



Global Climate Change

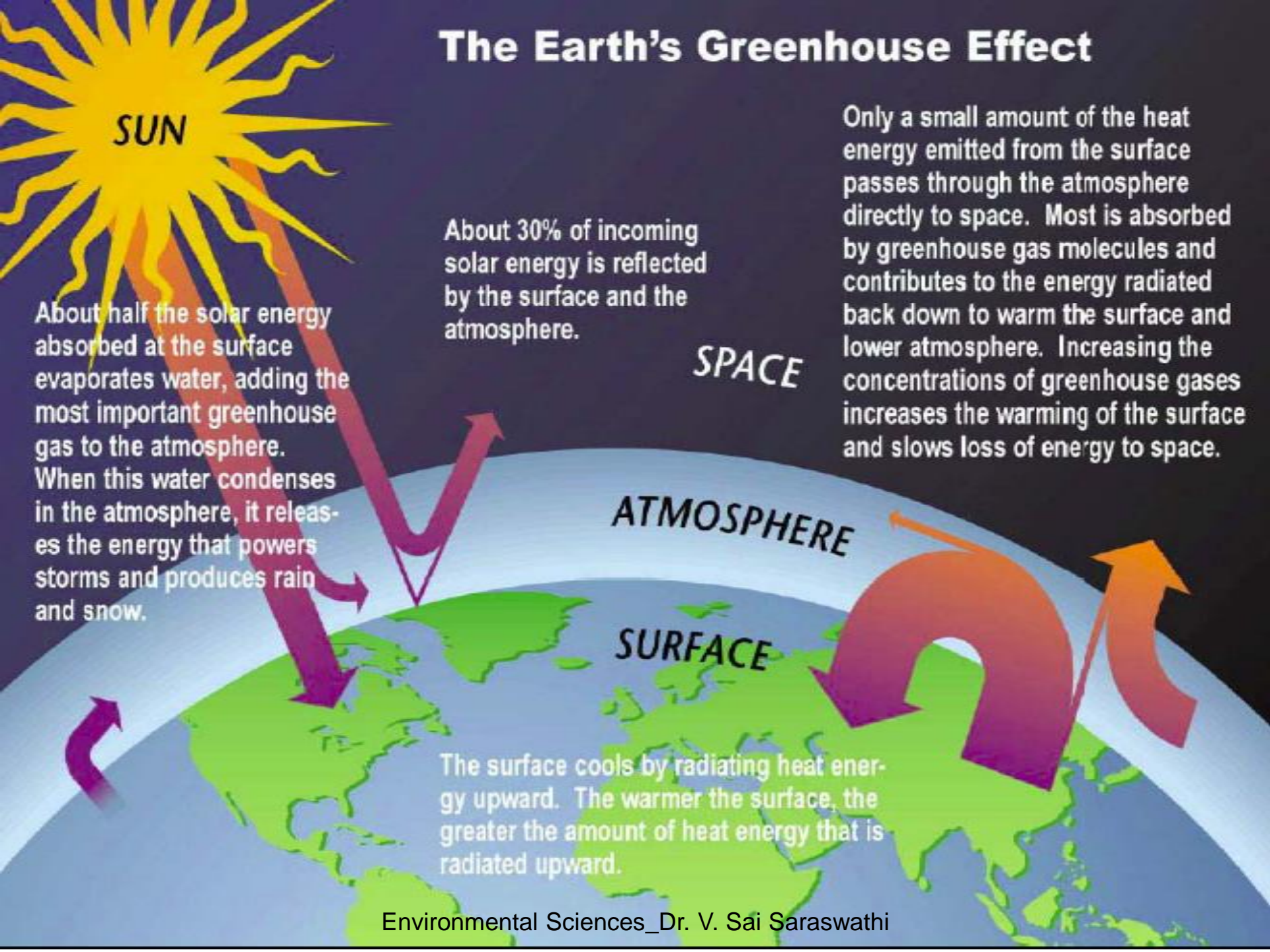
By

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Observed Changes and Effects

The Earth's Greenhouse Effect



SUN

About half the solar energy absorbed at the surface evaporates water, adding the most important greenhouse gas to the atmosphere. When this water condenses in the atmosphere, it releases the energy that powers storms and produces rain and snow.

