



SUSTAINABLE DEVELOPMENT

NEEDS, LIMITATIONS, TRADE-OFFS



1.
NEEDS

What are NEEDS?

NEEDS

Essential Needs

- Essential Necessities which varies SPATIALLY (DCs vs LDCs) and TEMPORALLY (changes overtime)
- E.g. Food, Shelter, Clothes, Jobs

NEEDS

Perceived Needs

- **Socially and Culturally determined - There's a need for long-term sustainability of essential needs first**
- **E.g. Smartphones, Laptops, Luxury Shoes**



2.

LIMITATIONS

Is it really a LIMITATION?



LIMITATIONS

Imposed by current levels of technology,
as well as currently present and possible future
needs which have to be met first.

LIMITATIONS

1. Environmental Limits

- Use of resources → Once all resources have been used up → The ability for the resources to regenerate naturally or with any help of technology will decline.

Technology: Can enhance the carrying capacity of the resource base.

- Spatial variations [LDC vs DC]

LIMITATIONS

2. Limits by the Organisation of Society

- Most institutions facing challenges tend to be independent and fragmented.
- A case of **GOVERNMENT FAILURE** → Government fails to implement appropriate whose policy actions which prevent degradation of the environment.
- Often too focused on economic growth.



3.

TRADE-OFFS


Are TRADE-OFFs serious?

TRADE-OFFS

- Trade-offs are essentially an opportunity cost which impedes the achieving of sustainable development.
- E.g. Income Distribution is one aspect of the quality of growth.
 - Rapid growth combined with worsening income distribution is worse than slow growth and redistribution of income in favour of the poor.

TRADE-OFFS

- Despite the increasing attention to resource efficiency to moderate the amount of trade-offs → Due to increasing affluence and population growth → Environmental problems linked to resource use for economic growth will still intensify.



Exam Requirements

EXAM REQUIREMENTS

1. Explain the Concept of Sustainable Development

- Need to describe and explain what needs, limitations and trade-offs are and give specific examples.
- Acknowledge that Sustainable Development is a LONG TERM problem/aim.

EXAM REQUIREMENTS

2. Explain the differences and similarities between limitations and trade-offs.

Similarities:

- They occur spatially in every country, be it less developed or developed countries.
- They are similar in terms of their relationship to SD → Has the ability to impede SD greatly.
- Both are LONG TERM issues and are INEVITABLE.

EXAM REQUIREMENTS

2. Explain the differences and similarities between limitations and trade-offs.

Differences:

- The severity of limitations and trade-offs may be different depending on country.
- Limitations are inherent, hard to resolve, while trade-offs can be prevented or reduced with effective governance.



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CHALLENGES TO SUSTAINABLE DEVELOPMENT



WE'LL BE LOOKING AT 2
PRIME EXAMPLES

1. Rio Earth Summit
2. Rio +20



RIO EARTH SUMMIT

[1992 UN Conference on Environment]

What were the challenges?

RIO EARTH SUMMIT

Main Purpose

- Focused on how to relieve the global environmental system
- Emphasized that economic and social progress depend critically on the preservation of the natural resource base
 - Introduced measures to prevent environmental degradation.

RIO EARTH SUMMIT

Outcome of the Summit

Agenda 21

A comprehensive plan of action to achieve all areas of Sustainable Development

[Recommends action by TNCs, NGOs, Local authorities]

RIO EARTH SUMMIT

Challenges

(a) Different viewpoint of Sustainable Development for DCs and LDCs

- DCs more economically secure (SD a quality of life issue)
- LDCs view SD as a means to economic growth but with greener practices.

RIO EARTH SUMMIT

Challenges

(b) Dispute over the cause of Sustainable Development for DCs and LDCs

- LDCs view that overPOPULATION is more harmful to the environment due to increased consumption.
- DCs view that overCONSUMPTION is more harmful to the environment.

RIO EARTH SUMMIT

Challenges

(c) Lack of Political Commitment

- Lack of legislation and independent institutions scrutiny to monitor the progress and principles of Sustainable Development.

RIO EARTH SUMMIT

Challenges

(d) Economic Challenges

- LDCs face great limitations due to the huge lack in financial resources.
- DCs face overconsumption problems and economic growth issues.



Rio +20

*[2012 UN Conference on
Sustainable Development]*

Rio +20

Main Purpose

- To secure renewed political commitments for Sustainable Development
- To assess the progress and remaining gaps left by Rio Earth Summit



Rio +20

Outcome of the Summit

*Sustainable Development Goals
and the
Concept of a 'Green Economy'*

Rio +20

Challenges

(a) Political Challenges

(i) No shared vision of what 'Green economy' meant as the notion meant different things to different interests.

DCs felt it was a transition to a cleaner and more resource-efficient economy.

LDCs felt it was a means of green growth allowing them to prosper economically while saving the environment.

Rio +20

Challenges

(a) Political Challenges


- (ii) Non-Commitment of countries and a lack of international monitoring
 - DCs were not willing to transfer technology to LDCs.

RIO EARTH SUMMIT

Challenges

(b) Economic Challenges

- Involves placing economic value on environmental services provided by nature.
- Framework does not consider immediate concerns of LDCs such as malnourishment, diseases and sanitation.



Exam
Requirements

EXAM REQUIREMENTS

- This topic is more of a bridging topic for later chapters.
- It will serve as concrete evidence of the different needs, limitations and trade-offs which DCs and LDCs have.
- Sustainable Development Goals (SDGs) are extremely important as they still exist till today, hence can be used as evidence to monitor current progress.



