

# **Protected Areas and Climate Change in Asia**

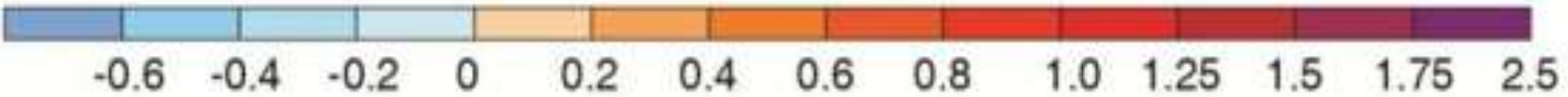
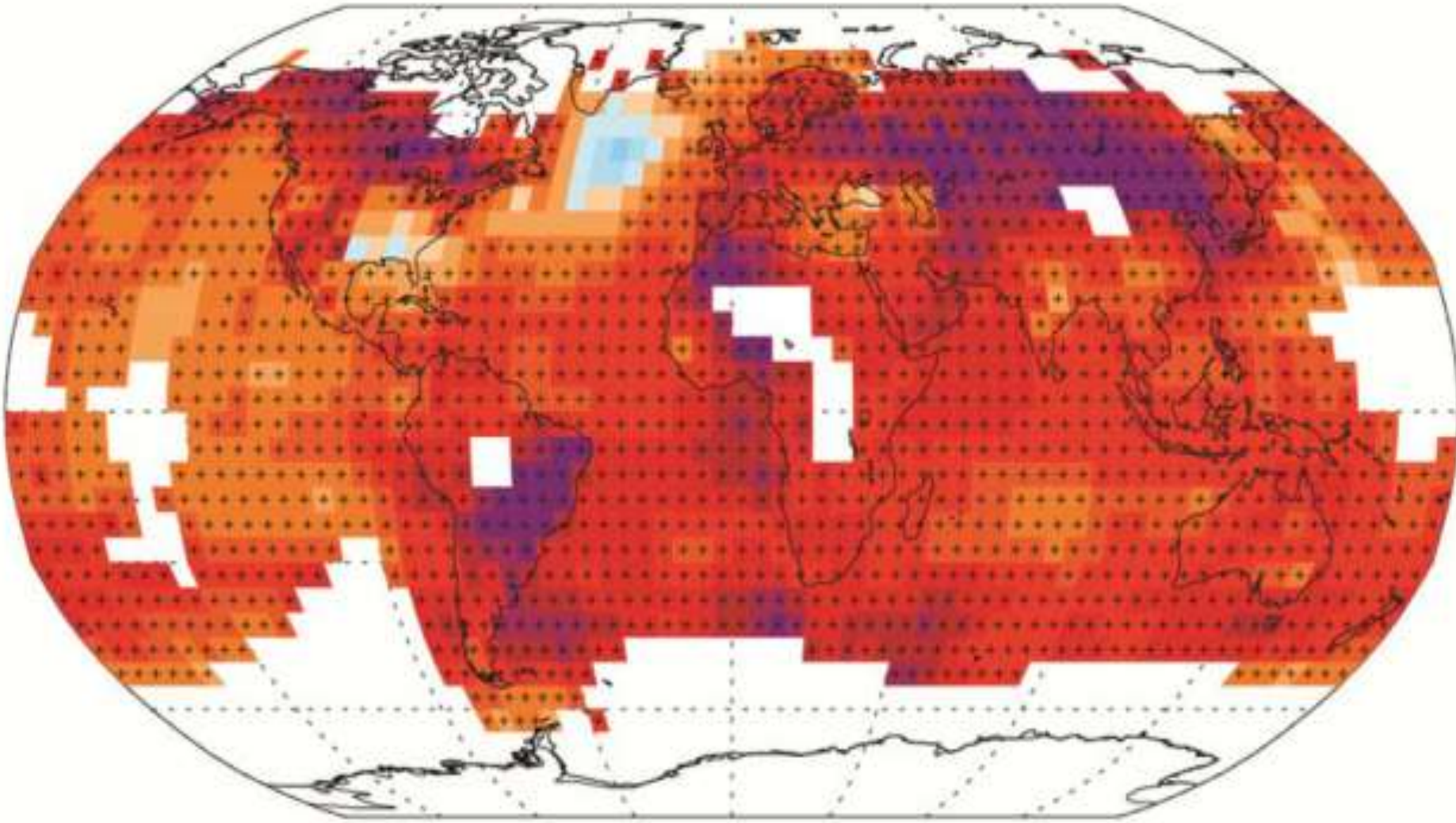
**Contributed to Asia Parks Congress**

**By**

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Wildlife Conservation, Thailand**

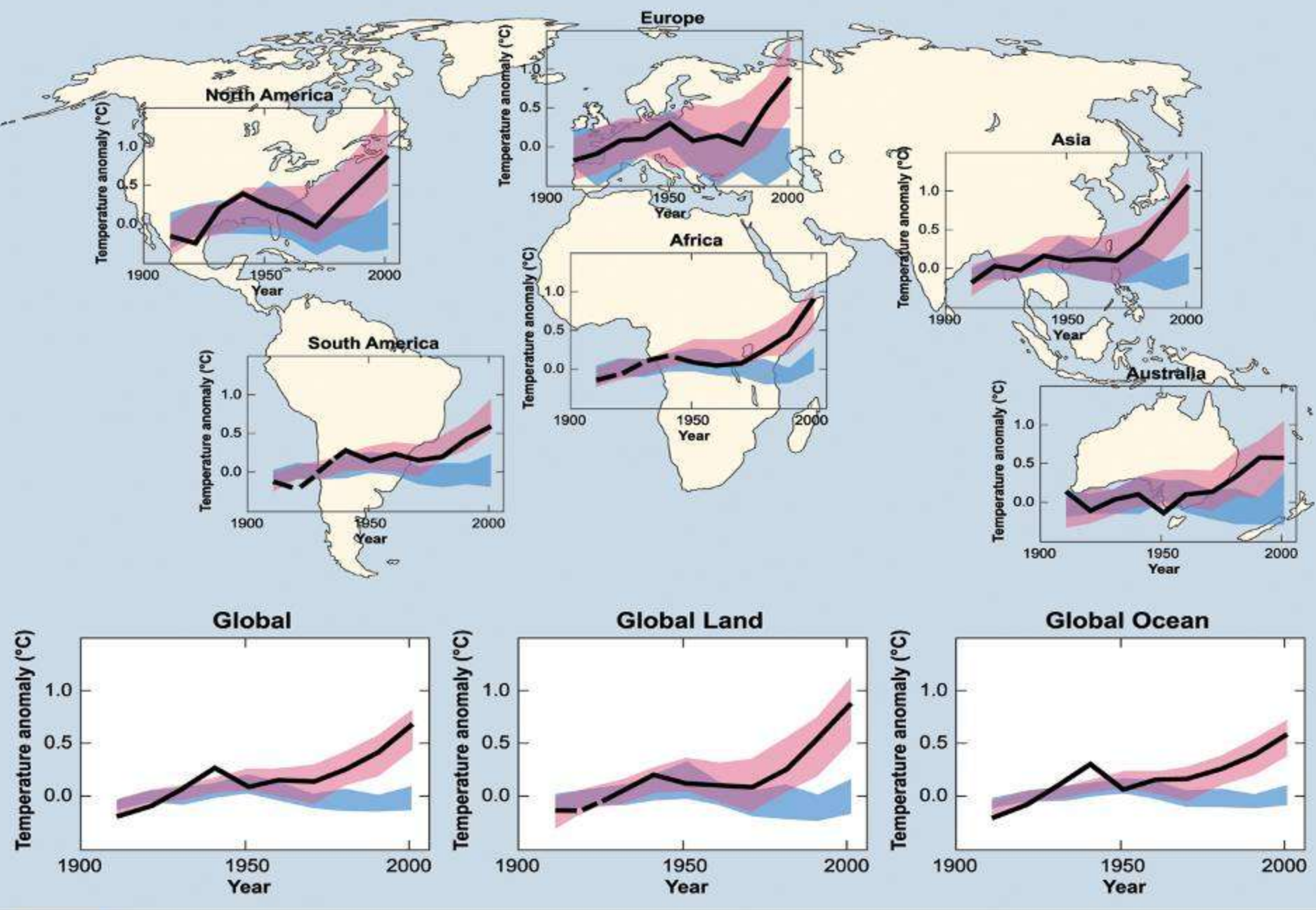
# Observed change in average surface temperature 1901–2012



-0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1.0 1.25 1.5 1.75 2.5

Trend (°C over period)



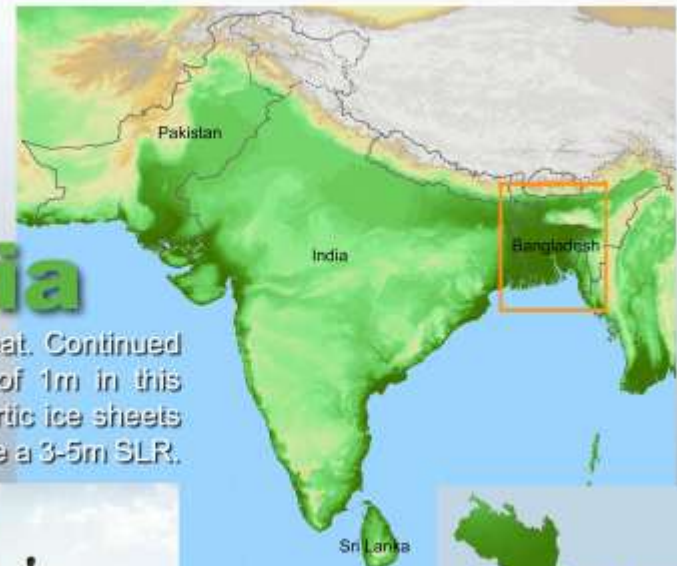


models using only natural forcings  
 models using both natural and anthropogenic forcings

observations

# Sea Level Rise from Global Warming Potential Impact on South Asia

Sea Level Rise (SLR) due to climate change is a serious global threat. Continued growth of Green House Gas emissions could well promote SLR of 1m in this century. Recent scientific evidence indicates Greenland & West Antarctic ice sheets are melting faster than predicted, rapid breakup of which might produce a 3-5m SLR.



