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| 1 | <b>3.7 Research methods</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>3.1 The living environment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>3.1.2 Conservation of biodiversity Continued</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 2 | <p>Introduction to Env Sci and Environmental Investigations</p> <p>Sampling Strategies: Random, Systematic and Transects, capture, mark, release</p> <p>Sampling Techniques for Plants and Animals, kite diagrams</p> <p>Measuring Abiotic Factors</p> <p>Soil Analysis</p> <p>Data Handling and Ecological Indices</p> <p>Experimental Design and Statistical Reliability</p> <p><b>3.2 The Physical Environment</b></p> <p><b>3.2.1 The atmosphere</b></p> <p>Introduction. Earth's atmosphere and electromagnetic radiation</p> <p>UV, visible and infrared radiation - origins and roles</p> <p>Earth's energy balance and thermal stratification</p> <p>Atmospheric chemistry and life-support systems</p> <p>Greenhouse gases and the enhanced greenhouse effect</p> <p>Global climate change.</p> <p>Anthropogenic climate change</p> <p>Interconnected natural systems cause environmental change; sea level, wind patterns</p> <p>Proxy data - Describe how different proxy records provide evidence of past climates, strengths and limitations</p> <p>Oceans, thermohaline circulation and El Niño</p> <p>Cryosphere and sea-level change, sea ice</p> <p>Climate modelling, uncertainty and feedbacks, tipping points, difficulties</p> | <p>Why is Earth habitable? Atmosphere, insolation, orbit, magnetosphere</p> <p>How life changed Earth: oxygen, ozone, carbon sequestration and biogeochemical cycles</p> <p>Evidence for Earth's environmental history: ice cores, pollen, dendrochronology and modern monitoring</p> <p><b>3.1.2 Conservation of biodiversity</b></p> <p>Ecosystems as interacting systems</p> <p>Habitats, niches and adaptation</p> <p><b>3.2.2 The hydrosphere</b></p> <p>Water treatment processes, DEFRA, WHO, treating contaminated water</p> <p>Sustainable water supplies, management of water supplies, exploit new sources</p> <p>Ocean circulation and UK climate, thermohaline circulation</p> <p><b>3.2.3 Mineral resources</b></p> <p><b>3.2.2 Lithosphere</b></p> <p>Mineral resources and their importance, lithosphere</p> <p>Geological processes; hydrothermal deposits, metamorphic processes, proterozoic marine sediments, continental drift</p> <p>Reserves, resources and Lasky's Principle</p> <p>Mineral exploration techniques, drones, satellite, ground-based truck/drill</p> <p>Factors affecting mine viability</p> <p>Environmental impacts of mining, and their control</p> <p>Sustainable mineral use and recycling, strategies to secure future</p> | <p>Populations and communities, population dynamics</p> <p>Abiotic and biotic factors - benefit to particular organisms</p> <p>Food chains, food webs and trophic levels</p> <p>Ecological pyramids</p> <p>Productivity and biomass</p> <p>Energy transfer efficiency</p> <p>Soil investigations and practical skills. Which soil characteristics make the best agricultural land?</p> <p>Practical analysis and write up</p> <p>Visit to HESI</p> <p><b>3.5 Biological resources</b></p> <p><b>3.5.1 Agriculture</b></p> <p>The selection of species, suitability of the environment, crop distribution, technological factors</p> <p>The biotic factors that affect productivity, Pest control: predators, competitors, pathogens, eg insects, fungi, weeds, bacteria.</p> <p>Cultural pest control, Integrated control, Pesticides, Antibiotics, Pollinators</p> <p>Nutrient supply: maintenance of soil biota: detritivores and decomposers.</p> <p>Agrochemicals - Are Agrochemicals Worth the Environmental Cost? Data plotting lesson</p> <p><b>How to answer 6 and 9 mark questions PEEL Point - Evidence - Explain - Link</b></p> <p>Food chain energy losses. Abiotic factors that affect productivity</p> <p>Genetic manipulation; selective breeding, asexual, GM</p> | <p>Decomposition, Nutrient cycling</p> <p>Ecological succession and how it can be controlled</p> <p>Plagioclimax communities, human activities and management methods</p> <p>Population control r and k selection strategies</p> <p><b>3.5.1 Agriculture continued</b></p> <p>Economic factors, Political factors</p> <p>Strategies to increase the sustainability of agriculture, consumer preferences, energy inputs etc</p> <p>Nutrient supplies, Increased use of natural processes to supply nutrients</p> <p>Energy inputs, use of natural processes instead of artificial fertilisers, low tillage techniques</p> <p>Water management to ensure sustainable supplies.