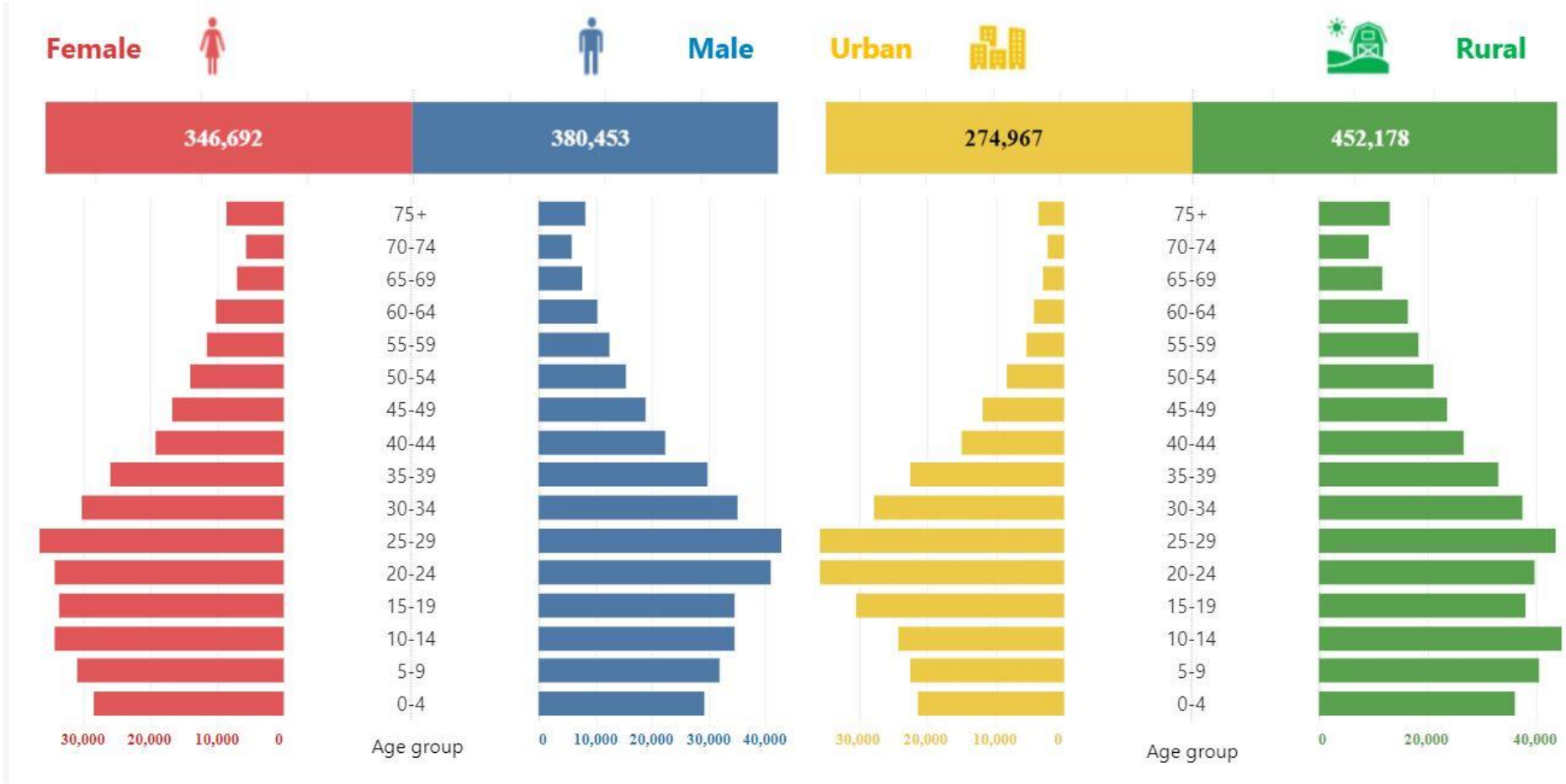
State of Urbanisation



State of Urbanisation

- Status of welfare & development schemes:
  - Completion of 12th FYP : 2018-2023
  - Preparation of 13th FYP
  - CNDP 2030
  - Met the criteria to graduate from LDCs (UN Triennial review of 2015 and 2018)
  - Set to graduate from LDC in 2023