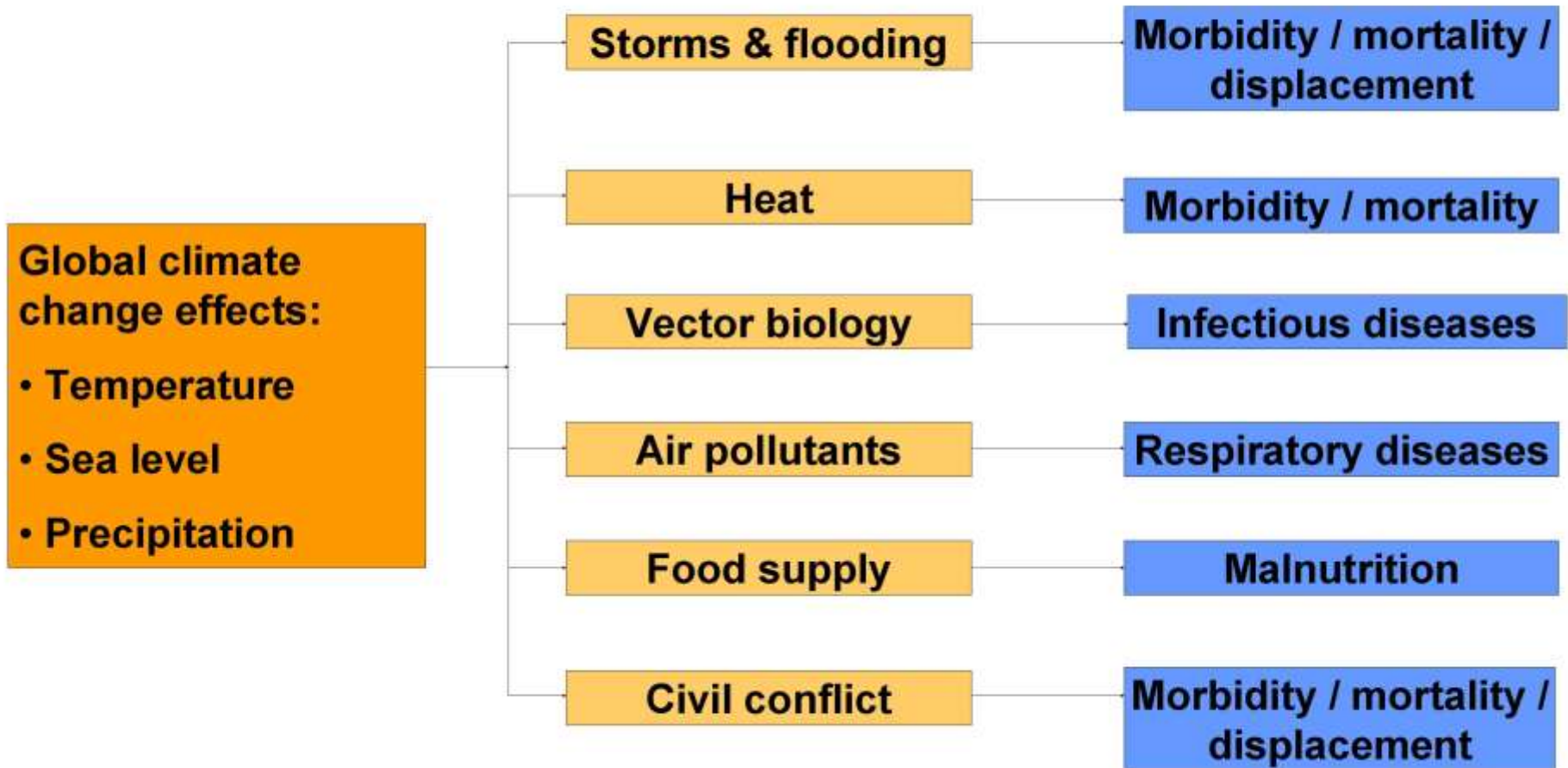
Millions of people in the South Asia region would be displaced, and accompanying economic and ecological damage will be severe. Even a 1m SLR would turn at least 6.4 million people into environmental refugees. An estimated 19 billion US\$ of GDP would be lost. Among the countries, Bangladesh will be most severely affected.

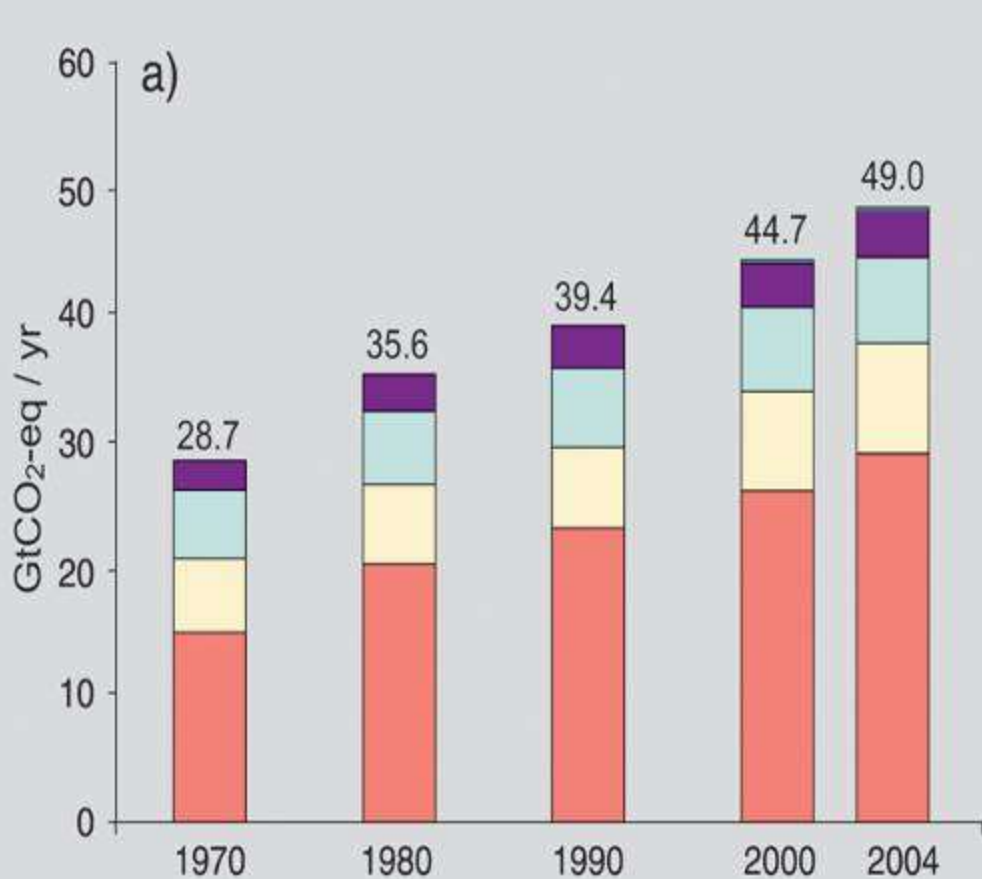
## Bangladesh

SLR	Impacted Population	Impacted GDP
1 meter	1.5 million	1.9 billion US\$
3 meter	5.4 million	7.8 billion US\$
5 meter	16.7 million	22.8 billion US\$

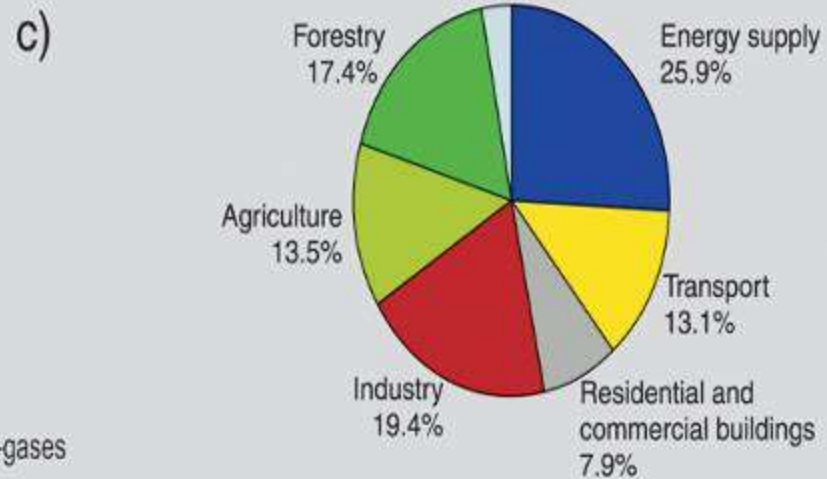
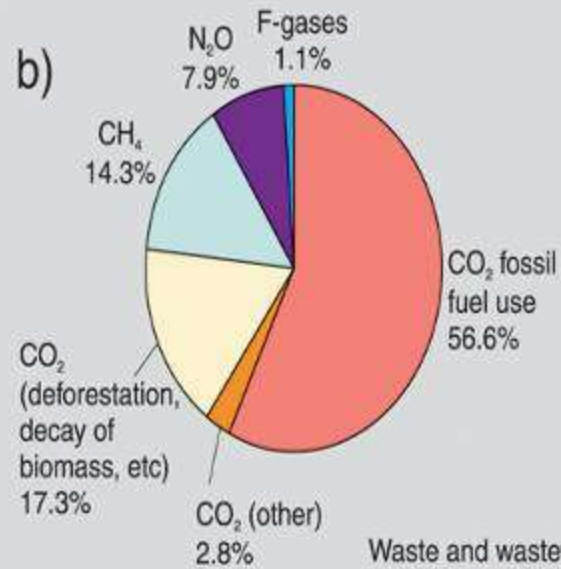