</p> <p>Social impacts: the control of environmental impacts on rural communities.</p> <p><b>GROUP PROJECT Can we feed 10 billion people sustainably?</b></p> <p><b>Lesson 1 – Research</b></p> <p><b>Lesson 2 – Data Analysis, compare their farming system with conventional farming</b></p> <p><b>Lesson 3 – Conference - Groups present their recommendations.</b></p> <p><b>MOCK EXAMS</b></p> <p><b>MOCK EXAM ANALYSIS AND FEEDBACK</b></p> | <p>Biodiversity concepts, Measuring biodiversity</p> <p>Genetic, species and habitat diversity</p> <p>Ecosystem services; atmospheric composition, biogeochemical cycles, interspecies, soil</p> <p>Threats to biodiversity, introduced species, exploitation, habitat destruction</p> <p>The importance of the conservation of biodiversity, population dynamics, biomimetics, new medicine</p> <p>Conservation principles and priorities IUCN, carrying capacity</p> <p>CITES, legislation, protocols, Wildlife and Countryside Act 1981, EDGE, keystone, endemic</p> <p>Captive breeding and release</p> <p>In-situ conservation Ex-situ conservation</p> <p><b>3.5.2 Aquatic food production systems</b></p> <p>Aquatic Food Resources – importance of marine and freshwater food resources, global food supply, nutritional value</p> <p>Marine productivity, upwellings</p> <p>Food webs, productivity and fish stocks, seasonal changes</p> <p>Fishing methods and overexploitation. EU fisheries controls, Marine Stewardship Council</p> <p>Population estimates, dynamics and regulation</p> <p>Sustainable fisheries management (quotas, MSY, MPAs, by-catch reduction)</p> | <p>Habitat conservation and restoration, Human impacts on ecosystems</p> <p><b>BIG SUMMER PROJECT</b></p> <p><b>Biodiversity conservation in selected habitats; oceanic islands, mangroves, antartica, deep water coral reefs, tropical rainforest, temperate broadleaf woodland</b></p> <p>Protected areas and legislation, protocols, trade controls</p> <p>Quadrat investigations, Transects</p> <p>Biodiversity calculations, Population estimation (Lincoln Index)</p> <p>Ecosystem resilience, Data analysis</p> <p><b>STATISTICS and MATHs SKILLS</b></p> <p>Mann-Whitney U test theory application to real data</p> <p>Understand measures of dispersion, including standard deviation and range</p> <p>Standard Deviation - theory and application to real data e.g crop yield for a given nutrient input</p> <p>Simpson's index of diversity</p> <p><b>MOCK EXAM</b></p> <p><b>MOCK EXAM ANALYSIS AND FEEDBACK</b></p> <p>Revision Case Studies</p> <p>REVISION How to answer 6 and 9 mark questions PEEL Point - Evidence - Explain - Link</p> <p><b>REVISION</b></p> |

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| <p>monitoring and predicting climate change</p> <p>Carbon footprints and sustainable development</p> <p>Carbon sequestration, CCS methods</p> <p>Ozone depletion: science and evidence. Rowland-Molina hypothesis</p> <p>Monitoring ozone depletion, Antarctica, effectiveness of restoration methods</p> <p>Montreal Protocol and recovery of the ozone layer, CFC's</p> <p>Atmospheric data analysis and exam skills</p> <p><b>MOCK EXAMS</b></p> <p><b>MOCK EXAM ANALYSIS AND FEEDBACK</b></p> <p><b>3.2.2 The hydrosphere</b></p> <p>The hydrological cycle and dynamic eq</p> <p>Sustainable water management. Eval</p> | <p>mineral supplies, phytomining, bioleaching</p> <p>Link to sustainability, end of life strategies, recycling, difficulties with recycling schemes</p> <p><b>3.2.4 Biogeochemical cycles</b></p> <p>Introduction to biogeochemical cycles, importance</p> <p>Carbon cycle and human impacts and influences, sustainable management</p> <p>Nitrogen cycle and human impacts, consequences of changes in nitrogen reservoirs, sustainable management</p> <p>Phosphorus cycle, human activities and eutrophication</p> <p>Sustainable management of nutrient cycles C, P and N</p> <p><b>3.2.5 Soils</b></p> <p>Soil fertility and management, human activities