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State of Urbanisation

Table 3.2: Number of Schools, Institutes and Centres, 2022

School/Institutes/Centres	Government	Private	Total
Early Childhood Development			
ECCD Centres[1]	433	58	491
Schools Education			
Extended Classrooms	63	0	63
Primary Schools	302	12	314
Lower Secondary Schools	59	1	60
Middle Secondary Schools	62	1	63
Higher Secondary Schools	71	21	92
Special Institutes	2	0	2
Central Schools[2]	64	0	64
Autonomous Schools	69	0	69
Schools with SEN Program	32	0	32
Sub-total	**724**	**35**	**759**
Tertiary Education			
Tertiary Institutes within Bhutan	15	3	18
Technical Training Institutes			
Technical/Vocational Institutes	6	0	6
Institute of Zorig Chusum	2	0	2
Sub-total	**8**	**0**	**8**
Other Forms of Education			
Monastic Education (Lobdras and Shedras)[3]	79	...	79
Continuing Education Centres	0	1	1
Non-Formal Education Centres[4]	430	0	430
Sub-total	**509**	**1**	**510**

Note: [1] Private ECCD includes ECCD under NGO, Private & Corporation.

[2] Central Schools and Autonomous School already counted under general Schools.

[3] The data is only inclusive of lobdras and shedras

[4] The Non-Formal Education Centers include Community Learning Centers as well.

Source: Education Management Information System, MoE.

State of Urbanisation

Table 8.1.4: Length of Roads by Type, 2018 - 2022

(Km)

Type of Road	Asian Highway	Express-way	Primary National Highway	Secondary National Highway	Dzongkhag Road	Urban Road	Farm Road	Access Road[1]	All road
As of June 2022	142.90	6.20	1,528.18	1,162.64	2,072.86	417.08	11,257.38	1,682.92	18,270.15
Black topped	142.90	6.20	1528	978.65	1,198.26	402.77	150.92	456.08	4,863.78
Non-black topped	0.00	0.00	0.00	183.99	874.60	14.31	11,106.46	1,226.84	13,406.20
As of June 2021	142.90	6.20	1,531.09	1,160.74	2,072.86	417.08	11,257.16	1,676.58	18,264.61
Black topped	142.90	6.20	1,531.09	969.30	1,198.26	402.77	150.92	456.08	4,857.51
Non-black topped	0.00	0.00	0.00	191.44	874.60	14.31	11,106.24	1,220.50	13,407.09
As of June 2020		6.20	1,682.59	1,152.14	2,071.16	417.08	11,257.16	1,677.78	18,264.10
Black topped		6.20	1,682.59	937.65	1,163.38	402.77	150.92	456.48	4,799.99
Non-black topped		0.00	0.00	214.49	907.78	14.31	11,106.24	1,221.30	13,464.11
As of June 2019		6.20	1,772.39	997.58	2,060.43	417.08	11,292.29	1,736.03	18,282.00
Black topped		6.20	1,730.35	792.53	1,190.85	402.77	12.60	506.65	4,641.95
Non-black topped		0.00	42.04	205.05	869.59	14.31	11,279.69	1,229.38	13,640.06
As of June 2018		6.20	1,822.65	903.28	2,004.69	417.11	11,292.29	1,735.08	18,181.30
Black topped		6.20	1,733.85	677.93	1,135.11	402.8	12.60	506.70	4,475.19
Non-black topped		0.00	88.80	225.35	869.59	14.31	11,279.69	1,228.38	13,705.12

Note: [1] Access road includes Forest road and Power tiller road.

a. The national highway before year 2011 is now primary national highway, the distric road is now secondary national highway and the feeder road is now Dzongkhag road, therefore it is not available for the previous year.

b. The changes in the length of the road esp (PNH/SNH/Access Road)is mainly due to the reclassification of the road done by DoR mainly to fit proper defination.

c. Length of farm roads reduced after omiting the repeated data s.d. Asian highway is included in primary national highway.

