

University of California
Agriculture and Natural Resources

uc california naturalist

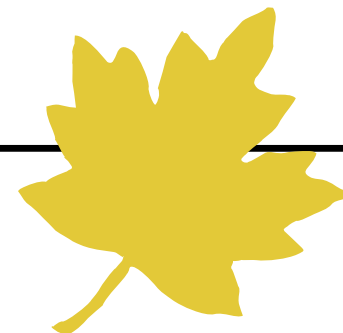


Chapter 1

Introduction to the CA Naturalist Program
California's Biodiversity in Context
The Role of Naturalists



uc california naturalist



healing ourselves and the natural world

- Discovery
- Action
- Stewardship


Introduction to the CA Naturalist Program



- a. a vibrant human society needs a healthy natural world, just as a healthy natural world needs a vibrant human society




b. reconnecting with nature can bring us great satisfaction and happiness

- 
- c. becoming a naturalist is good for your health
- spending time out of the office
 - taking in scenes of natural beauty
 - hiking
 - sketching what you see

- spending time with friends
- collecting insects
- collecting plants
- discovering new species
- making great memories
- just having fun like when you were a kid!

- d. becoming a naturalist offers a chance to explore nature and deepen your understanding of how she works

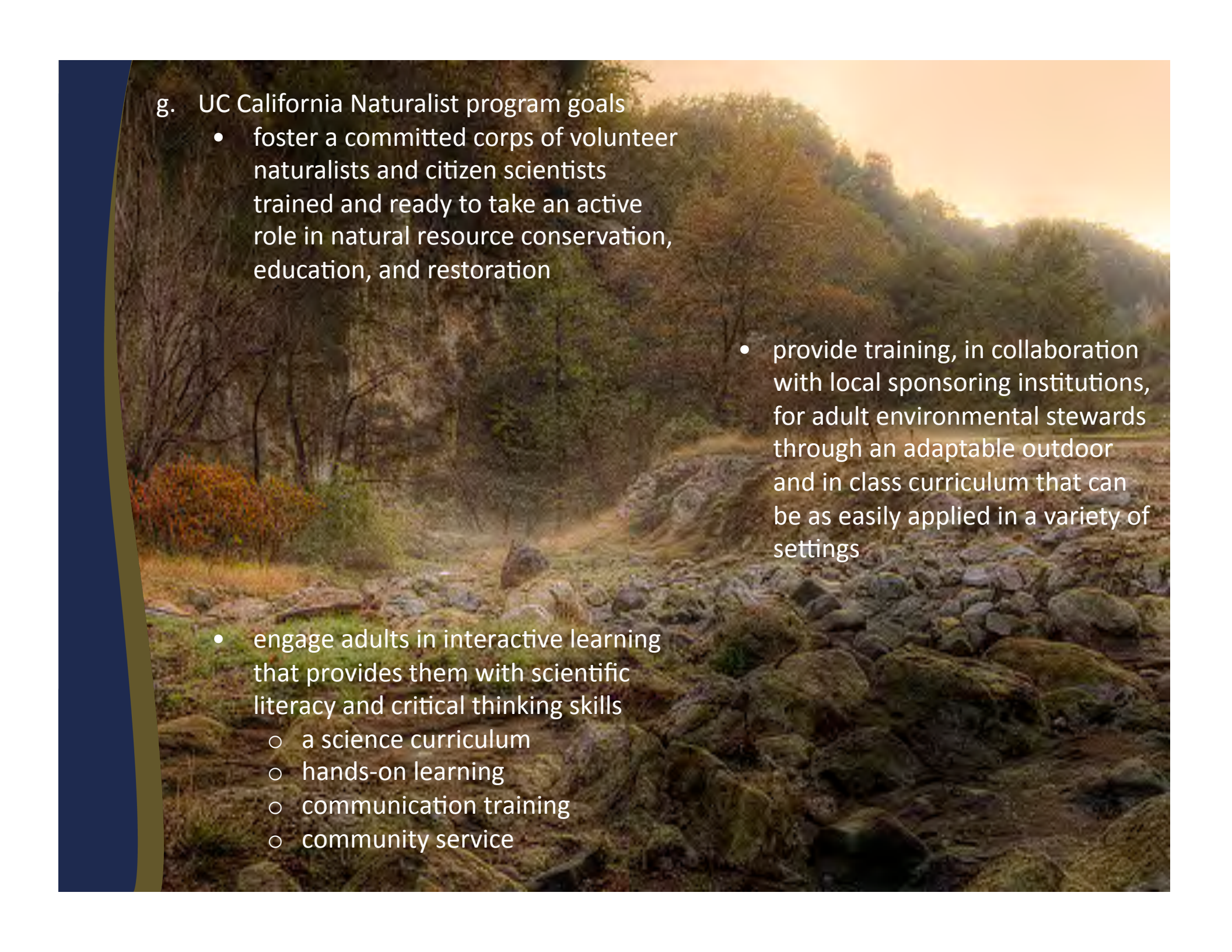


- 
- e. by joining the UC California Naturalist Community, you will be working with an interdisciplinary team of both amateurs and professionals to protect the planetary ecosystem functions which make life on Earth possible

f. why California?