About 30% of incoming solar energy is reflected by the surface and the atmosphere.

SPACE

Only a small amount of the heat energy emitted from the surface passes through the atmosphere directly to space. Most is absorbed by greenhouse gas molecules and contributes to the energy radiated back down to warm the surface and lower atmosphere. Increasing the concentrations of greenhouse gases increases the warming of the surface and slows loss of energy to space.

ATMOSPHERE

SURFACE

The surface cools by radiating heat energy upward. The warmer the surface, the greater the amount of heat energy that is radiated upward.



GLOBAL CLIMATE CHANGE

What is it?

Introduction

- **Climate change** is a change in the statistical distribution of weather over periods of time that range from decades to millions of years.
- May be specific in some areas.

Climate Change: Basic Issues

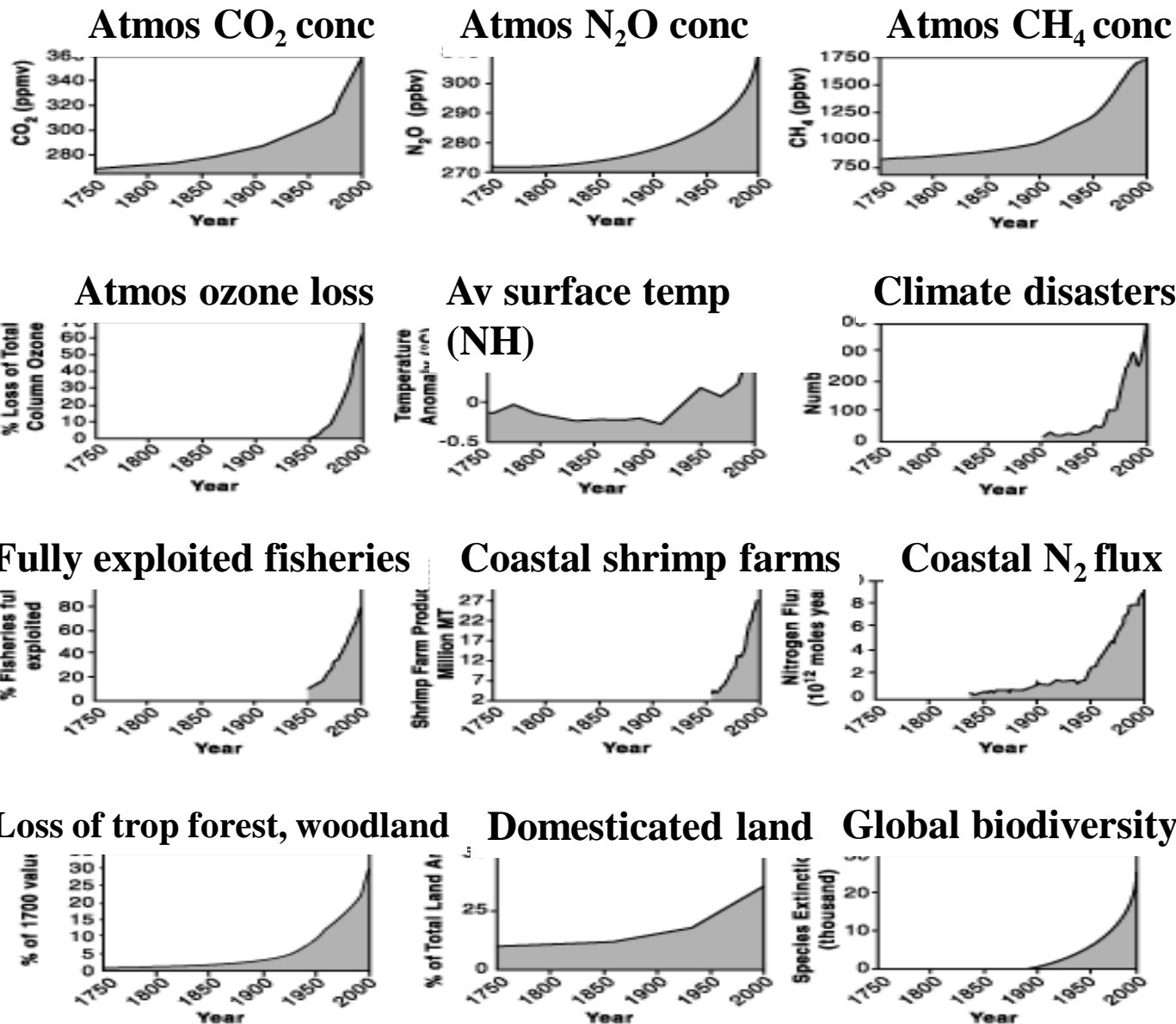
- Earth's climate varies naturally – because of a variety of **cosmological and geological processes**.
- “**Climate change**” refers to an *additional*, and relatively rapid, change induced by human actions.
- The additional change – several degrees C within a century – will disrupt the foundations of life on Earth.
- **Ecosystems and life** in general have evolved within a narrow band of climatic-environmental conditions.