Source: Design Division, Department of Roads, MoWHS. Source for farm road information: GNHC

Table 8.1.1: Number and Length of Motorable Bridges by Type as of July 2022

Type of Bridges	Number	Total Length (M)
Permanent Bridges		
Reinforced Concrete T Beam / T-Girder/Box Grid	67	1,344.60
Reinforced Cement Concrete Slab	35	467.75
Pre-Stressed Concrete	30	1,714.90
Reinforced Cement Concrete Arch	4	383.00
Composite	24	528.00
Steel Pony Truss	11	190.00
Steel Arch	11	1,059.25
Steel Hamilton	7	240.60
Steel Truss / Girder	15	1,355.40
Multicell Box Culvert	8	406.00
Temporary (semi-permanent) Bridges		
Bailey Bridges	164	5,572.79
Bailey Suspension Bridge	6	695.13
Total	**382**	**13,957.42**

Source: Bridge Division, Department of Roads, MoWHS.

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State of Urbanisation

Table 6.1.1: Land Cover by Major Categories, 2010 and 2016

Land Cover class	Sub-Class	LCMP 2010 Total Area (Ha)	LCMP 2010 Area (%)	LCMP 2010 Total Area (%)	LULC 2016 Total Area (Ha)	LULC 2016 Area (%)	LULC 2016 Total Area (%)
Forests	Fir Forest	183,208.3	4.8	70.5	230,984.0	6.0	70.8
	Mixed Conifer forest	613,963.9	16.0		519,585.7	13.5	
	Blue Pine Forest	80,024.0	2.1		101,155.1	2.6	
	Chir Pine Forest	107,666.5	2.8		101,537.5	2.6	
	Broadleaf Forest	1,688,956.5	44.0		1,763,899.5	45.9	
	Broadleaf & Conifer Forest	31,472.1	0.8		...	...	
Alpine Scrub	Alpine Scrubs	...	...	...	130,097.7	3.4	3.4
Shrubs	Shrubs	400,526.4	10.4	10.4	374,032.6	9.7	9.7
Meadows	Meadows	157,568.5	4.1	4.1	96,273.6	2.5	2.5
Cultivated Agricultural	Chhuzhing	31,361.2	0.8	2.9	31,891.9	0.8	2.8
	Kamzhing	69,670.8	1.8		68,260.6	1.8	
	Apple Orchard	2,041.5	0.1		5,529.9	0.1	
	Citrus Orchard	5,086.4	0.1				
	Areca nut Plantation	984.9	0.0				
	Cardamom Plantation	3,398.0	0.1				
	Others	13.4	...		...	...	
Built up areas	Built up Areas	6,150.9	0.2	0.2	7,457.0	0.2	0.2
Non-Built up areas	Non-Built up Areas	330.1	0.0	0.0	595.9	0.0	0.0
Snow Cover	Snow Cover	285,479.2	7.4	7.4	205,343.6	5.4	5.4
Bare Areas	Rock Outcrops	99,659.3	2.6	3.2	119,754.2	3.1	3.1
	Scree	23,287.7	0.6		39,701.4	1.0	1.0
	Bare Soils	26.9	...		...	...	...
Water Bodies	Lakes	4,753.4	0.1	0.7	6,252.6	0.2	0.7
	Reservoirs	130.7	0.0				
	Rivers	22,684.7	0.6		18,923.2	0.5	
Marshy Areas	Marshy Areas	319.5	0.0	0.0	...	...	...
Degraded Areas	Landslides	7,032.5	0.2	...	3,730.2	0.1	0.1
	Gullies	6.7	...	0.5	...	...	...
	Ravines	...	...	...	...	...	...
	Moraines	13,596.2	0.4	...	14,393.9	0.4	0.4
Total		3,839,400.0	100.0	100.0	3,839,400.0	100.0	100.0