affecting soil conditions, sustainability</p> <p>Soil degradation and erosion, causes; wind erosion, water erosion vegetation etc</p> <p>Sustainable soil conservation, USLE calculations</p> <p>Environmental impacts of soil erosion, soil management strategies</p> | <p>Agricultural energetics. Intensive and extensive systems, mono and polyculture</p> <p>The ways in which agricultural energetics can be quantified and their applications</p> <p>Environmental impacts of agriculture, sustainability</p> <p>Manipulation of food species to increase productivity</p> <p>Habitat impacts, Pollution</p> <p>Changes to the hydrological cycle; unsustainable irrigation, evapotranspiration</p> <p>Social/economic/political factors which influence agricultural production, Consumer choice</p> <p>Genetic manipulation; selective breeding, asexual, GM</p> <p>Agricultural energetics. Intensive and extensive systems, mono and polyculture</p> <p>The ways in which agricultural energetics can be quantified and their applications</p> <p>Environmental impacts of agriculture, sustainability</p> <p>Manipulation of food species to increase productivity</p> <p>Habitat impacts, Pollution</p> <p>Changes to the hydrological cycle; unsustainable irrigation, evapotranspiration</p> <p>Social/economic/political factors which influence agricultural production, Consumer choice</p> |  | <p>Aquaculture – systems, advantages, disadvantages and environmental impacts, principles and application</p> <p>Fisheries case studies, data analysis, trophic level efficiency</p> <p>Reduced environmental impact of fishing</p> <p><b>3.5.3 Forest resources</b></p> <p>Forest Resources – the ecological, economic and social importance of forests</p> <p>Forest productivity and timber production</p> <p>Forest monocultures, single age structure, close planting, non-indigenous</p> <p>Deforestation: causes and environmental impacts, hydrology</p> <p><b>STATISTICS</b></p> |  |
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| <p><b>13</b></p> | <p><b>3.2.4 Biogeochemical cycles</b></p> <p>Introduction to biogeochemical cycles, importance<br/>Carbon cycle and human impacts and influences, sustainable management<br/>Nitrogen cycle and human impacts, consequences of changes in nitrogen reservoirs, sustainable management<br/>Phosphorus cycle, human activities and eutrophication<br/>Sustainable management of nutrient cycles C, P and N</p> <p><b>3.5.2 Aquatic food production systems</b><br/>Aquatic Food Resources – importance of marine and freshwater food resources, global food supply, nutritional value<br/>Marine productivity, upwellings<br/>Food webs, productivity and fish stocks, seasonal changes<br/>Fishing methods and overexploitation. EU fisheries controls, Marine Stewardship Council<br/>Population estimates, dynamics and regulation<br/>Sustainable fisheries management (quotas, MSY, MPAs, by-catch reduction)<br/>Aquaculture – systems, advantages, disadvantages and environmental impacts, principles and application<br/>Fisheries case studies, data analysis, trophic level efficiency<br/>Reduced environmental impact of fishing</p> <p><b>3.3 Energy Resources Importance of energy supplies in the development of society</b><br/>Introduction - Why Energy Matters: The Role of Energy in Society</p> <p>Energy in Agriculture, fishing, Industry, water supplies, Transport and Domestic Life<br/>Features of Energy Resources: Abundance, Energy Density and Intermittency<br/>Energy Conversions and Efficiency<br/>Sustainability of Energy Resources<br/>Environmental Impacts of Energy Production; pollution, habitat damage, depletion of reserves</p> | <p><b>3.5.3 Forest resources</b><br/>Forest Resources – the ecological, economic and social importance of forests<br/>Forest productivity and timber production<br/>Forest monocultures, single age structure, close planting, non-indigenous<br/>Deforestation: causes and environmental impacts, hydrology</p> <p><b>REVISION How to answer 6 and 9 mark questions PEEL Point - Evidence - Explain – Link</b><br/><b>Year 13 Mock Exam Week</b><br/><b>Year 13 Mock Exam Analysis and Feedback</b><br/><b>Re-teach any knowledge gaps identified in mock exam</b></p> <p><b>3.3 Energy Resources continued Importance of energy supplies in the development of