UNIT – V

- **Economics of biodiversity:** Economics of biodiversity conservation - Valuing individual species and diversity of species -Policy responses at national and international levels. Economics of Climate Change – stern Report

Economics of Biodiversity conservation

•Biodiversity is all the different kinds of life you'll find in one area—the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world.

• Each of these species and organisms work together in ecosystems, like an intricate web, to maintain balance and support life.

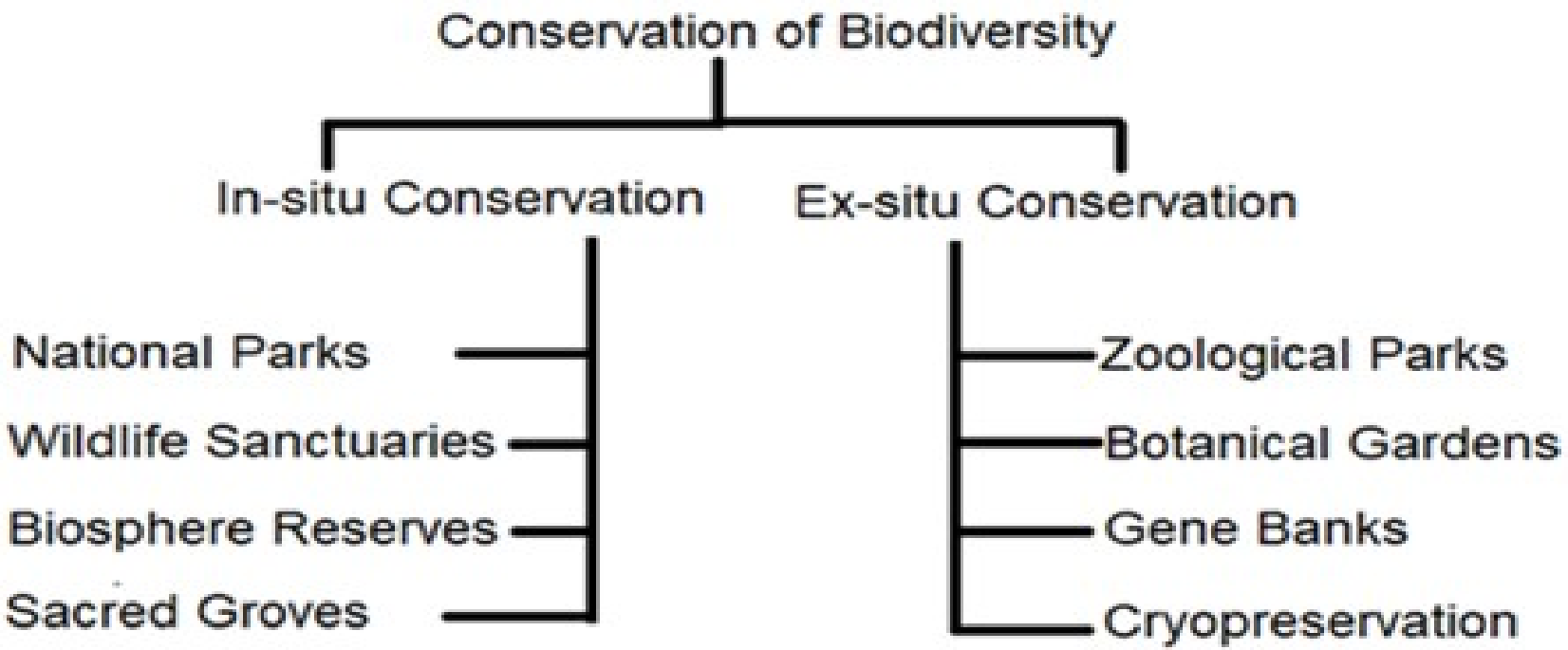
•Biodiversity supports everything in nature that we need to survive: food, clean water, medicine, and shelter.