Source: Land Cover Map Project (LCMP) & Land Use Land Cover (LULC), Ministry of Agriculture and Forests

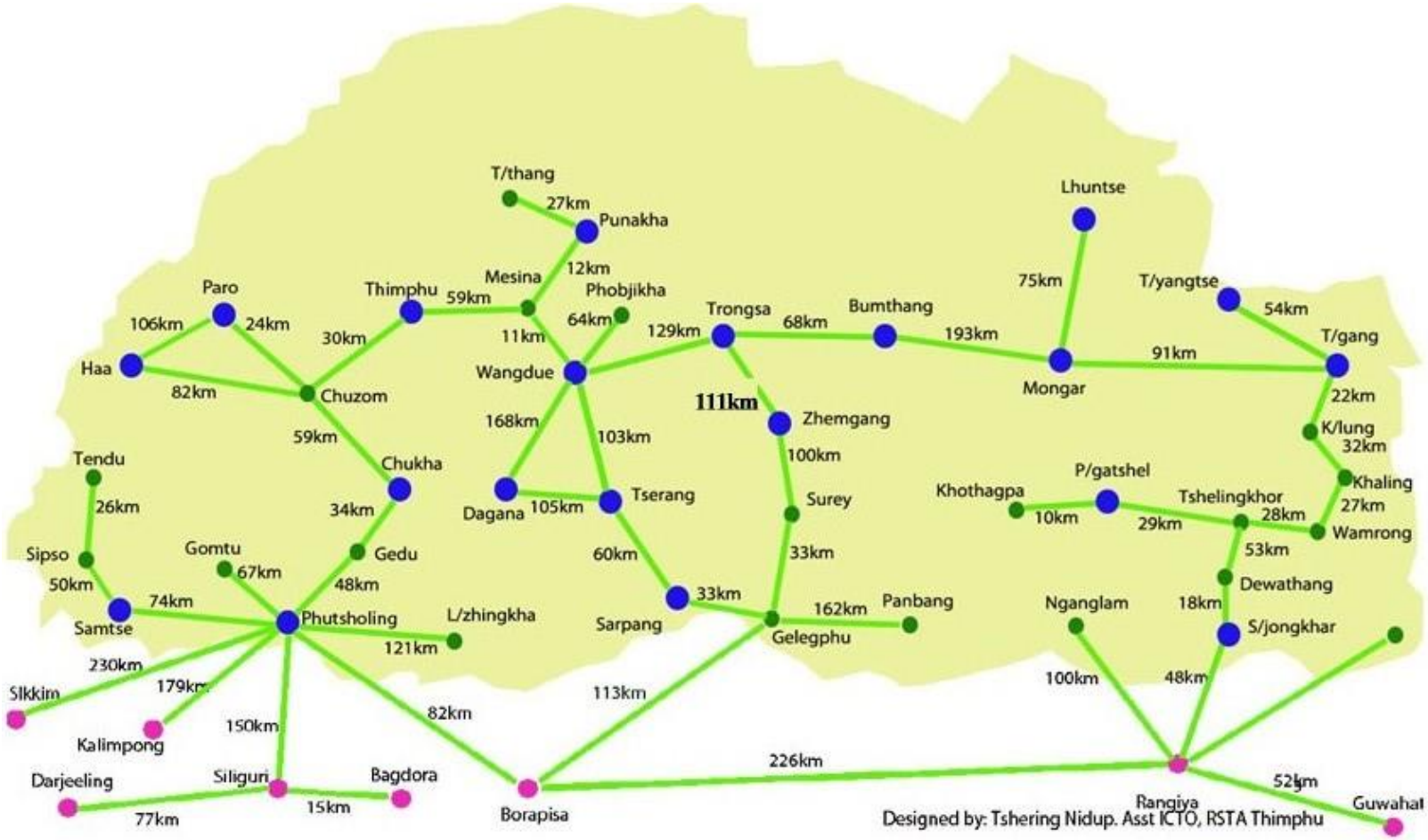
Present Day Challenges

1. Sector-specific challenges
    1. **Transportation:** Difficult Terrain, Frequent Landslides
    2. **Waste management:** Due to Rapid Increase in urban population, difficulty on waste management and pressure on landfills, No Recycling Plant
    3. **Health:** 50% short on the required Doctors
       Major pressure on National Referral Hospital,
    1. **Land Use & Land Planning:** Lack of Comprehensive Hazard Mapping to incorporate in city plans, Private lands in environmentally sensitive areas, Land Use Planning carried only in planned localised areas, Preservation of wetlands (paddy cultivation)
    2. **Building Code & its implementation:** Building Codes of Bhutan to make seismic resilience building borrowed from Indian Codes, Guideline for the construction of Non engineered buildings, Constraint in resources (HR & Equipment) regular monitoring is impacted
