## Adapting to Climate Change: Issues for South Asia

#### Presented at

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and

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#### Presentation outline

- ✓ Climate change in South Asia
- ✓ Risks and potential impacts
- ✓ Adaptation issues
- ✓ Way forward



### Climate change in south Asia

#### Carbon emission and key observed climate trend and variability in South Asia

Country• CO2 emission		Change in temperature	Change in precipitation		
	(MT per capita,				
	2008				
Afghanistan	0.025				
Bangladesh	0.319	Increasing trend of about 1 degree Celsius in	Decadal rain anomalies above long term		
		May and 0.5 degree Celsius in November	average since 1960s		
		from 1985 to 1998	_		
Bhutan	1.04				
India	1.46	0.68 degree Celsius increase per century with	Increase in extreme rains in north-west		
		increasing trends in annual mean temperature	summer monsoon in recent decades and lower		
		and warming more pronounced during post	number of rainy days along east coast		
		monsoon and winter			
Maldives	2.99				
Nepal	0.12	0.09 degree Celsius increase per year in	No distinct long-term trends in precipitation		
		Himalayas and 0.04 degree Celsius in Terai	records for 1948-1994		
		region with more in winter			
Pakistan	0.97	0.6-1.0 degree Celsius increase in mean	10-15 percent decrease in coastal belt and		
		temperature in coastal areas since early 1900s	hyper arid plains nd increase in summer and		
			winter precipitation over the last 40 years in		
			northern Pakistan		
Sri Lanka	0.58	0.016 degree Celsius increase per year	An increase trend in February and decrease		
		between 1961 to 90 over entire country and 2	trend in June		
		degree Celsius increase per century in Central			
		high land			

Cruz et al. 2007, World Development Indicators



### Climate change in south Asia (2)

Observed changes in extreme events and severe climate anomalies

Climate events	Observed changes				
Heat waves	Frequency of hot days and multiple-day heat wave has increased in past				
	century in India with an increase in deaths due to heat stress in recent years				
Intense rains and	Serious and recurrent floods in Bangladesh, Nepal and north-east states of				
floods	India during 2002, 2003, 2004 and 2008; floods in Surat Barmer and in Sri				
	Nagar of India during summer monsoon seasons of 2006; floods in north-east				
	Pakistan in 2009, 17 May 2003 floods in southern province of Sri Lanka were				
	triggered by 730 mm rain				
Droughts	50 percent of droughts associated with El Nino; consecutive droughts in 199				
	and 2000 in Pakistan and Northwest India led to sharp decline in water tables;				
	consecutive droughts between 2000 and 20002 caused crop failures, mass				
	starvation and affected ~11 million people in Orissa, India; droughts in North				
	east India during summer monsoon of 2006				
Cyclones/typhoons	Frequency of monsoon depressions and cyclones formation in Bay of Bengal				
	and Arabian Sea on the decline since 1970 but intensity is increasing causing				
	severe floods in terms of damages to life and property				

Source: Cruz et al. 2007

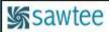


### Climate change risks (1)

#### Country level risks of climate change

· Country	Risks				
Afghanistan	Exposure of agriculture (pasture), ecosystem, and water resources to				
	drought and desertification				
	Flooding from glacial melt and long run vulnerability of depletion of				
	water supplies glacial-fed rivers				
	Water and food insecurity, malnutrition, and possible mitigation and				
	conflict				
Bangladesh	Combined impacts of sea-level rise and glacial melt lead to increased				
	incidence of flooding and land loss				
	Drought in some areas				
	More intense storm surges				
	Lower agriculture output through diminished yields and loss of land				
	<ul> <li>Increased incidence of heat-related illness, water-borne diseases</li> </ul>				
	poverty, child and infant mortality; lower access to safe water and				
	sanitation and possible migration				
	<ul> <li>Loss of biodiversity in coastal ecosystem,</li> </ul>				

Source World bank 2009



### Climate change risks (2)

#### Country level risks of climate change

· Country	Risks				
Bhutan	Damage from glacial melt				
	Impact of increased temperature on rangelands and agriculture				
	Potential loss of forest biodiversity due to vegetation and increased				
	incidence of forest fire due to temperature increase				
India	<ul> <li>Exposure of agriculture, water resources, and ecosystems to extreme weather events and more variable precipitation</li> <li>Impact of glacial melt on water resources, quantity, biodiversity and low-lying agriculture</li> <li>Impact on urban infrastructure including drainages, water and</li> </ul>				
	sanitation  • Vegetation shift in forests and biodiversity, regime shifts in rangelands, and decreased agricultural yields in tropics and subtropics  • Increased exposure to sea rise				