•The concept of "economics of biodiversity conservation" is all about understanding and valuing the economic benefits that come from protecting and preserving biodiversity.

•Biodiversity refers to the variety of life forms (such as plants, animals, and microorganisms) found in an ecosystem.

Economics of Biodiversity conservation

•Conservation is the active effort to safeguard and sustainably manage this biodiversity.



Economics of Biodiversity conservation

1. **Biodiversity**: Imagine a big puzzle with various unique pieces representing different species of plants, animals, and microorganisms.

- Biodiversity refers to the number and variety of these pieces in a particular area (like a forest, a coral reef, or a grassland). Each piece plays a vital role in the functioning of the ecosystem.

2. **Ecosystem Services**: Biodiversity provides numerous services to humans, often known as ecosystem services.

- For example, forests purify the air we breathe, bees pollinate crops, wetlands help prevent floods, and plants provide us with medicines.

- These services have tremendous economic value.

Economics of Biodiversity conservation

3. **Economic Benefits**: When we conserve biodiversity, we safeguard these ecosystem services.

- For instance, by protecting a forest, we ensure clean air, timber for sustainable logging, and habitat for wildlife-based tourism.

- These benefits have direct and indirect economic value for communities and societies.

4. **Sustainable Development**: Biodiversity conservation is essential for sustainable development.

- It means meeting the needs of the current generation without compromising the ability of future generations to meet their needs.

Economics of Biodiversity conservation

- By maintaining biodiversity, we can secure resources for the long term and prevent environmental degradation that could harm economies.

5. **Cost of Biodiversity Loss**: On the flip side, when biodiversity is lost, it can have severe economic consequences.

- For instance, overfishing may deplete fish stocks and hurt fishing industries, or deforestation may lead to soil erosion and reduced agricultural productivity.

- These losses can be costly to repair and impact the livelihoods of many.

Economics of Biodiversity conservation

6. **Economic Incentives for Conservation**: Understanding the economics of biodiversity helps policymakers and communities recognize the economic benefits of conservation.

- This knowledge can lead to the creation of economic incentives, such as payments for ecosystem services (PES), eco-tourism initiatives, or sustainable harvesting practices.

- The economics of biodiversity conservation involves recognizing the economic value of biodiversity and the ecosystem services it provides.

- By conserving biodiversity, we can ensure sustainable development and secure the well-being of current and future generations.

Valuing individual species

•Valuing individual species in the economics of biodiversity is an important but challenging aspect of environmental economics.

•Biodiversity refers to the variety of life forms and ecosystems on Earth, including the diversity of species, genes, and ecosystems.

•Each species plays a unique role in its ecosystem, and their presence or absence can have significant impacts on the overall health and functioning of the ecosystem.

•Therefore, understanding and quantifying the economic value of individual species is crucial for making informed decisions about conservation and sustainable development.

Valuing individual species

• The valuation of individual species and the diversity of species plays a crucial role in understanding the economic significance of biodiversity.

1. **Direct Use Value**: Some species have direct economic value because they are directly used by humans for various purposes.

- For example, many plant and animal species provide food, medicine, timber, or other resources that have a direct market value.

- Valuing these species can be relatively straightforward by estimating the market prices of the products derived from them.

Valuing individual species

2. **Indirect Use Value**: Species can also provide indirect economic benefits by contributing to ecosystem services.

- Ecosystem services include processes such as pollination, water purification, carbon sequestration, and climate regulation, among others.

- Estimating the economic value of these services often requires complex models and assessments.

3. **Option Value**: Some species may not have direct use at present, but they could have significant value in the future due to their potential for scientific discoveries or technological innovations.

- This is often referred to as the option value.

Valuing individual species

4. **Non-Use Value**: Species may also have non-use values, which are based on people's preferences for the existence of certain species or their ethical, cultural, or aesthetic significance.

