

Short Exam Study Guides for Biogeography

Exam I, Exam II, and Exam III



Picture: Tornado Disturbance and Ecological Succession in an Eastern Deciduous Biome

Exam I Review for Biogeography

Assigned Readings

MacDonald: Reading 1 (Some Basics), Reading 2 (Physical Environment), and Reading 3 (Biological Interactions)
Eastern Forest (EF) Reading: Pages 8-57

Terms and Concepts to Know from Readings

Some Basics – biologic hierarchies, world soils, (be able to define each soil order), climate and lake classification terminology (amictic, dimictic...), angiosperms, assemblage, autecology, autotrophs, biomass, chemosynthesis, CAM, dicotyledon, domain, food web, guilds, gymnosperm, heterotrophs, lithosphere, metapopulations, monocotyledon, primary production, synecology, trophic level.

Physical Environment – Allen's Rule, annual, carrying capacity, density, dimorphic leaves, euryhaline, eurythermic, hydrophyte, mesophyte, ordination analysis, perennial, phenology, phloem, sclerophyllous leaves, stenothermic, xerophyte, xylem.

Biological Interactions – Batesian mimicry, competitive exclusion principle, Muellerian mimicry, Euryphagous, fundamental niche, inter and intraspecific competition, lotka-volterra model, optimal forging theory, realized niche, stenophagous

Eastern Forest – key concepts; i.e. forest stratification, indicator species, species richness (patterns) soil characteristics...
Review the many handouts that I have given you.

Throughout class-wide discussions and PowerPoint slides presentations, I often ask questions to spark interest, create discussion, or pull concepts together. Know the answers to these discussion questions, as any may show up on the exam.

Exam Format (total points possible on the exam: 35)

Part I:

10 multiple choice questions (10 points). Any information printed on an overhead is fair game for the exam Study terms, examples, & questions. Expect questions from readings.

Part II:

Short Essays (12 points). I will provide the organizational framework for each question. Example essays: 1) discuss the Eastern hemlock as it exemplifies many fundamental concepts in biogeography, 2) discuss Wallace's Line and Nestor parrots case studies in the context of biogeography (what do the case studies exemplify in biogeography?); 3) identify major time & space constraints on the living with examples; 4) discuss major biological influences on the distribution of organisms; 5) discuss trophic levels in the biosphere, 6) discuss global climate as the primary control on the distribution life; 7) highland biogeography & human activities in "tropical" America.

Part III:

Listing, Labeling, Short Answers (5 points). Very short conceptual questions on any topic.

Part IV:

Terminology Short Answer (8 points). 10 definitions or conceptual questions followed by short answers (answer only Example: allelopathy, leaching, Am climate... Expect three terms from readings.

Note: Subject to minor revisions

Exam I Review for Biogeography General Overview of Concepts and Terms to Know

1. Know the Biogeographical Realms.
2. Overview of Physical explanations for the distribution of organisms (study Wallace's Line).
3. Ecological Tolerance – Environmental gradients (abiotic/biotic limiting factors); stress intolerance, ecological optimum, law of the minimum; ex, Saltmarsh cordgrass to Saltmeadow cordgrass
4. Basic distribution theories (time and space constraints & multiple examples – Welwitschia, and tapir...); centers-of-origin, vicariance, dispersal, range, dispersion (distribution).
5. Ranges - geographic area an organism occupies and the different types of ranges contiguous vs disjunct.
6. Nestor parrots case study: dispersal & range; vicariance; habitat; speciation.
7. Review your outdoor classes on the Eastern hemlock. Be able to answer any of the questions on the hand out. Be able to apply any if the discussion topics to the Eastern hemlock – i.e. niche and habitat.
8. Biological explanations for the distribution of organisms; explain biologically influenced patterns in vegetation; know ecosystems terminology; energy, matter & food (trophic levels).
9. Important ecological controls; i.e. predation, symbiosis, competition.
10. Major physical controls on the distribution of life; major climatic controls and their influence on the distribution of life.
11. Know the three tier Koppen climatic classification system (You should be able to accurately discuss each level of Koppen classification i.e. BWk or Aw...).
12. Climate of a hypothetical continent that bisects the equator and contains no real mountain ranges.
13. Understand relationships between climate and biomes (know the diagram).
14. Vertical biomes and climatic zones and human activity in tropical mountains of middle and Latin America – rain forest, cloud forest, scrub/shrub woodland...be able to name crops grown at each zone.
15. Do your readings. Know major concepts and all terms listed at the end of each chapter.
16. Know all examples and case studies. I often give a real example to explain a topic/term/concept, i.e. allelopathy and creosote or garlic mustard. Know how the example applies.

