

Biological Sciences Resource List

TROP ICSU
Feb, 2023

Lesson Plans

| # | Lesson Plan Title | Disciplines | Key Topics | Link |
|---|--|---------------------|---|---|
| 1 | Lesson Plan: Pond Ecosystems and Climate Change | Biological Sciences | Ecology, Biodiversity, Ecosystem | https://tropicsu.org/pond-ecosystems-and-climate-change/ |
| 2 | Lesson Plan: Climate Impacts on the Silkworm Life Cycle | Biological Sciences | Ecology, Biodiversity | https://tropicsu.org/silkworm-lifecycle/ |
| 3 | Lesson Plan: Impact of Climate Change on Mulberry Cultivation | Biological Sciences | Ecology, Biodiversity | https://tropicsu.org/impact-of-climate-change-on-mulberry-cultivation/ |
| 4 | Lesson Plan: Climate Change and Reproductive Fitness in Red Deer | Biological Sciences | Evolutionary Biology, Natural Selection, Reproductive Fitness | https://tropicsu.org/climate-change-and-reproductive-fitness-in-red-deer/ |
| 5 | Lesson Plan: Climate Change and Risks of New Pandemics | Biological Sciences | Human Health, Infectious Diseases, COVID-19 Pandemic | https://tropicsu.org/climate-change-and-risks-of-new-pandemics/ |
| 6 | Lesson Plan: Demography and Pandemics in a Warming World | Biological Sciences | Human Health, Infectious Diseases, COVID-19 Pandemic | https://tropicsu.org/the-covid-19-pandemic-climate-change-demography-and-pandemics-in-a-warming-world/ |
| 7 | Lesson Plan: Insect Pollination in a Warming World | Biological Sciences | Entomology, Botany, Pollination | https://tropicsu.org/insect-pollination-in-a-warming-world/ |
| 8 | Lesson Plan: Genetically Modified Organisms | Biological Sciences | Genetics, Gene Editing, Botany | https://tropicsu.org/genetically-modified-organisms-gmos/ |

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|----|--|---------------------|--|---|
| 9 | Lesson Plan: Gene Editing using CRISPR | Biological Sciences | Genetics, Botany | https://tropicsu.org/gene-editing-using-crispr/ |
| 10 | Lesson Plan: Evolutionary Adaptations to Climate Change | Biological Sciences | Natural Selection, Genetics, Adaptation, Evolution, Biodiversity, Species and Speciation | https://tropicsu.org/evolutionary-adaptations-to-climate-change/ |
| 11 | Lesson Plan: Impact of Climate Change on Circadian Rhythms and Sleep | Biological Sciences | Human Health | https://tropicsu.org/impact-of-climate-change-on-circadian-rhythms-and-sleep/ |
| 12 | Lesson Plan: Ecosystems and Food Webs | Biological Sciences | Ecology, Phenology, Biodiversity, Biosphere, Conservation | https://tropicsu.org/ecosystems-and-food-webs/ |
| 13 | Lesson Plan: Ecological Niches and Biogeography: Mountain Gorillas, Bamboo and Climate | Biological Sciences | Ecology, Ecosystem, Biodiversity, Species and Speciation, Species Extinction, Conservation | https://tropicsu.org/ecological-niches-and-biogeography-mountain-gorillas-bamboo-and-climate/ |
| 14 | Lesson Plan: Photosynthetic Pathways and Physiological Responses to Climate Change | Biological Sciences | Botany, Photosynthesis | https://tropicsu.org/photosynthetic-pathways-and-physiological-responses-to-climate-change/ |
| 15 | Lesson Plan: Plant Diseases and Climate Change | Biological Sciences | Botany | https://tropicsu.org/plant-diseases-and-climate/ |
| 16 | Lesson Plan: Insect Behavior and Climate Change | Biological Sciences | Entomology, Biodiversity, Ecosystem | https://tropicsu.org/insect-behavior-and-climate-change/ |

