COURSE OUTLINE: ES3201

Course Title	**Coupled Human and Natural Systems**		
Course Code	**ES3201**		
Offered	Study Year 3, Sem 2 | Study Year 4, Sem 2		
Course Coordinator	Lee Ser Huay Janice Teresa (Asst Prof)	janicelee@ntu.edu.sg	6592 3601
Pre-requisites	ES1001		
AU	4		
Contact hours	Field Trip: 40, Tutorials: 26, Lectures: 26		
Approved for delivery from	AY 2019/20 semester 2		
Last revised	2 Jun 2019, 16:13		

Course Aims

The course will introduce major concepts in the study of coupled human and natural systems such as telecoupling and complex adaptive systems. The course will focus on identifying social and ecological components and processes in socioecological systems and apply established frameworks to the study of connections and linkages across social and ecological realms. The aims of this course are to apply established conceptual frameworks, and to develop a working knowledge of social science research methods and spatial analyses when studying coupled human and natural systems.

Intended Learning Outcomes

Upon successfully completing this course, you should be able to:

1. Describe major concepts in the study of coupled human and natural systems.
2. Apply established conceptual frameworks to study human-environment interactions.
3. Design appropriate social surveys for the collection of social data.
4. Generate meaningful maps and interpretation of spatial analysis results.
5. Communicate concepts in coupled human and natural systems effectively in written and spoken word.
6. Discuss the role of social sciences in the study of earth and environmental systems sciences.
7. Develop creative and critical thinking skills.
8. Develop skills in reviewing their peers' written work and provide constructive feedback.

Course Content

Introduction to CHNS

Population & Environment

Governing the Commons

Frameworks for studying complex CHNS

Community-based Conservation

Social Science Research in CHNS I

Social Science Research in CHNS II

Land-Use System Science I

Land-Use System Science II

Telecoupling I: Food & Agricultural Systems

Telecoupling II: Urban-Rural Connection

CHNS Complexity & Resilience I

CHNS Complexity & Resilience II

Assessment

Component	Course ILOs tested	ASE Graduate Attributes tested	Weighting	Team / Individual	Assessment Rubrics
Continuous Assessment					
Tutorials					
Peer Review Assignments	5, 8	**2.** a, b **3.** a	15	individual	See Appendix for rubric
Term Paper	1, 2, 3, 5	**1.** a **2.** a, b **3.** a **5.** a, b, c **6.** a, b **7.** a, b **9.** b, c	30	individual	See Appendix for rubric
Mapping Assignment	1, 2, 4, 5	**1.** a, b **3.** c **5.** b	15	individual	See Appendix for rubric
Presentation	1, 2, 5, 6	**2.** a, b **3.** b, c	20	individual	See Appendix for rubric

		6. b **7.** b			
Written Report	1, 2, 5, 6, 7	**1.** a **3.** a **5.** a, b	20	individual	See Appendix for rubric
		Total	**100%**		

These are the relevant ASE Graduate Attributes.

1. Apply environmental knowledge, concepts and skills to make sound decisions

a. Interpret evidence to give sound environmental advice to stakeholders

b. Give advice to industry regarding existing environmental legislation

2. Demonstrate intellectual flexibility and critical thinking

a. Demonstrate intellectual flexibility to view environmental issues from multiple perspectives

b. Question assumptions behind current ways of solving environmental problems

3. Demonstrate passion and use advanced communication skills to share that passion

a. Effectively communicate environmental concepts in writing

b. Effectively communicate environmental concepts in speech

c. Effectively communicate environmental concepts in various forms of media such as data visualisation, diagrams, animation, video, or podcasts

5. Conduct research

a. Search for relevant scientific literature

b. Synthesize findings from scientific literature into laboratory reports, presentations, written assignments and field reports

c. Make first-hand observations in order to draw conclusions

6. Solve environmental problems

a. Demonstrate creative approaches to solving environmental problems

b. Express and explain why the problems are important

7. Synthesize interdisciplinary approaches to solving problems

a. Apply techniques from diverse disciplines to solve environmental problems

b. Explain how a certain problem-solving approach may impact the environment or human society

9. Demonstrate ethical values

b. Respect regulations involving plagiarism and copyright

c. Respect requirements regarding confidentiality, data protection, conflict of interest, and falsification of data

Formative Feedback

You will receive written feedback for Written Assignments 1 & 2, Peer Review Assignments 1 & 2, Mapping Assignment & Term Paper.