Causes of Change



**MOST OF THE OBSERVED
INCREASE IN GLOBAL AVERAGE
TEMPERATURE SINCE THE MID-
20TH CENTURY IS VERY LIKELY
DUE TO THE OBSERVED INCREASE
IN HUMAN-CAUSED GREENHOUSE
GAS CONCENTRATIONS AND
HUMAN INFLUENCES TOO.**

Changes in environmental indicators, 1750 - 2000



From: Steffen et al. In press 2004



GLOBAL CLIMATE CHANGE

What's going to happen?

Agricultural
Lands

Coastal
Zones

Forest
Lands

Freshwater
Systems

Arid Lands &
Grasslands



Food and Fiber Production

Provision of Clean and Sufficient Water

Maintenance of Biodiversity

Maintenance of Human Health

Storage and cycling of Carbon, Nitrogen, Phosphorus

Climate change will affect the ability of ecological
systems to provide a range of essential ecological
goods and services

World Population 6,056,528,577 ►



The Challenge: Sustainable Management of an Ever-Changing Planet

Environmental Sciences_Dr. V. Sai Saraswathi



Food production needs to double to meet the needs of an additional 3 billion people in the next 30 years



Climate change is projected to decrease agricultural productivity in the tropics and sub-tropics for almost any amount of warming



Wood fuel is the only source of fuel for one third of the world's population

Wood demand will double in the next 50 years

Forest management will become more difficult due to an increase in pests and fires



Climate change is projected to decrease water availability in many arid- and semi-arid regions