- breathtaking diversity of plants, animals and natural landscapes
- Mediterranean climate
- because its our home





g. UC California Naturalist program goals

- foster a committed corps of volunteer naturalists and citizen scientists trained and ready to take an active role in natural resource conservation, education, and restoration
- provide training, in collaboration with local sponsoring institutions, for adult environmental stewards through an adaptable outdoor and in class curriculum that can be as easily applied in a variety of settings
- engage adults in interactive learning that provides them with scientific literacy and critical thinking skills
 - a science curriculum
 - hands-on learning
 - communication training
 - community service



- h. there are Master Naturalist type programs in 26 other states, but this is the first such program for California that will engage adults including teachers, docents, land stewards, and nature enthusiasts in service learning and participatory research

- Statewide Naturalist Programs



i. Texas Naturalist

- 2,751 volunteers trained
- reached 530,845 people
- impacted 75,000 acres habitat
- 192,606 hours of service = \$3.38 million in '03-'04



j. we cannot protect and restore California's unique ecology without an environmentally literate, engaged public

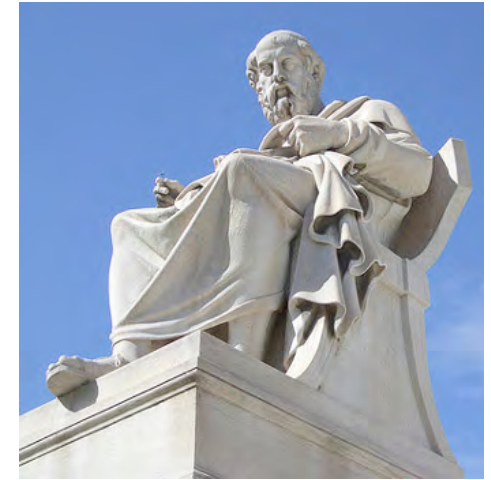
- environmental literacy
- scientific and social understanding
- interpretive skills
- involved in collaborative conservation



- k. what naturalists will gain
- advance scientific literacy
 - knowledge
 - perceptions
 - changes in behavior
 - credibility



- local community of naturalists
 - relationship with fellow naturalists in the area
 - increased networking in field of interest
 - work together to improve local environment
 - being a part of a corps of informed citizens across the State and Nation



- relationship with the UC
 - resources (museums, field stations...)
 - communication with scientists
 - research updates




- web portal
 - course and advanced training opportunities
 - estuarine
 - coastal
 - desert
 - etc



- volunteer opportunities
- citizen science opportunities
- annual conferences
- environmental science content relevant to California





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graph BT; A[California Naturalist program: Handbook, website portal, database, instructor support materials, slideshows, promotional material] --> B[Train-the-Trainer workshop for local partners]; B --> C[Local partner delivers the class]; C --> D[Certificate of Completion]
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Certificate of Completion

Local partner delivers the class

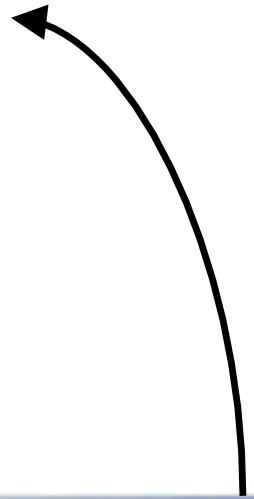
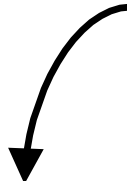
Train-the-Trainer workshop
for local partners

California Naturalist program:
Handbook, website portal,
database, instructor support
materials, slideshows, promotional
material



UC MASTER NATURALIST

SCIENCE STEWARDSHIP SERVICE



I. curriculum

- statewide framework
- 7 bio-region modules planned
- regional issue sidebars
- the UC California Naturalist Handbook 2011 draft
 - by Greg de Nevers, Deborah Stanger Edelman, and Adina Merenlender
- lecture slides
 - by Sube Caohuu
- Table of Contents
 - Acknowledgements
 - Chapter 1 Introduction to Becoming a California Naturalist
 - Chapter 2 Geology, Soils, and Climate
 - Chapter 3 Water
 - Chapter 4 Interpretation, Communication, and Citizen Science
 - Chapter 5 plants
 - Chapter 6 Forests and Woodland Resources
 - Chapter 7 Wildlife
 - Chapter 8 Energy and Global Environmental Challenges
 - Glossary