- Non-use values are challenging to quantify and typically require methods such as contingent valuation surveys or choice experiments.

5. **Existence Value**: This aspect of non-use value refers to people's willingness to pay for the preservation of a species, even if they never directly use or benefit from it.

- It reflects the intrinsic value placed on the existence of a species.

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Valuing individual species

- Incorporating the value of individual species in economic assessments can help policymakers, businesses, and communities make more informed decisions regarding biodiversity conservation, natural resource management, and sustainable development.

- However, it's important to recognize that assigning monetary value to nature's contributions has limitations, and ethical considerations should also be taken into account when making decisions that impact biodiversity.

Valuing diversity of species

1. **Ecosystem Services:** Each species in the forest provides specific benefits or services to the environment.

- For example, some plants may clean the air, while others prevent soil erosion.

- Animals might pollinate flowers or control pest populations.

- Collectively, these services are called "ecosystem services," and they are crucial for the forest's productivity and resilience.

2. **Human Livelihoods:** The well-being of people living around the forest often depends on the resources it provides.

Valuing diversity of species

- For example, forests might be a source of food, medicine, and building materials for local communities.

- These resources contribute to local economies, providing jobs and income opportunities for people who harvest and use them sustainably.

3. **Tourism and Recreation:** Biodiversity can attract tourists and nature enthusiasts who want to experience the beauty and uniqueness of the forest and its inhabitants.

- Tourism related to biodiversity can create income for local communities through activities like guided tours, wildlife watching, and eco-lodges.

Valuing diversity of species

4. **Climate Regulation:** Forests, with their diverse species, play a crucial role in regulating the global climate.

- They absorb carbon dioxide, a greenhouse gas responsible for climate change, and release oxygen. This process helps stabilize the Earth's climate and mitigate the impacts of global warming.

5. **Resilience and Adaptation:** A diverse forest is better equipped to withstand disturbances like disease outbreaks, natural disasters, or climate change.

- Different species have varying responses to these challenges, so a diverse ecosystem is more likely to recover and adapt.

Valuing diversity of species

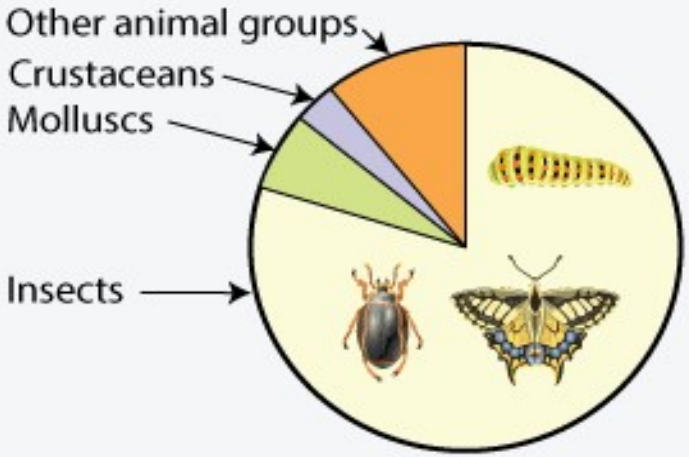
•However, the diversity of species is under threat due to factors like deforestation, pollution, overexploitation, and climate change.

•When species disappear from the forest, it can disrupt the delicate balance of the ecosystem, leading to negative impacts on both the environment and human economies.