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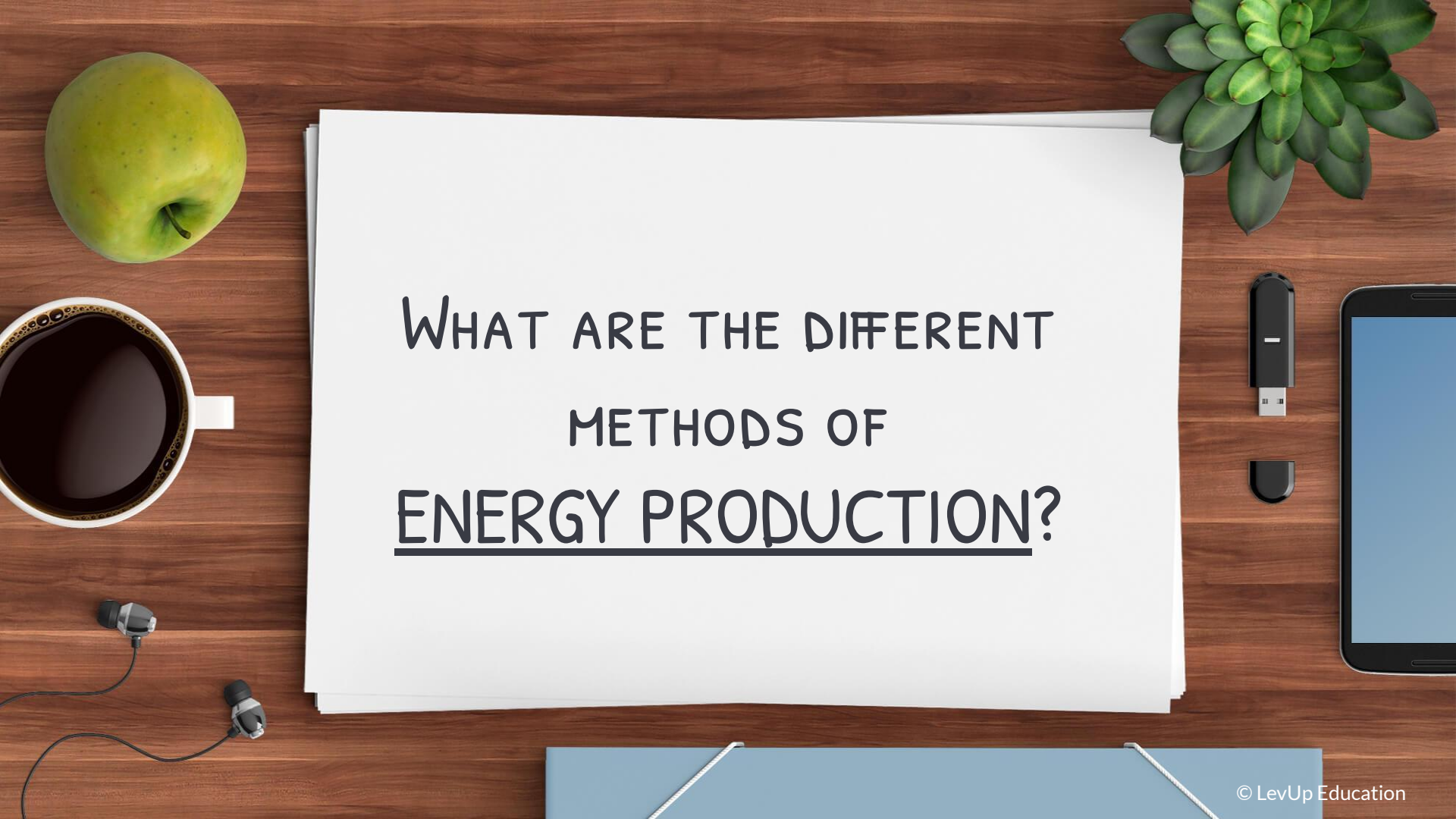
ALTERNATIVE ENERGY SOURCES



REASONS FOR ALTERNATIVE SOURCES

1. Low-Carbon form of energy production
2. Reliable, consistent form of energy production
3. High potential for increasing energy generation
4. More economically viable
5. Promotes economic development





WHAT ARE THE DIFFERENT
METHODS OF
ENERGY PRODUCTION?

BIOMASS ENERGY

- Biofuels such as Corn, Logs, Bamboo/Sugar Cane.
- Has the potential to be large scale but needs efficient management as it involves utilisation of land and resources → May affect environmental sustainability.

SOLAR ENERGY

- Has the potential to be large scale but currently small scale due to technological limitations.
- *Subject to daily and seasonal variations and is weather-dependent.*

WIND ENERGY

- Location-specific, requires constant wind power and large space.

HYDROPOWER

- Location specific → Requires rivers/water body.
- Tidal power dependent on timing.

GEOHERMAL ENERGY

- Location specific → Only for tectonic-active regions.



ENERGY MIX

DEFINITION OF ENERGY MIX

- The BALANCE between the various sources of energy at the national scale.
 - Overtime, industrialised countries are looking into diversifying their energy mix [mix of fossil fuels and renewable energy] → Improves energy security.

* In 2009, China accounted for 46.9% of global coal consumption that generated 70.6% of its commercial energy.

ENERGY CONSUMPTION


- LDCs/NIEs starting to consume more energy in recent years.
- DCs seeking to reduce levels of energy consumption.

ENERGY PRODUCTION

2 elements to geography of energy production:

- Global distribution of reserves
- Distribution of energy production and consumption

→ On the rise due to the complex interaction of economic and political factors.



Exam
Requirements

EXAM REQUIREMENTS

- Try to use these energy sources, in this order when crafting your essay [12m essays]:

Nuclear Energy + Solar/Biomass Energy + Hydropower/Wind

EXAM REQUIREMENTS

- You need to bring in the concept of ENERGY MIX as a form of evaluation.
- Talk about the trade-offs or conflict created by high energy consumption and production.
- Discuss more on how increasingly more countries are moving towards diversifying their sources of energy.



