Year 11 Physical case studies: The facts

Coasts:

- Coastal Landforms
  - Arch – Durdle Door
  - Stacks and stumps – Old Harry and his wife/ Needles on the Isle of Wight
  - Spit – Hurst Castle

- Coastal Management

- Lyme Regis
  - Impacts of coastal management:
    - New defences have stood up to recent storm events
    - New beaches have increased visitor numbers and seafront businesses are thriving.
    - Spoilt the natural look of the coast – Angered locals
  
  - Conflicts
    - Fossil hunters and locals. Locals want the cliff to be stabilised to protect their homes, the fossil hunters want the cliff to fall so that they can collect fossils.
    - Locals and tourists. The extra noise, traffic and litter from tourists have angered the local people.

- Bournemouth case study
  - Groynes: Positive – Stops longshore drift to make a bigger beach which decreases erosion as it takes the sea longer to erode. Negative – Wood rots and it can stop the beach growing down river increasing erosion
  - Sea Wall
    - Negative: Expensive and it’s a fixed height, therefore it can flood. Positive: Reflect wave energy so it reduces erosion. Last a long time so it doesn’t require maintenance.
  - Beach Nourishment: Adding sand to the beach
    - Positive – Bigger beach which means less erosion
    - Negative – Has to be constantly replaced
• Somerset Floods
  
  o Impacts
  
  ▪ People cut off
  ▪ Farmers lost 11,500 hectares of land
  ▪ Cattle had to be rounded up
  ▪ Road closures and travel chaos
  ▪ Villages isolated and homes evacuated
  ▪ Power outages
  
  o Responses

  ▪ The flooding on the levels action group (FLAG) supported people by offering homeowners sandbags and boats for transportation
  ▪ River banks are being raised and strengthened.
  ▪ In March 2014, 8km of River Parratt was dredged (To increase capacity of the river channel)
  ▪ Installed giant pumps from the Netherlands to lower water levels.

Ecosystems
• Rainforests
  o Animal adaptations: Jaguar (Sharp teeth to eat prey, sharp claws to catch prey, spotted for camouflage) Sloth (Slow to avoid detection from predators, brown for camouflage, sharp claws to grip onto trees)
  o Plant adaptations
    ▪ Buttress Roots – Big to support trees like the Kapok tree (50m tall), shallow roots to absorb nutrients due to leaching
    ▪ Drip tips – Water falls off the leaf to prevent mould and the leaf breaking. Allows the roots to access water as well.
    ▪ Lianas – Vines that grow around trees and get to the top to access sunlight
  o Causes of deforestation
    ▪ Loggers: Cut down the timber and pulp. 1980s Malaysian rainforests were the main source of ‘tropical woods’ such as mahogany.
    ▪ Miners: Dig for materials such as oil and gas.
    ▪ Road building: Improve access (Saves money and petrol emissions). Also allows big trucks to come through.
  o Effects of deforestation
    ▪ Loss of biodiversity
    ▪ Climate change – Trees are a carbon sink (Take in carbon dioxide)
    ▪ Economic gains and losses
  o Sustainable management
    ▪ Selective logging
      ▪ If an area falls below a certain price then it is not logged (Cut down)
      ▪ Only trees that are a certain height are cut down allowing young trees to grow and mature
- **Debt reduction**
  - US government reduced Peru’s debt in exchange for conservation measures in areas of rainforest
  - Some countries have built up international debts over the years and sell off rainforest land for mining and logging to cover the debt.

- **Conservation projects**
  - UNESCO world heritage sites are worldwide protected areas
  - It is illegal to deforest in these areas or build on them.

- **Ecotourism**
  - Small scale and aims to introduce people to the natural world
  - Uses local people for work and uses materials found locally to reduce food miles

- **International agreements**
  - Monitoring and use of satellite technology to check all activities are legal.
  - Fines and prosecution if not.
  - New York declaration on Forest (2014) signed by Kelloggs to half forest loss by 2020 and halt it in 2030.

**Deserts**

- **Development opportunities**
  - **Energy**
    - Solar radiation in the Mojave Desert is among the best available in the United States as it receives twice as much sunlight as the rest of the US. Are tropical latitudes, the blue, cloudless skies are ideal for Solar energy. These plants can generally be built in a few years because solar plants are built almost entirely readily available materials. Solar Energy Generating Systems(SEGS) is the name given to nine solar power plants the Mojave Desert were built in the 1980s, the first commercial solar plant. These plants have a combined capacity of 354 megawatts(MW) which made them the largest solar power in the world.
    As part of solar technology, water is circulated in cooling towers to maintain the use of solar panels which puts pressure on precious water supplies.
    - Alta Wind Energy Centre (AWEC) is the second largest onshore wind energy project in the world. It consists of 600 wind turbines in total and aims to "reduce carbon dioxide emissions by more than 5.2 million metric tons, which is equivalent to taking 446,000 cars off the road".
- The building of the wind farms is intrusive and can destroy the natural landscape. Furthermore the wind turbines can blow the light infertile soil away and encourage soil erosion.

Mojave California Fracking is a uses the Mojave Desert to access natural gas and oil from the earth using a process called hydraulic fracturing. The use of Mojave California Fracking has been embraced by the oil and natural gas industry in order to be able to help expand supplies of this material to customers who need it.