    3. **Coordination Issue:** Various Agencies and Stakeholders to implement DRM, communication issues

Present Day Challenges

2. **Balance of population growth, economy, development:**
   - Disparity in Development,
   - Western Part of the country is more developed,
   - High rate of Rural Urban migration(east to west),
   - Population density increase in Western Urban Centers,
   - Fallow Agricultural Land,

Present Day Challenges on Critical Infrastructure



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Present Day Challenges on Critical Infrastructure

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Present Day Challenges on Critical Infrastructure

Present Day Challenges

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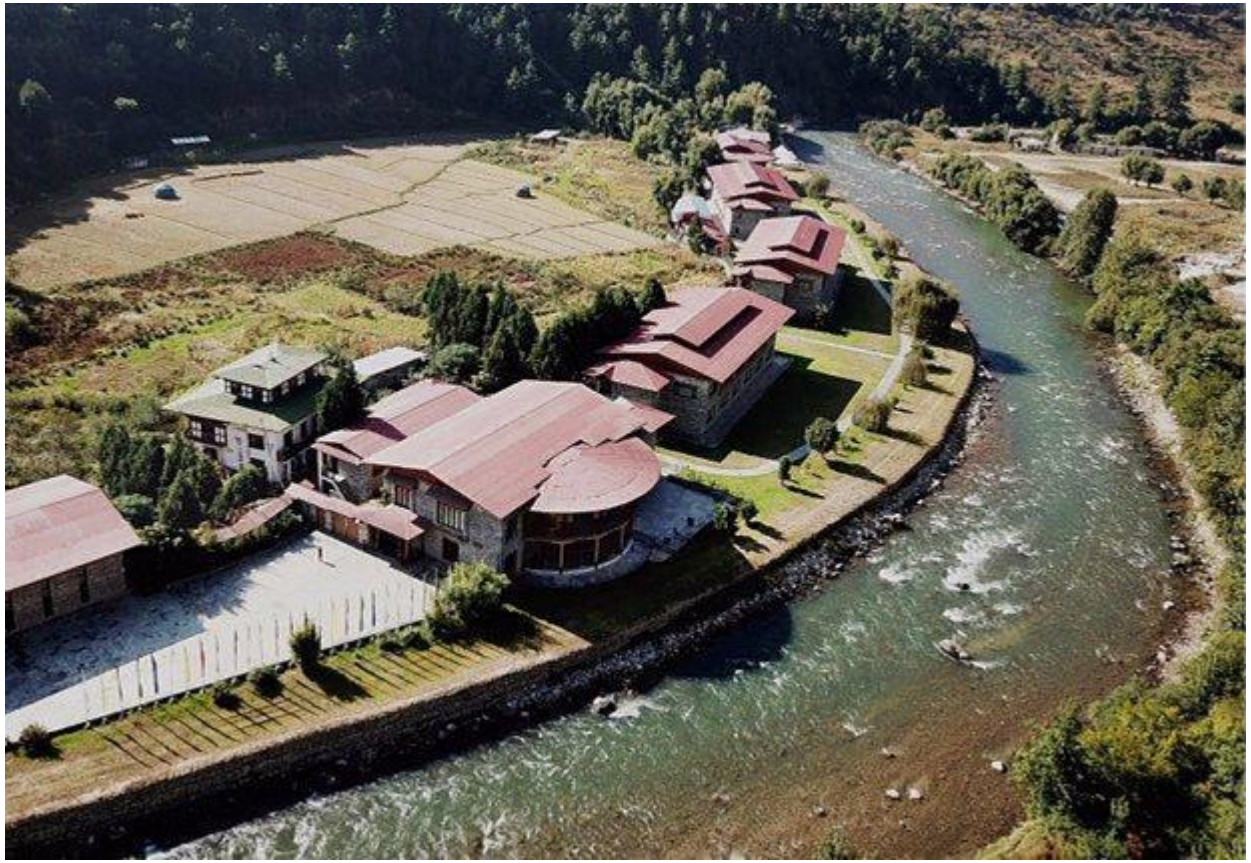
Present Day Challenges: Development on Environment Sensitive Areas