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HYDROPOWER

WHAT IS HYDROPOWER?

- Hydropower is a renewable energy source where power is derived from the energy of water moving from higher to lower elevations.
- It is employed on a **LOCALISED** scale.



ENVIRONMENTAL &
SOCIAL IMPACTS OF
HYDROPOWER

IMPACTS

1. The Dam & its Reservoir

- ***Lack of Resources:*** Creation of reservoir results in a loss of resources in the area [*Nam Choan Dam Project, Thailand*].
- ***Decline in water quality:*** Reservoir formed undergoes much variation in water quality in the first decade due to sediments released. Algae blooms take place due to richness of trapped nutrients [*Brazil, 1996*]

IMPACTS

- ***Loss of cultural heritage + Settlement Relocation:*** Requires relocation of communities in order to make way for the dam [*Tilari Dam*].
- ***Negative Health Impacts:*** Water impoundment resulting in breeding of mosquitoes or diseases such as Malaria transmitted.

IMPACTS

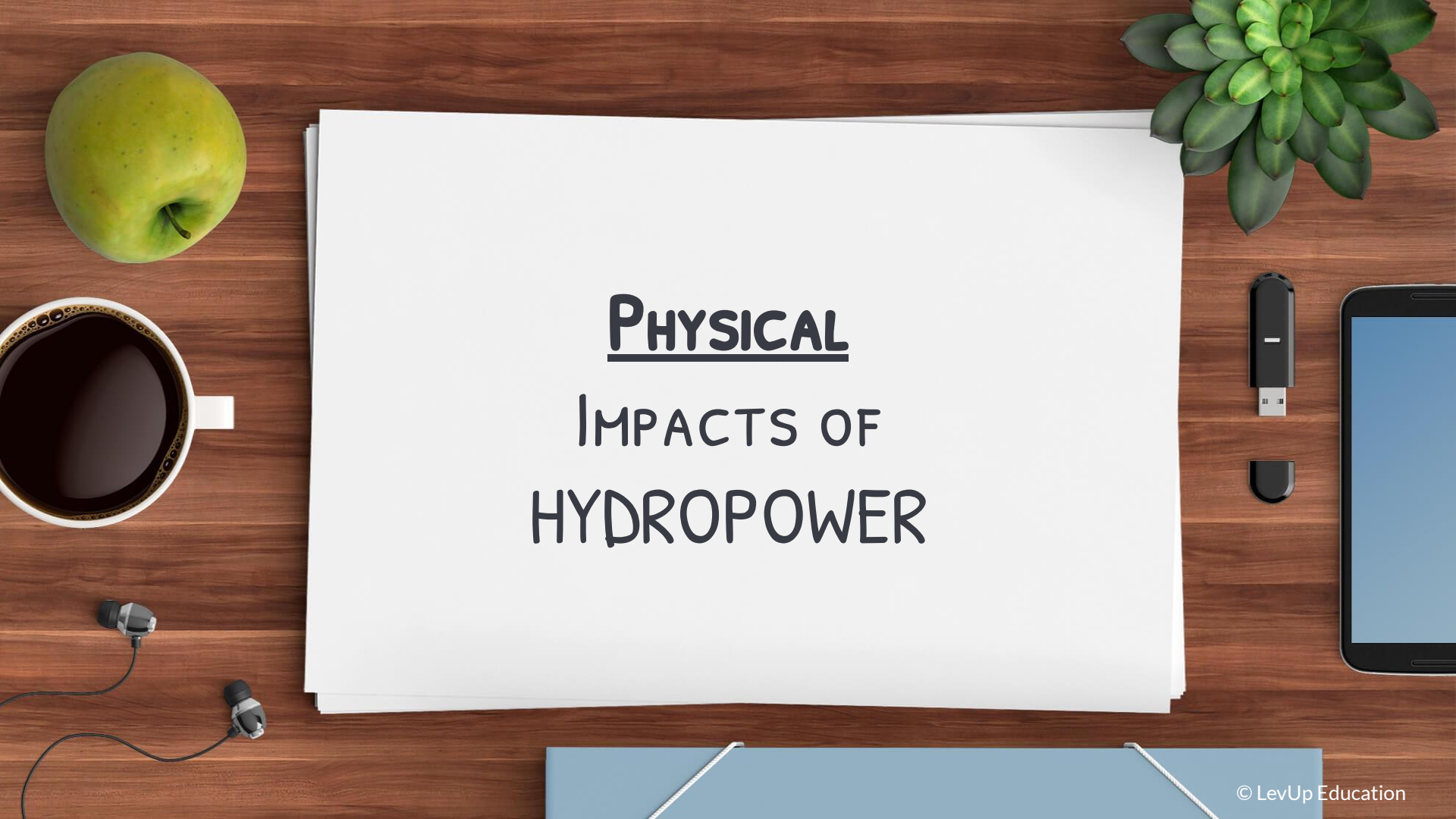
- ***Effects on marine and lake fishes:*** Creation of a barrier will cut off access to spawning grounds resulting in an impact on flow of nutrients. Construction period of dam also results in sedimentation thereby killing marine life.



ECONOMIC
IMPACTS OF
HYDROPOWER

IMPACTS

- High costs of reservoir creation and maintenance
- Wide range of techniques available for reservoir desiltation - cost needs to be budgeted.
- Dredging another option to manage sedimentation problems (high cost).