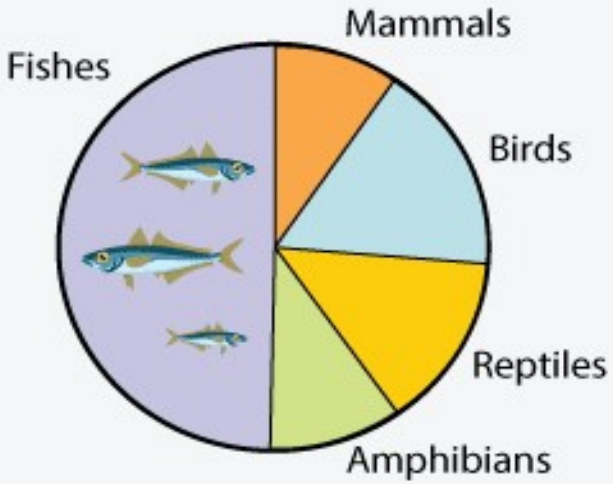
•So, protecting biodiversity is not just about preserving nature for its own sake; it's also about safeguarding the resources and services that directly or indirectly support human well-being and livelihoods.

•By valuing and preserving the diversity of species, we can ensure a sustainable and prosperous future for both nature and ourselves.

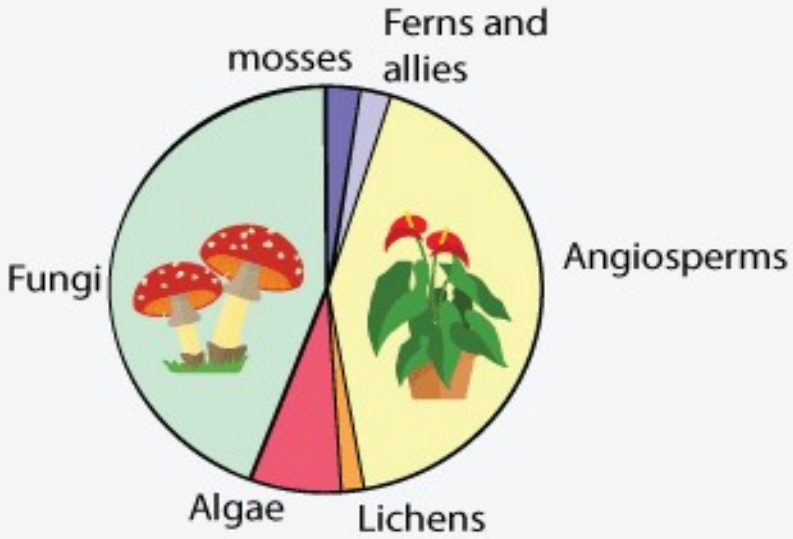
REPRESENTATION OF GLOBAL BIODIVERSITY



invertebrates



Vertebrates



Plants

Policy responses at national and international levels

•Policy responses at national and international levels in environmental economics are the actions taken by governments and organizations to address environmental challenges and promote sustainable practices.

•These policies aim to protect the environment, conserve natural resources, and ensure a better future for both the planet and its inhabitants.

•**National level Policy responses**

1. **Environmental Regulations:** Governments establish laws and regulations to control pollution, protect natural resources, and set standards for emissions and waste disposal.

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•For example, limits on air and water pollution from industries and vehicles are common environmental regulations.

2. **Economic Instruments:** Governments may use economic tools like taxes, subsidies, and tradable permits to internalize environmental costs and incentives.

- For instance, a carbon tax can be imposed on greenhouse gas emissions to encourage businesses to reduce their carbon footprint.

3. **Protected Areas and Conservation:** National governments create protected areas such as national parks, wildlife reserves, and marine sanctuaries to safeguard biodiversity and ecosystems.

Cont

- These areas are managed to limit human impact and preserve natural habitats.

4. **Sustainable Resource Management:** Policies are implemented to promote sustainable practices in agriculture, forestry, and fisheries.

- This may include promoting sustainable farming methods, responsible logging, and sustainable fishing quotas.

5. **Environmental Impact Assessment (EIA):** Before initiating large-scale projects like infrastructure development or industrial facilities, governments may require an EIA to assess potential environmental impacts and find ways to mitigate them.

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6. **Renewable Energy Promotion:** Governments can provide incentives and subsidies for the development and adoption of renewable energy sources such as solar, wind, and hydropower.

- This helps reduce greenhouse gas emissions and dependence on fossil fuels.