# Potential Impacts of Global Climate Change on Human Health

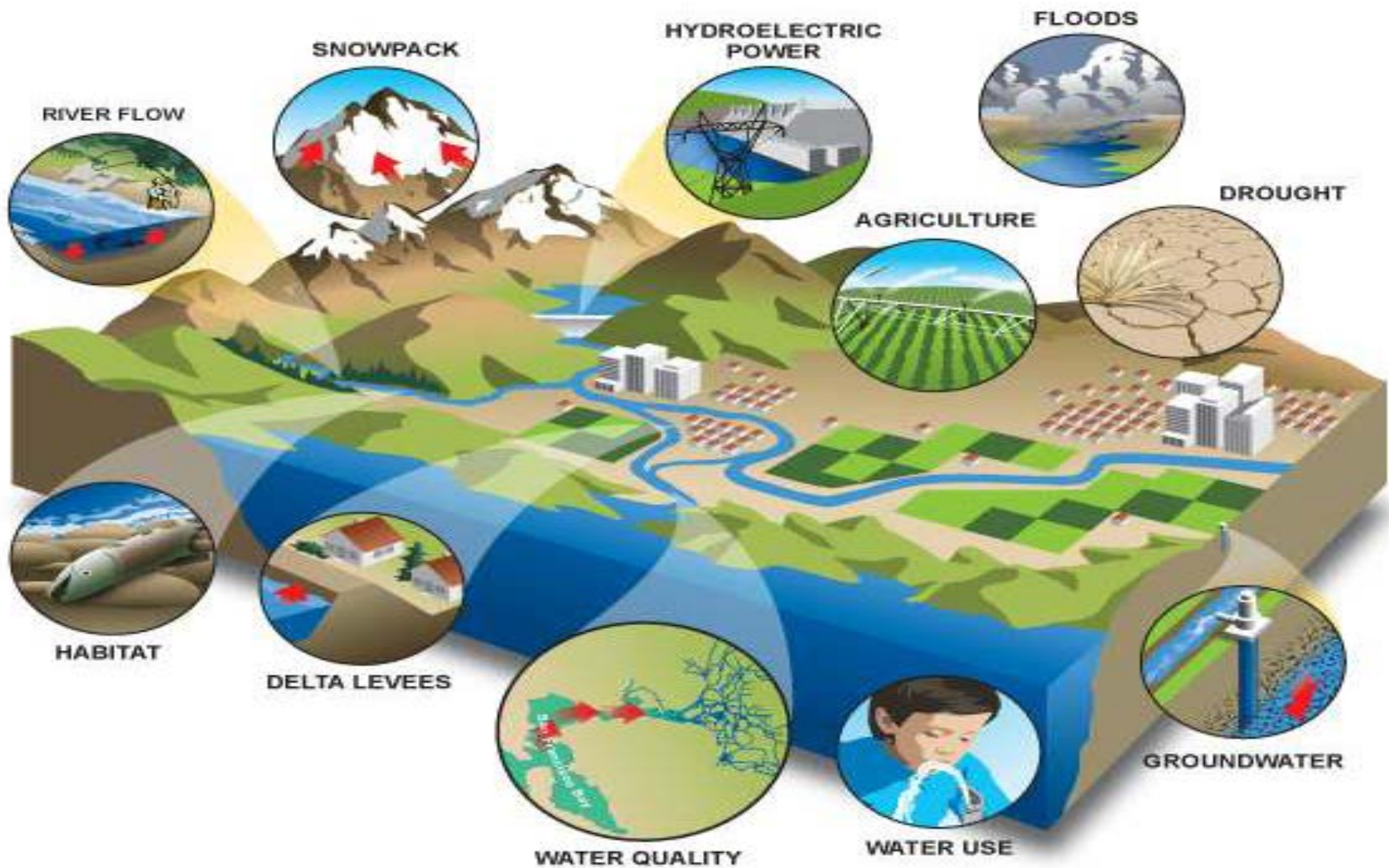




■ CO<sub>2</sub> from fossil fuel use and other sources   
 ■ CO<sub>2</sub> from deforestation, decay and peat  
■ CH<sub>4</sub> from agriculture, waste and energy   
 ■ N<sub>2</sub>O from agriculture and others   
 ■ F-gases



# Annual greenhouse gas emissions by sector



**The impact of climate change on humans is felt through changes in ecosystems and biodiversity**

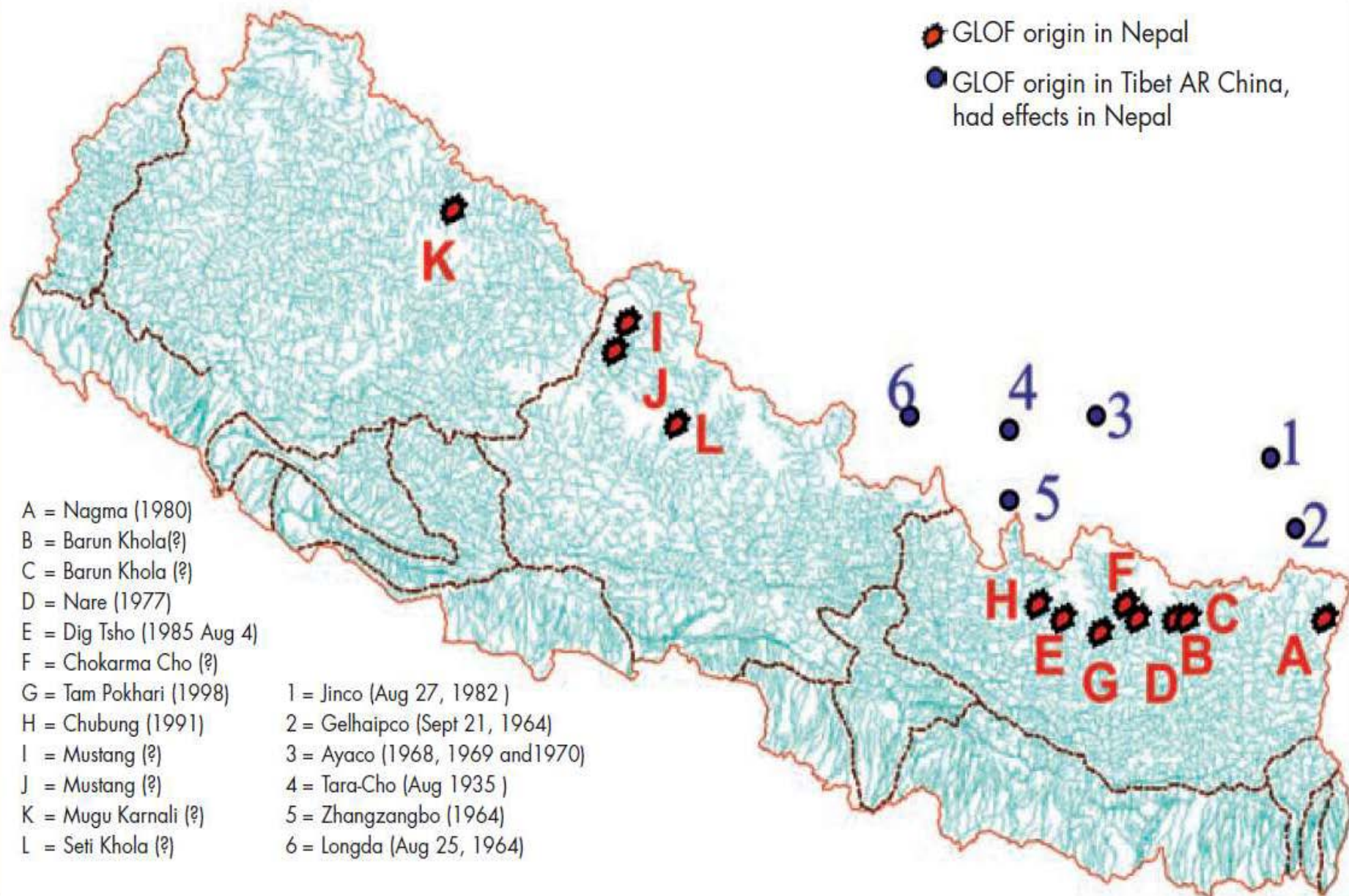


An aerial photograph of the Tibetan Plateau and Himalayas. The terrain is rugged and mountainous, with a color gradient from green in the lower elevations to brown and tan in the higher elevations. A prominent river system is visible, flowing from the upper right towards the lower right. The river is surrounded by a dense network of smaller tributaries. The text is overlaid in the bottom left corner.