You will also receive oral feedback for Class Presentation 1 & 2.

Learning and Teaching Approach

Field Trip (40 hours)	Field trips will provide you with on-the-ground experiences about oil palm landscapes and allow you to interact with many different stakeholders (e.g., company personnel, small farmers) about the issue of oil palm expansion in Sumatra.
Tutorials (26 hours)	Tutorial sessions will: • Allow you a space to discuss in-depth what you have learned from the lectures and readings • Demonstrate practical applications of conceptual frameworks, social survey design and data collection, and spatial analyses for the study of coupled human-natural systems.
Lectures (26 hours)	Lectures will pass on theoretical knowledge required to understand major concepts and techniques used to study coupled-human and natural systems.

Reading and References

Textbooks:
1. Environmental Social Science: Human-Environment Interactions and Sustainability by Moran, E. [LWNL Call No. GF75.M829e; e-book access through NTU Library]
2. Navigating Social-Ecological Systems: Building Resilience for Complexity and Change by Berkes, F., Colding, J., Folke, C. [e-book access through NTU Library]
3. The Princeton Guide to Ecology by Levin S. [e-book access through NTU Library]
4. Conducting research in conservation: social science methods and practice by Helen Newig (and

others) [LWNL Call No. GE10.C746]
5. Web resources: Human Ecology-Basic Concepts for Sustainable Development by Gerald Marten (http://www.gerrymarten.com/human-ecology/tableofcontents.html)

Readings:
1 – What is CHNS
1. Lewis & Maslin (2015), “Defining the Anthropocene.” Nature 519 (171)
2. Liu, J., et al. (2007). "Coupled Human and Natural Systems." AMBIO: A Journal of the Human Environment 36(8): 639-649.

http://anthropocene.info/short-films.php
https://www.youtube.com/watch?v=RgqtrlixYR4

2 – Population & Environment
1. Lambin, E. F., et al. (2001). "The causes of land-use and land-cover change: moving beyond the myths." Global Environmental Change 11(4): 261-269.

http://www.gerrymarten.com/human-ecology/chapter02.html#p6

Tutorial:
http://e360.yale.edu/features/too_many_people_too_much_consumption
https://www.wired.com/1997/02/the-doomslayer-2/
www.kurzweilai.net/kurzweil-responds-to-brockman-2007
www.readingfromtheleft.com/PDF/IPAT-Hynes.pdf

3 – Governing the Commons
1. Ostrom, E., et al. (1999). "Revisiting the Commons: Local Lessons, Global Challenges." Science 284(5412): 278.
2. Hardin G. (1968) “The Tragedy of the Commons” Science 162(3859): 1243-1248
3. Heberlein, T. (2012) Navigating Environmental Attitudes [e-book access through NTU library] – Chapter 1 Attitudes, Rivers, and Environmental Fixes

https://news.mongabay.com/2017/10/indonesia-for-sale-in-depth-series-on-corruption-palm-oil-and-rainforests-starts-tomorrow/

Tutorial
Varkkey, H. (2012). "Patronage politics as a driver of economic regionalisation: The Indonesian oil palm sector and transboundary haze." Asia Pac. Viewp. 53(3): 314-329.

4 – Frameworks for Studying Complex CHNS
1. Ostrom, E. 2009). "A General Framework for Analyzing Sustainability of Social-Ecological Systems." Science 325(5939): 419.
2. Parrott, L., C. Chion, R. Gonzalès and G. Latombe. 2012. Agents, individuals, and networks: modeling methods to inform natural resource management in regional landscapes. Ecology and Society 17(3): 32.

http://www.gerrymarten.com/human-ecology/chapter04.html

Tutorial
https://www.theguardian.com/sustainable-business/ng-interactive/2014/nov/10/palm-oil-rainforest-cupboard-interactive
https://news.nationalgeographic.com/2017/03/wildlife-watch-illegal-logging-palm-oil-indonesia-sumatran-elephants/
https://news.mongabay.com/2017/01/local-ngos-ecosystem-services-not-orangutans-key-to-saving-leuser/
https://news.mongabay.com/2015/11/acehs-priceless-leuser-ecosystem-still-shrinking-as-oil-palm-grows/

5 – Community-based conservation
1. Agrawal, A. & Gibson, C. (1999) Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation. World Development 27(4): 629-649.

