

Human Sensory Ecology Field Activity

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Abstract

In this 45-60 minute contemplative field activity, students use a human sensory ecology framework to collect quantifiable data in their chosen outdoor environment. The activity works anywhere and engages students of all backgrounds. It is designed as a self-administered field experience, useful for remote or non-lab courses, but also diversifies field activities in courses emphasizing traditional data-collection in a group setting. In the activity, students are challenged to observe their surroundings as biological ecologists, but also to investigate their multi-sensory experience as a potential source of personal well-being and meaning. The associated writing assignments also allow students to think critically about their connections to nature in a world increasingly dominated by technology and social interactions. This can facilitate deeper discussion relevant for today's students about the value of non-material human-environment relationships as part of a broader conception of human ecology.

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Introduction – What is Human Sensory Ecology and why teach it?

ESA's recently-adopted four-dimensional ecology education (4DEE) framework seeks to elevate two important new dimensions of ecology, "Human-Environment Interactions" and "Ecology Practices", to equal status with "Core Ecology Concepts" (the familiar ecology hierarchy).² This new emphasis will require innovative, multi-disciplinary approaches. Human ecological relationships are shaped in diverse social, cultural, and technological contexts. These relationships result from both material needs (food, materials, energy) and non-material motivations (ethics, spiritual views, social norms).

For modern industrial societies, material ecological connections are largely decoupled from local ecosystems and are therefore abstract. In contrast, direct interactions with local environments via activities such as contemplative practices, nature study, or outdoor recreation

¹ The author has taught this activity since 2021 in three courses: Conservation Biology, Ecology, and Human Ecology (an honors course for non-biology majors).

² Klemow et al. 2019

may be personal and powerfully affective, but appear to fall outside the scope of traditional ecology. How then to incorporate “Ecology Practices” involving direct engagement with local ecosystems into a college science course emphasizing “Human-Environment Interactions” in a way that is meaningful to students?

Sensory ecology is the study of how organisms process and respond to sensory stimuli in their environment and how these sensory responses affect their interactions within that environment.³ This approach recognizes that ecological relationships and processes are grounded in organismal “informational interactions” via sensory experience (vision, hearing, touch, smell, taste).⁴

For humans, sensory awareness can connect objective characteristics of environments to the subjective experiences they induce. Personal “nature experiences” shape individual values and scale up by votes, dollars, or community engagement to affect impactful land-use decisions, from restoration of green spaces in cities to protection of natural areas outside of cities.⁵ Personal contact with these places may also encourage mindfulness of remote ecosystem connections and our global-scale environmental impacts. *Human* sensory ecology, then, provides a conceptual framework to inspire new practices that integrate traditional biological ecology into a multi-disciplinary investigation of the significance of non-material human-environment interactions.

The *Human Sensory Ecology Field Activity* combines concepts from sensory ecology, philosophy, and contemplative practices. During a 45-60 minute session, students record and quantify natural and anthropogenic stimuli in five sensory categories (sights, sounds, textures, scents, and mind) within a chosen outdoor environment. Observations are followed by a written report, class discussion, in-class writing prompt, and final exam questions. The activity works anywhere and engages students of all backgrounds. It is designed as a self-administered field experience, useful for remote or non-lab courses, but also diversifies field activities in courses emphasizing traditional data-collection in a group setting.

In the activity, students are challenged to observe their surroundings as biological ecologists, but also to investigate their multi-sensory experience as a potential source of personal well-being and meaning. The associated discussions and writing prompts also allow students to think critically about their connections to nature in a world increasingly dominated by technology and social interactions. This can facilitate deeper discussion relevant to today’s students about the value of non-material human-environment relationships as part of a broader conception of human ecology.

³ Dangles et al. 2009 cited in Burnett, 2011.

⁴ Dusenberry, 1992 pp 1-16.

⁵ Examples of sensory ecology applied to conservation in the US include the NPS Dark Sky Program and protection of “soundscapes” and the USFS and NPS Wilderness Character Monitoring programs.

Student Learning Objectives

Students will...

1. Gain confidence that they can focus on their direct sensory experience for an uninterrupted 45-60 minutes in an outdoor environment of their choice.
2. Use field ecology skills and a rigorous data collection protocol to make detailed records of sensory observations.
3. Experience a heightened awareness of the sensory richness of their chosen study environment.
4. Record their thoughts, feelings, insights, inspirations, and challenges while engaged in the activity.
5. Reflect on the extent to which they value natural and anthropogenic stimuli in their environments as sources of personal well-being and meaning.