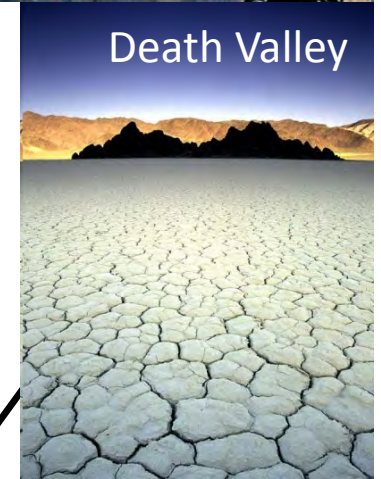
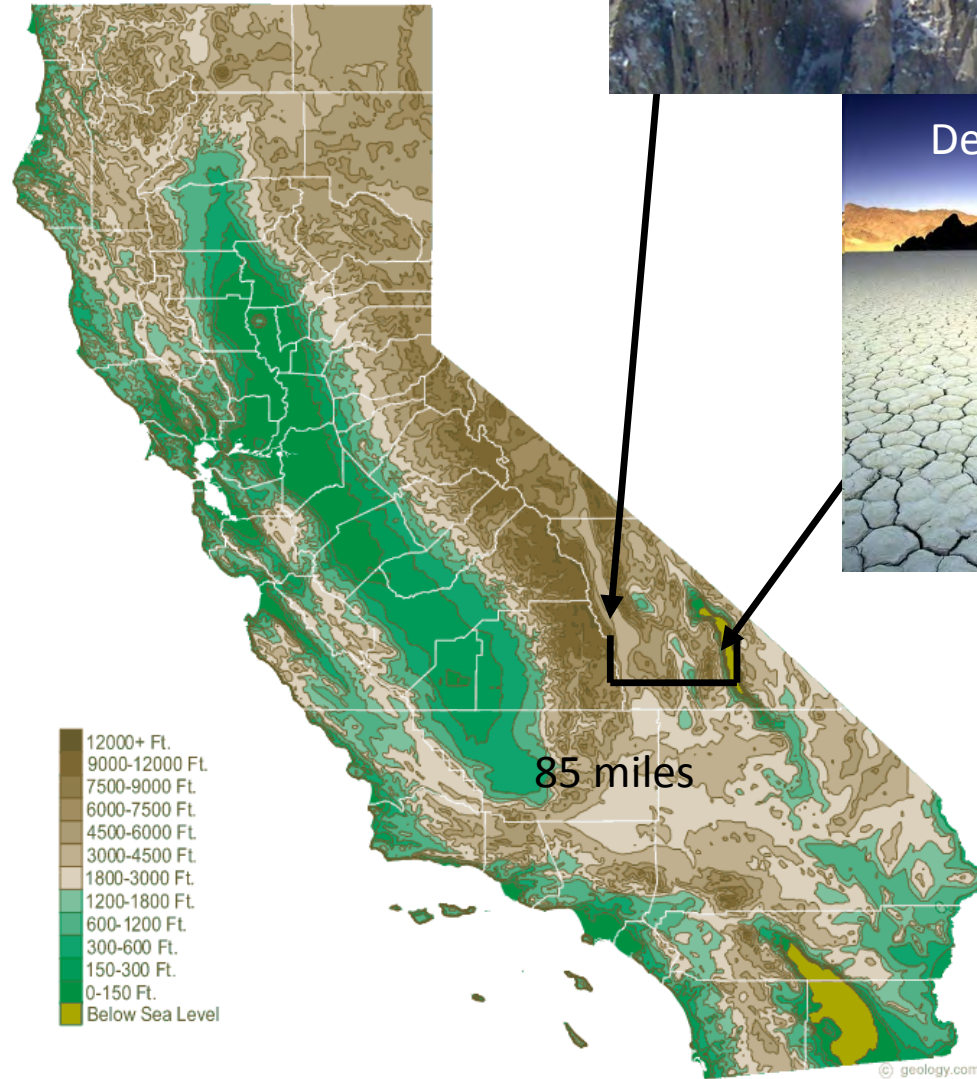
m. next step

- publish curriculum
- conduct train-the-trainer workshops
- develop regional modules
- marine module
- more classes
- citizen science portal
- encourage underserved adults to participate

California's Biodiversity in Context

a. CA is a state of extremes

- Mt Whitney and Badwater in Death Valley are the highest and lowest points in the contiguous 48 states, respectively



- oldest
 - Methuselah, a Great Basin Bristlecone Pine in the White Mountains of CA is the oldest living tree in the Western Hemisphere at nearly 5,000 yrs old



- largest
 - the General Sherman Tree, a Giant Sequoia, is the largest tree (by volume) in the world



- tallest
 - the Coastal redwoods are the tallest trees in the world

- b. California is one of Earth's 25 biodiversity hotspots
- 30,000 species of insects
 - 63 species of freshwater fish
 - 46 species of amphibians
 - 96 species of reptiles
 - 563 species of birds
 - 190 species of mammals
 - more than 8,000 species of plants, many of which are found only in CA



Figure 1 The 25 hotspots. The hotspot expanses comprise 30–3% of the red areas.

- c. California has the largest number of endemic species out of all 50 states

Region	Area (km ²)	Native genera	Native spp.	% spp endemic	Intr. Genera & spp.
California	411,000	878	4839	30	188/1023
California Floristic Province (CFP)	324,000	795	4452	47.7	
Alaska	1,479,000	355	1366	5.9	
Texas	751,000	1075	4196	9	
Japan	377,000	1098	4022	34	