Present Day Challenges: Development on Environment Sensitive Areas

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Present Day Challenges : Disaster

Current Status on DRM Activities

Current Status on Disaster Risk Management Activities:

- **2013 Disaster Management Act**
- **2014 Disaster Management Rules and Regulation : Mandates Contingency Plan at National Level, Local Government Level and Agency Level**
- **2017 National DRM Strategy**
- **2019 Situational Analysis Report for Risk Management in Bhutan: to implement disaster rules and Analysis**
- **2022 Road Map for Enhancing Disaster Risk Management (Draft)**

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Present Day Challenges

Recommendation from Situational Analysis Report:

1. Legal and policy frameworks and institutional mandates
2. Understanding disaster risks and Improvement of EWS
3. Mainstreaming disaster risk management infrastructure planning and development
4. Preparedness and immediate response mechanisms
5. cross-cutting factors
6. Long-term actions (five years and beyond)

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Emergent Risks & Future Challenges

Hints:

1. **Climate Change Scenario :** Cloud Burst, Rapid Decline of Glaciers
2. **Climate Impacts (foreseen and unforeseen) :** Increase in Temperature,Drying of Community Water Sources, Sudden Unexpected Rains, Unexpected Snow
3. **Steps taken towards climate action (climate change adaptation & mitigation) :** Carbon Neutral(60% Forest Cover Mandated by Constitution) , Community Water Shed management, Community EWS

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Steps taken to ensure risk-informed development & resilience

1. **Support from the National Government to the Local Governments to foster disaster risk reduction (DRR) & climate action :**
   DDM supports Local Government to prepare Disaster Management Contingency Plans, Capacity and Skills Training Provided Annually, Regular training
1. **Good cases of risk-informed development :**
   Paro Valley Development Plan
1. **Good cases of community-driven / multi-stakeholder driven DRR or climate action initiatives:**
   - Hazard Mapping of GLOF for Punatsangchu, Mangde Chu and Chamkhar CHU prepared,
   - Lowering of Thorthomi Lake by 5m at Lunana (GLOF)
   - EbA Projects (Riverbank Protection, Slope Stablisation, Rainwater Harvesting, Livelihood Improvement (composting, oyster mushroom cultivation) landscape projects,
   - Relocation of Highly Disaster Vulnerable Informal Settlements

Lowering of Water levels of Glacier Lake

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Relocation of Highly Vulnerable Informal Settlements

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Shortcomings learned from the Seminar:

- **No DRR Plan**
- **No Permanent EOCs established**
- **National Post-event Recovery Plan / Local Post-event Recovery Plan**
- **Business Continuity Plan of Major Industries**
- **DRM have been not tested through Simulation/mock drills**
- **No Financial Plan/Strategy for DRR, DRM, Post-Event Recovery**

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Best Practises in HR Mobilisation:

Desup: National Volunteers

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Thank you