Assignments/Products

1. Filled out 5-page field data sheet.
2. 2-3 page report in scientific format
3. Participation in class discussion.
4. 1-page response to in-class writing prompt.
5. Optional: Final exam question.

Equipment/Logistics

1. Provide students with data-sheets and instructions as hard-copy printouts.
2. Students should try to find an appropriate site for the activity. If safety is a concern, students should be encouraged to pair up with partners (from class or from outside of class).
3. Students should be encouraged to refrain from social interactions with partners or other persons during the observation periods.

Extensions/Variations

1. Students can be assigned more than one observation session. Multiple observation sessions can either be at the same site or contrasting sites.
2. An optional Powerpoint presentation and interactive classroom activity can introduce the general topic of Sensory Ecology in the classroom before the scheduled lab session(s).
3. Rather than being a self-directed field activity, the activity can be run as a normal lab/field session with an entire class. Students can be split into groups that are assigned to different observation locations within the same general study area. With this format, a separate learning objective can be studying the within-group variability (subjectivity) of the recorded observations.

References

- Burnett, S. (2011) Perceptual Worlds and Sensory Ecology. *Nature Education Knowledge* 3(10):75
- Dangles, O. et al. (2009) Variability in sensory ecology: Expanding the bridge between physiology and evolutionary biology. *Quarterly Review of Biology* 84, 51–74 (2009).
- Dusenberry, David (1992) *Sensory Ecology: How Organisms Acquire and Respond to Information*. W.H. Freeman Co., 558 pages.
- Klemow, K., Berkowitz, A., Cid, C., & Middendorf, G. (2019). Improving ecological education through a four-dimensional framework. *Frontiers in Ecology and the Environment*, 17(2), 71.

SENSORY ECOLOGY FIELD PROTOCOLS & DATA SHEETS

General instructions:

Spend 45 to 60 minutes doing your observations. Spend some of the time in one place, some of it moving around. Fill in the data sheets as you go and/or at the end of the observation period. Give yourself time to "look deeply" or "listen deeply" to certain stimuli if you wish. You may observe both "small things" (eg seeds in soil, parts of a flower, tiny insects) and "large things" (the entire forest canopy, distant objects or sounds, etc.). Be mindful of safety at all times. If you are doing the activity with a partner, position yourselves within earshot of each other, but not within sight (eg sit facing away from each other). Refrain from talking to each other during the observation period. For "describe location" be as specific as you can. Include GPS points if you have them. Include written description even if you have GPS points. Example: "Minnewaska SP, Peterskill trailhead, along the trail down to the creek, and locations along the creek."

Guide to filling in the data

P/A	Presence/absence. Check the box if this source of stimuli is present. Leave blank if absent or not applicable.
Sub-categories	Check boxes that apply. For "other", add information under "Description/Notes".
Spatial Scale	1 = stimuli was < 5 ft away ; 2 = stimuli between 5-100 ft; 3 = stimuli between 100 ft and 1 mile; 4 stimuli > than 1 mile away.
% wgt.	Assign a percentage to each row based on it's relative strength in the overall experience of this sense. The percentage (weight) should be based on magnitude and persistence (duration) of the stimuli. Stimuli that are persistent and high magnitude (noticeable) should get a high percentage. Try to make your percentages for all stimuli (natural and anthropogenic) add up to 100%. Don't assign percentages for the sub-categories, just one percentage for each row. For surface textures, assign wgts even if you did not actually walk on all surfaces (ie use your vision sense).
Description/Notes	Add information here to make your record more complete and informative. This will also help to improve future versions of this data sheet.
Total % wgt. Natural*	Estimate the overall % weight assigned to the natural stimuli.
Total % wgt. Anthropogenic*	Estimate the overall % weight assigned to the anthropogenic stimuli
Species category seen/heard	General categories for tallying species observed.
Tally # of species	Tally the distinct species observed (even if unidentified) in this space.
Total # of species	Add up your tally here.
Species list:	List any species in any category that you were able to identify. Use the greatest degree of specificity you can, but list anything you can identify at any taxonomic level. For example "deer" is ok - list it. "White-tailed deer" is better - list it that way if you have confidence in your ID.