6 – Social Science Research in CHNS I
1. Handouts from Conducting research in conservation: social science methods and practice by Helen Newig (and others) [LWNL Call No. GE10.C746]

7 – Social Science Research in CHNS II
1. Handouts from Conducting research in conservation: social science methods and practice by Helen Newig (and others) [LWNL Call No. GE10.C746]

8 – Land-Use System Science I
1. Turner, B. L., et al. (2007). "The emergence of land change science for global environmental change and sustainability." Proceedings of the National Academy of Sciences 104(52): 20666-20671.

Tutorial
Readings related to eco-certification debate.
9 – Land-Use System Science II 1. Geist, H. J. and E. F. Lambin (2002). "Proximate causes and underlying driving forces of tropical deforestation." BioScience 52(2): 143-150.

Tutorial
Readings related to zero-deforestation commitments
10 – Telecoupling Forests & Agricultural Systems
1. Liu, J., V. Hull, M. Batistella, R. DeFries, T. Dietz, F. Fu, T. W. Hertel, R. C. Izaurralde, E. F. Lambin, S.Li, L. A. Martinelli, W. J. McConnell, E. F. Moran, R. Naylor, Z. Ouyang, K. R. Polenske, A. Reenberg, G.de Miranda Rocha, C. S. Simmons, P. H. Verburg, P. M. Vitousek, F. Zhang, and C. Zhu. 2013. Framing sustainability in a telecoupled world. Ecology and Society 18(2): 26.
2. Gibbs, H. K., et al. (2016). "Did Ranchers and Slaughterhouses Respond to Zero-Deforestation Agreements in the Brazilian Amazon?" Conservation Letters 9(1): 32-42.

https://resourcetrade.earth/stories/food-security-trade-and-its-impacts#top
http://storymaps.esri.com/stories/feedingtheworld/
https://trase.earth/

11 – Telecoupling Urban-Rural Connection
1. Seto, K. C., et al. (2012). "Urban land teleconnections and sustainability." Proceedings of the National

Academy of Sciences 109(20): 7687-7692.
2. Tilman, D. and M. Clark (2014). "Global diets link environmental sustainability and human health." Nature 515(7528): 518–522.

http://environment.yale.edu/news/article/pnas-special-feature-on-urbanization-edited-by-karen-seto-yale/
https://blog.nature.org/science/2014/09/25/karen-seto-cities-conservation-urbanization-population-sustainability/

12 – CHNS Complexity & Resilience I
1. Holling, C. S. (2001). "Understanding the Complexity of Economic, Ecological, and Social Systems." Ecosystems 4(5): 390-405.
2. Folke, C., et al. (2004). "Regime Shifts, Resilience, and Biodiversity in Ecosystem Management." Annual Review of Ecology, Evolution, and Systematics 35(1): 557-581.
3. DeFries, R. and H. Nagendra (2017). "Ecosystem management as a wicked problem." Science 356(6335): 265-270.

Resilience Alliance Workbook from https://www.resalliance.org/resilience-assessment

13 – CHNS Complexity & Resilience II
1. Adger, W. N. (2006). "Vulnerability." Global Environmental Change 16(3): 268-281.
2. Folke, C., et al. (2005). "Adaptive Governance of Social-Ecological Systems." Annual Review of Environment and Resources 30(1): 441-473.

Resilience Alliance Workbook from https://www.resalliance.org/resilience-assessment

Course Policies and Student Responsibilities

(1) General

You are expected to complete all assigned pre-class readings and activities, attend all seminar classes punctually and take all scheduled assignments and tests by due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements for seminar sessions you have missed. You are expected to participate in all seminar discussions and activities.