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|----|--|---------------------|---|---|
| 17 | Lesson Plan: Phenotypic Plasticity: Coping with Climate Change | Biological Sciences | Range Shifts, Species Extinction, Botany, Adaptation | https://tropicsu.org/phenotypic-plasticity-coping-with-climate-change/ |
| 18 | Lesson Plan: Metabolic Rate and Climate Change | Biological Sciences | Evolutionary Biology, Adaptation | https://tropicsu.org/metabolic-rate-and-climate-change/ |
| 19 | Lesson Plan: Biodiversity and Species Extinction due to Climate Change | Biological Sciences | Biodiversity, Species and Speciation, Species Extinction, Biosphere, Conservation, Extinction | https://tropicsu.org/biodiversity-and-species-extinction-due-to-climate-change/ |
| 20 | Lesson Plan: Wild Strawberry Fruiting and Climate Change | Biological Sciences | Phenology, Botany | https://tropicsu.org/wild-strawberry-fruiting-and-climate-change/ |
| 21 | Lesson Plan: Abiotic Stress on Plants due to Climate Change | Biological Sciences | Botany, Adaptation, Range Shifts | https://tropicsu.org/abiotic-stress-on-plants-due-to-climate-change/ |
| 22 | Lesson Plan: Natural Selection and Climate Change | Biological Sciences | Natural Selection, Species and Speciation, Evolution, Adaptation, Genetics | https://tropicsu.org/natural-selection-and-climate-change/ |
| 23 | Lesson Plan: Impact of Climate Change on Photosynthesis | Biological Sciences | Photosynthesis, Botany | https://tropicsu.org/impact-of-climate-change-on-photosynthesis/ |
| 24 | Lesson Plan: Teaching about Microbial Life and Climate Change | Biological Sciences | Microbiology, Adaptation | https://tropicsu.org/teaching-about-microbial-life-and-climate-change/ |

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|----|--|--|---|---|
| 25 | Lesson Plan: The Impact of Climate Change on Sex Determination in Sea Turtles | Biological Sciences | Biodiversity, Ecology, Species and Speciation, Ecosystem, Conservation | https://tropicsu.org/the-impact-of-climate-change-on-sex-determination-in-sea-turtles/ |
| 26 | Lesson Plan: Teaching Phenology in Plants (Leaf-out) through Climate-related Examples | Biological Sciences | Botany, Phenology, Biodiversity | https://tropicsu.org/teaching-phenology-in-plants-leaf-out-through-climate-related-examples/ |
| 27 | Lesson Plan: Teaching Phenology in Plants (Flowering) through Climate-related Examples | Biological Sciences | Botany, Phenology, Biodiversity | https://tropicsu.org/teaching-phenology-in-plants-flowering-through-climate-related-examples/ |
| 28 | Lesson Plan: Teaching Human Health and Climate Change | Biological Sciences | Human Health, Disease, Infectious Disease, Epidemiology, Microbiology | https://tropicsu.org/teaching-human-health-and-climate-change/ |
| 29 | Lesson Plan: Teaching Biodiversity through Climate-related Examples | Biological Sciences | Biodiversity, Evolution, Species and Speciation | https://tropicsu.org/teaching-biodiversity-through-climate-related-examples/ |
| 30 | Climate Change Impacts on Secondary Metabolites of Plants | Biological Sciences | Botany, Photosynthesis | https://tropicsu.org/climate-change-impacts-on-secondary-metabolites-of-plants/ |
| 31 | Carbon Sequestration in Trees | Environmental Sciences, Biological Sciences, Earth Sciences, Chemistry | Carbon Sequestration, Carbon Cycle, Biogeochemical Cycles, Ecology, Botany, Biosphere | https://tropicsu.org/carbon-sequestration-in-trees/ |

Teaching Tools

| # | Teaching Tool Title | Disciplines | Key Topics | Link |
|---|---|---------------------|---|---|
| 1 | Video: Climate Change in the Biology Classroom | Biological Sciences | Climate Change Overview | https://tropicsu.org/climate-change-in-the-biology-classroom/ |
| 2 | Video: Earth's Climate, the Biosphere, and Geological Evolution | Biological Sciences | Biodiversity, Adaptation, Evolution, Ecology, Ecosystem, Natural Selection | https://tropicsu.org/earths-climate-the-biosphere-and-geological-evolution/ |
| 3 | Reading: Climate Change and Ecosystems | Biological Sciences | Climate Change Overview, Ecosystem | https://tropicsu.org/climate-change-and-ecosystems/ |
| 4 | Reading: Climate Change in the Life Sciences Classroom | Biological Sciences | Climate Change Overview | https://tropicsu.org/climate-change-in-the-life-sciences-classroom/ |
| 5 | Video: Climate Change and Biology Education | Biological Sciences | Climate Change Overview | https://tropicsu.org/climate-change-and-biology-education/ |
| 6 | Teaching Module: Mapping Range Shifts | Biological Sciences | Biodiversity, Species and Speciation, Range Shifts | https://tropicsu.org/mapping-range-shifts/ |
| 7 | Reading: Pandemics in a Changing World | Biological Sciences | Pandemic, Epidemiology, Covid-19 Pandemic, Human Health, Infectious Disease | https://tropicsu.org/pandemics-in-a-changing-world/ |
| 8 | Reading: Infectious Diseases In A Warming World | Biological Sciences | Epidemiology, Disease, Human Health | https://tropicsu.org/infectious-diseases-in-a-warming-world/ |