Source: World Bank 2009



### Climate change risks (3)

#### Country level risks of climate change

Country	Risks
Maldives	Ecosystem damages and loss afforded by coral reefs
	<ul> <li>Inundation of island due to sea-level rise and physical damages</li> </ul>
	from flooding
	<ul> <li>Increased salinity of ground waters resources</li> </ul>
	Possible migration and large scale relocation
Nepal	Decline in agriculture production in some areas
	<ul> <li>Glacial lake outburst floods and future desiccation of water</li> </ul>
	resources due to rapid glacial melt and impact on dependent
	ecosystems and agriculture
	<ul> <li>Impact of vegetation shift to forest biodiversity</li> </ul>
	Likely outbreak of malaria and similar diseases

Source; World Bank 2009



### Climate change risks (4)

#### Country level risks of climate change

Country	Risks						
Pakistan	<ul> <li>Increased intensity and frequency of drought and effects on</li> </ul>						
	agriculture (pasture), water resources, and ecosystems (wetlands)						
	Initial flooding and future drying of water resources due to glacial						
	melt and impact on water consumption						
	Damages 0f sea level rise						
	• 143 Outbreak of heat related and insect-transmitted diseases,						
	malnutrition, food and water insecurity, migration, and conflict						
Sri Lanka	Reduced drop yields due to temperature increase						
	Sea-level rise; damages to settlements, industries; and livelihoods in						
	coastal areas						
	Saltwater intrusion in agriculture, fresh water, and ground water						
	Ecosystem degradation and biodiversity loss in coastal and marine						
	ecosystem						

Source World Bank 2009



### Climate change risks (5)

#### Climate Change risks

	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
Sea-level rise	12	4	-:	1	V	-	4	1
Glacier retreat	V	V	√.	4	- 20	1	4	122
Temperature increase	V	V	1	4	٧	4	4	٧
Floods more frequent	ा	₫.	4	¥	₹	√.	₹.	- 32
Drought more frequent	V	(some areas)	+	1	2	7	V	9

Likely: √ Not Present - Unknown: ?

Source: World Bank 2009



### Climate change impacts (1)

#### Projected climate change impact in South Asia

· Country		Drought	Flood			
	Cost Additional		Intensity	Affected	Additional	Intensity
	mn \$	cost mn \$	of impact	people	affected	of impact
					people	
	2010	2030		2010	2030	
Afghanistan	4	40	Acute	55,000	90,000	Severe
Bangladesh	15	25	Severe	600,000	900,000	Acute
Bhutan		1	High	15000	25000	Acute
India	300	1500	Severe	20,000,000	25,000,000	Acute
Maldives			High		::	Low
Nepal	1	10	High	85,000	100,000	Acute
Pakistan	35	200	Severe	3000,000	450,000	Acute
Sri Lanka	5	25	High	45,000	40,000	High

Source: Climate Vulnerability Monitor 2012



### Climate change impacts (2)

#### Projected climate change impact in South Asia

Country		Storm		Biodiversity		
	Affected	Additional	Intensity	Contraction	Additional	Intensity
	people	affected	of impact	of biological	contraction	of Impact
		people		zone km2		
	2010	2030		2010	2030	
Afghanistan			Low	10,000	20,000	Acute
Bangladesh	400,000	600,000	Acute	100	250	Moderate
Bhutan			Low	250	450	Acute
India	300,000	350,000	Moderate	15,000	30,000	Moderate
Maldives	5	15	Low			Low
Nepal			Low	200	400	High
Pakistan	4,500	8,750	High	2,000	4,000	High
Sri Lanka	2,500	60	Moderate	1,250	2,750	Moderate

Source: Climate Vulnerability Monitor 2012



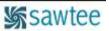
#### Adaptation challenges

- ✓ Lack of awareness
- ✓ Inadequate generation and sharing of information
- ✓ Diverse institutional structure
- ✓ Lack institutional capability
- ✓ Ad-hoc Short-term approaches
- ✓ Lack of resources and technology
- ✓ Enhancing livelihood of climate refugees



#### Way forwards

- ✓ Adapt now- 'a stich in time serves nine'
- ✓ Integrate adaptation plan and strategies with sustainable development planning
- ✓ Create conditions to enable adaptation
- ✓ Increase awareness and knowledge
- ✓ Protect natural resources
- ✓ Involve those at risks
- ✓ Ensure enabling global framework for international cooperation with adequate fund and right technology
- ✓ Collaborate and cooperate at regional level
- ✓ Go for 'no regrets' approach



# Thanks for your kind attention

Suggestions/ comments posh.pandey@sawtee.org