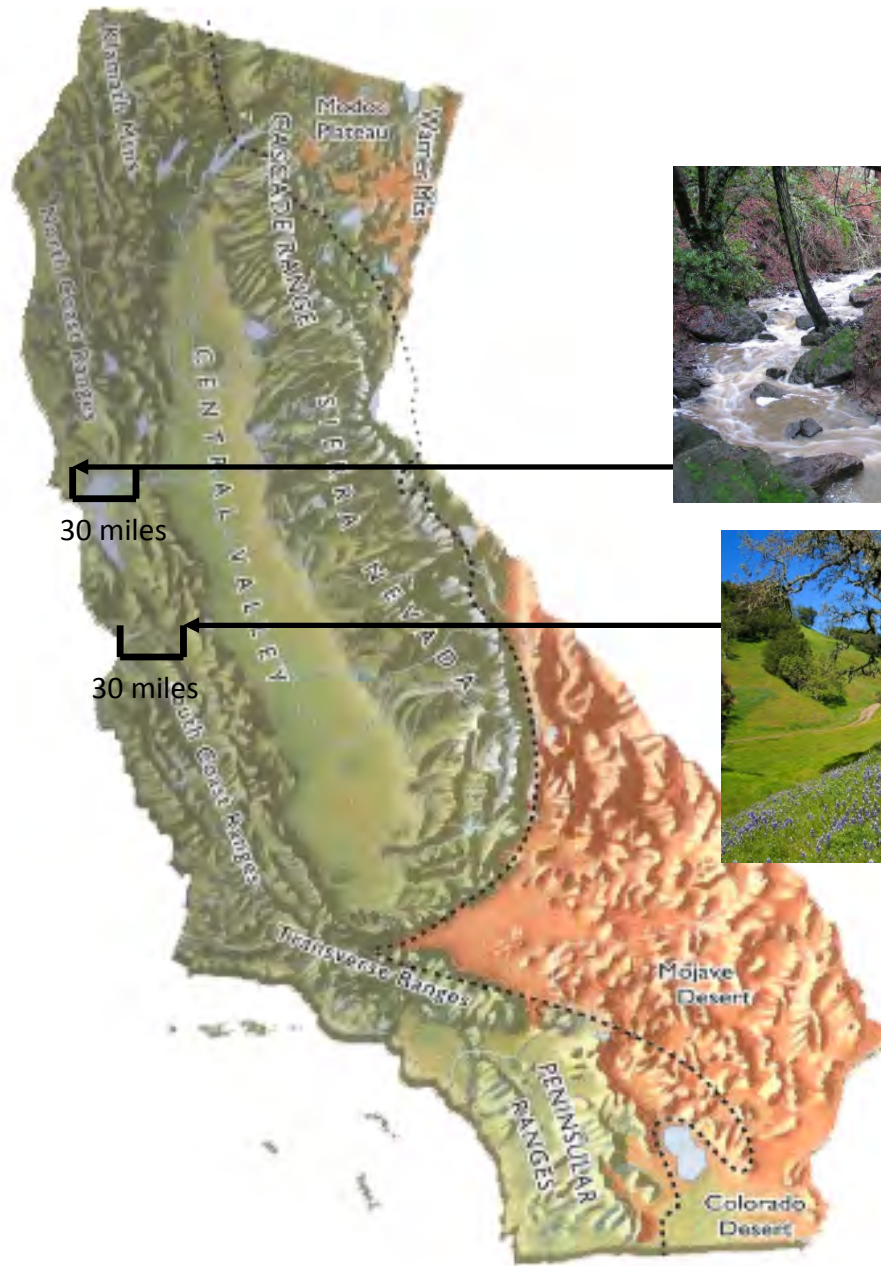
Numbers of vascular plant taxa (sensu Ornduff et al.; circa 2005)

- *geographic range*: area within which a given species may be found
 - *geographic range* is not static, as plants and animals are constantly probing the boundaries of their range
- *endemic species* are naturally and exclusively restricted to a particular locality or region

- ex. of CA endemics
 - *Clarkia xantiana*



- Blue oak



○ at 6pm, July:



55 degrees
relative humidity
80%



82 degrees
relative humidity
17%

- aspect
 - the direction a hill faces
 - in the Northern Hemisphere, the sun shines from the south
 - North facing slopes are cooler
 - South facing slopes are hotter



- slope
 - a measure of steepness
 - most hills vary between 15% and 30% slope

- plant communities will differ depending on where on the slope a plant occurs
 - soil at the bottom of the hill tends to be richer and softer because it has collected soils washed off the hills by landslides and streams
 - soil on the slopes tends to be shallower and rockier

- Tule fog
 - during the day, warm air moves up and over valley walls
 - at night, cool air flows down the valley walls and pools at the bottom
 - Tule fog forms when cold mountain air flows down the sides of the Central Valley and fills it to the "brim"



- it is not the averages but the extremes of temperature and rainfall which determine a species' geographic range
 - citrus growers push the limits of temperature tolerance in the trees they cultivate, and periodically they pay the price in form of a cold snap that wipes out their entire crop

○ precipitation

PM 13.04

3. once the cloud reaches a sufficiently high altitude, it begins to "drop" its water

2. the temperature of the cloud drops with increasing altitude, as well as its water carrying capacity