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|----|---|---|--|---|
| 9 | Video: Gene Editing in Tomato Plants | Biological Sciences | Genetics, Botany | https://tropicsu.org/gene-editing-in-tomato-plants/ |
| 10 | Reading: GM Crops in Sub-Saharan Africa | Biological Sciences, Environmental Sciences | Genetics, Botany, Agriculture, Food Security | https://tropicsu.org/gm-crops-in-sub-saharan-africa/ |
| 11 | Reading: Insect Behaviour and Temperature Variation | Biological Sciences | Entomology, Biodiversity | https://tropicsu.org/insect-behaviour-and-temperature-variation/ |
| 12 | Video: To Bee or Not To Bee | Biological Sciences | Entomology, Pollination, Conservation, Phenology | https://tropicsu.org/to-bee-or-not-to-bee/ |
| 13 | Reading: Ecosystem-Based Conservation in Central Africa | Biological Sciences | Conservation, Biodiversity, Ecosystem | https://tropicsu.org/ecosystem-based-conservation-in-central-africa/ |
| 14 | Reading: Climate Change and Mountain Gorillas of Central Africa | Biological Sciences | Pollination, Conservation, Biodiversity, Adaptation, Botany, Biosphere, Agriculture, Food Security | https://tropicsu.org/climate-change-and-mountain-gorillas-of-central-africa/ |
| 15 | Reading: Carbon Dioxide and Photosynthesis | Biological Sciences | Photosynthesis, Botany | https://tropicsu.org/carbon-dioxide-and-photosynthesis/ |
| 16 | Video: Climate Change and Food Webs | Biological Sciences | Ecosystem, Ecology | https://tropicsu.org/climate-change-and-food-webs/ |

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| 17 | Reading: Impacts of Climate Change on Biodiversity in Uganda | Biological Sciences | Ecosystem, Range Shifts | https://tropicsu.org/impacts-of-climate-change-on-biodiversity-in-uganda/ |
| 18 | Video: The Effect of Climate Change on Photosynthetic Pathways | Biological Sciences | Photosynthesis, Botany | https://tropicsu.org/the-effect-of-climate-change-on-photosynthetic-pathways/ |
| 19 | Video: Evolutionary Biology: Where Do We Go Now? | Biological Sciences | Phenology, Range Shifts, Species and Speciation | https://tropicsu.org/evolutionary-biology-where-do-we-go-now/ |
| 20 | Reading: Climate Change and the Decline of Insect Population | Biological Sciences | Biodiversity, Entomology, Epidemiology, Infectious Disease, Ecosystem | https://tropicsu.org/climate-change-and-the-decline-of-insect-population/ |
| 21 | Reading: Plant Pathogenesis | Biological Sciences | Botany, Food Security | https://tropicsu.org/plant-pathogenesis/ |
| 22 | Reading: Global Warming and Terrestrial Metabolism of Ectotherms | Biological Sciences | Adaptation, Ecosystem, Biodiversity | https://tropicsu.org/global-warming-and-terrestrial-metabolism-of-ectotherms/ |
| 23 | Classroom/Laboratory Activity: Metabolic Rates and Global Warming | Biological Sciences | Adaptation, Ecosystem, Species Extinction | https://tropicsu.org/metabolic-rates-and-global-warming/ |
| 24 | Reading: Adaptation or Plasticity? | Biological Sciences | Adaptation, Evolution, Natural Selection | https://tropicsu.org/adaptation-or-plasticity/ |