**Melting glaciers on the Tibetan Plateau  
and the Himalayas spells disaster for  
protected areas and downstream  
farmers**



Figure 1: Recorded glacial lake outburst events in the central Himalayan region that have affected Nepal and TAR/China



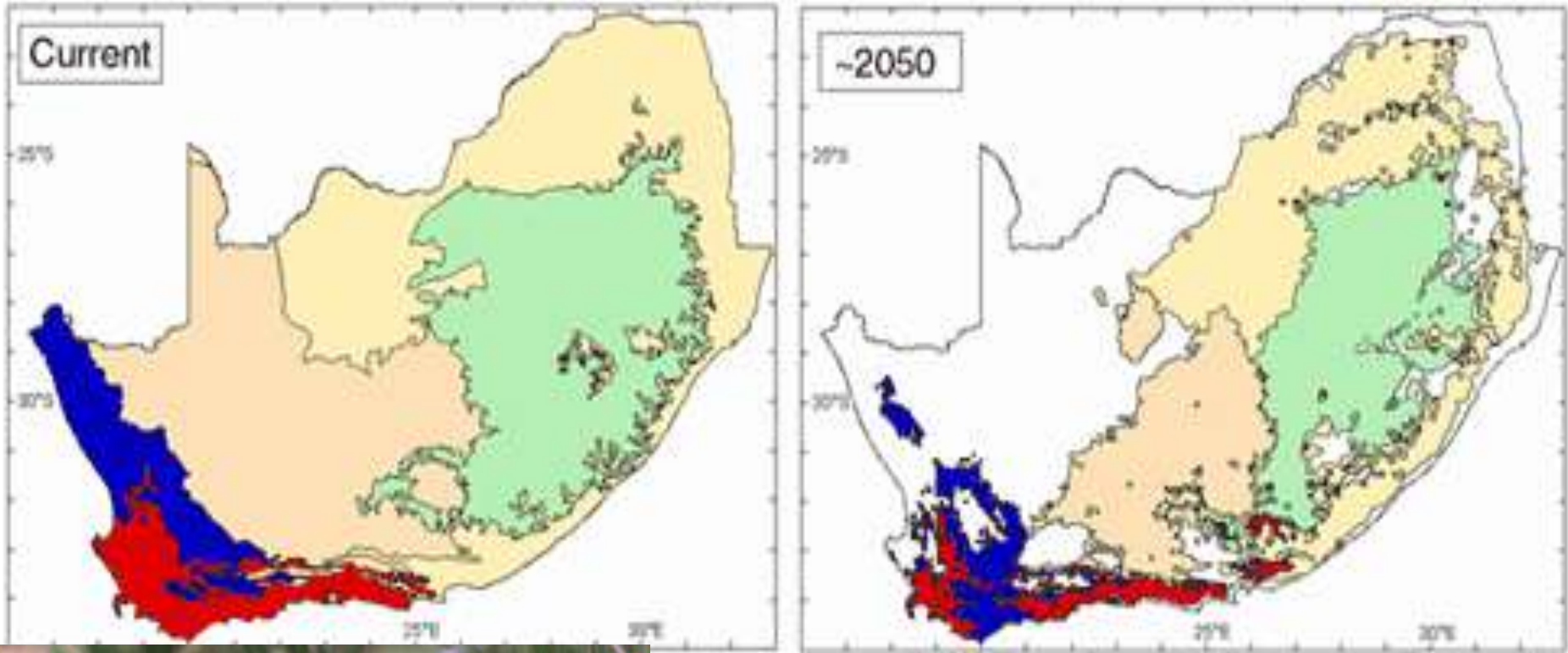




**Dig Tsho glacier lake burst in Sagarmatha NP released up to 10 million cubic meters of water in 4 hours, destroyed farms, bridges, trails, and the Namche hydroelectric station.**



# Climate change will affect the distribution of species, and the areas designed to protect them.



South African Biomes

- Desert
- Forest
- Fynbos
- Grassland
- Nama-Karoo
- Savanna
- Succulent Karoo
- Undefined



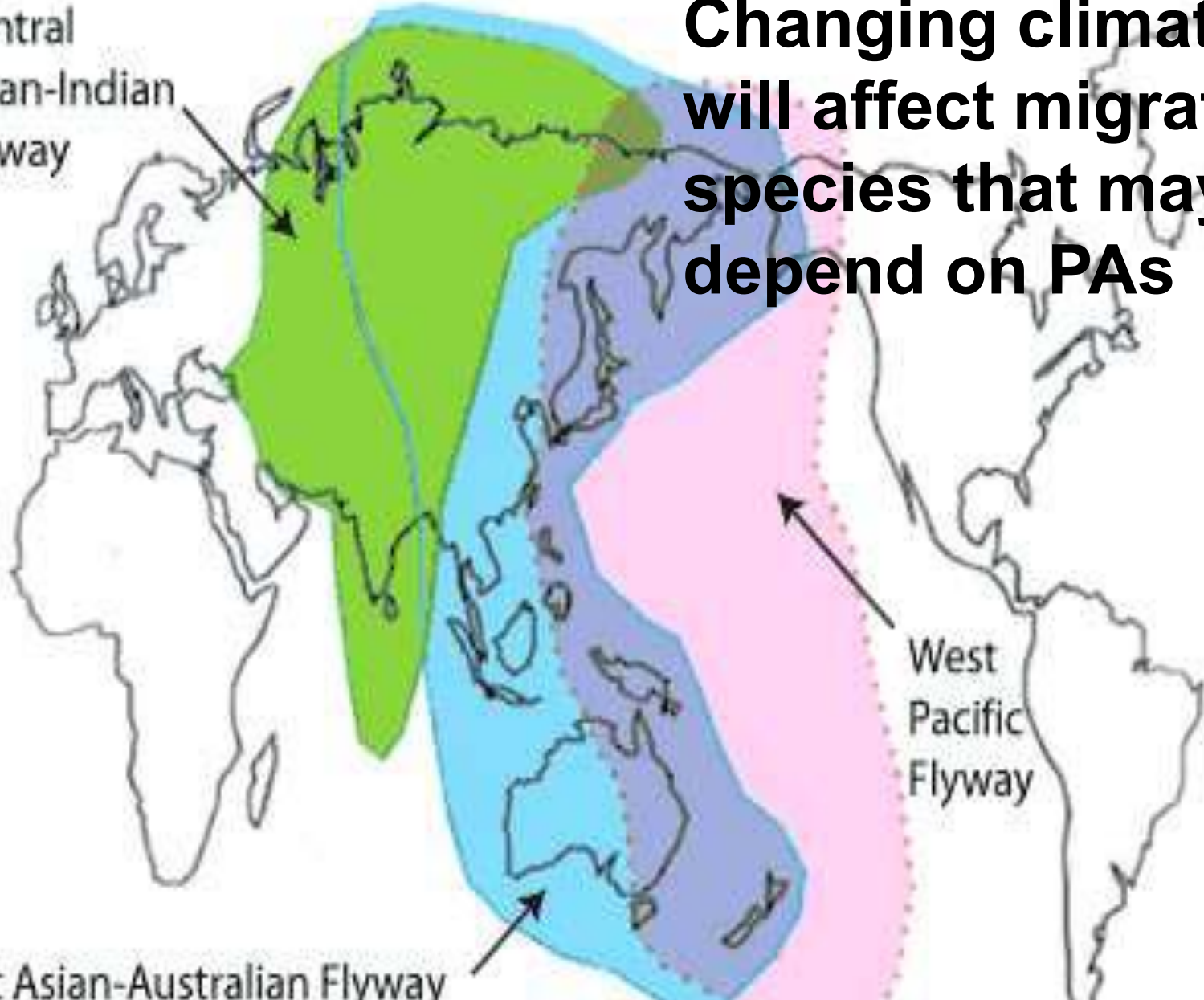
# Asian Migratory Bird Flyways

Central  
Asian-Indian  
Flyway

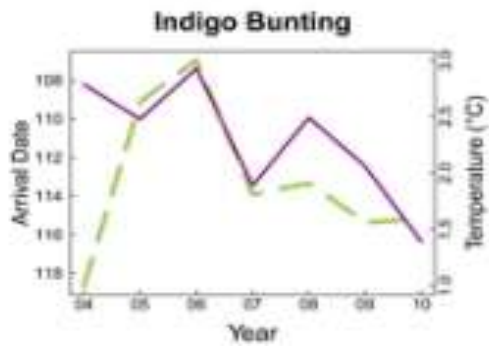
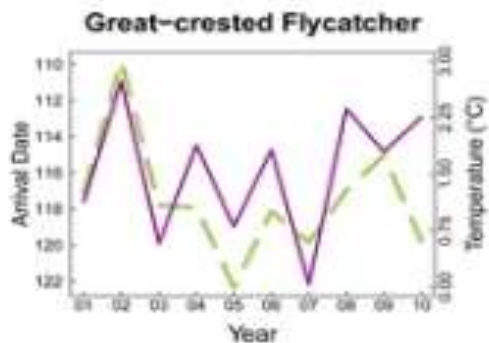
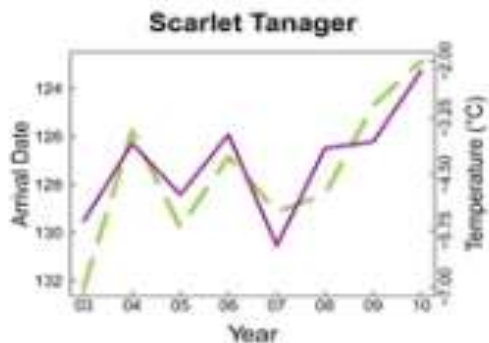
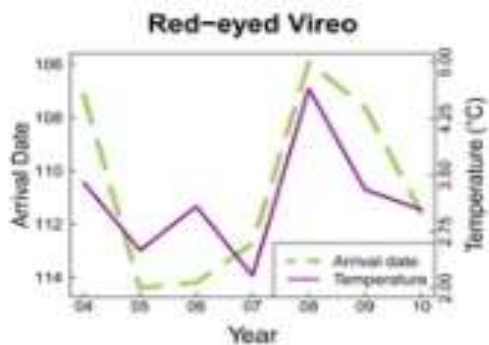
**Changing climates  
will affect migratory  
species that may  
depend on PAs**