The oil drilling provides a number of jobs and employment opportunities for economies. An offshore oil drilling site takes a considerable number of people to operate, thus providing jobs to hundreds of people. Furthermore, industries like shipping and transportation benefit from oil drilling, and thus oil drilling results in jobs in other industries as well.

Hydraulic fracturing requires large deposits of water to perform. In order to access the oil rigs, accessibility has to be created. Due to extreme temperatures, tarmac roads melt and strong winds blow sand onto the roads which increase human risk.

**AGRICULTURE:** Farmers use the land in deserts due to the high temperatures but do face the challenge of water shortages so heavily rely on irrigation technology to better manage the limited freshwater resources and feeding growing populations around the world.

- Although the soils may be infertile, around oases, water can be found in underground aquifers and distributed through irrigation systems.

- Commonly grown produce include: figs, dates, fruits, wheat, barley and vegetables. The vast area of space available is ideal to provide food for a growing global population.

- In Western USA, the Colorado River is used for irrigation but as so much water is taken from the river, the delta where it enters the Sea of Cortez (near Mexico) has completely dried up.

- In California, the drought has limited water allocations from surface sources, forcing farmers to rely even more on groundwater supplies. These valuable “water banks” risk depletion.

- There is also a problem of salinisation which occurs due to high rates of evapotranspiration rates which leaves a high salt content in the soil and reduces fertility.
• **MINERAL EXTRACTION:** Molycorp is the only US company that produces the rare earth metals used in devices ranging from wind turbines to compact fluorescent lightbulbs.

• Rare earths are used in a wide variety of electronics and clean energy technology. They tend to be dispersed in tiny quantities throughout the crust, which makes them difficult and expensive to mine. By mining the materials, it helps US manufacturers to stop relying on Chinese imports.

• It is estimated that only about one percent of the Mojave's gold has been extracted; there’s tons and tons of it still out there. That's the good news.

• The rare earth metals are quarried and transported via large trucks and lorries out of the desert.

• The quarrying provides many direct (within the quarry mining) and indirect (driver) jobs which has a positive impact on the economy.

• The problems arise as these quarry mines can lead to huge holes in the landscape which can lead to soil erosion. The tracks from the tyres can also lead to a similar problem.

• Due to the extreme weather and presence of vast barren areas, there is very limited road networks. Furthermore tarmac melts and strong winds blow over the roads. It is common for vehicles to breakdown in the heat and drivers to be left stranded.

• **TOURISM:** Southern Nevada is the most tourism-dependent economy in the United States. Las Vegas ranked fourth in annual visitors behind Orlando, New York (47 million) and Chicago (45.6 million), but ahead of Atlanta (37 million) and Atlantic City (33.3 million).

• People are drawn to the high temperatures, human attractions, casinos, water fountains, water parks and golf courses that Vegas offers.

• The tourism industry provides many with direct and indirect jobs and benefits positively to the economy.

• However as the destination is located in the desert, it does put extreme pressure on water resources. There is a high demand of water for the upkeep of hotels, catering, drinking water, irrigation and water parks and fountains, all of which are irrigated from the Colorado river which has dried up the delta in Mexico which could lead to social conflicts.
Managing desertification

- Efficient stoves
  - The Toyola stove in Ghana or the Upesi stove in Kenya are both examples that are being distributed by charities such as Practical Action and the Global Alliance for Clean. They are made locally using more available materials like clay, and much smaller amounts of wood and charcoal.
  - Some also have a thermacouple, generating sufficient electricity from the heat to charge a mobile phone— which growing numbers of Sahel farmers own to gain access to weather forecasts.
- Terracing
  - Prevent rainfall from washing away topsoil & nutrients
  - Ensures rainfall infiltrates soil instead of running off down the slope.
  - Cheap to build, only man power needed
- Planting trees
  - Tree roots help to stabilise the soil, while their decomposing lead litter adds valuable nutrients
  - The African Union’s proposed Green Wall is a plan to plant a wall of trees across the entire Sahel region, running from the Atlantic Ocean to the Indian Ocean. It offers hope for sustainable development among communities, and will bring work to poor communities.

Natural Hazards

- Why live near a volcano (Iceland)
  - Geothermal energy
  - Minerals
  - Tourism
  - No choice
- Preparing for earthquakes/volcanoes
  - Earthquake Drills
  - Appropriate technology
    - Bamboo houses proven to withstand earthquake shaking
    - 20% cheaper and employs local people
  - Disaster prevention day on the 1st September every year
Plate boundaries:
- Conservative – San Andreas
- Collision – Himalaya
- Destructive – Sendai in Japan, Mt St Helens (Pacific ring of fire)
- Constructive - Iceland

Weather and climate
- Tropical storms (Katrina)
  - Effects: 1700 dead, $81.2bn in damage, 80% of the land was flooded.
  - Responses: 80% of the town was evacuated, £1bn of the aid was lost to fraud (Football tickets, diamond jewellery) 7000 active troop members come in to support

- Weather hazards in the UK
  - Somerset (see above)
  - Beast from the East

Climate change

Natural causes:
- Milankovitch Cycles:
  - Eccentricity: Earths orbit change from elliptical (Circular) to more oval shaped every 100,000 years. Places get further away from the sun (Colder). This is why ice ages occur every 100,000 years.
  - Tilt: Every 41,000 years the earths axis changes from 21.5 to 24.5 degrees. If tilted closer to the sun (Warmer) and vice versa
  - Wobble: Every 23,000 years the earth’s axis wobbles on its axis and gets closer to the sun/further away from the sun.