*Some stimuli may be "semi-natural", ie of mixed human/non-human origin or influence. Use your own judgement, assign them as "natural" or "anthrogenic" accordingly, and explain your reasoning in the Notes column. The overall context of the site may affect how you categorize these stimuli. (Note: Natural stimuli are separated from the anthropogenic stimuli in the table by thick borders.)

Name:

Partner Name(s):

Date:

Time:

Describe Location:

Sights	P/A	Sub-categories	Spatial Scale (1 - 4)	% wgt.	Description / Notes
light & sky	<input type="checkbox"/>	<input type="checkbox"/> sun <input type="checkbox"/> sky <input type="checkbox"/> clouds <input type="checkbox"/> other			
trees	<input type="checkbox"/>	<input type="checkbox"/> broad-leaf <input type="checkbox"/> conifers <input type="checkbox"/> other			
plants etc.	<input type="checkbox"/>	<input type="checkbox"/> plants <input type="checkbox"/> fungi <input type="checkbox"/> lichen <input type="checkbox"/> other			
animals (other than human)	<input type="checkbox"/>	<input type="checkbox"/> birds <input type="checkbox"/> insects <input type="checkbox"/> mammals <input type="checkbox"/> other			
natural ground surface	<input type="checkbox"/>	<input type="checkbox"/> detritus <input type="checkbox"/> soil <input type="checkbox"/> rock <input type="checkbox"/> other			
natural water sources	<input type="checkbox"/>	<input type="checkbox"/> river/stream <input type="checkbox"/> lake/pond <input type="checkbox"/> snowfall <input type="checkbox"/> other			
humans	<input type="checkbox"/>				
structures	<input type="checkbox"/>	<input type="checkbox"/> buildings <input type="checkbox"/> signs <input type="checkbox"/> bridges <input type="checkbox"/> other			
vehicles	<input type="checkbox"/>	<input type="checkbox"/> automobiles <input type="checkbox"/> aircraft <input type="checkbox"/> other			
anthropogenic ground surface	<input type="checkbox"/>	<input type="checkbox"/> pavement <input type="checkbox"/> plants <input type="checkbox"/> other			
engineered water systems	<input type="checkbox"/>	<input type="checkbox"/> fountain <input type="checkbox"/> artificial pond <input type="checkbox"/> other			
electronic devices	<input type="checkbox"/>	<input type="checkbox"/> smart phone <input type="checkbox"/> tablet <input type="checkbox"/> other			
other	<input type="checkbox"/>				

Total % wgt. natural	
Total % wgt. anthropogenic	(natural + anthropogenic = 100%)

Species category seen	tally # of spp	Total spp #	Species list:
trees			
plants			
birds			
insects			
mammals			

Was there any sight in particular that was most impactful for you?

Comments, notes, reflections:

Name:

Partner Name(s):

Date:

Time:

Describe Location:

Sounds	P/A	Sub-categories	Spatial Scale (1 - 4)	% wgt.	Description / Notes
birds	<input type="checkbox"/>	<input type="checkbox"/> bird calls <input type="checkbox"/> other			
insects	<input type="checkbox"/>				
wind/weather	<input type="checkbox"/>	<input type="checkbox"/> wind <input type="checkbox"/> precipitation <input type="checkbox"/> thunder <input type="checkbox"/> other			
water	<input type="checkbox"/>	<input type="checkbox"/> stream <input type="checkbox"/> waves <input type="checkbox"/> drips <input type="checkbox"/> other			
falling objects etc.	<input type="checkbox"/>	<input type="checkbox"/> plant material <input type="checkbox"/> rocks <input type="checkbox"/> other			
human voices	<input type="checkbox"/>				
automobiles	<input type="checkbox"/>				
aircraft	<input type="checkbox"/>				
Industry/machines	<input type="checkbox"/>	<input type="checkbox"/> construction <input type="checkbox"/> machines <input type="checkbox"/> other			
electronic devices	<input type="checkbox"/>	<input type="checkbox"/> smart phone <input type="checkbox"/> tablet <input type="checkbox"/> other			
other	<input type="checkbox"/>				
other	<input type="checkbox"/>				

Total % wgt. natural	
Total % wgt. anthropogenic	(natural + anthropogenic = 100%)

Species category heard	tally # of spp	Total spp #	Species list:
birds			
insects			
mammals			

Was there any sound in particular that was most impactful for you?