East Asian-Australian Flyway

West  
Pacific  
Flyway







**Climate change affects breeding times of many Species, and can promote invasion of non-native species of plants and animals.**

# Plant invasion

Nepalese wildlife park under threat from invasive species

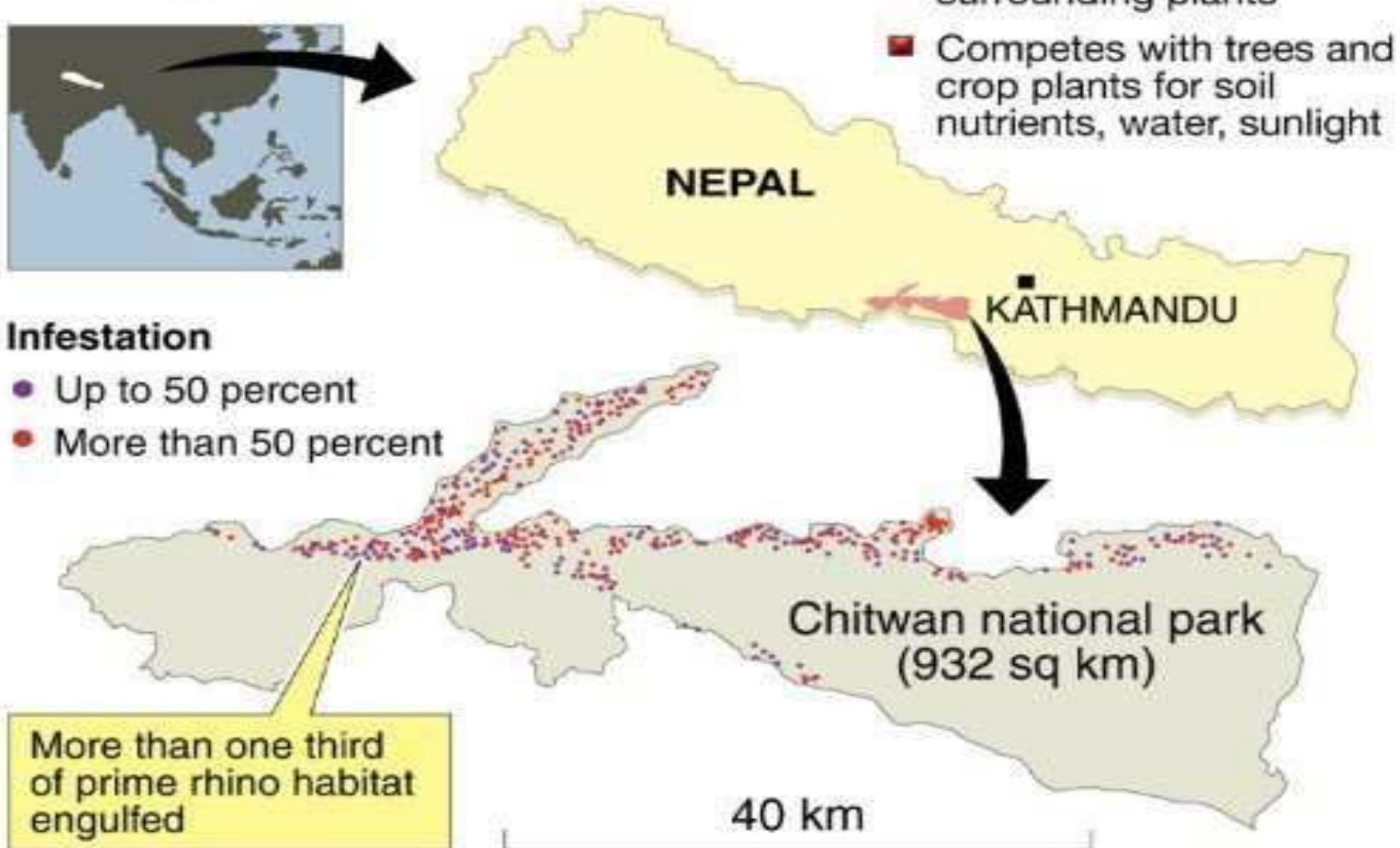


*Micania microantha*

- Creeper plant, smothers and chokes surrounding plants
- Competes with trees and crop plants for soil nutrients, water, sunlight

## Infestation

- Up to 50 percent
- More than 50 percent



More than one third of prime rhino habitat engulfed


40 km





**Invasive plant species threaten the population of Asian rhinos in Chitwan. Other invasive species threaten many other native species throughout Asia's protected areas.**



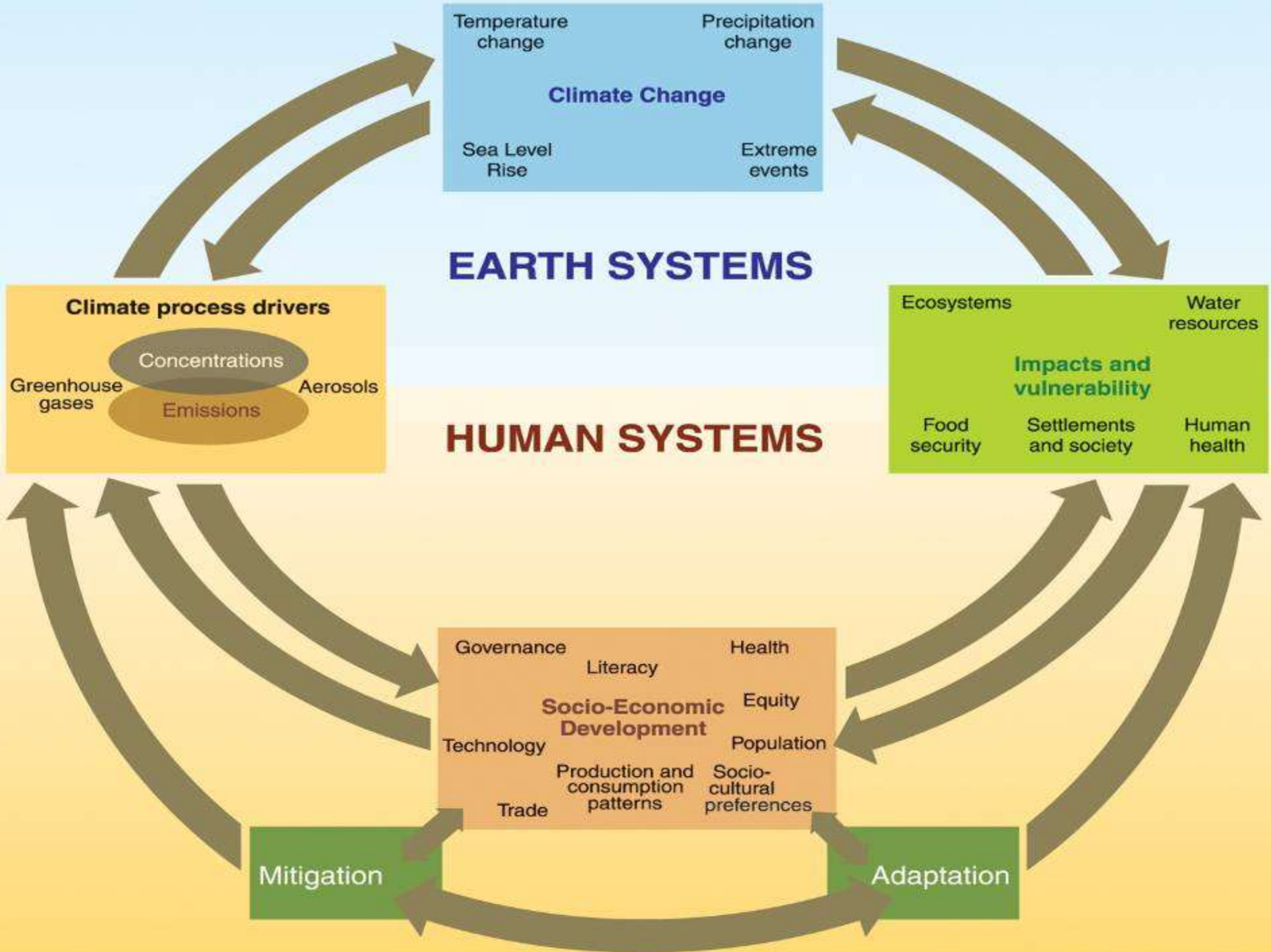
An aerial photograph of a dense forest. The majority of the trees are dark green, but several trees are in various stages of autumn, showing shades of orange, red, and brown. The forest is thick and covers a hillside.