PHYSICAL
IMPACTS OF
HYDROPOWER

IMPACTS


- ***Adverse effects on local water table/groundwater conditions:*** Local heightening of water tables following reservoir impoundment can have effects.
- ***Adverse effects on local climate:*** Creation of new water bodies with large surface areas is thought to affect climate [*Lake Volta shifted peak rainfall from Oct to July*]



POLITICAL
IMPACTS OF
HYDROPOWER

IMPACTS

- **Public Participation:** The question of who benefits and who bears most burden of the affected environment. Construction of dam requires relocation.
- **Transboundary Conflict:** Dam constructed may have river flowing past more than 1 country hence this may require water agreements as water availability and quality may be affected.

A top-down view of a wooden desk. In the center is a blue clipboard with a black clip at the top, holding a white sheet of paper. On the paper, the words "Exam Requirements" are written in a black, sans-serif font. To the left of the clipboard is a white cup of black coffee, a loaf of bread with seeds, and a stack of papers. To the right is a silver laptop. At the bottom of the clipboard is a black fountain pen. The number "13" is printed at the bottom center of the paper. The background is a dark wood grain.

Exam Requirements

EXAM REQUIREMENTS

- Discuss the different economic, social, environmental and political impacts of HYDROPOWER.
- Environmental impacts should be the most important, then link all the other factors to tie in together and form the argument.
- May require you to compare and evaluate HYDROPOWER against NUCLEAR energy or BIOFUEL.

SYNOPTIC LINK

Synoptic Link:

- Link to Transboundary Conflicts of water [THEME 2]



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NUCLEAR ENERGY

WHAT IS NUCLEAR ENERGY?

- Nuclear Energy is a Non-Renewable form of energy which can cover global needs for 100 years.
- It is a radioactive form of energy.
- The fuel used is a mineral product known as Uranium.



ENVIRONMENTAL &
SOCIAL IMPACTS OF
NUCLEAR ENERGY

IMPACTS

1. Radioactive Rain Clouds

- Radionuclides from a nuclear explosion will be dispersed throughout the atmosphere → 'Hotspots' occur where rainfall washes radioactive material from the clouds onto the ground.
- REGIONAL SCALE implications.

IMPACTS

2. Radioactive contamination on agricultural food and water

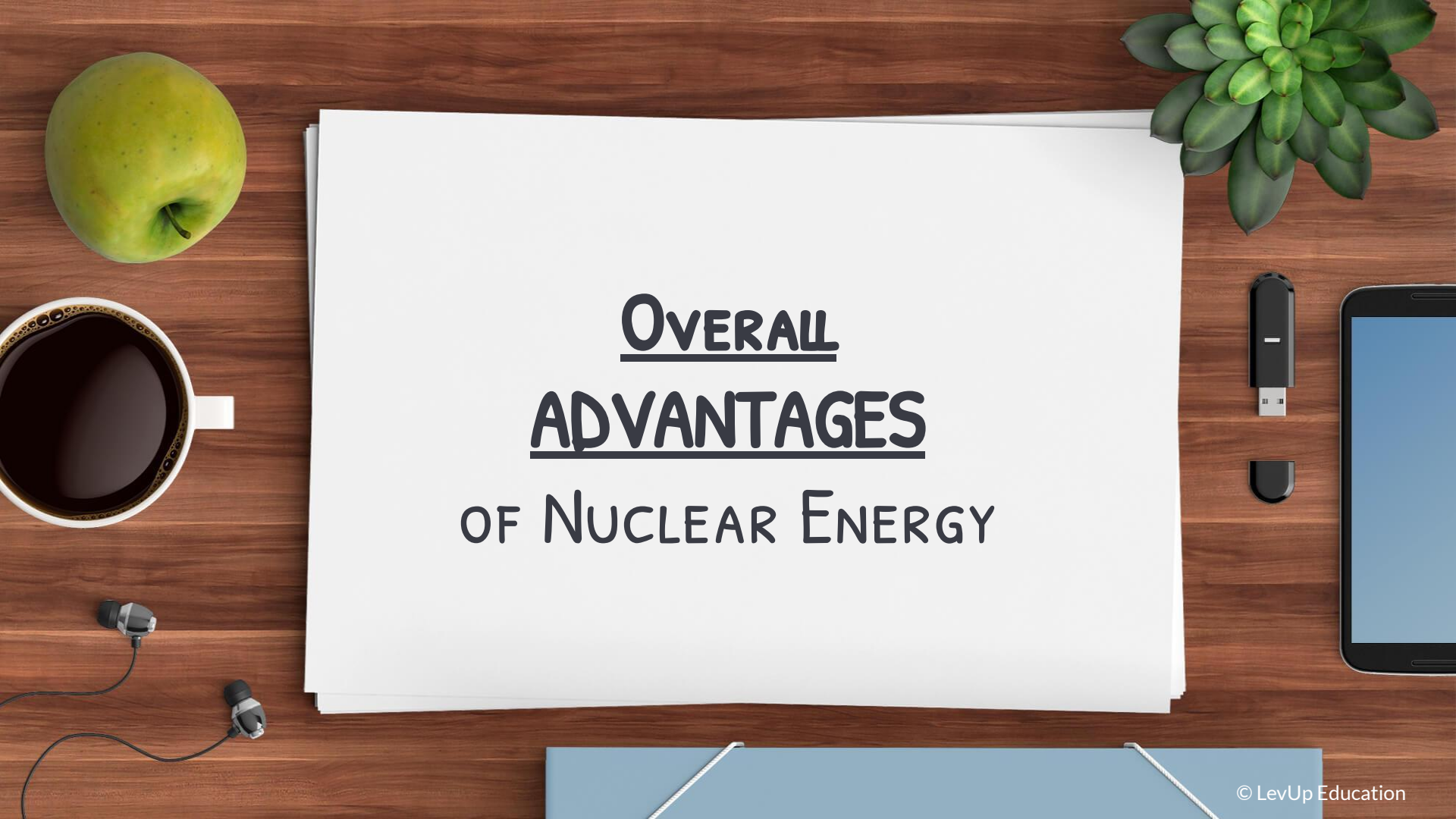
- Destruction of vegetation grown in open air and through contaminated water, and milk from cows grazing on contaminated grassland.
- Can last >25 years [*Long-Term* impact]