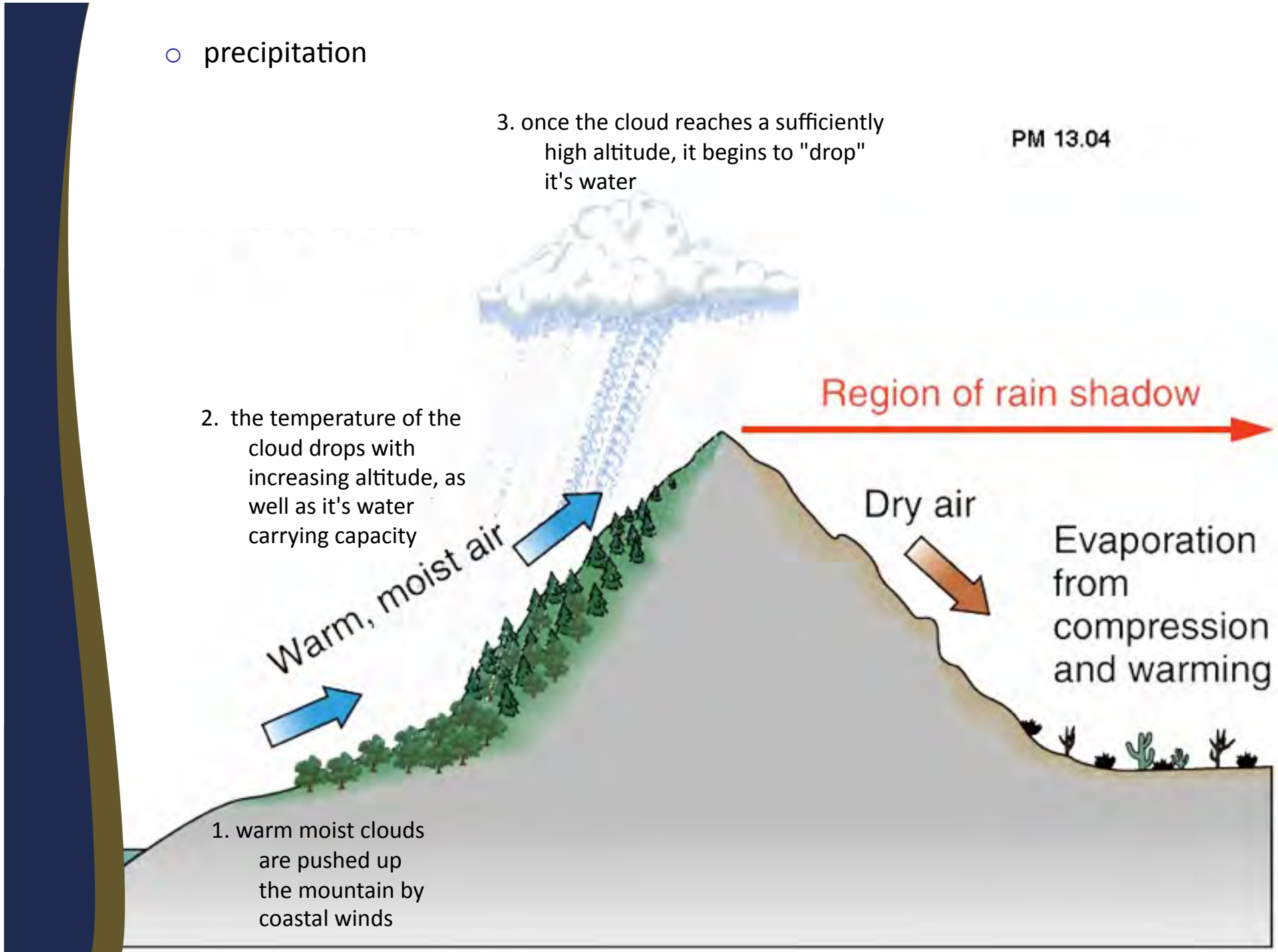
1. warm moist clouds are pushed up the mountain by coastal winds