society</b></p> <p>Biofuels and Geothermal Energy<br/>Energy Storage Technologies<br/>Matching Supply and Demand, fluctuations e.g weather related<br/>Transport Energy Conservation</p> <p><b>REVISION</b><br/><b>MOCK EXAM WEEK</b><br/><b>MOCK EXAM FEEDBACK AND ANALYSIS</b></p> <p><b>3.3 Energy Resources continued</b><br/>Building Energy Conservation I: Heat Transfer<br/>Building Energy Conservation II: Passive Design and Smart Technologies, vehicle design<br/>Industrial Energy Conservation, Unit conversions (J, W, kWh, MWh), scatter graphs, load factors, efficiencies</p> | <p><b>3.6 Sustainability - Synoptic capture of whole course</b><br/>Sustainability: Why Natural Systems Work<br/>Dynamic Equilibria and Negative Feedback<br/>Positive Feedback and Climate Change, Tipping Points and Earth System Stability</p> <p>Why Diversity Makes Systems More Resilient<br/>Learning from Nature: Renewable Energy Systems<br/>Low Energy-Density Natural Systems<br/>Nature's Low-Temperature Chemistry<br/>Carbon Footprints and Sustainable Development</p> <p>Linear vs Circular Material Systems<br/>Natural Material Cycles</p> <p><b>3.5 Biological resources</b><br/><b>3.5.1 Agriculture</b><br/>The selection of species, suitability of the environment, crop distribution, technological factors<br/>The biotic factors that affect productivity, Pest control: predators, competitors, pathogens, eg insects, fungi, weeds, bacteria.<br/>Cultural pest control, Integrated control, Pesticides, Antibiotics, Pollinators<br/>Nutrient supply: maintenance of soil biota: detritivores and decomposers.<br/>Agrochemicals - Are Agrochemicals Worth the Environmental Cost? Data plotting lesson<br/>Food chain energy losses. Abiotic factors that affect productivity</p> | <p><b>3.6 Sustainability - Synoptic capture of whole course</b><br/>Waste, Toxicity and Biodegradability<br/>Principles of the Circular Economy<br/>Applying Circular Economy Principles<br/>Sustainable Cities and Lifestyles<br/>Ecological Footprints and Biocapacity<br/>Global Sustainability Case Studies</p> <p><b>3.5 Biological resources</b><br/>Genetic manipulation; selective breeding, asexual, GM<br/>Agricultural energetics. Intensive and extensive systems, mono and polyculture<br/>The ways in which agricultural energetics can be quantified and their applications<br/>Environmental impacts of agriculture, sustainability<br/>Manipulation of food species to increase productivity<br/>Habitat impacts, Pollution<br/>Changes to the hydrological cycle; unsustainable irrigation, evapotranspiration, Water management to ensure sustainable supplies.<br/>Social/economic/political factors which influence agricultural production, Consumer choice<br/>Social impacts: the control of environmental impacts on rural communities.<br/>Strategies to increase the sustainability of agriculture, consumer preferences, energy inputs etc</p> <p>Nutrient supplies, Increased use of natural processes to supply nutrients</p> <p>Energy inputs, use of natural processes instead of artificial fertilisers, low tillage techniques</p> | <p>REVISION command words e.g. Compare, Assess, Discuss, Evaluate, Suggest, Analyse, Calculate, Predict</p> <p>REVISION The Data Lesson - Reading graphs, Scatter graphs, Line graphs, Bar charts, Pie charts</p> <p>Radar diagrams, Sankey diagrams, Kite diagrams, Maps</p> <p>REVISION Case studies, Acts, Legislation</p> <p>REVISION How to answer 6 and 9 mark questions PEEL Point - Evidence - Explain - Link<br/>REVISE STATISTICS</p> <p>REVISE recurring exam themes: Energy, Matter, Cycles, Feedback, Human impacts, Sustainability<br/>REVISION How to answer 6 and 9 mark questions PEEL Point - Evidence - Explain - Link<br/>REVISION</p> | <p>REVISION</p> <p>PUBLIC EXAMINATIONS</p> |
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|  | <div>Fossil fuels: Extraction and Processing;<br/>pollution, habitat damage, depletion of<br/>reserves</div> <div>New Fossil Fuel Technologies: CCS, Coal<br/>Gasification and Methane Hydrates</div> <div>Nuclear Fission: Current Technologies<br/>Fusion and Future Nuclear Technologies</div> <div>Solar Energy: PV, CSP and Heat Pumps</div> <div>Renewables; Wind Energy, Hydroelectric,<br/>Tidal and Wave Energy</div> |  |  |  |  |  |
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