SOCIO-ECONOMIC
IMPACTS OF
HYDROPOWER

IMPACTS

- Disruption of agriculture activities, relocation of people, and consequent psychological stress.
- Infrastructure such as pipelines and water sources will be affected → High costs.
-

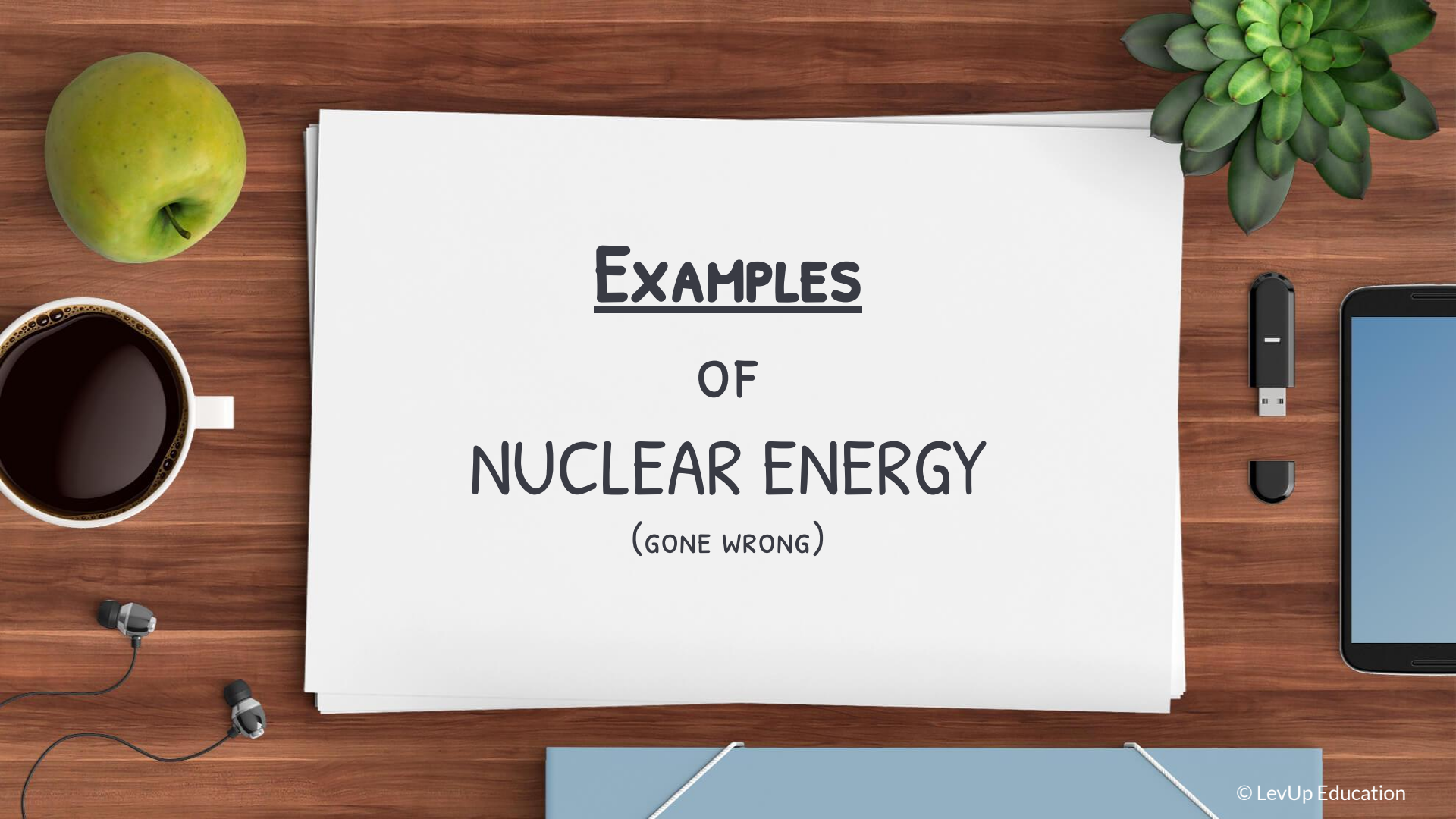


OVERALL
ADVANTAGES
OF NUCLEAR ENERGY



IMPACTS

- Low carbon emissions (due to the use of Uranium)
- Cost-effective (can be mass produced in huge controlled amounts)
- Minimal waste (unless gone wrong)



EXAMPLES
OF
NUCLEAR ENERGY
(GONE WRONG)


EXAMPLES

CHERNOBYL 1986 NUCLEAR DISASTER

- External release of a significant fraction of reaction core which went widespread.

FUKUSHIMA 2011 NUCLEAR DISASTER

- Reactor shutdown after earthquake and tsunami.
- Failure of energy cooling cause explosion.



Exam
Requirements

EXAM REQUIREMENTS

- Discuss the different economic, social, environmental and political impacts of NUCLEAR ENERGY.
- Environmental impacts should be the most important, then link all the other factors to tie in together and form the argument.
- May require you to compare and evaluate NUCLEAR ENERGY against HYDROPOWER or BIOFUEL.



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THE SCIENCE OF CLIMATE CHANGE [EVIDENCE]

DEFINITION OF CLIMATE CHANGE

- A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.