(2) Field trip

You are expected to attend the field trip to Sumatra during the recess week. The field course will last a period of 5 days. We will cover travel and accommodation expenses for the field trip and release the field trip schedule in the first week of class. You will be responsible for reading the schedule carefully and be fully prepared for the field trip. You are also responsible for your own safety and well-being and should take all necessary action to ensure you have what you need while in the field.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the Academic Integrity website for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	Office Location	Phone	Email
Lee Ser Huay Janice Teresa (Asst Prof)	N2-01c-43	6592 3601	janicelee@ntu.edu.sg

Planned Weekly Schedule

Week	Topic	Course ILO	Readings/ Activities
1	Introduction to CHNS		
2	Population & Environment	1, 5, 6	
3	Governing the Commons	1, 5, 6	
4	Frameworks for studying complex CHNS	1, 2, 5, 6	Written Assignment 1
5	Community-based Conservation	1, 2, 5, 6	Peer review Assignment 1
6	Social Science Research in CHNS I	1, 3, 5, 6, 7, 8	
7	Social Science Research in CHNS II	1, 3, 5, 6, 7, 8	Class Presentation 1
8	Land-Use System Science I	1, 4, 5, 6, 7, 8	Class Presentation 2
9	Land-Use System Science II	1, 4, 5, 6, 7, 8	Mapping Assignment
10	Telecoupling I: Food & Agricultural Systems	1, 2, 5, 6, 7, 8	
11	Telecoupling II: Urban-Rural Connection	1, 2, 5, 6, 7, 8	Written Assignment 2
12	CHNS Complexity & Resilience I	1, 2, 5, 6, 7, 8	Peer review Assignment 2
13	CHNS Complexity & Resilience II	1, 2, 5, 6, 7, 8	Term Paper

Appendix 1: Assessment Rubrics

Rubric for Tutorials: Peer Review Assignments (15%)

Assessment Criteria for Peer Review Assignment 1

Category	Excellent (85-100%)	Good (70-84%)	Adequate (55-69%)	Inadequate (< 55%)
Submitted paper prior to deadline	Essay submitted on time			Essay submitted late
Provided meaningful feedback on content of essay	Comments include specific suggestions and additional resources for consideration	Comments indicate some suggestions for consideration	Comments are superficial and provide vague suggestions for consideration	No comments provided
Provided meaningful feedback on structure/ organization and clarity of points	Comments include specific suggestions improving structure and order	Comments identify potential problems with structure and organization	Comments are superficial	No comments provided
Provided all comments in a positive, encouraging and constructive manner	Comments praise specific strengths of the presentation as well as constructively addressing weaknesses with alternatives that might be considered	Comments include positive feedback and suggestions	Comments are neutral or non-engaging	Comments might be interpreted as insulting

Appendix 4: Assessment Criteria for Peer Review Assignment 2

Category	Excellent (85-100%)	Good (70-84%)	Adequate (55-69%)	Inadequate (< 55%)

Submitted paper prior to deadline	Essay submitted on time	Essay submitted on time	Essay submitted on time	Essay submitted late
Provided meaningful feedback on content of essay	Comments include specific suggestions and additional resources for consideration	Comments indicate some suggestions for consideration	Comments are superficial and provide vague suggestions for consideration	No comments provided
Provided meaningful feedback on structure/ organization and clarity of points	Comments include specific suggestions improving structure and order	Comments identify potential problems with structure and organization	Comments are superficial	No comments provided
Provided all comments in a positive, encouraging and constructive manner	Comments praise specific strengths of the presentation as well as constructively addressing weaknesses with alternatives that might be considered	Comments include positive feedback and suggestions	Comments are neutral or non-engaging	Comments might be interpreted as insulting

Rubric for Tutorials: Term Paper (30%)

	Excellent (90-100%)	**Good (74-89%)**	**Adequate (65-73%)**	**Inadequate (< 65%)**
Background	Points were clearly expressed. Points were connected and well-linked.	Points were expressed. Points were less well connected.	Points were poorly expressed. Little connection between points.	Points were difficult to understand and confusing. No connection between points.
	Provided clear justification for project and synthesized important literature for the topic.	Justification for project was present. Some literature references for topic were cited.	Minimal justification and outline for the project. Lack of literature references.	No attempt made to justify why the project is pursued. Lack of literature references.
Research Question/ Objective	Well defined objectives. Aims were explicit. Addresses a relevant and important topic.	Objectives were defined but required refinement. Addresses a relevant and important topic.	Objectives were poorly defined. Addresses a topic which is not an example of a coupled human natural system.	Objectives were poorly defined and were superficial. Addresses a topic which is not an example of a coupled human natural system.