7. **Carbon Pricing:** Implementing a carbon pricing mechanism, such as a carbon tax or cap-and-trade system, encourages businesses to reduce their carbon emissions and invest in cleaner technologies

Cont

International level Policy responses

1. **Global Environmental Funds:** International organizations establish funds, such as the Global Environment Facility (GEF), to provide financial support for projects that address global environmental challenges in developing countries.

2. **Technology Transfer and Capacity Building:** Developed countries may assist developing countries in adopting cleaner technologies and building capacity for sustainable development through international cooperation.

Cont

2. **Trade and Environment Linkages:** International agreements may address the impact of trade on the environment and encourage sustainable practices in international trade.

3. **Education and Awareness Campaigns:** Implementing international campaigns to raise awareness about environmental issues and the importance of sustainable practices.

4. **Research and Data Sharing:** Facilitating international research collaborations and data sharing on environmental issues, promoting evidence-based policy decisions.

Cont

5. **Sustainable Development Goals (SDGs):** Ensuring that countries work collectively towards achieving the environmental-related SDGs, fostering a global commitment to sustainable development.

6. **International Cooperation for Pollution Control:** Establishing collaborative efforts to address trans boundary pollution, such as shared water bodies or air that affects multiple countries

7. **Carbon Pricing:** Implementing a carbon pricing mechanism, such as a carbon tax or cap-and-trade system, encourages businesses to reduce their carbon emissions and invest in cleaner technologies

Cont


Sustainable Exhibitions
Sustainable Procurement
Sustainable Design
Environmental Policy
Go Green on Energy
Pollution Reduction
Conservation of Resources
Sustainability Awareness

Economics of climate change

•Climate change has potential to do significant economic harm, and poses worrying tail risks.

•It is a global externality—one country's emissions affect all countries by adding to the stock of heat-warming gases in the earth's atmosphere from which warming arises.

•The process of climate change is set to have a significant economic impact on many countries, with a large number of lower income countries being particularly at risk.

• Macroeconomic policies in these countries will need to be calibrated to accommodate more frequent weather shocks, including by building policy space to respond to shocks.

Economics of climate change

- Infrastructure will need to be upgraded to enhance economic resilience.

- Elsewhere, climate change can entail significant risks to macro financial stability.

- Nonfinancial corporate sectors face risks from climate damages and stranded assets—such as coal reserves that become uneconomic with carbon pricing—and the disruption could affect corporate balance sheet quality.

Economics of climate change

•Climate change refers to long-term changes in the Earth's climate patterns, such as global warming (increase in average temperature) and shifts in weather events like storms, droughts, and floods.

• It is primarily caused by human activities, mainly the burning of fossil fuels (coal, oil, and gas) that release greenhouse gases (GHGs) into the atmosphere.

•**The Problem: Greenhouse Gas Emissions** The burning of fossil fuels and deforestation release carbon dioxide (CO_2) and other greenhouse gases (like methane and nitrous oxide) into the atmosphere.

• These gases trap heat from the sun, leading to a gradual warming of the Earth's surface.

Economics of climate change

•**The Costs of Climate Change** Climate change has several economic impacts:

1. **Extreme Weather Events:** More frequent and intense storms, floods, and droughts can damage infrastructure, homes, and crops, leading to high repair costs and agricultural losses.

2. **Sea Level Rise:** Melting ice caps and glaciers raise sea levels, causing coastal erosion, flooding, and the loss of valuable land and property.

3. **Health Impacts:** Climate change can affect human health by increasing the spread of diseases, heat-related illnesses, and malnutrition due to changing agricultural patterns.

Economics of climate change

4. **Ecosystem Disruption:** Loss of biodiversity and disruption of ecosystems can impact fisheries, forestry, and tourism industries.

5. **Migration and Conflict:** Climate-induced migration can lead to social and economic challenges, potentially causing conflicts over resources and land.