Warm, moist air

Region of rain shadow

Dry air

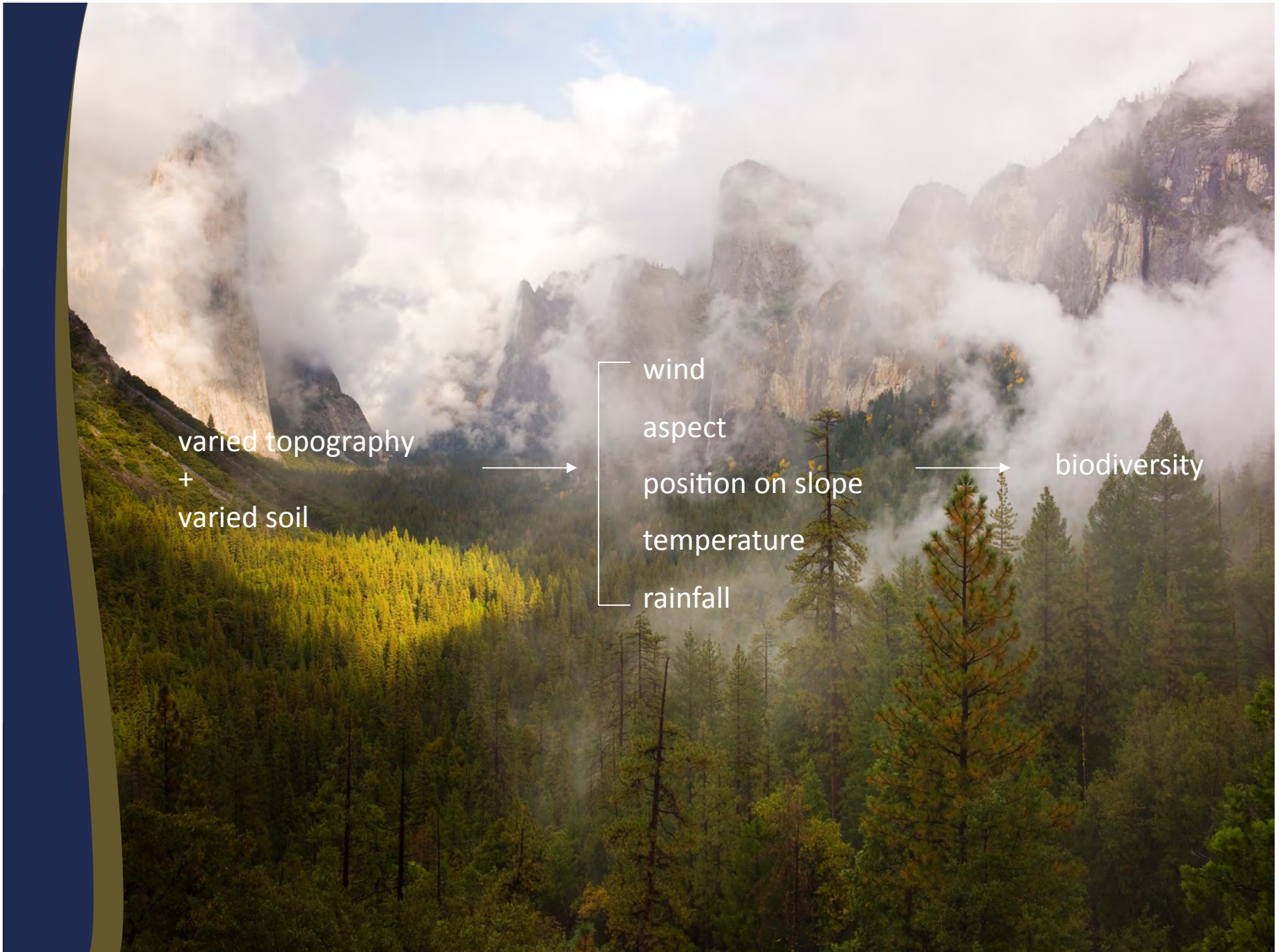
Evaporation from compression and warming



- extent of orographic precipitation varies with elevation and size of the mountain range
 - clouds passing over low topography San Francisco only produce 20 inches of annual rainfall
 - the same clouds passing over Mount Tamalpais on the other hand are driven up 2,000 or more feet and consequently Kentfield has 60 inches of annual rainfall
 - naturally, plant communities that grow in these two areas can be quite different



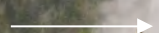
- soil diversity also contributes to California's high biodiversity
 - soils have different chemical compositions and physical structures depending on their parent materials and how and where they were formed
- soil type shapes the composition of plant communities
 - ex. serpentine soils are conducive to the growth of leather oak



varied topography
+
varied soil



- wind
- aspect
- position on slope
- temperature
- rainfall



biodiversity

f. the biodiversity crisis

- biodiversity at all scales of life is currently being threatened
 - genes
 - species
 - natural ecological processes
 - evolutionary processes
 - ecosystems

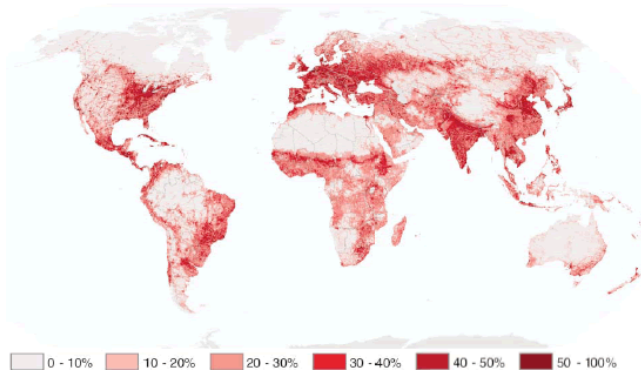


- the current rate of species extinction exceeds the background extinction rate prior to the emergence of modern humanity

- if the current rate of biodiversity loss continues, we will experience the most extreme mass extinction event since the K-T extinction event that ended the age of the dinosaurs



- land use change is the primary driver of habitat loss and ecosystem degradation-it greatly exacerbates most of the other threats to the environment
 - accelerated rates of land use change can be attributed to geometric growth of human population, which has increased six-fold since the 1800s



- overall, the human footprint is detectable across 83 percent of the land area in the world, excluding Antarctica

- synergistic effects between habitat loss, habitat fragmentation, and climate change can compound the effects of habitat loss on biodiversity