Comments, notes, reflections:

Name:

Partner Name(s):

Date:

Time:

Describe Location:

Touch & Texture	P/A	Sub-categories	Spatial Scale (1 - 4)	% wgt.	Description / Notes
Natural surfaces	<input type="checkbox"/>	<input type="checkbox"/> soil <input type="checkbox"/> rock <input type="checkbox"/> detritus <input type="checkbox"/> vegetation <input type="checkbox"/> other			
on-skin touch sensation	<input type="checkbox"/>	<input type="checkbox"/> wind <input type="checkbox"/> moisture <input type="checkbox"/> temperature <input type="checkbox"/> other			
human impacted natural surface	<input type="checkbox"/>	<input type="checkbox"/> compacted soil <input type="checkbox"/> other			
unpaved trail/road	<input type="checkbox"/>	<input type="checkbox"/> walking trail <input type="checkbox"/> dirt road <input type="checkbox"/> other			
paved road/trail	<input type="checkbox"/>	<input type="checkbox"/> walking <input type="checkbox"/> bike <input type="checkbox"/> cars <input type="checkbox"/> other			
structures	<input type="checkbox"/>	<input type="checkbox"/> bridges <input type="checkbox"/> benches <input type="checkbox"/> tables <input type="checkbox"/> other			
other	<input type="checkbox"/>				

Total % wgt. natural	
Total % wgt. anthropogenic	(natural + anthropogenic = 100%)

Scents	P/A	Sub-categories	Spatial Scale (1 - 4)	% wgt.	Description / Notes
plants	<input type="checkbox"/>	<input type="checkbox"/> leaves/needles <input type="checkbox"/> aromatics <input type="checkbox"/> other			
animals	<input type="checkbox"/>	<input type="checkbox"/> body smells <input type="checkbox"/> other			
detritus/soil	<input type="checkbox"/>	<input type="checkbox"/> dead leaves <input type="checkbox"/> soil <input type="checkbox"/> animal smells <input type="checkbox"/> other			
water	<input type="checkbox"/>	<input type="checkbox"/> riparian areas <input type="checkbox"/> wet soil <input type="checkbox"/> other			
personal products	<input type="checkbox"/>	<input type="checkbox"/> perfumes, creams <input type="checkbox"/> repellents <input type="checkbox"/> other			
industrial	<input type="checkbox"/>	<input type="checkbox"/> exhaust <input type="checkbox"/> chemical <input type="checkbox"/> other			
other	<input type="checkbox"/>				
other	<input type="checkbox"/>				

Total % wgt. natural	
Total % wgt. anthropogenic	

Comments, notes, reflections:

Name:

Partner Name(s):

Date:

Time:

Describe Location:

Mental activity	P/A	Sub-categories	% wgt.	Description / Notes
Focused on sense stimuli	<input type="checkbox"/>	See questions below		
Reflecting on sense stimuli	<input type="checkbox"/>	See questions below		
Broader insights or inspiration from stimuli	<input type="checkbox"/>	See questions below		
Unrelated thoughts	<input type="checkbox"/>	See questions below		
Digital media	<input type="checkbox"/>	<input type="checkbox"/> smart phone <input type="checkbox"/> tablet <input type="checkbox"/> other		
other	<input type="checkbox"/>			
other	<input type="checkbox"/>			

Total % wgt. related	
Total % wgt. unrelated	(related + unrelated = 100%)

Do you want to share any comments on thoughts you had during this experience?

Do you want to share any comments on feelings you had during this experience?

Do you want to share any comments on insights or inspiration you had during this experience?

Reference for converting increments of time into % wghts.

seconds minutes			seconds minutes			seconds minutes		
1800 30			2700 45			3600 60		
1%	18	0.30	1%	27	0.45	1%	36	0.60
5%	90	1.50	5%	135	2.25	5%	180	3.00
10%	180	3.00	10%	270	4.50	10%	360	6.00
15%	270	4.50	15%	405	6.75	15%	540	9.00
20%	360	6.00	20%	540	9.00	20%	720	12.00
25%	450	7.50	25%	675	11.25	25%	900	15.00
50%	900	15.00	50%	1350	22.50	50%	1800	30.00
75%	1350	22.50	75%	2025	33.75	75%	2700	45.00
100%	1800	30.00	100%	2700	45.00	100%	3600	60.00

Sensory Ecology Field Activity and Report - Instructions

Sensory Ecology field observations

Complete the sensory ecology outdoor observation activity by following the instructions on the first page of the file “9 - Sensory Ecology datasheets” and filling in the associated datasheets. Make sure you include notes and reflections as well as answers to the questions at the bottom of each data sheet. Also, consider answering the three questions on the “mental activities” page. These notes, reflections, and answers to questions will help you with the writing assignment that accompanies the activity. Note: Your assignment is to do one 45-60 minute observation session, which includes the time needed to fill in the datasheets.