Methods	Well thought out, and explicit description of methods.	Well thought out but description of methods was less explicit.	Poor design of study and vague description of methods.	Methodology was flawed. Vague description of methods.
Data Analysis	The process of data collection and analysis was well documented. Data limitations or any caveats related to the analysis were stated. Appropriate techniques were used to evaluate data.	The process of data collection was documented. Data limitations were stated. Appropriate techniques used to evaluate data.	The process of data collection was not documented. No reflection of data limitations and potential caveats in study. Inappropriate techniques used to evaluate data.	No attempt made to collect data for project.
Results & Discussion	Results were presented in an organized fashion and clearly explained. Interpretation of results were well supported.	Results were less organized and less clearly explained. Interpretation of results were fairly supported.	Results were poorly organized and incoherent. Interpretation of results were flawed and too speculative.	Results were not organized and incoherent. No attempt made to interpret results.
Conclusion	Good summary of project work. Linked findings to purpose of study and demonstrated how findings contributed to gap in literature.	Good summary of project work. Poor linking of findings to purpose of study. Weak demonstration of how findings contributed to gaps in literature.	Poor summary of project work. Findings were not linked to purpose of the study. No demonstration of how findings contributed to gaps in literature.	Summary was confusing and did not attempt to link results and discussion to purpose of the study. No demonstration of how findings contributed to gaps in literature.
References	All relevant statements supported by references. All citations standardized.	Most statements supported by references. Most citations standardized.	Minority of statements supported by references. Poor standardization for citations.	No references or citations.

Rubric for Tutorials: Mapping Assignment (15%)

	Excellent (90-100%)	**Good (74-89%)**	**Adequate (65-73%)**	**Inadequate (< 65%)**

Objective	Well defined objectives. Aims were explicit.	Objectives were defined but required refinement.	Objectives were poorly defined.	Objectives were poorly defined and were superficial.
Methods	Well thought out, and explicit description of methods.	Well thought out but description of methods was less explicit.	Poor design of study and vague description of methods.	Methodology was flawed. Vague description of methods.
Data Analysis	The process of data collection and analysis was well documented. Data limitations or any caveats related to the analysis were stated. Appropriate techniques were used to evaluate data.	The process of data collection was documented. Data limitations were stated. Appropriate techniques used to evaluate data.	The process of data collection was not documented. No reflection of data limitations and potential caveats in study. Inappropriate techniques used to evaluate data.	No attempt made to collect data for project.
Results and Discussion	Results presented in a logical and organized manner. Excellent use of graphs and figures to present results. Interpretation of results demonstrate understanding and clearly expressed.	Results presented in an organized manner. Graphs and figures were used to present results. Interpretation of results demonstrate understanding.	Results presented in an organized manner. Graphs and figures were used but were not well described. Interpretation of results was limited.	Results were poorly organized. Graphs and figures were poorly constructed and not described. Demonstrate lack of understanding of results and vague explanations.

Rubric for Tutorials: Presentation (20%)

Category	**Excellent (90-100%)**	**Good (74-89%)**	**Adequate (65-73%)**	**Inadequate (< 65%)**
Opening/ Intro	Clearly, quickly established the focus of the presentation, gained audience attention.	Established focus by the end of the intro, but went off on a tangent or two. Gained audience attention.	Audience had an idea of what was coming, but the intro did not clarify the main focus.	Little or no intro, or intro unfocused such that audience did not know the speaker's main focus.
Clarity and organization	Main points clearly stated and explained; well thought out background, logical, smooth organization.	Main points clearly stated; background adequate, logical, smooth organization.	Main points must be inferred by audience, background adequate, audience can	Presentation jumped among disconnected topics. Main points unclear.

