Resources for remote teaching in ecology and environmental science
UCI Ecology & Evolutionary Biology – Ecology Group
April 2020

Smithsonian Museum of Natural History
• Virtual tours: https://naturalhistory.si.edu/visit/virtual-tour

Monterey Bay Aquarium
• Exhibits, tours: https://www.montereybayaquarium.org/
• Tidepooling expedition to Pt. Lomos: https://www.montereybayaquarium.org/stories/tidepooling-adventure

Aquarium of the Pacific
• Online Academy: http://www.aquariumofpacific.org/news/aquariumacademy/
• Lectures: https://www.youtube.com/playlist?list=PLofT2LwTg3TXKaJOA0j55BaQ-ViD5G19

PBS Learning Media
• Videos, interactive tools, lessons for teaching science
• https://www.pbslearningmedia.org/subjects/science/
• e.g., interactive lesson on ocean circulation in the North Atlantic:

National Park Service
• Virtual hikes, tours, and programs
  https://www.nps.gov/subjects/npscelebrates/find-your-virtual-park.htm
• e.g., virtual visits at https://www.nationalparks.org/connect/blog/take-virtual-visit-national-park

Glass invertebrates at the Harvard Museum of Comparative Zoology
• ~430 glass models of marine and terrestrial invertebrates, including sea anemones, jelly fish, octopus, sea cucumbers, marine worms and land snails
• Main page: https://mcz.harvard.edu/blaschka-glass-invertebrates
• Video: https://vimeo.com/99769917
• 3D virtual models: https://sketchfab.com/ARC-3D/collections/the-blaschka-marine-invertebrates

National Oceanic and Atmospheric Administration (NOAA)
• National Marine Sanctuaries
  • Virtual dives: https://sanctuaries.noaa.gov/vr/
  • Webinars (e.g., coral restoration, heatwaves):
    https://sanctuaries.noaa.gov/education/teachers/webinar-series.html
- **Florida Keys Coral Nursery:** [https://sanctuaries.noaa.gov/vr/florida-keys/coral-nursery.html](https://sanctuaries.noaa.gov/vr/florida-keys/coral-nursery.html)
- **Sea Grant Education at Home Resources:** [https://seagrant.noaa.gov/educationathome](https://seagrant.noaa.gov/educationathome)
  - e.g., California Sea Grant: [https://caseagrant.ucsd.edu/extension-outreach/at-home-education-resources](https://caseagrant.ucsd.edu/extension-outreach/at-home-education-resources)

**JoVE (Journal of Visualized Experiments)**
- **Lab manual in introductory biology:** [https://www.jove.com/science-education-library/41/lab-bio](https://www.jove.com/science-education-library/41/lab-bio)
- Some modules are open access, including “Evolutionary Relationships” and “Extinction”
- All JoVE Education videos are free to access (requires you to create an account) until June 15

**STEM Learning UK**
- **Online modules, including a collection on Science & Plants for Schools:** [https://www.stem.org.uk/elibrary/collection/2923](https://www.stem.org.uk/elibrary/collection/2923)
- e.g., surveys of virtual quadrats:

**The Nature Conservancy**
- **Virtual field trips:** [https://www.nature.org/en-us/about-us/who-we-are/how-we-work/youth-engagement/nature-lab/virtual-field-trips/](https://www.nature.org/en-us/about-us/who-we-are/how-we-work/youth-engagement/nature-lab/virtual-field-trips/)

**Zooniverse**
- “People-Powered Research”
- Crowdsourcing data collection
- e.g., “Notes from Nature – Capturing California’s Flowers” to investigate phenological change in wildflowers at [https://www.zooniverse.org/projects/md68135/notes-from-nature-capturing-californias-flowers](https://www.zooniverse.org/projects/md68135/notes-from-nature-capturing-californias-flowers)

**Google**
- **Google Earth Engine:** [https://earthengine.google.com/](https://earthengine.google.com/)
- **Google Earth Pro:** [https://www.google.com/earth/](https://www.google.com/earth/)
- **Google Arts & Culture:** [https://artsandculture.google.com/](https://artsandculture.google.com/)
  - National Parks: [https://artsandculture.google.com/project/national-park-service](https://artsandculture.google.com/project/national-park-service)
  - Digging Dinosaurs, e.g., [https://artsandculture.google.com/exhibit/mary-anning-history-s-pioneer-of-palaeontology%C2%A0/RwLC8g-VfbBAJA](https://artsandculture.google.com/exhibit/mary-anning-history-s-pioneer-of-palaeontology%C2%A0/RwLC8g-VfbBAJA)
- **Access Mars (virtual exploration of Mars w/ NASA & JPL):** [https://accessmars.withgoogle.com/](https://accessmars.withgoogle.com/)

**National Phenology Network**
- **Resources for higher education:** [https://www.usanpn.org/nn/education/higher](https://www.usanpn.org/nn/education/higher)
• Example lesson plan on exploring phenology data: https://www.usanpn.org/nn/Phenology-Data-Exploration
• Data visualization tools: https://www.usanpn.org/nn/connect/visualizations

Rocky Mountain Biological Laboratory
• Case Study - phenological responses of birds and plants to climate change: https://www.digitalrmbl.org/case-studies/the-biology-of-climate-change/

Google Sheet compiling online resources for field learning in ecology and environmental sciences:
• https://docs.google.com/spreadsheets/d/16K6bGTf-wGjxi6aGi_v6vLQSpsoGj1zq3tXLHWweg/edit#gid=1066503162

Google Sheet compiling online resources for field learning in geosciences (Julie Libarkin @GeoEdResearch):
• Includes a tab for online labs & field trips
• https://docs.google.com/spreadsheets/d/1-R6THvClcAjGrWRspCN9155lzdZ95ziwiF88mQyC/htmlview?urp=gmail_link

Teach the Earth
• Teaching Geosciences Online:
  https://serc.carleton.edu/teachearth/teach_geo_online/index.html

Environmental data-driven inquiry & exploration (EDDIE)
• Modules for teaching about macrosystems and environmental data
• https://serc.carleton.edu/eddie/modules.html