One third of the world's population is now subject to water scarcity

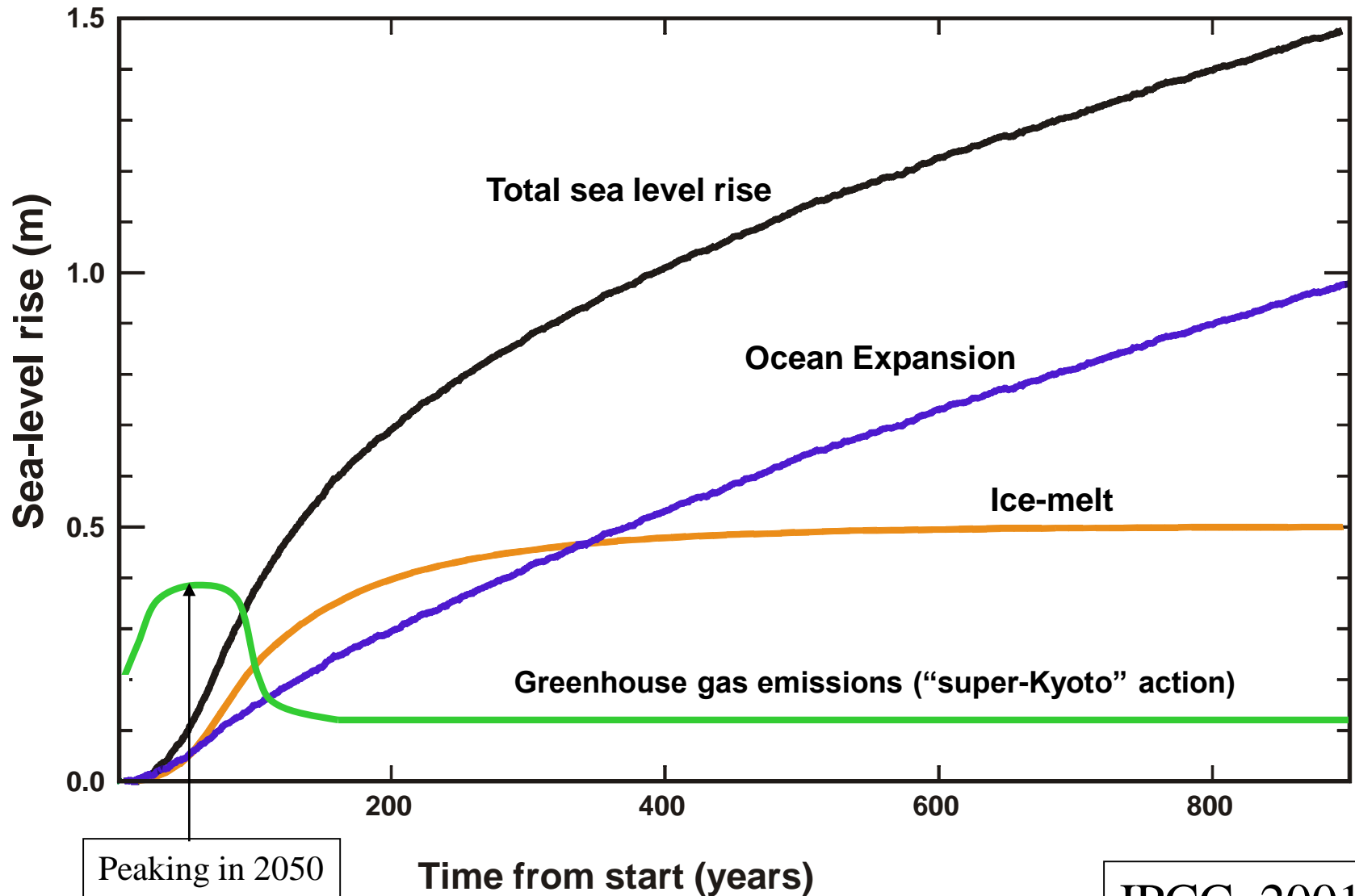


Biodiversity underlies all ecological goods and services

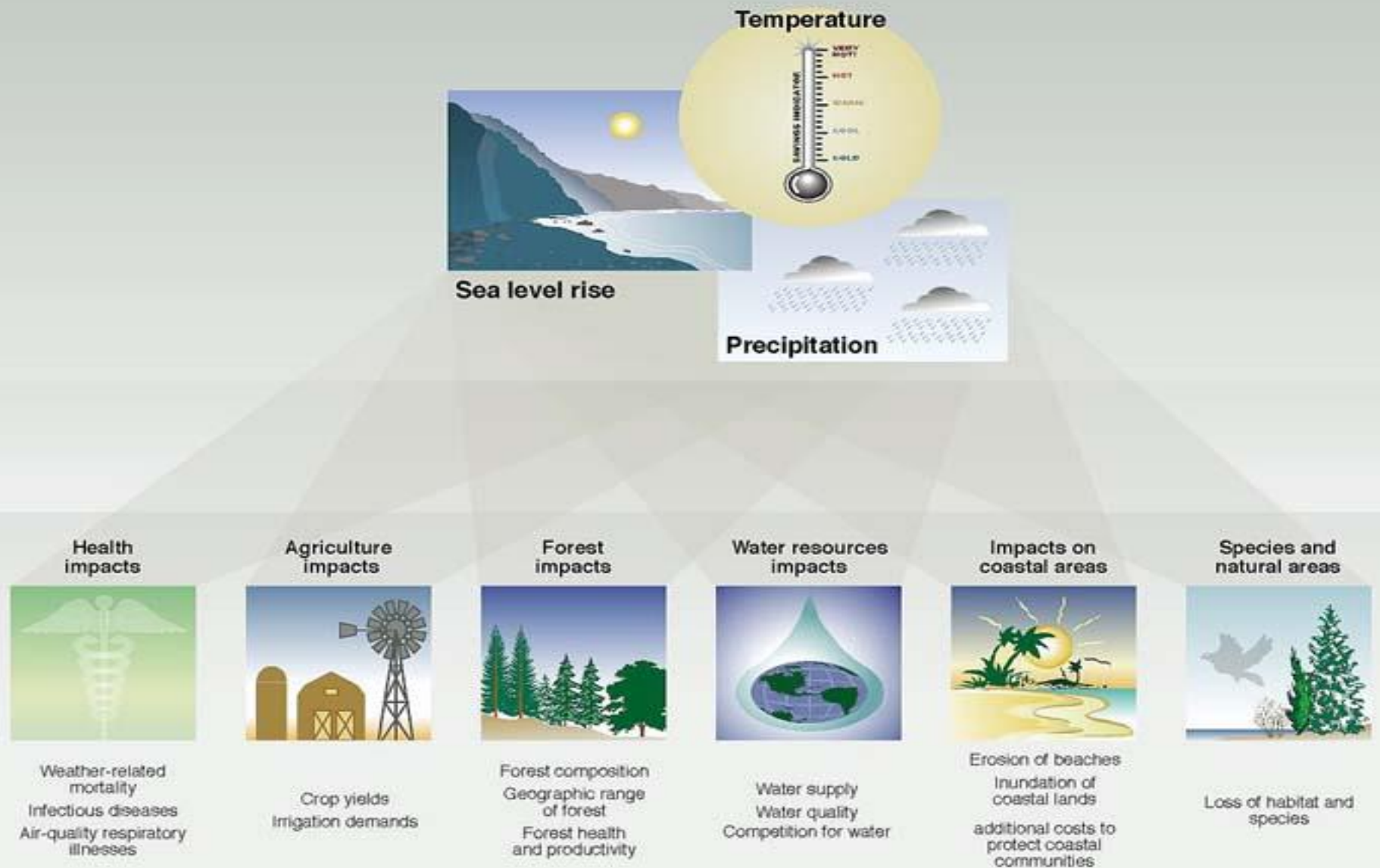


Climate change will exacerbate the loss of biodiversity

Sea-Level Rise, over the coming millennium



More adverse than beneficial impacts on biological and socioeconomic systems are projected



Other Causes

- Plate tectonics
- Solar output
- Sudden shift in climate
- Volcanism
- Ocean Variability
- Human Influences

Changes in climatic phenomenon	Confidence in observed changes (latter half of 1900s)	Probability of projected changes to 2100
Higher maximum temperatures - more hot days	Likely	Very likely
Higher minimum temperatures, - fewer cold days and frost days	Very likely	Very likely
Increase of heat index over land areas	Likely	Very likely
More intense precipitation events	Likely, (N mid to high latitudes)	Very likely
Increased summer continental drying and associated risk of drought	Likely, in a few areas	Likely, over most mid- latitude continental interiors.
Increase in tropical cyclone peak wind intensities	Not observed in the few analysis available	Likely, over some areas
Increase in tropical cyclone mean and peak precipitation intensities	Insufficient data	Likely, over some areas

Risks to Small Island-States

- Coastal flooding/Storm.
- Damaged coastal infrastructure (roads, etc.)
- Salination of island fresh-water (esp. subterranean cells).
- Impaired crop production.
- Population displacement: diverse health risks (nutrition, infection, mental health)

Current Programs to Address Climate Change

International

- **Kyoto Protocol** emission targets — went into effect on February 16, 2005 without US participation
- Cities for Climate Change Protection - milestones

National

- Research
- Other States – Climate Action Plans.



GLOBAL CLIMATE CHANGE

So.. What can we do?