			follow presentation but holes evident.	
Content	Content presented and analyzed in an interesting, knowledgeable, logical way. Key points clearly expressed and integrated with logical links. Presented appropriate and useful, forward-thinking insights.	Content presented and analyzed in an interesting, knowledgeable way. Key points clearly expressed and integrated with logical links. Presented appropriate insights.	Content presented in an interesting way. Some key points linked, but others 'hanging'. Presentation lacked clear synthesis and insight.	Content patchy. Lacked specific important information. Little effort to synthesize key points.
Style/Delivery	Audience could see and hear presentation clearly, appropriate eye contact, gestures, and language. Effective pauses and verbal intonation. Graceful transitions.	Audience could see and hear presentation clearly, appropriate eye contact, gestures, and language. Some pauses, verbal intonation, and transitions effective.	Audience could see and hear presentation. Presentation poorly timed. Speaker expressed hesitation or uncertainty.	Presenter spoke to the screen or mostly to one person in the audience. Difficult to hear or understand. Poorly timed.
Visual Aids	Well-selected, well-placed images and text. Figures were explained to clearly support ideas presented without extraneous info.	Well-selected images and text, not always well-placed. Figures clearly support ideas presented. May have some extraneous info.	Chosen images extraneous to presentation or marginally support presentation. Too much extra detail.	Chosen images and text marginally useful and poorly ordered. Too much extra detail. Limited connection to topic.
Summary	Conclusions clearly stated. Summary integrated main points and brought the presentation to a logical and effective close.	Conclusions clearly stated. Summary integrated main points and brought the presentation to an appropriate close.	Summary shown but poorly explained by speaker. Audience has to summarize for themselves.	Summary non-existent or very abrupt. Lack of synthesis.
Addressing questions	Questions handled with confidence and in a knowledgeable way. Speaker clearly demonstrated further	Questions handled in a knowledgeable way but with some hesitation. Speaker clearly demonstrated	Speaker made a strong effort to answer questions, but lacked depth of knowledge	Speaker lacked answers to obvious questions the audience would be likely to

	depth of knowledge than just information in his/her presentation.	further depth of knowledge than just the information in his/her presentation.	beyond what he/she already presented.	ask. Speaker struggled to link answer to content of presentation.

Rubric for Tutorials: Written Report (20%)

Assessment Criteria for Written Assignment 1

Category	Excellent (85-100%)	Good (70-84%)	Adequate (55-69%)	Inadequate (< 55%)
Clarity	The essay is clear and presented with a strong, coherent, and compelling voice that takes its audience into consideration	The essay is clear and is presented with a strong, coherent voice	The essay is mostly clear but contains a few errors that detract from the argument	Essay is unclear or does not address the assignment
Argumentation	Presents a focused argument that considers alternative solutions, evaluates them, and offers an insightful resolution	Presents a focused argument that considers alternative solutions and evaluates them	Presents a simple argument with a single point which may wander or not have a solution	Does not present an argument
Evidence	Offers multiple lines of evidence informing the argument and evaluates the merit of their contribution	Offers multiple lines of evidence and relates them to the argument	Offers a single line of evidence for claims	Does not provide evidence for claims
Sources	Expertly sourced references that include seminal articles that are relevant to the argument being presented	Entirely sourced references that are mostly relevant to the argument being presented	Offers a single line of evidence for claims	Does not provide evidence for claims

Assessment Criteria for Written Assignment 2

Category	Excellent (85-100%)	Good (70-84%)	Adequate (55-69%)	Inadequate (< 55%)

Clarity	Clear statement of the research problem. Identifies a clear issue that is recognizable from the proposal.	Clear statement of the research problem but some elements are inadequately addressed.	The proposal is mostly clear but contains a few errors that detract from the argument	Proposal is unclear or does not address the research statement.
Introduction	Proposal adequately and clearly summarized previous research focused on the problem. Significance of the research explained clearly.	Proposal adequately summarized previous research focused on the problem. Significance of the research explained.	Proposal summarized previous research focused on the problem. Significance of the research was unclear.	Superficial summary of previous research and significance of the research was not explained.
Proposed Method	Explicit in research methodology and demonstrates thoughtfulness in design of research	Explains research methodology but lacks specificity. Demonstrates thoughtfulness in research design.	Presents a simple methodology to the research problem and lacks specificity.	Proposed methodology was unclear and vague.
Sources	Expertly sourced references that include seminal articles that are relevant to the argument being presented	Entirely sourced references that are mostly relevant to the argument being presented	Offers a single line of evidence for claims	Does not provide evidence for claims

Appendix 2: Intended Affective Outcomes

As a result of this course, it is expected you will develop the following "big picture" attributes:

Appreciate the complexities in solving environmental problems.

Be aware of the value of social sciences in addressing environmental problems.

Motivated to apply their knowledge and skills in environmental challenges.