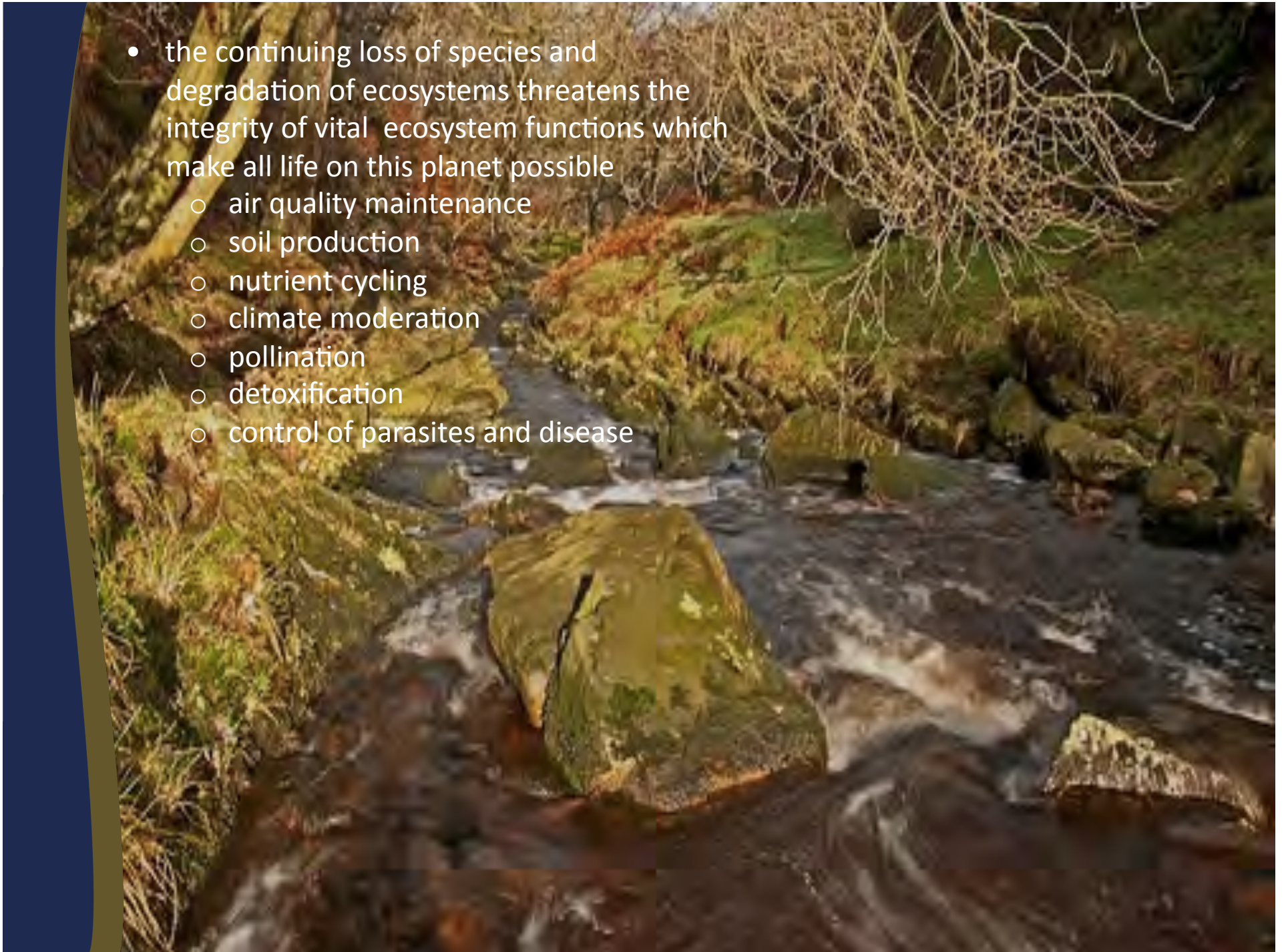


- researchers are figuring out whether or not species will be able to shift their distributions or evolve new adaptations fast enough to accommodate global warming
 - numerous studies such as the UC Berkeley Grinnell Project have documented the historical movement of species in response to climate change



- the continuing loss of species and degradation of ecosystems threatens our economy and sciences
 - many of our medicines and advances in agriculture and public health depend upon the study of wild species and their habitats
 - we have categorized and named less than 1% of all Earth's biodiversity, and of that 1%, we have only ventured beyond a superficial description of anatomy into biochemistry and genetics in a handful of these

- the continuing loss of species and degradation of ecosystems threatens the integrity of vital ecosystem functions which make all life on this planet possible
 - air quality maintenance
 - soil production
 - nutrient cycling
 - climate moderation
 - pollination
 - detoxification
 - control of parasites and disease



The Role of Naturalists

"To be a Naturalist is better than to be a King."

Charles William Beebe, Journal, 31
December, 1893

Jane Goodall



- a. what a naturalist does
- observes the natural world
 - reports back to his/her fellow humans
 - works with others to patch these observations into an understanding of the world
 - this is where knowledge originally comes from



- humans have always been naturalists by necessity: we have had to observe, measure, speculate and communicate about the world in order to survive

b. why be a naturalist?