EVIDENCE OF CLIMATE
CHANGE

EVIDENCE(S)

Evidence of Climate Change:

- Evidence from oceans and lakes
 - Isotopic Records
 - Foraminifera
 - Pollen Grains
- Ice Core
 - Isotopic Records
 - Greenhouse Gases

EVIDENCE FROM OCEANS AND LAKES

- During ice age, water is constantly removed from oceans and stored on land as snow and ice → During interglacial periods, water returns to ocean as rivers

1. Isotopic Records

- During glacial times, water molecules are removed from oceans by **evaporation** but not returned via condensation and rainfall, the remaining ocean water slowly becomes depleted in molecules with the lighter isotopes (*now concentrated with heavier isotopes*).

EVIDENCE FROM OCEANS AND LAKES

2. Foraminifera

- Tiny organisms (zooplankton, a.k.a foraminifera) constructs shells that are made up of a certain chemical composition which is affected by the ocean waters.
- When foraminifera die, the shells fall to the ocean floor and accumulate as ocean sediment.
- These provide a record of these organisms that goes back in time → Analysis of the isotopic composition of the calcium carbonate in the shells show a changing ocean chemistry overtime.



EVIDENCE FROM OCEANS AND LAKES

3. Pollen Grains

- Lake sediments may contain pollen grains that were deposited from the vegetation in the local region.
- Pollen grains are extremely resistant to decay from one plant type to another.
- Cores of sediment from lakes are able to show what vegetation was like in the past (wet/dry).
- Will reflect climatic conditions in the past.

ICE CORE

What is an ice core?

- Snow that accumulates at high elevations which does not melt → later buried by more snowfall and compressed as ice → forms ice sheets (core taken out).

1. Isotopic Composition


- The isotopic composition of ice core can show that the temperature was colder if there is a higher ratio of O(16) to O(18).
- During glacial periods, water molecules O(16) will be evaporated, condensed and fall as snow to be compressed in ice cap.
- Extraction of the ice core and testing of its chemical composition would show the variation in ratio of O(16) to O(18).

ICE CORE

2. Greenhouse Gases [GHG]

- More GHG = warmer climate
- Less GHG = colder climate

- Ice-core records are important as bubbles of air that were trapped in the ice as it became compressed provided tiny 'time capsules' of the atmosphere overtime.
- Glacial periods reflect the lowest levels of GHG trapped.
- Interglacial periods reflected the highest levels of GHG trapped.



Exam
Requirements



EXAM REQUIREMENTS

- Explain the various types of evidences that show that climate change exists.
- Tends to come out for smaller marked essays.



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ANTHROPOGENIC ACTIVITIES
THAT AFFECT CLIMATE
CHANGE

RELATIVE SIGNIFICANCE OF ANTHROPOGENIC ACTIVITIES

- Anthropogenic (human) activities are the largest contributors to climate change, has sped up the effects of climate change.
 - In the form of power stations, industries, transportation fuels, agricultural by-products.
 - Found globally, all produce GHGs.

BURNING OF FOSSIL FUELS


- Overtime, for the use of transportation, heating, electricity, manufacturing, etc., there has been an increased use of fossil fuels → Results in an **increase in carbon dioxide** → Affects the ozone layer and traps heat → Speed up climate change.

LAND-USE CHANGES – DEFORESTATION

- Over the years, there has been a **change in the use of land** from agriculture and plain fields to deforestation for the purpose of **manufacturing** through creation of factories.
- Deforestation releases **methane** and other **harmful GHG** which trap heat and cause a speeding up in climate change.
- 33% of CO₂ emissions are due to deforestation [*covered in another video on deforestation*].

OVERALL EVALUATION

- Human-caused changes in climate overlap with the natural climate.
- Human activities are very significant in the cause of climate change → Speeds up the effects of climate change.
- All-in-all, climate change is attributed to both natural and human-related causes, but human-related causes are becoming a bigger issue.

A top-down view of a wooden desk. In the center is a blue clipboard with a black clip at the top, holding a white sheet of paper. On the paper, the words "Exam Requirements" are written in a black, sans-serif font. To the left of the clipboard is a white cup of black coffee, a loaf of bread with seeds, and a stack of papers. To the right is a silver laptop with a visible keyboard and trackpad. At the bottom of the clipboard is a black fountain pen. A small number "6" is visible at the bottom center of the paper. In the top right corner, there is a small potted plant with green grass-like leaves.

Exam Requirements

EXAM REQUIREMENTS

- Explain the relative significance of human-related causes on climate change and how it has made a rather huge impact on climate change.
- Tends to come out for smaller marked essays, or required for evaluation.



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OF CLIMATE CHANGE ON
SUSTAINABLE DEVT

WHAT DOES CLIMATE CHANGE BRING?

- Higher maximum temperatures and minimum temperatures [Greater fluctuations in temperature].
- More intense seasonal changes [can bring about droughts, floods, hurricanes, etc.]