Exam II Review for Biogeography

Assigned Readings

- 1) Eastern Forests: 58-153;154-249; and 250-268. EF readings should focus on text portions of the book. Don't worry about the picture identifications. Focus on: a) what determines a community; b) each of the major eastern forest communities(know a few key species and characteristics of each); c) what is a disturbance; d) what causes disturbances; e)ecological secession in old fields; f) alien perennial herbs; g) heaths; h) landscape patches forest fragmentation; i) how type" and "why type" questions regarding adaptations (birds, insects...).
- 2) Mitsch and Gosselink, Wetlands Biological Adaptations to the Wetland Environment. Focus on: a) adaptations to anoxia and salt; b) structural and biochemical mechanisms by which plants avoid or tolerate hypoxia; c) whole plant strategies; d) animal adaptations.
- 3) Hughes A., Disturbance and Diversity: An Ecological Chicken and Egg Problem (disturbance affects species diversity, resistance and resilience; do disturbance and diversity interact)
- 4) Nelson, et al. Bottomland Hardwood Forest Recovery Following Tornado Disturbance and Salvage Logging (understand post disturbance recovery with and without salvage logging)

Exam Format (total points possible on the exam: 35)

Part I:

Multiple choice questions (11 points). Any information printed on an overhead is fair game for the exam Study terms, examples, & questions. Expect questions from readings.

Part II:

Detailed Essays (12 points). Example essays: 1) Highland biogeography & human activities in "tropical" America; 2) Merriam's Life Zones: altitudinal vegetation zones & highland climates; 3) Characteristics and location of soil orders; 4) Disturbance ecology and plant succession; 5) Northern hardwood forest biome (composition, range, dominant species, characteristics...); 5) Pedogenic soil regimes; 6) One shorter essay from your readings (it will be on a major topic).

Part III:

Listing, sketching, calculating and conceptual questions with very short answers (6 points) .

Questions will come from lecture, field work, and reading.

Part IV:

Terminology Short Answer (6 points); definitions each worth 1 points; answer 6 of 8 terms (leave the two you know the least blank)

Example: Capillary Action.

Expect terms from readings and fieldtrips

Note: Subject to minor revisions

Throughout the PowerPoint slides during lecture I often present questions to spark interest, create discussion, or pull concepts together. Know the answers to these discussion questions, as any may show up on the exam.

Exam II Review for Biogeography General Overview of Concepts and Terms to Know

- 1) Merriam's Life Zones - know the name of each zone, elevation, perception, example species...details of each).
- 2) Highland Biogeography & Human Activities in "Tropical" America – know the different climate and vegetation zones and associated human activity.
- 3) Know the 12 World Soil Orders - basic characteristics of each and where they are found.
- 4) Basic soil terminology: Leaching, eluviation, humus, cations, colloids, CEC, degree of weathering, soil profile...
- 5) Know each pedogenic soil regime; characteristics of each; and relationship to climate and vegetation.
- 6) Know succession: primary, secondary, pioneer species. Be able to provide examples. Know succession on New Island in the farmers abandoned field.
- 7) Be able to calculate an Index of Similarity based upon Alpha or Beta Diversity.
- 8) Be able to calculate the varying measures of diversity: species dominance based on frequency, species abundance/evenness, and relative dominance.
- 9) There will be one reading essay on the exam. I will select a topic that was covered in great detail (a big topic).
- 10) Handouts to know: a) Merriam's Life Zones; b) General Distribution of Soil Orders & Associated Vegetation Type in Zones of Latitude from the Tropics to the Arctic; c) World Biomes: A Major Set of Natural Vegetation that Occurs Wherever a Particular Set of Climate & Soil Conditions Prevail; d) Soils and the Distribution of Life (matching); Global Climate and Soil Controls on the Distribution Life; and, e) Biome & Comparative Ecosystem Species Fieldtrip Condensed Test Study Guide (Labs 1 & 2).
- 11) Study and restudy your fieldwork labs. In reality, we have spent most of this section in the field. Be certain you can answer any question from each of the following labs: Biome and Comparative Ecosystem Species Fieldtrip and Biogeography Northern Hardwood Belt Transect Exercise
- 12) Note: nothing except succession will be on the exam from the New Island Disturbances and Wetland Delineation Fieldtrip

Exam III Review for Biogeography

Exam Format (total points possible on the exam: 40)

Assigned Readings

1) **On the Termination of Species** (know the questions discussed in groups); 2) Madagascar: Emerald Isle or Paradise Lost (deforestation causes, solutions, institutions and forest governance); 3) Biodiversity Hotspots for Conservation Priorities (know the priority hot spots), 4) 100 of the Worst Invasive Alien Species (know a few key characteristic of the species discussed), 5) Raunkiaer's "Life-Forms" & Statistical Methods (apply the article to our discussion on the same topic), 6) **MacDonald - Communities Formations and Biomes** (terms: association, community, dominance type, ecological equivalent, ecotone, formation, growth form, individualistic community concept, life form, life zone, old growth forest, ordination analysis, primary forest, releve, secondary growth forest, species evenness, stand superorganism community concept,

Note: On the exam: student presentation questions (1 to 4 points) documentary questions (1-2points)

Throughout the PowerPoint slides during lecture I often present questions to spark interest, create discussion, or pull concepts together. Know the answers to these discussion questions, as any may show up on the exam.

