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A Peer Review of Teaching Benchmark Portfolio: LARC 497/597: Waste Ecologies

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A PEER REVIEW OF TEACHING BENCHMARK PORTFOLIO: LARC 497/597: WASTE ECOLOGIES

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ABSTRACT

This teaching portfolio presents a summary of my teaching efforts, course objectives, outcomes, and student learning for the first offering of the course LARC 497/597: Waste Ecologies. As a new professional elective course open to all upper level undergraduate and graduate students at the University of Nebraska-Lincoln in Spring 2018, participating in the Peer Review of Teaching program enabled me to develop the course through backwards design by matching course objectives with specific assignments and exercises that tracked student learning. Although this marked the first time teaching this course, it integrates my research trajectory of designing with waste. The Peer Review of Teaching program provided the venue and opportunity to critically reflect on course objectives, course activities and assignments, and develop and apply methods for students assessment and techniques for documentating student learning. My primary objective for participating in the program was to receive peer feedback on the clarity of the course, its delivery and structure, and strategies for assessing and documenting student learning, providing the support necessary to develop this new course. This portfolio documents the course objectives and structure, my teaching methods, assignments and their rationales, assessment methods, and selected student work, which is analyzed relative to the achievement of learning outcomes and course objectives. It also provides a critical reflection of potential planned changes for the next offering based on this analysis, documentation, and feedback.

Keywords: waste theory; design research pedagogy; landscape architecture; project-based learning; reuse

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OBJECTIVES OF PEER REVIEW COURSE PORTFOLIO

The Peer Review of Teaching program provided me with the resources, tools, and structure to rigorously establish and document the main objectives of this seminar course. This course portfolio provides an overview of the course structure, learning outcomes, and student learning for my professional elective course LARC 497/597: Waste Ecologies. This portfolio provides documentation of my course development process, course implimentation, and course outcomes through the refinement of course goals, activities, projects and assignments, and assessment.

The objectives of this Peer Review Course Portfolio are:

1. Provide a rigorous, detailed overview of my course, with a focus on its relationship to my research trajectory, course structure, assignment types, and documentation of student learning.
2. Assist other instructors in the design field to integrate a research trajectory within an advanced-level seminar course and provide methods for assessing and documenting student learning. Assignment descriptions, sample questions for reflections, assessment rubrics, and samples of student work across a range of ability levels provide guidelines for instructors developing new elective courses and a framework for student learning of complex theory-related topics.

The creation of this portfolio and participation in the Peer Review of Teaching program has provided me with the tools to critically examine my teaching methods. The pairing of course activities and assignments with learning outcomes for the course through backward design was one of the most effective strategies I gained from this process. This porfolio documents and reflects on the integration of this framework in the seminar course, uncovering the successes and opportunities for further development. By helping me to develop more proactive strategies for documenting and assessing student learning, I aim to continue developing these strategies and impliment them in other courses, particularly those related to my expertise and research around waste materials and waste landscapes.

DESCRIPTION OF COURSE

In Spring 2018, LARC 497/597: Waste Ecologies (see Appendix A on page 16 for Syllabus), a 3-credit elective course, was offered for the first time at the University of Nebraska-Lincoln in the College of Architecture. As an advanced research seminar / professional elective course, Waste Ecologies enabled me to integrate my research as a design pedagogy in a seminar format.

My research trajectory, which I have titled ***landscape lifecycles***, aims to reconceptualize waste as a resource for site and material transformation. Integrating waste transformation into design curricula is imperative. The next generation of designers must be critical of and actively engage with complex, contaminated landscapes and waste legacies. Rather than apply conventional approaches to waste reclamation that typically result in passive parks, I argue for an alternative, transformative approach. Grounded in concepts of material lifecycles, industrial ecology, and circular economies, ***landscape lifecycles*** spatializes these abstract systems and explores the aesthetic, experiential, and performative potentials of waste.

Implementing landscape lifecycles as a design pedagogy explores how reacting differently to the creation of waste yields creative acts of reuse, exposing students to a state-of-mind about waste's design opportunities rather than providing ready-made solutions. I encourage students to explore their unique interests within highly structured courses, resulting in a diversity of distinct, speculative responses that engage with waste's potential.

My courses aim to answer: *how do we train the next generation of landscape architects to innovatively and actively engage with perceived waste materials and landscapes in order to design meaningful waste places?* Courses use a scaffolded approach with a phased structure building on skills and the development of a waste-based language. Content and topics explored through readings and discussions build a theoretical foundation in each phase, which parallels and supports assignments, project development, and design inquiry.

Landscape lifecycles as a pedagogical approach to a research seminar explores the blurry, ambiguous, culturally constructed attitudes toward waste, its spatial and material implications, and its experiential possibilities.

The course objectives are to:

1. Question and be critical of cultural attitudes toward waste and the impact this has had on design;
2. Use reflection papers to document students' attitudes toward waste and how it might shift throughout the course; and
3. Speculate on the potentials of material and spatial waste generated by existing material-based systems that affect the built environment and support our cities.

Student enrollment for the course in Spring 2018 consisted of 11 students. 2 were undergraduate architecture students in their fourth year, 1 undergraduate engineering student in their fourth year, and 8 graduate architecture students, 2 in their first year and 6 in their final semester.