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|----|---|---------------------|---|---|
| 25 | Video: Plant Responses to Climate Related Abiotic Stress | Biological Sciences | Range Shifts, Adaptation, Botany, Phenology | https://tropicsu.org/plant-responses-to-climate-related-abiotic-stress/ |
| 26 | Teaching Module: Plant Response to Climate related Temperature and Water Stress | Biological Sciences | Adaptation, Botany | https://tropicsu.org/plant-response-to-climate-related-temperature-and-water-stress/ |
| 27 | Classroom/Laboratory Activity: Photosynthesis Under Variable Environmental Conditions | Biological Sciences | Photosynthesis, Botany | https://tropicsu.org/photosynthesis-under-variable-environmentalconditions/ |
| 28 | Classroom/ Laboratory Activity: Photosynthesis and Atmospheric Carbon Dioxide | Biological Sciences | Photosynthesis, Botany | https://tropicsu.org/photosynthesis-and-atmospheric-carbon-dioxide/ |
| 29 | Reading: Natural Selection and Evolutionary Rescue of a Species | Biological Sciences | Species and Speciation, Natural Selection | https://tropicsu.org/natural-selection-and-evolutionary-rescue-of-a-species/ |
| 30 | Video: Natural Selection and Climate Change | Biological Sciences | Evolution, Adaptation, Genetics | https://tropicsu.org/natural-selection-and-climate-change-2/ |
| 31 | Classroom/Laboratory Activity: Carbon Dioxide and Photosynthetic Rates | Biological Sciences | Photosynthesis, Botany | https://tropicsu.org/carbon-dioxide-and-photosynthetic-rates/ |
| 32 | Classroom/Laboratory Activity: Squirrel Species Distribution and Climate Change | Biological Sciences | Ecology, Ecosystem, Range Shifts, Biodiversity, Evolution, Species and Speciation | https://tropicsu.org/squirrel-species-distribution-and-climate-change/ |

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|----|--|---|---|---|
| 33 | Classroom/Laboratory Activity: Malaria and Climate Change | Biological Sciences | Human Health, Disease, Infectious Disease, Epidemiology, Adaptation | https://tropicsu.org/malaria-and-climate-change/ |
| 34 | Classroom Activity: Climate Change and Phenology in Plants (Flowering) | Biological Sciences | Botany, Phenology | https://tropicsu.org/climate-change-and-phenology-in-plants-flowering/ |
| 35 | Classroom/Laboratory Activity: Survival Skills-Response of Organisms to Climate Change | Biological Sciences | Biodiversity, Ecology, Evolution, Species and Speciation | https://tropicsu.org/survival-skills-response-of-organisms-to-climate-change/ |
| 36 | Classroom/Laboratory Activity: Climate Change and Leaf-out in Plants | Biological Sciences | Botany, Phenology | https://tropicsu.org/climate-change-and-leaf-out-in-plants/ |
| 37 | Teaching Module: Climate Change & Phenological Events in Plants and Animals | Biological Sciences | Botany, Species and Speciation, Phenology | https://tropicsu.org/climate-change-phenological-events-in-plants-and-animals/ |
| 38 | Game: Climate Change and Human Health- Analysis and Policies | Biological Sciences | Human Health, Epidemiology, Infectious Disease, Public Policy, Biosphere, Disease | https://tropicsu.org/climate-change-and-human-health-analysis-and-policies/ |
| 39 | Reading: Phenology and Climate | Biological Sciences | Botany, Phenology | https://tropicsu.org/phenology-and-climate/ |
| 40 | Video: Climate Change and the American Pika | Biological Sciences | Ecosystem, Species and Speciation, Ecology | https://tropicsu.org/climate-change-and-the-american-pika/ |
| 41 | Video: Human Health, Vector-Borne Diseases, and Climate Change | Biological Sciences, Environmental Sciences | Human Health, Infectious Disease, Disease, Epidemiology | https://tropicsu.org/human-health-vector-borne-diseases-and-climate-change/ |

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|----|---|---|--|---|
| 42 | Climate Change and Crop Pollination | Biological Sciences, Environmental Sciences | Pollination, Adaptation, Botany, Biosphere, Agriculture, Food Security, Conservation | https://tropicsu.org/climate-change-and-crop-pollination/ |
| 43 | What is the Biosphere? | Earth Sciences, Biological Sciences | Climate Change Overview, Biosphere | https://tropicsu.org/what-is-the-biosphere/ |
| 44 | IUCN Fact Sheet of Species Extinction due to Climate Change (Bramble Cay Melomys) | Biological Sciences, Environmental Sciences | Biodiversity, Conservation, Species Extinction, Extinction | https://tropicsu.org/iucn-fact-sheet-of-species-extinction-due-to-climate-change-bramble-cay-melomys/ |
| 45 | Species extinction due to climate change | Biological Sciences, Environmental Sciences | Biodiversity, Conservation, Species Extinction, Extinction | https://tropicsu.org/species-extinction-due-to-climate-change/ |
| 46 | Mammalian Extinction due to Human-Induced Climate Change | Biological Sciences, Environmental Sciences | Biodiversity, Conservation, Extinction, Species Extinction | https://tropicsu.org/mammalian-extinction-due-to-human-induced-climate-change/ |
| 47 | Climate and the Biosphere: An Overview | Earth Sciences, Environmental Sciences, Biological Sciences | Climate Change Overview, Biosphere, Ecosystem, Biodiversity | https://tropicsu.org/climate-and-the-biosphere-an-overview/ |
| 48 | Climate Change and Human Evolution | Biological Sciences, Earth Sciences, Environmental Studies, Social Sciences | Climate Change Overview, Evolution, Migration, Earth's Climate, Climate History, Anthroposphere, El Nino Southern Oscillation, Environmental Migration, Anthropology | https://tropicsu.org/climate-change-and-human-evolution/ |
| 49 | Move, Adapt or Die | Biological Sciences | Evolution, Natural Selection, Adaptation, Genetics | https://tropicsu.org/move-adapt-or-die/ |
| 50 | Bark Beetle Outbreaks in Bhutan | Biological Sciences, Environmental Sciences | Ecology, Entomology, Ecosystems, Phenology | https://tropicsu.org/bark-beetle-outbreaks-in-bhutan/ |