Sensory Ecology writing assignment (report)

Write a 2-3 page report (4 page maximum), with 1.5 line spacing, that describes your experience with this assignment. Include your expectations before the activity, how you did it (where you did it, how you divided tasks, etc.), what you observed, and your evaluation, summary, and reflections. Highlight the aspects of the activity that were most interesting, impactful, or challenging.

Base your report on the following questions or directives, which are arranged within the traditional scientific writing format.

Introduction: Briefly introduce the report giving some background and context. What were your thoughts and expectations going into this assignment?

Methods: Briefly describe where you did the activity, how you handled the tasks (eg, did you fill in datasheets at the end, at different times during the observation period, or continuously throughout the period?), and any other techniques or choices you made that affected the outcome of the activity.

Results: Summarize in words the data in your sheets - what you saw, heard, touched, smelled, and thought, focusing on the most impactful or interesting aspects of the experience.

Discussion: Overall, was this experience valuable, interesting, or challenging? Why or why not? Do you want to share any thoughts, feelings, insights, inspirations that came from the experience? Do you have any complaints, critiques, or suggestions related to the assignment?

Instructions for turning in the assignment

Submit two electronic files using Brightspace. The two electronic files will be a) the report itself, in MS Word, 1.5 line spacing, with a file name following this example: “Keeling, Eric – Sensory ecology report”. b) photos or scans of the four datasheets (pages 2-5 in the excel file). Ideally, the 4 photos should be submitted as one file (pdf preferably). File name should follow this example: “Keeling, Eric - Sensory ecology data”. Also turn in the hard-copy of your datasheets in class.

Grading

Your report will be graded on the following:

	Points
Writing and Mechanics (filename, spacing, clarity, conciseness)	1
Organization (unified and coherent paragraphs that present a logical flow of ideas)	2
Completeness (addressing questions and directives in instructions above, including completeness of datasheet)	3
Depth of discussion (development of themes listed under "Discussion" above)	4
Total	10

Reflections on Sensory Ecology Activity – In-class writing prompt

Consider the following three questions related to the sensory ecology activity (or similar contemplative experiences you have had in an outdoor environment).

- 1) Did the experience of being attentive to your surroundings in an outdoor, natural/semi-natural environment have positive effects for you? (e.g. Increased sense of well-being; therapeutic effects, etc.)
- 2) Do you feel that the natural stimuli of the environment (the “nature” part) played an especially important role in the positive effects you experienced?
- 3) Assume that an artificial, virtual-reality experience of your chosen environment is available that is completely realistic in all senses, and that you have consciously chosen it over an experience in the real environment. (Assume you *know* it is VR; ie you have not been deceived into thinking it is real). Would the value of the experience be significantly diminished if these stimuli were completely and accurately provided through an artificial, virtual-reality experience, created by human producers, rather than from the “real world”?

After considering your answers to these questions, circle one of the categories below that most closely (even if not perfectly) represents your feelings on this theme:

- a) YES – positive effects; YES – natural stimuli were important; YES – the value of the experience would be diminished for me if it was produced via virtual reality.
- b) YES – positive effects; YES – natural stimuli were important; NO – the value of the experience would not be significantly diminished for me if it was produced via virtual reality.
- c) YES – positive effects; NO – natural stimuli were not important to me.
- d) NO – the experience was generally not positive for me.

Whatever category you choose, write ~ 1 page articulating why you feel the way you do about the questions (1, 2, and 3 above). For example, if you picked category a, articulate what the positive effects were, why the natural component of the environment was important, and why VR would diminish the experience, etc.

State clearly at the outset of your essay which category of response you are writing, based on your answers to the four questions above. You will be graded on the clarity of your writing, overall effort, and the depth of your thinking.