Economics of climate change

•Economists propose two main strategies to address climate change:

•**Mitigation:** This involves reducing greenhouse gas emissions to prevent further warming.

• Implementing clean energy solutions, such as solar, wind, and hydroelectric power, along with energy efficiency measures, can help mitigate climate change.

•Investing in these technologies can create new jobs and industries.

•**Adaptation:** As some level of climate change is already unavoidable, adaptation aims to minimize its negative impacts.

Economics of climate change

•This includes measures like building flood barriers, developing drought-resistant crops, and designing resilient infrastructure.

•**The Cost of Inaction** While addressing climate change requires investments and changes to the way we do things, the cost of inaction is much higher.

• Failing to take adequate action can lead to significant economic losses due to the impacts mentioned earlier.

• Furthermore, the costs of dealing with extreme weather events and adapting to a changing climate can be much higher than proactively reducing emissions.

Economics of climate change

- **Economic Opportunities** Transitioning to a low-carbon economy and investing in green technologies can create new job opportunities, stimulate innovation, and lead to sustainable economic growth.

- In summary, climate change poses significant economic challenges, but addressing it through mitigation and adaptation presents opportunities for economic growth and a more sustainable future.

- Taking action now can help us avoid the more severe consequences of climate change and create a better world for future generations

Economic Benefits of Climate Change

1. **Agricultural Productivity:** In some regions, a warmer climate and increased carbon dioxide (CO2) levels can lead to improved agricultural productivity.

- Longer growing seasons and enhanced CO2 levels can stimulate plant growth, potentially increasing crop yields in certain areas.

2. Energy Demand and Consumption: In colder regions, a milder climate can lead to reduced energy demand for heating, resulting in cost savings for households and businesses.

Economic Benefits of Climate Change

3. Arctic Shipping Routes: Melting ice in the Arctic due to climate change has opened up new shipping routes, reducing travel distances and transit times for some maritime trade, potentially leading to cost savings for shipping companies.

Economic Losses & Challenges of Climate Change

1. **Extreme Weather Events:** Climate change is associated with an increase in the frequency and intensity of extreme weather events, such as hurricanes, floods, heatwaves, and wildfires.

- These events can cause substantial economic losses in terms of infrastructure damage, property loss, and disruptions to businesses and supply chains.

2. **Agricultural and Food Security:** Climate change can negatively affect agricultural productivity and food security in many regions.

- Changes in precipitation patterns, more frequent droughts, and increased pests and diseases can reduce crop yields and raise food prices, impacting the livelihoods of farmers and food availability for communities

Economic Losses & Challenges of Climate Change

3. **Sea-Level Rise and Coastal Erosion:** Rising sea levels due to melting glaciers and polar ice caps can lead to coastal erosion, threatening coastal communities, infrastructure, and valuable real estate. The cost of relocating and protecting these areas can be substantial.

4. **Healthcare Costs:** Climate change is linked to an increase in heat-related illnesses, vector-borne diseases, and respiratory problems due to worsened air quality.

•These health impacts can lead to increased healthcare costs and reduced productivity.

5. **Water Scarcity and Resource Management:** Changes in precipitation patterns can exacerbate water scarcity in some regions, affecting agriculture, industry, and domestic water supplies.

Economic Losses & Challenges of Climate Change

•Proper water resource management becomes crucial to mitigate economic losses.

6. **Biodiversity Loss:** Climate change poses a significant threat to biodiversity, leading to species extinction, disruptions in ecosystems, and loss of ecosystem services.

• Biodiversity loss can impact sectors like agriculture, fisheries, and tourism that depend on healthy ecosystems.

7. **Migration and Displacement:** Climate change-induced extreme events and environmental degradation can lead to population displacement and migration, placing additional social and economic burdens on host communities.

Economic Losses & Challenges of Climate Change

8. **Insurance Costs:** Increasing frequency and severity of extreme weather events can result in higher insurance costs, affecting individuals, businesses, and governments.