- become a generalist with knowledge of the system as a whole
- during the 18th and 19th centuries, before formal fields of ecology, entomology, geology, and zoology emerged, only naturalists had command of these disciplines



- their collected specimens were instrumental to the creation of most natural history museums, including the California Academy of Sciences

- today, naturalists can contribute to science through their observations of rare or even new species
 - there are only so many scientists in California- more eyes and ears are needed in the field if we are to fully discover and explore all of our state's biodiversity



- 
- A large, spreading tree with vibrant yellow and orange autumn foliage stands in a field of tall, dry grass. In the background, a dense forest of dark green evergreen trees is visible under a blue sky with light, wispy clouds. The scene is captured in a natural, outdoor setting.
- naturalists form the link between the everyday and the academic

c. exemplary naturalists

- Charles Darwin (1809-1882)
 - articulated evolution, the greatest and most elegant explanatory theory of the biological sciences ever yet proposed



- John Muir (1838-1914)
 - wrote brilliant essays that changed our views on nature and deeply inspired readership to protect the environment
 - possessed the **two key qualities** vital to any naturalist
 1. the power of careful observation
 2. the ability to communicate and inspire others
 - pushed for the designation of Yosemite Valley, Sequoia & Kings Canyon, Grand Canyon, Mt Rainier as national parks
 - founded the Sierra Club
 - through nothing but keen observation ability and logic, discovered that Yosemite had been borne of glacial carving

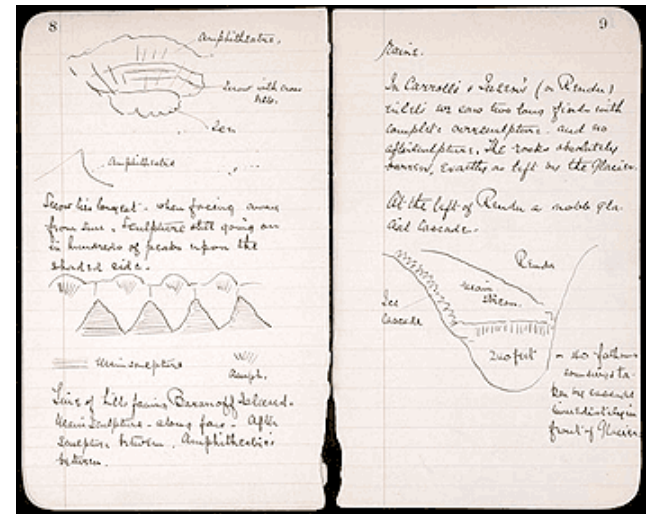
d. becoming a naturalist

- practice observing the world around you with all your senses



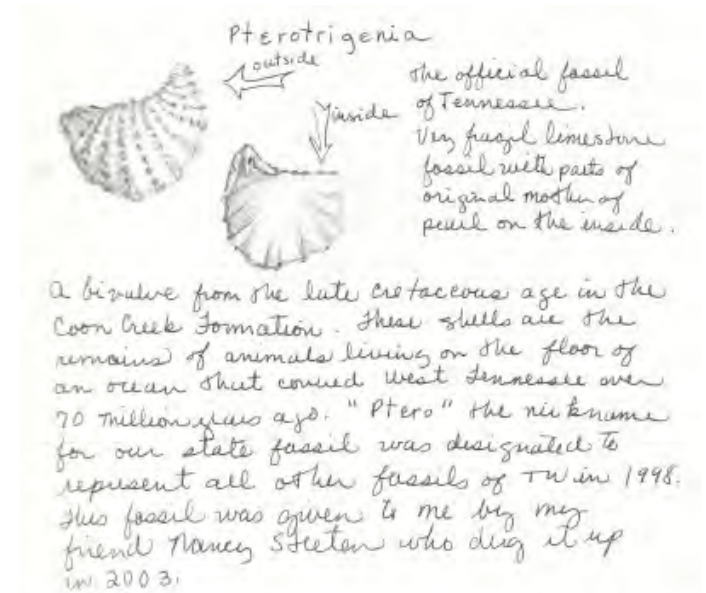
- record your observations in a naturalist journal
 - a tool to sharpen your skills of observation and interpretation
 - a way of spending some time to imbue value into your experiences
 - it doesn't matter if others have found what you are now just finding for your own, what matters is that the experience is new to **you!**
- a resource for other naturalists who may wish to build on your discoveries

- Grinnell Method used by UC Berkeley students and professional naturalists for over a century
 - field notebook
 - this is what you actually take to the field to record your observations
 - record detailed observations
 - put up an "Observation checklist" on the first or last page that you routinely refer to



- field journal
 - a place to rewrite your field observations in a format that is easy for you and others to read
 - each field day ought to have a separate journal entry with written descriptions, a species account and a catalog of collected specimens

- written description
 - this is a general account of the day's events
 - begin each page with the location of that entry and underline it with a wavy line
 - write in full sentences to tell a full story of what you observed
 - only write on one side of the sheet, and use the opposite side for sketches, maps, or photos (taped onto the paper)
 - underline species names, using straight lines for scientific names and wavy lines for common names



- species account
 - this is an account of specific natural observations of interests
 - title the page with the name of the species (scientific name)
- catalog
 - this is a record of any specimens that you collect
 - title each page "Catalog"
 - label or tag each specimen you collect

- learn how to properly name and classify what you find
 - necessary in order to communicate clearly
 - Carl Linnaeus (1707-1778), hierarchical classification
 - each *species* is assigned a *binomial*
 - first word designates the *genus*
 - things in same genus share recent common ancestor
 - 2nd word designates the *species*



- Hierarchical classification

Kingdom: Animalia

Phylum: Chordata

Class: Mammalia

Order: Carnivora

Family: Canidae

Genus: *Canis*

Species: *domestica*