**Climate change will affect flowering  
and fruiting of plants in protected areas.  
PA managers should monitor such changes.**





Changing fruit  
production will affect  
fruit-eating species





# Ecosystem Services (ES) related to Wetlands

## Provisioning

- Floodplain recession agriculture
- Fresh water supply
- Food source (fishery, birds, wildlife)
- Grazing area for cattle

## Regulating

- Flood attenuation and protection
- River flow regulation
- Improvement of water quality
- Nutrient cycling and sediment retention

## Cultural

- Ecotourism
- Services meeting aesthetic, emotional, ethnic or spiritual needs

## Supporting

- Biodiversity
- Carbon sequestration and storage
- Groundwater recharge



Protected Area Certificates + Management Plan for Development



Benefit sharing, Conservation of Nature and Sustainable Use of Resources



**Air quality**

**Pest & disease control**

**Watershed protection and regulation**

**Forest products**

**Conservation of  
biodiversity**

**Plant pollination**

**Carbon sequestration and storage**

**Soil formation and fertility**

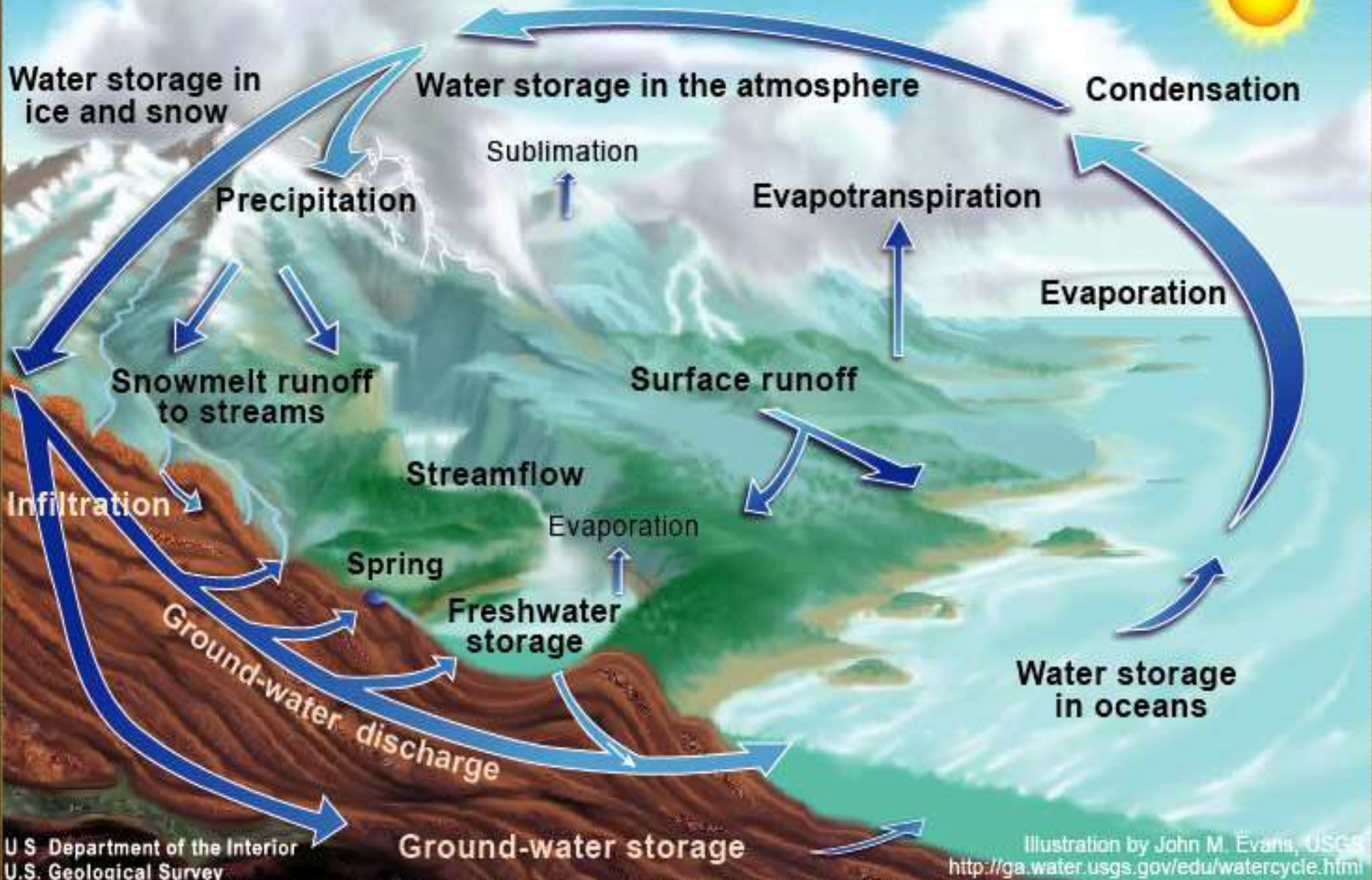
**Decomposition of wastes**

**Landscape beauty**





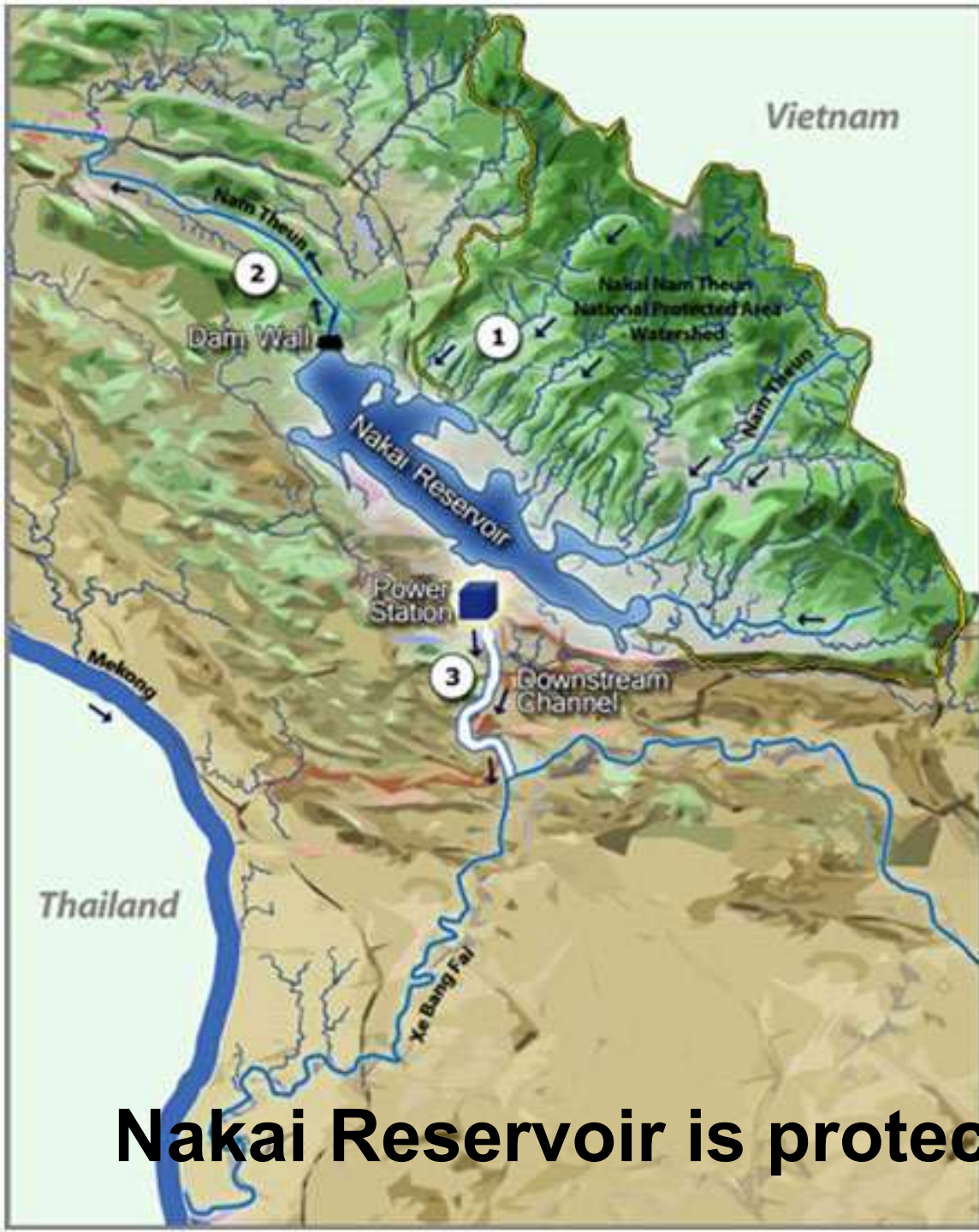
# The Water Cycle











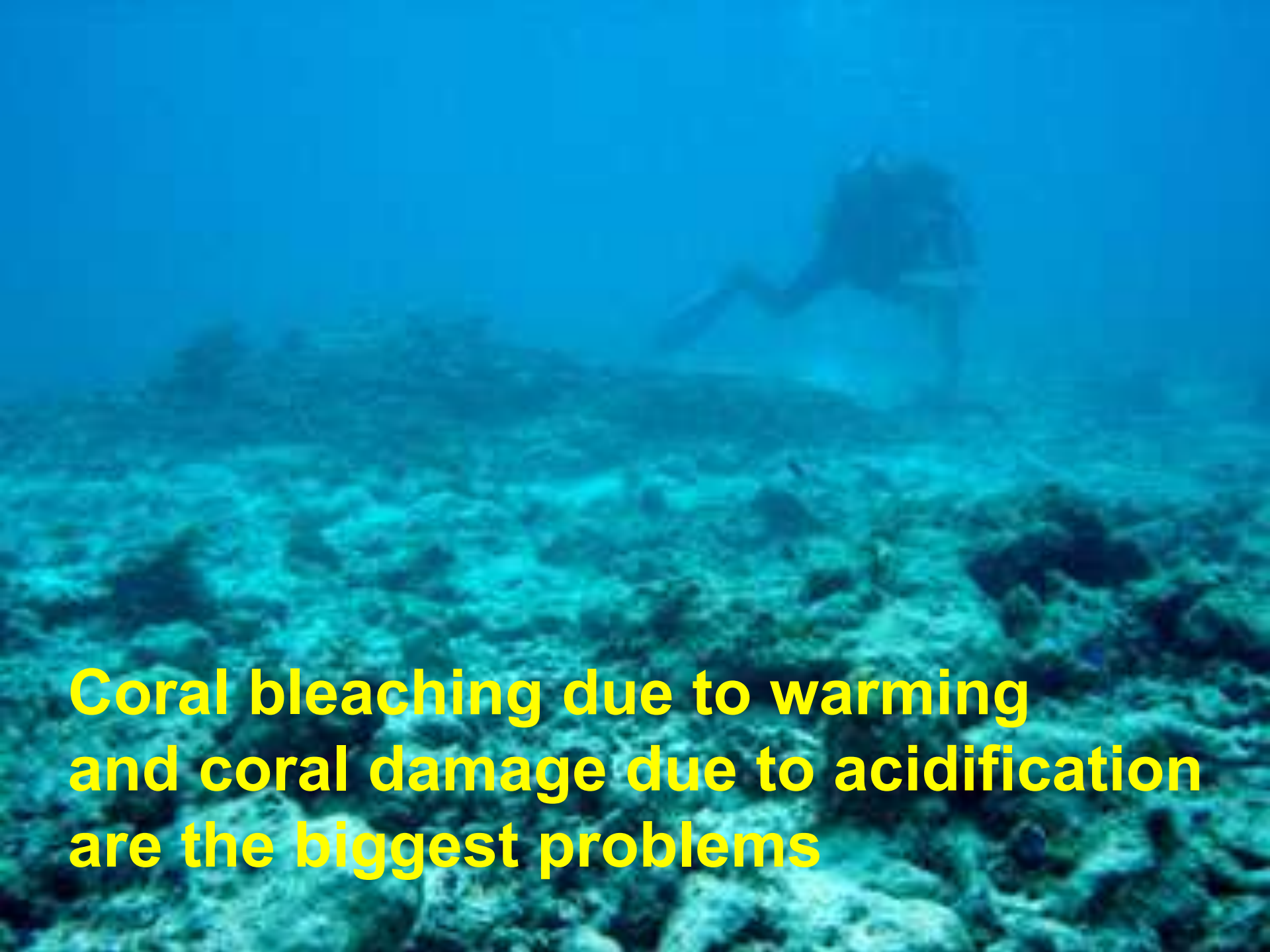
**Nakai Reservoir is protected by the PA**



**Coral Reefs are already  
being affected by climate  