EFFECTS OF CLIMATE CHANGE ON SD

Look at how Climate Change affects the 3 different aspects of Sustainable Development:

- Economic [Businesses, Macroeconomy]
- Social [Society, Standard of Living, People]
- Environmental [Environmental Degradation, Pollution]

... the list goes on

ENVIRONMENTAL EFFECTS

1. Effects on Ecosystems

- **Terrestrial Ecosystems** [If forest is damaged or removed due to deforestation/forest fires, habitat loss can endanger survival of living animals, and changes in seasons/temperature can trigger life-cycle changes]
- **Marine Ecosystem** [Warmer temperature increase the incidence of toxic algae blooms and marine diseases]
- *Affects environmental sustainability.*

ENVIRONMENTAL EFFECTS

2. Effects on Crop Yields

- Climate change can increase areas showered with greater precipitation → Increase overall agricultural efficiency.
- Fluctuations in Co₂, temperature, precipitation may result in crops becoming more vulnerable to diseases and pests → Could lead to food shortages [*affect social sustainability*]

ENVIRONMENTAL EFFECTS

3. Rise in sea levels

- Increments in global temperatures → Causes glaciers and ice sheets to melt, and higher temperature will cause oceans' volume to expand → raises sea levels.
- *Affects environmental sustainability and social sustainability [floods].*

SOCIAL EFFECTS

1. Water Shortages

- Climate Change causes great fluctuations and changes in temperatures → increased droughts in certain areas, El Nino may also be prolonged → Increase shortages of water → Fall in standard of living with fall in basic needs.

2. Threat to Lives and livelihood


- Increased thirst (from droughts) or impact of floods → Both lead to increased deaths and diseases → later bring about psychological effects as well.
- Loss of items of sentimental value → Mental stability affected.

ECONOMIC EFFECTS

1. Damage to infrastructure and property

- Increased flooding → Causes damages to infrastructure which can be very costly to repair.
- Climate change can also cause damages to production plants/affect lives of workers → Reduce productivity and output → Affect firms and the economy negatively.

- In the long-run, it may be hard to recover from increased economic costs resulted from the effects of climate change → Not economically sustainable.



Exam
Requirements

EXAM REQUIREMENTS

- Explain how the effects of climate change (positive/negative) has affected social, economic and environmental sustainability in the short-run and long-run.



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MITIGATION MEASURES TO CLIMATE CHANGE

STRATEGIES TO MITIGATE CLIMATE CHANGE

- Look at strategies that aim to reduce severity of the impacts of climate change.
 1. International Agreements
 2. Debt for Nature
 3. Renewable Energy Alternatives
 4. Geo-engineering techniques

INTERNATIONAL AGREEMENTS

1. Earth Summit

- Provides the overall policy framework addressing the climate change issue and forms the foundation of global efforts to curb climate change.
- Aims to stabilise greenhouse gas emissions within a specific time-frame sufficient to allow ecosystems to adapt naturally.

2. Kyoto Protocol

- Involved several mechanisms
- **Joint Implementation** (Wealthier countries can transfer 'emissions units' between them and implement joint initiatives to curb emissions)

INTERNATIONAL AGREEMENTS

- **Clean Development Mechanism** (Allows governments or private entities in rich countries to set up emission reduction projects in LDCs, where they are awarded credits known as 'certified emission reductions')
- **Carbon Trading** (Emissions Trading - tradeable carbon credit unit called assigned amount units → Drives countries to better efficiency in their own greenhouse gas emissions)

INTERNATIONAL AGREEMENTS

3. Paris Climate Change Conference

- Global agreement on the reduction of climate change, produced the Paris Agreement in 2015.
- Expected key result was to set a goal of limiting global warming to less than 2 degrees celsius compared to pre-industrial levels.
- The Paris Agreement calls for zero net anthropogenic activities releasing greenhouse gas emissions by 2030, and reiterated the need to focus on achieving the SDGs.

DEBT FOR NATURE

- Debt for nature swap is an agreement between a less-developed country in debt and one or more of its creditors.
- These creditors agree to forgo the debts in return for the promise of environmental protection.

1. Bilateral Debt for Nature swaps

- Between governments, where the creditor government who lent the money forgoes the debt, in exchange the debtor agrees to set aside a predetermined sum of local currency for environmental protection.

DEBT FOR NATURE

2. Commercial Debt for Nature swaps


- The non-governmental organisation solicits debt donations or purchases the debt at a discount from the creditor, where it later decides on the amount of funding into conservation projects.

RENEWABLE ENERGY ALTERNATIVES

- Covered in detail in Part 3 of the series [*Alternative Energy Sources video*].
- One of the key contributors to greenhouse gas emissions is energy use. Alternative energy sources could significantly reduce greenhouse gas emissions.
- Nuclear Energy, Hydropower, Biofuels, Wind Energy, Solar Energy are the 5 main alternatives.
- Evaluate the various alternative energy sources based on location, costs and ability.

GEO-ENGINEERING TECHNIQUES

- Large scale schemes to manipulate Earth's climate and mitigate the effects of greenhouse warming.
- Introduce large scale technological fixes on a massive scale that remove carbon dioxide from the air or limiting the amount of sunlight reaching the planet's surface.



Exam
Requirements

EXAM REQUIREMENTS

- Be able to explain and discuss mitigation measures, and evaluate the strategies based on scale, spatial variations.
- Explain mitigation measures with adaptation measures where required (*next video*).



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ADAPTATION MEASURES TO CLIMATE CHANGE

ADAPTATION MEASURES

- To compromise and make the best out of current situations.
- Timely adaptation measures are required to avoid any potential adverse effects of climate change, and to take advantage of the positive effects.
- Adaptation refers to the **process of adjustment to actual or expected changes in climate, as well as its effects.**
 - Includes *green and gray* measures.

GREEN AND GRAY MEASURES

- Green and Gray measures namely refer to projects, such as infrastructure projects that incorporate nature and the environment as part of the solution.
- This involves adaptation of the current situation (results/effects of climate change) and tweak the environment to aid in preventing worsened impacts.

EXAMPLE OF GREEN AND GRAY MEASURES

Blue-Green Infrastructure

planned interconnected networks of natural and semi-natural areas, including water bodies and green and open spaces, that provide different ecosystem services

(own definition, drawing on EU Commission 2013, Voskamp and Van de Ven 2015 and Ghofrani et. al 2016)



Green Infrastructure

planned networks of natural and semi-natural areas with other environmental features designed and managed to deliver different ecosystem services

(EU Commission 2013)



Grey Infrastructure

traditional human-engineered measures that perform infrastructure functions such as water and wastewater treatment plants or protective infrastructure such as dykes and seawalls.