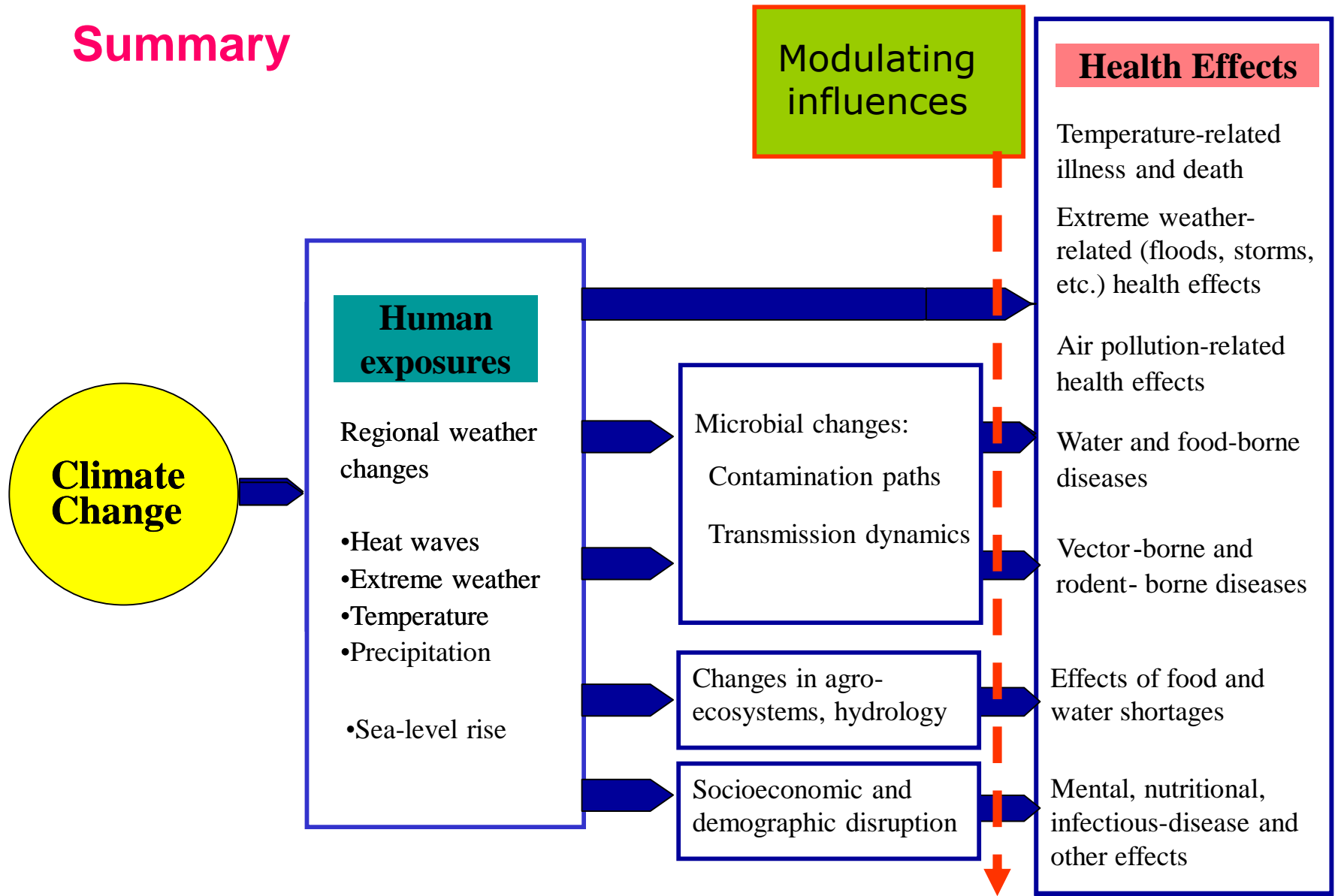
- Reduce emissions of greenhouse gases.
- Attempt to develop alternatives energies.
- Allow emission to continue, but prepare for global climate changes.
- Allow emissions to continue as normal and leave preparations up to individual countries
- Combine any of these ideas
- Come up with your own unique plan!

Potential mitigation technologies and practices

Sectors Potential activities

- **Energy supply:** Fuel switch.
- **Transport:** Vehicle efficiency, hybrid vehicles, biofuels, modal shift, planning.
- **Buildings:** Efficient lighting, appliances, Acs, improved insulation, solarheating and cooling, alternatives of Fluorinated gases.
- **Industry:** Heat & power recovery, recycling, emission control
- **Agriculture** Land mgmt, restoration of degraded lands, improved cultivation techniques, improved fertilizer applications
- **Forests:** Forest mgmt, reduced deforestation, Forestry product use for bioenergy.
- **Waste:** LF methane recovery, waste incineration and energy recovery, composting, recycling & waste minimization

Summary



Thank You