change**





An underwater photograph showing a coral reef with significant coral bleaching. The coral appears pale white and yellow, indicating the loss of their natural colors. In the background, a diver is visible, providing a sense of scale to the reef. The water is clear and blue.

**Coral bleaching due to warming  
and coral damage due to acidification  
are the biggest problems**





**The Alchemist Cafe**  
Dublin

**Biodiversity**  
The Science Behind the Slogans!

**BIOFOREST**

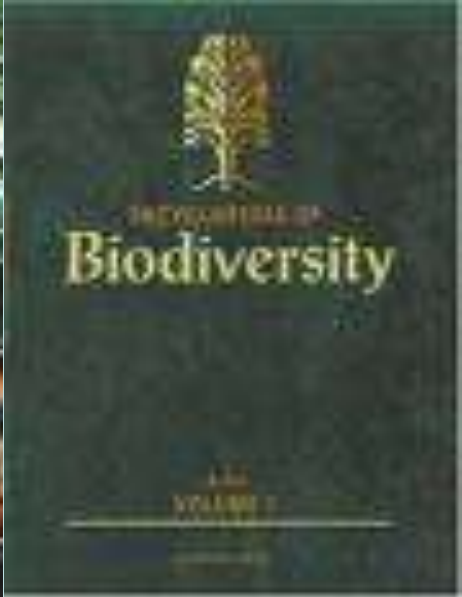
7.45pm on the 9th of November in  
The Mercantile, Dame Street

Dr. George Smith of BIOFOREST project, Trinity College Dublin will be discussing biodiversity; what it really is, how it is affecting us all now, and will affect us in the future.

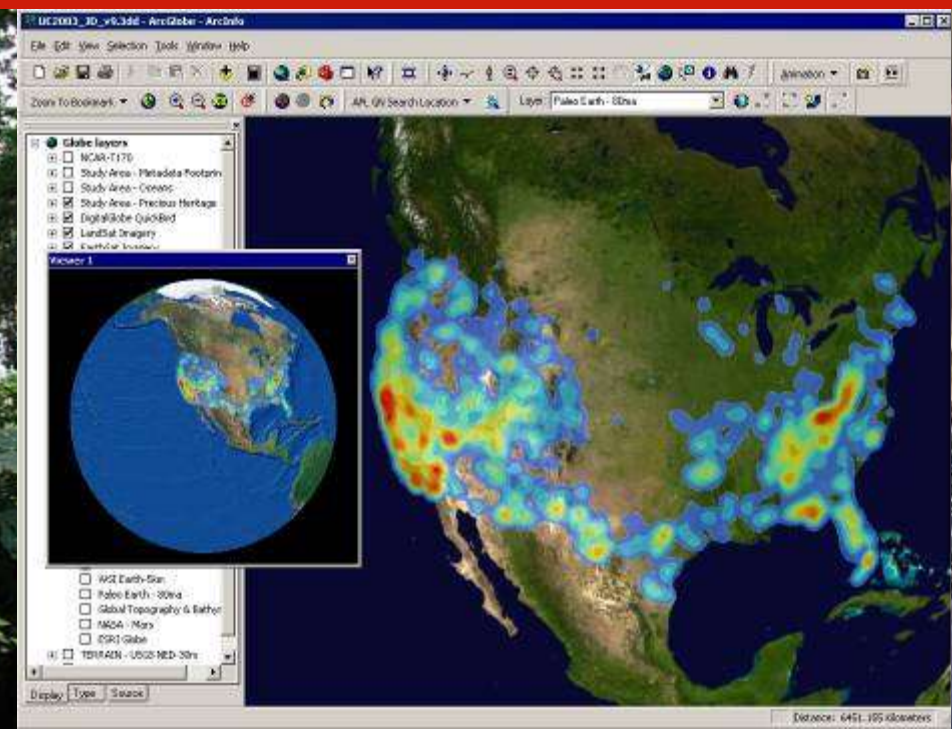
Admission is free and there is finger food provided

In Association with **cpl**

[www.alchemistcafe.cjb.net](http://www.alchemistcafe.cjb.net)



# Conclusion 1: Build strong scientific support





# Climate Change Susceptibility Traits

>90 detailed traits identified by IUCN's Species Survival Commission

**A. Specialised habitat and/or microhabitat requirements**

**B. Narrow environmental tolerances or thresholds** that are likely to be exceeded due to climate change at any stage in the life cycle

