## C1A: Ecology

**Instructors:** G. Ravikanth (co-ordinator: gravikanth@atree.org), Abi Tamim Vanak (avanak@atree.org), and Soubadra Devy (soubadra@atree.org)

**Credits and contact hours:** 3 credits, 48 hours

**Class schedule**: MON (10-11), WED & FRI (11-12)

**Course Description:**

This course is primarily designed for students with a background in the social sciences, or students from the natural sciences who have had no prior training in ecology. This introductory full semester core course will introduce students to basic principles in ecology with emphasis on its application. Students will learn about ecological concepts that apply at levels of the population, community and ecosystem: the relationship between organisms and their environment, interactions amongst organisms;; patterns in the distribution of species and communities;; and processes that underlie the functioning of ecosystems. The course will also draw upon case studies to illustrate the application of ecological concepts to conservation and sustainable use of resources. The course will also have special lectures and discussions on ecology and conservation.

**Course evaluation:** There will be brief assignments assigned during this course. The Final examination at the end of the semester will count for 80% of the marks;; The assignments will each count for 10% of the marks and class participation and attendance will count for the remaining 10% of the marks.

# Course schedule (dates/day will be finalized shortly)

| Sl. No | Date/ Day | Module | Lecture | Instructor |
|---|---|---|---|---|
| 1 | 10/8/15 | Introduction | Introduction to Ecology: Its history, evolution from natural history and relevance in a human dominated world. Introduction to the idea of scales/and levels of organization. | RK |
| 2 | 12/8/15 | | The physical environment (soil,water, temperature) | RK |
| 3 | 14/8/15 | | Adaptations to the physical environment, drought and salt tolerance, C3/C4 species | RK |
| 4 | 17/8/15 | | Photosynthesis and climate | RK |
| 5 | 19/8/15 | | **[Lab]** C3, C4 and CAM photosynthesis and respiration measurements using Infra Red Gas Analyser (IRGA). | RK |
| 6 | 21/8/15 | | Application: Elevated $CO_2$ and plant response | RK |
| 7 | 24/8/15 | Evolution | Natural Selection and Evolution | RK |
| 8 | 26/8/15 | | Speciation, sexual selection and evolution, taxonomy and systematics | RK |
| 9 | 31/8/15 | | Application: Relevance of taxonomy/systematics to conservation | RK |
| 10 | 2/9/15 | | An introduction to population genetics. Population genetics and its conservation implications (e.g., inbreeding depression and genetic drift). | RK |
| 11 | 4/9/15 | | Population Genetics _ Continued | RK |
| 12 | 7/9/15 | | Application: Impacts of disturbance/harvesting on Genetic diversity. Examples in plants. Impacts of selecting hunting on the genetic pool. Conservation issues: Genetic rescue/genetic enrichment | RK |
| 13 | 9/9/15 | Population Ecology | Introduction to population ecology: What is a population? Terms. Population estimation | ATV |
| 14 | 11/9/15 | | Population processes. Life tables and matrix models. Generalizing about populations: Survivorship curves | ATV |
| 15 | 14/9/15 | | Lab (Population Ecology) (in the afternoon) | ATV |

| | | | | |
|---|---|---|---|---|
| 16 | 16/9/15 | | Assignment | ATV/RK |
| 17 | 18/9/15 | | Assignment | ATV/RK |
| | 21/9/15 | | Assignment | ATV/RK |
| 18 | 23/9/15 | | Models of population growth: exponential and logistic growth. Carrying capacity and life-histories.<br><br>Temporal and spatial patterns in the dynamics of populations: Biotic and abiotic factors, density dependent vs density independent controls. | ATV |
| 19 | 25/9/15 | | Dispersal, patches and metapopulations. Movement ecology | ATV |
| 20 | 28/9/15 | | Models in Ecology: deterministic VS non deterministic. | ATV |
| 21 | 30/9/15 | | Application: Dynamics of an endangered population: the case of the Island fox | ATV |
| 22 | 5/10/15 | | Conservation of species and populations applied population ecology, sustainable harvest models | ATV |
| 23 | 7/10/15 | Community Ecology | Introduction to community ecology: What is an ecological community, inter and intra specific competition, ecotones etc. | SD |
| 24 | 9/10/15 | | Food webs, bottom-up and top-down control | SD |
| 25 | 11/10/15 | | Interspecific competition: density dependent mortality, population regulation | SD |
| 26<br><br>27 | 14/10/15 | | Mutualistic interactions : pollination dispersal, predation | SD |
| 28 | 16/10/15 | | Application: Species interactions and its relevance to Agricultural and agroforestry systems | SD |
| 29 | 19/10/15 | | Community building/Succession - open & closed communities | SD |
| 30 | 21/10/15 | | **[Lab]** Community ecology | SD |
| 31 | 23/10/15 | | Disturbance, gap dynamics | SD |
| 32 | 26/10/15 | | Application: Paper discussion (Implications of non-equilibrium dynamics to management) | SD |

| | | | | |
|---|---|---|---|---|
| 33 | 28/10/15 | Community Ecology | Introduction to the ecosystem concept. Energy and matter in ecosystems: net and gross production. Measuring biomass and productivity. | SD |
| 34 | 30/10/15 | | Cycling of nutrients through terrestrial ecosystems. | SD |
| 35 | 4/11/15 | | Application: Productivity and nutrient cycling paper discussion on global change and impacts on nutrient cycles | SD |
| 36 | 6/11/15 | | Biomes & climate | SD |
| 37 | 9/11/15 | | Ecosystems of India - humid tropical forests | SD |
| 38 | 11/11/15 | | Ecosystems of India - tropical montane forests and sholas | SD |
| 39 | 13/11/15 | | Ecosystems of India - dry deciduous forests | SD |
| 40 | 16/11/15 | | Ecosystems of India - temperate coniferous and broadleaved forests | SD |
| 41 | 18/11/15 | | Ecosystems of India - alpine meadows | SD |
| 42 | 20/11/15 | Conservation Biology and Sustainable Science | Biodiversity - measures, patterns at continental & global scales | SD |
| 43 | 23/11/15 | | Biodiversity and Humans: species extinction, AJH overexploitation, invasive species, global□warming | SD |
| 44 | 25/11/15 | | Conservation of communities and ecosystems applied community & ecosystems ecology | SD |
| 45 | 27/11/15 | | Landscape fragmentation and species conservation: protected area | ATV |
| 46 | 30/11/15 | | Human-Wildlife conflict: the science of conflict | ATV |
| 47 | 2/12/15 | | Conservation planning – prioritization, zoning. | ATV |
| 48 | 4/12/15 | | Final exam | RK |

Note: ATV: Abi Tamim Vanak; SD = Soubadra Devy; RK = G. Ravikanth

* We will assign projects to students that can be done over the semester and presented at the end.

**Textbooks:**

1. *The Economy of Nature-Robert Ricklefs. (6 ed.) 2010.□*
2. *Ecology: Individuals to Ecosystems: Begon,Townsend and Harper (4 ed.) 2006.*

3. *Conservation Biology: A Primer for South Asia. Bawa, K.S. Richard Primack and Meera Oommen. 2010.*