Part I:

Multiple Choice (15 points). Any information printed on an overhead is fair game for the exam Study terms, examples, & questions. Expect questions from readings.

Part II:

Short Essays (12 points). I will provide the organizational framework for each question. Example essays: Discuss the major conclusions from the applied biogeography study titled: *Plant Succession Following Surge and Retreat Events of the Bering Glacier, Alaska*; Any question(s) covered in class from the article *On the Termination of Species*; Characteristics of endangered species; Causes of extinction; Why don't we know the exact number of species?; Plant life forms and strategies to survive unfavorable seasons; Characteristics of any biome (from readings); Essay on any article's central theme main points, and or conclusions (I will give you options)...

Part III:

Listing/Fill-in-the-Blank Short Answers (5 points)

Listing and conceptual questions on any topic. Questions that can be answered in one or two words.

Part IV:

Terminology Short Answer (8 points). 10 definitions or conceptual questions followed by short answers. 2 bonus short answer questions. Example: Megatherms. Expect terms from readings.

Note: Subject to minor revisions

Exam III Review for Biogeography General Overview of Concepts and Terms to Know

1. Plant Succession Following Surge and Retreat Events of the Bering Glacier, Alaska – know the important observations on each of the three surge surfaces (1922, 1955, 1993). For example, on the 1993 surface: a) no vegetation was located on first 125 meters (2003 ice front) of the transect; b) fireweed dominates transects closer to ice... Specifically be able to make a basic comparison of 1993 & 1965 glacial surge surfaces at the push moraine for Arrowhead Island.
2. Know what species dominate plant communities from different stages of development after glacial retreat.
3. Case studies in biodiversity: passenger Pigeon and Lake Victoria
4. Biodiversity terms and concepts to know. For example, discuss species richness, genetic diversity, ecosystem diversity, keystone species, bellwether species, species area curve...
5. How many species are there? Why don't we know the exact number of species?
6. What are the three measures of biodiversity? Be able to calculate diversity – richness, evenness...
7. Losing biodiversity. Laws that protect species from extinction – the Endangered Species Act
8. Characteristics of endangered species. Case study: the Florida Panther and Giant Panda
9. The role humans have played in species extinction. Pay particular attention to introduction of invasive species and habitat destruction. Know the different types of habitat fragmentation.
10. The hunting controversy and species extinction (with multiple examples).
11. Why should we preserve species. Does it matter if the deer tick goes extinct? Intrinsic and instrumental values.
12. Know each of the Earth's major biomes, Major characteristics of each.
13. Animal and plant life-form classification. Know specific adaptations. Consider the location of the shoot-apice.
14. Be able to discuss each plant life-form classification as it is linked to a major biome.
15. Study the article questions that we discussed in class from “On the Termination of Species”. Read the article on biological hotspots.
16. Know all of the biomes. When studying the Earth's biomes, as you read, be sure to pay close attention to: a) Tropical savanna and adaptations to extreme wet and dry conditions; b) Mediterranean, Maquis, Chaparral biome and adaptations to fire; c) Grassland and grass adaptations to heat, low precipitation, grazing, and fire; d) Temperate deciduous forest and temperature, perception, soils, fire...as control; e) Desert biome: how do plants adapt to dry conditions? Why are deserts distributed as they are - i.e. interior of continents deserts?; f) Edaphic controls on flora and fauna in a tundra biome; g) Boreal: growth adaptations and subclimax communities.
17. Study your notes from our fieldtrip “Patterns of Tornado Disturbance and Ecological Succession in an Eastern Deciduous Biome”

- 1) Hydrosere succession in a boreal wetland environment (know details from each of the stages as it makes for a good short essay question).
- 2) Be able to define a wetland. Distribution patterns within a wetland. Consider: hydrology, plants, and soil. How can these be used to identify a wetland and its boundaries in the field?
- 3) Hydric soils: consider – saturation, redox potential, and mineral/organic content.
- 4) Know specific characteristics of individual wetland species that we discussed in class.
- 5) Wetland community distribution: controls - morphological adaptations of wetland vegetation (i.e. hypertrophied lenticels and Aerenchyma...(also, makes for a good essay question)).