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|----|--|--|---|---|
| 51 | Biogeochemical Cycles | Environmental Sciences, Earth Sciences | Climate Change Overview, Carbon Cycle, Biogeochemical Cycles, Geologic Carbon Cycle, | https://tropicsu.org/biogeochemical-cycles/ |
| 52 | Risk of Bird Extinction | Biological Sciences, Environmental Sciences | Biodiversity, Species Extinction, Conservation, Biosphere, Extinction | https://tropicsu.org/risk-of-bird-extinction/ |
| 53 | Global Warming and Sleep Deprivation | Biological Sciences, Environmental Sciences | Human Health | https://tropicsu.org/global-warming-and-sleep-deprivation/ |
| 54 | Climate Change and Human Health in the United States | Environmental Sciences, Biological Sciences, Social Sciences | Human Health, Epidemiology, Infectious Disease, Psychology, Climate Psychology, Mental Health | https://tropicsu.org/climate-change-and-human-health-in-the-united-states/ |
| 55 | Can People Change Climate? | Earth Sciences, Environmental Sciences, Biological Sciences | Climate Change Overview, Biodiversity, Ecosystem, Biosphere, Earth's Climate, Anthroposphere | https://tropicsu.org/can-people-change-climate/ |
| 56 | Climate Change and Bird Migration | Biological Sciences, Environmental Sciences | Migration, Environmental Migration, Range Shifts | https://tropicsu.org/climate-change-and-bird-migration/ |
| 57 | Climate Change – The Teacher Friendly Guide | All disciplines | Climate Change Overview | https://tropicsu.org/climate-change-the-teacher-friendly-guide/ |
| 58 | Climate Solutions for Coastal and Ocean sinks sector | Biological Sciences, Environmental Sciences | Carbon Emissions, Conservation, Ecology, Ecosystems, Biodiversity | https://tropicsu.org/climate-solutions-for-coastal-and-ocean-sinks-sector/ |
| 59 | Series of two E-Learning Courses on Introduction to Climate Change and Climate Science | All disciplines | Climate Change Overview | https://tropicsu.org/series-of-two-e-learning-courses-on-introduction-to-climate-change-and-climate-science/ |

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|----|---|---|---|---|
| 60 | Daisyworld – A Model to Explore the Gaia Hypothesis | Earth Sciences, Mathematics and Statistics, Biological Sciences | Earth's Climate, Planetary Climate, Biosphere, Climate Change Overview | https://tropicsu.org/a-model-to-explore-the-gaia-hypothesis/ |
| 61 | Evolutionary Adaptation in Response to Climate Change | Biological Sciences, Environmental Sciences | Evolution, Adaptation, Natural Selection | https://tropicsu.org/evolutionary-adaptation-in-response-to-climate-change/ |
| 62 | Climate Change: A Guide For Teachers Of All Disciplines | All disciplines | Climate Change Overview | https://tropicsu.org/climate-change-a-guide-for-teachers-of-all-disciplines/ |
| 63 | Teach Climate Science with the Teacher Friendly Guide To Climate Change | All disciplines | Climate Change Overview | https://tropicsu.org/teach-climate-science-with-the-teacher-friendly-guide-to-climate-change/ |
| 64 | Climate Solutions for the Forestry Sector | Biological Sciences, Environmental Sciences | Land Use, Carbon Emissions, Conservation, Ecology, Ecosystems, Biodiversity | https://tropicsu.org/climate-solutions-for-buildings-and-cities-2/ |