CHALLENGES OF ADAPTATION MEASURES

- **Lack of political commitment**
 - Several countries may not see a need to implement adaptation measures, possibly due to the high costs and work involved and greater focus on other needs.
- **Insufficient cooperation**
 - Need for LDCs and DCs to work together for technological transfer and for other relevant stakeholders (IOs, NGOs) to aid in the process which may not be readily available.
- **Insufficient knowledge transfer and coordination**
 - No fixed plans on adaptation measures as they “come-and-go”, new issues may arise which may not have a direct solution crafted at that point in time.

COMPARISON OF MITIGATION AND ADAPTATION STRATEGIES

Key Differences:

1. Cost


- Mitigation involves immediate costs to implement the preventive strategies.
- Adaptation only involves costs as and when the effects of climate change emerge.

2. Scale

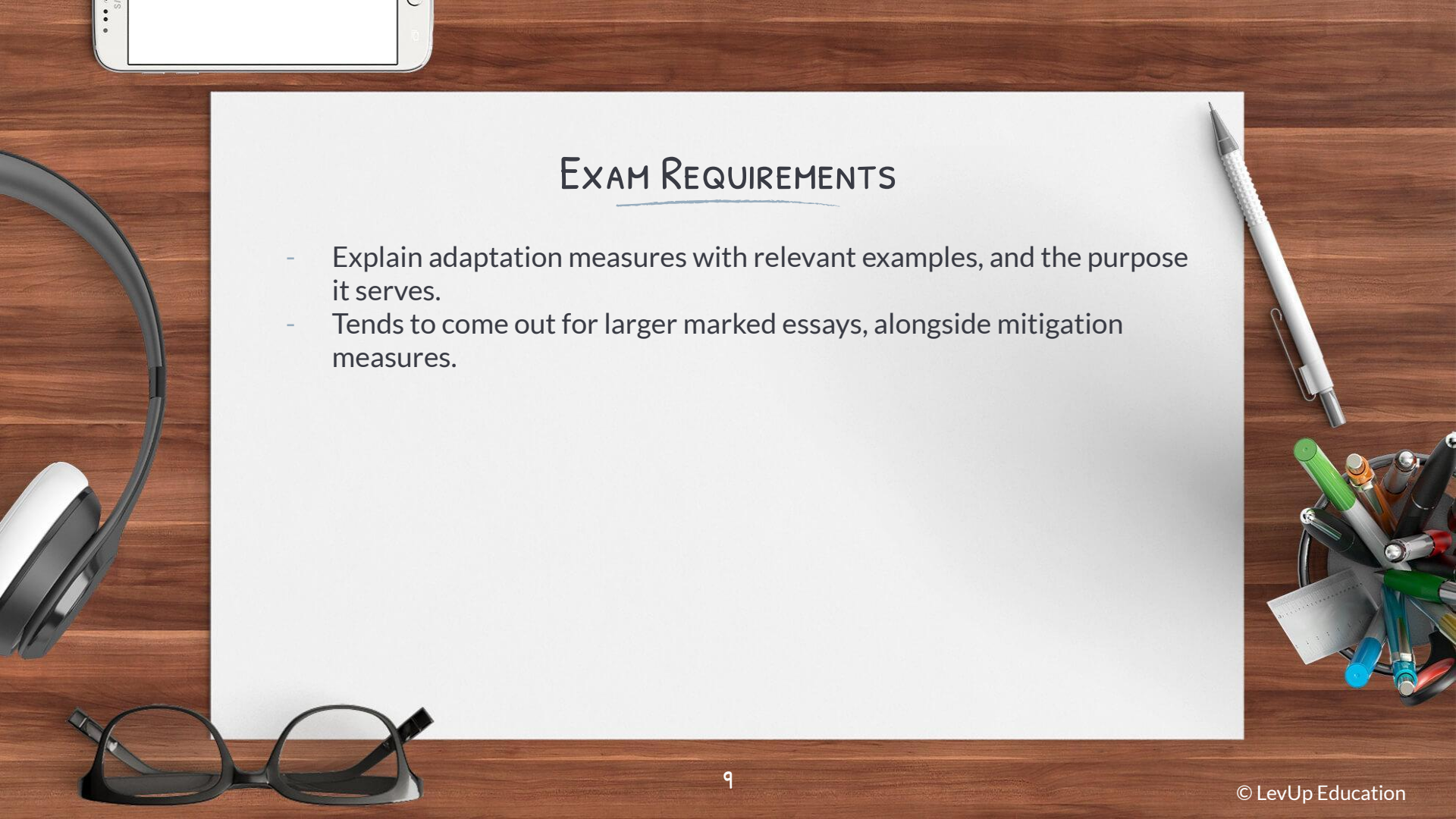
- Mitigation can operate at a variety of scales (community, national, global).
- Adaptation measures have to address a specific effect of climate change, usually at a smaller, national/local scale.

OVERALL EVALUATION

- There is a need to complement mitigation and adaptation strategies so as to enhance effectiveness in dealing with climate change.
- If the proper mitigation strategies are set in place, there would definitely be less of a change to even adopt adaptation strategies as the effects of climate change will be better managed.
 - Mitigation strategies aims to reduce magnitude of effects of global warming, and increases the time/prevents a need for adaptation strategies.



Exam Requirements



EXAM REQUIREMENTS

- Explain adaptation measures with relevant examples, and the purpose it serves.
- Tends to come out for larger marked essays, alongside mitigation measures.



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