**C. Dependence on specific environmental triggers or cues** that are likely to be disrupted by climate change

**D. Dependence on interspecific interactions** which are likely to be disrupted by climate change

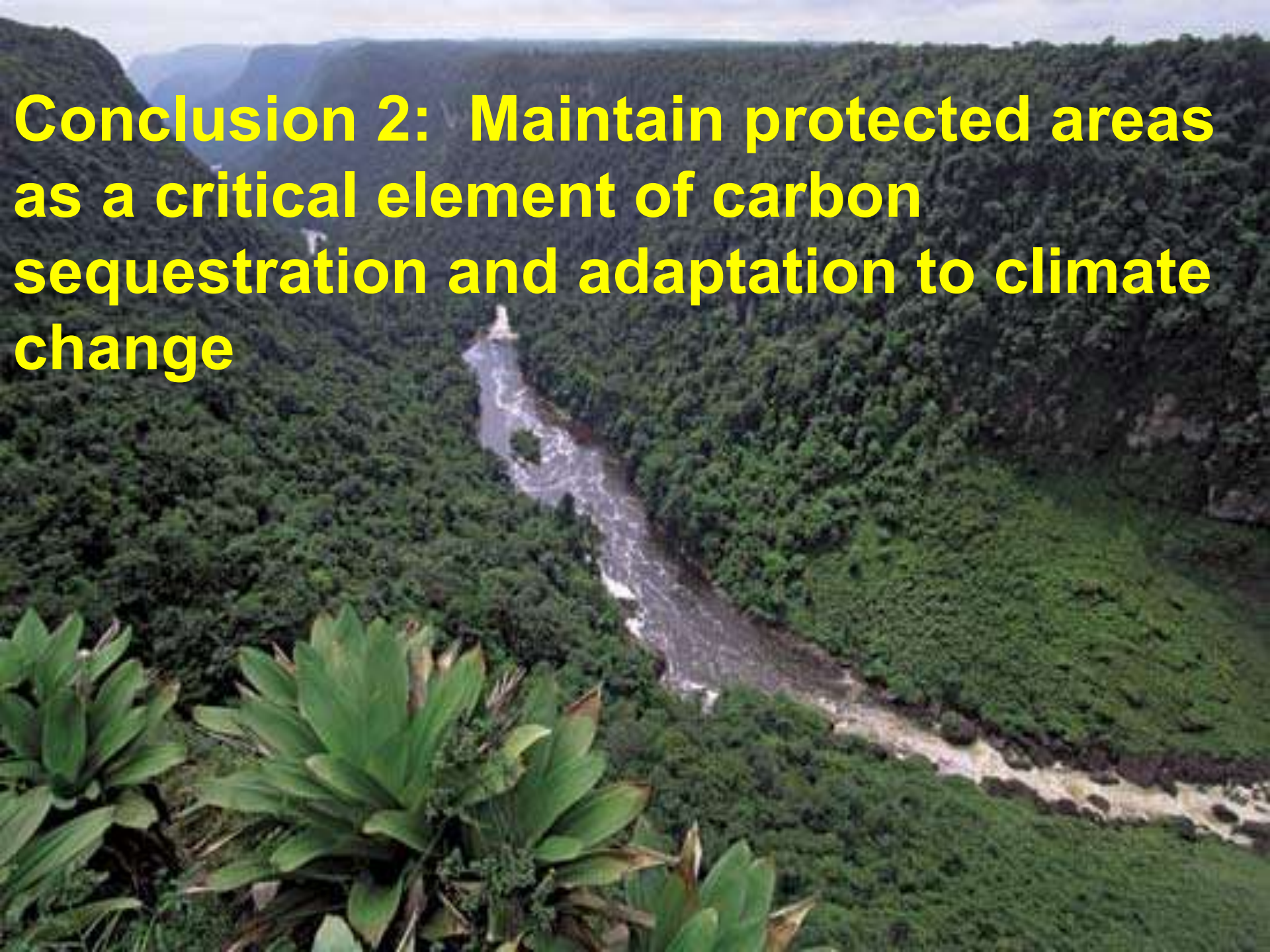
**E. Poor ability or limited opportunity to disperse to or colonise** a new or more suitable range

# Research priorities:

- **Establish a monitoring system for tracking the change in species distributions in response to climate change**
- **Explore possibilities for linking protected areas into larger landscapes that would enable species and ecosystems to adapt to climate change**
- **Improve understanding of the relationship between biodiversity and ecosystem services in protected areas**



**Conclusion 2: Maintain protected areas as a critical element of carbon sequestration and adaptation to climate change**





Burma

Klong Wang Chao

Khao Sanam Preang

- National Park
- Wildlife Sanctuary
- Proposed National Park
- Reservoir
- Western Forest Complex Boundary

Klong Lan

Mao Wong

Umpang

Thung Yai Naresuan (East)

Huai Kha Khaeng

Thung Yai Naresuan (West)

Phu Toei

Khao Laem

Lum Klong Ngu

Chalerm Rattanakosin

Srinakarin

Salakpra

Sal Yok

Erawan

Kanchanaburi

Thong Phapoom

# Thailand, Western Forest Complex Pilot Site, Villages & Road Network

ADB RETA 6213 GMS Biodiversity Conservation Corridors Initiative

Data Source: SRTM90, RFD, NPO, UNEP RRC AP



## Key to Features

- National Park (NP), Wildlife Sanctuary (WS)

- 1- Salakpra
- 2- Huai Kha Khaeng
- 3- Thung Yai West
- 4- Thung Yai East
- 5- Khao Sanampriang
- 6- Umpang
- 7- Erawan
- 8- Chalerm Rattanakosin
- 9- Sai Yok
- 10- Srinakharin
- 11- Klong Lan
- 12- Mao Wong
- 13- Phu Toey
- 14- Klong Wang Chao
- 15- Khao Laem
- 16- Thong Pha Phum
- 17- Lam Klong Ngu
- 18- Kaeng Krachan
- 19- Maenam Phachi

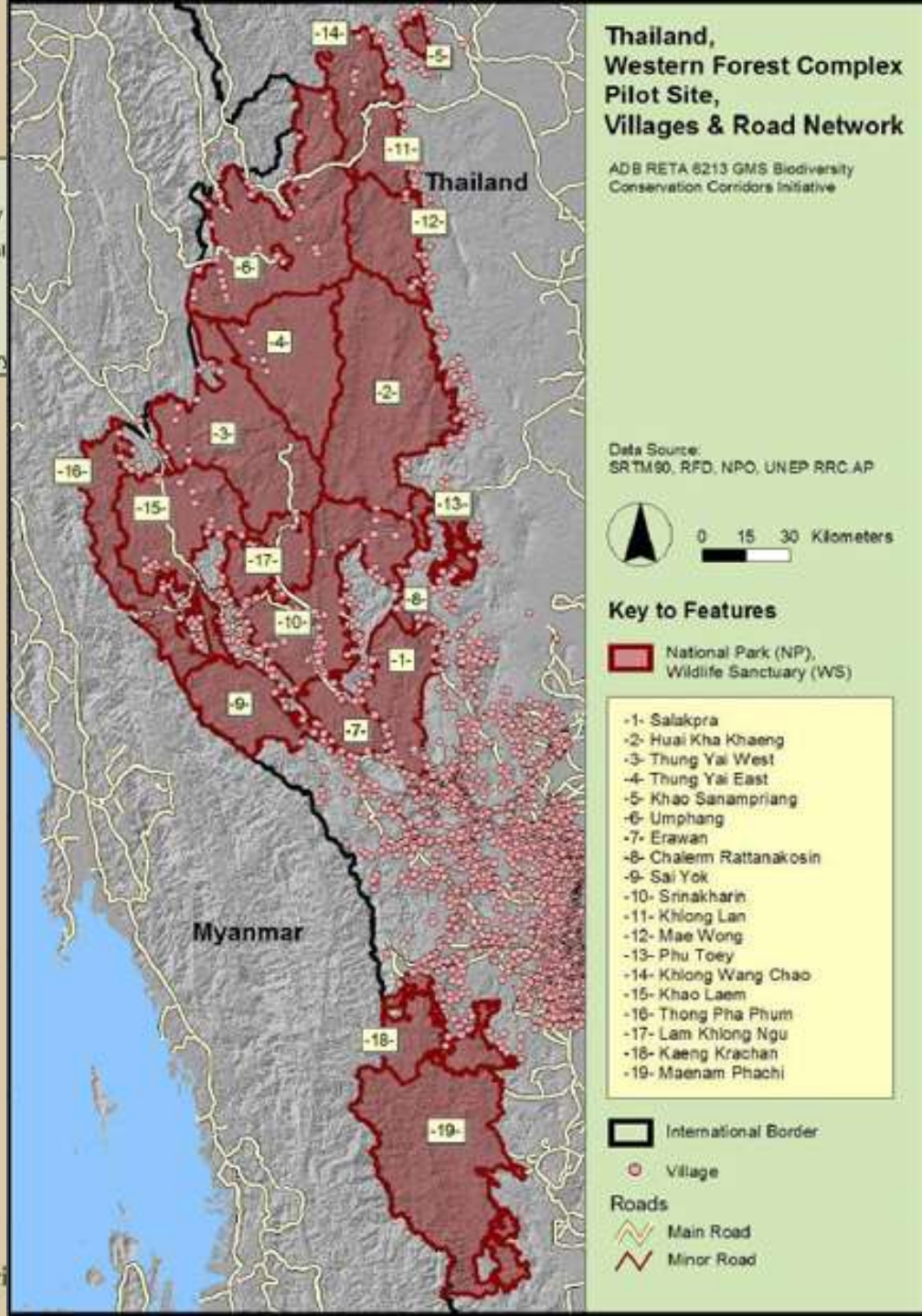
International Border

Village

## Roads

Main Road

Minor Road



## **Definition of REDD**

**“Reducing Emissions from Deforestation and forest degradation in Developing countries.”**

## **Definition of REDD+**

**Adds the role of conservation, sustainable management of forests and enhancement of forest carbon stocks**





# REDD+

REDD+ helps to mitigate climate change through forests, and provides social and environmental benefits. It includes these essential components: creating incentives for not clearing standing forests, maintaining and expanding forest cover, sustainably managing forest and recovering degraded lands.





**Conclusion 3. Promote regional cooperation to adapt to climate change**



# Recommendation: Manage protected areas to adapt to climate change

- Monitor changes to species and ecosystems, and modify management accordingly;
- Build links to surrounding lands through corridors that will enable species movement;
- Give greater attention to the problems of invasive species, and emerging infectious diseases;
- Enhance financial support for PAs through payment for ecosystem services such carbon sequestration, provision of water supplies, and conservation of biodiversity