9. **Investment Risks:** Climate change-related risks can impact investments in various sectors, including fossil fuels, agriculture, and real estate, leading to financial losses and reduced returns for investors.

10. **International Economic Impacts:** Climate change can exacerbate global economic disparities, with vulnerable and developing countries disproportionately affected by its impacts.

•This can lead to increased international aid and humanitarian costs.

Stern report

•The Stern Report on the Economics of Climate Change is a 700-page report released for the government of UK on 30 October 2006 by economist Nicholos Stern .

•Nicholos stern was chair of the Grantham research institute on climate change and the environment at the London school of economics (LSE) and also chair of the Centre for Climate Change Economics and Policy (CCCEP) at Leeds University and LSE.

• The report discusses the effect of global warming on the world economy though not the first economic report on climate change, it is significant as the largest and most widely known and discussed report of its kind.

Stern report

•The Review states that climate change is the greatest and widest-ranging market failure ever seen, presenting a unique challenge for economics.

•The Review provides prescriptions including environmental taxes to minimise the economic and social disruptions.

•The Stern Review's main conclusion is that the benefits of strong, early action on climate change far outweigh the costs of not acting.

•The Review points to the potential impacts of climate change on water resources, food production, health, and the environment According to the Review, without action, the overall costs of climate change will be equivalent to losing at least 5% of global gross domestic product (GDP) each year, now and forever.

Stern report

•Including a wider range of risks and impacts could increase this to 20% of GDP or more, also indefinitely. Stern believes that 5–6 degrees of temperature increase is "a real possibility".

•The Review proposes that one per cent of global GDP *per annum* is required to be invested to avoid the worst effects of climate change.

• In June 2008, Stern increased the estimate for the annual cost of achieving stabilisation between 500 and 550 ppm CO_2e to 2% of GDP to account for faster than expected climate change.

Stern report Summary

•The benefits of strong, early action on climate change outweigh the costs.

•The scientific evidence points to increasing risks of serious, irreversible impacts from climate change associated with business-as-usual (BAU) paths for emissions.

•Climate change threatens the basic elements of life for people around the world—access to water, food production, health, and use of land and the environment.

•The impacts of climate change are not evenly distributed—the poorest countries and people will suffer earliest and most and if and when the damages appear it will be too late to reverse the process. Thus we are forced to look a long way ahead.

Stern report Summary

•Climate change may initially have small positive effects for a few developed countries, but it is likely to be very damaging for the much higher temperature increases expected by mid-to-late century under BAU scenarios.

•Integrated assessment modeling provides a tool for estimating the total impact on the economy; our estimates suggest that this is likely to be higher than previously suggested.

•Emissions have been, and continue to be, driven by economic growth; yet stabilization of green house gas concentration in the atmosphere is feasible and consistent with continued growth.

Stern report Summary

- "Central estimates of the annual costs of achieving stabilization between 500 and 550ppm CO_2e are around 1% of global GDP, if we start to take strong action now.

- It would already be very difficult and costly to aim to stabilize at 450ppm CO_2e. If we delay, the opportunity to stabilize at 500–550ppm CO_2e may slip away

- The transition to a low carbon economy will bring challenges for competitiveness but also opportunities for growth. Policies to support the development of a range of low-carbon and high-efficiency technologies are required urgently.

- Establishing a carbon price, through tax, trading or regulation, is an essential foundation for climate change policy.

Stern report Summary

- Creating a broadly similar carbon price signal around the world, and using carbon finance to accelerate action in developing countries, are urgent priorities for international co-operation.

- Adaptation policy is crucial for dealing with the unavoidable impacts of climate change, but it has been under-emphasised in many countries.

- An effective response to climate change will depend on creating the conditions for international collective action.

- There is still time to avoid the worst impacts of climate change if strong collective action starts now.