TEACHING METHODS | COURSE MATERIALS | COURSE ACTIVITIES

The course applies a scaffolded approach over three phases, as illustrated in the table below, coupling history and theory with a semester long research project done in groups.

Phase	Time Period	Assignment
Phase 1 *Theories + Constructs of Waste Materials + Landscapes*	Weeks 1-6 (6 weeks)	Waste Reflection (Wk 1) Reading discussion (Wk 2)- Waste Culturally Constructed Reading discussion (Wk 3)- Sanitation + Managing Waste Reading discussion (Wk 4)- Brownfields and Wastelands Waste Reflection (Wk 4) Waste Topic Analysis [Part 1] (self-selected) (Wk 1-6)
Phase 2 *Designing + Reframing Waste as a Resource - Case Studies*	Weeks 7-10 (4 weeks)	Reading discussion (Wk 7)- Design, Waste, and Benefits Reading discussion (Wk 8)- Reframing Waste: Concepts Waste Reflection (Wk 9) Waste Case Studies [Part 2] (self-selected) (Wk 7-10)
Phase 3 *Symbiotic Waste Systems*	Weeks 12-16 (5 weeks)	Waste Symbiosis - Speculative Proposals [Part 3] (Wk 12-16) Waste Reflection (Wk 16)

The semester's three phases parallel the three parts of the group research project. Phase 1, *Theories + Constructs of Waste Materials + Landscapes*, investigates the ways in which waste is culturally constructed, how waste materials have come to be managed, and the types of landscapes that have resulted from the production of waste. These topics were investigated each week through assigned and supplemental readings and class discussions. Assigned readings are provided in the syllabus, while supplemental readings are chosen by individual students who find and select a reading to pair with one assigned reading and lead discussion for the week (see Appendix C on page 39 for Critical Reading Assignment). Parallel to this is Part 1 of the design-research project, in which students investigate the history, spatial trajectory, and processes of a waste material (see Appendix B on page 30 for Team Project Brief).

The second phase, *Design + Reframing Waste as a Resource–Case Studies*, explores design practices and emerging conceptual frameworks for waste reuse. As with Phase 1, topics are investigated each week through readings and class discussions, including supplemental readings determined by discussion leaders. This phase also included guest lectures and a field trip to supplement the reading material and discussions. The field trip was to University of Nebraska-Lincoln's Innovation Campus' Centralized Renewable Energy Systems (Figure 1), which uses wastewater from the Theresa Street Wastewater Treatment Plant to heat and cool the buildings in the campus. This trip enabled students to see an example of how waste can be innovatively reused for other purposes in design.

Parallel to this is Part 2 of the design-research project, which entails a case study investigation and analysis of a project that innovatively reuses waste materials and/or landscapes. Students were exposed to landscape performance as a method of analysis for landscape-based case studies to analyze their own case study.

In Phase 3/Part 3, *Symbiotic Waste Systems*, teams paired up with one another and develop speculative scenarios and proposals for how their individual waste systems can hybridize, referencing lessons collected from

their case studies. The purpose of this exercise is to develop symbiotic exchanges and relationships with one another, grounded in landscape performance criteria of economic, environmental, and social benefits. Proposals will be highly speculative and innovative, challenging and questioning conventional approaches to reusing and reclaiming waste. Although each part of the project has specific requirements for drawing contents and topics, the graphic style, topic selection, and exploration is determined by the student groups.

The course objectives were achieved through weekly reading assignments and discussions, reflection papers, guest lectures, a field trip, and the semester long research project. Additionally, three in-class reflection papers were used to track student learning and their evolving attitudes towards waste throughout the course. Students also submitted a final reflection paper done outside of class that reflects on their previous reflections. I found these reflections to be incredibly enlightening and effective in demonstrating student learning. This body of work produced by the students encompasses the outcomes of the course, which will be described further in the section "documenting + analyzing student learning" on page 9.

The teaching methods and structure outlined above were developed for several reasons:

1. As an advanced topics course for design students in their final years of design education, I structured the course to include both readings (verbal) and a project (visual). The readings introduced students to new topics and authors in the design disciplines. Class discussions of those readings were very fruitful and engaging, while the project allowed students to continue developing their graphic skills and explore interesting and strange conditions in the built environment.
2. The flexibility provided by the course content enabled students to explore topics they were most interested in. In this sense, I thought of myself more as a bottom-up instructor that set up the framework and general content, while providing some flexibility for students to find their niche within the framework and topics that were being explored.
3. The aspect of the course I was most interested in is exploring the types of cultural baggage and taboos waste has, and how this effects design. I was curious about whether students initially had particular cultural perceptions of waste, whether they were aware of this, and how this perception might evolve throughout the course. The in-class reflection activity yielded some of the most interesting results that documented this process.

Figure 1: Field Trip to Centralized Renewable Energy System (CRES) Plant; Lincoln, NE

THE COURSE + THE BROADER CURRICULUM

As mentioned in previous sections, LARC 497/597 is a special topics professional elective course (see Appendix G on page 74) designed by instructors within the program. Instructors are encouraged to develop a course that relates to their research trajectory. In their last semester of design education, students are given the option to select an elective course that best aligns with their interests.

I developed the Waste Ecologies course as both an extension of my research and as a venue for students to explore their design interests related to waste materials and landscapes. This course was structured to investigate the spatial consequences of waste materials and landscapes. In doing so, we explored the cultural constructs of waste, questioned the spatial and material consequences of these cultural constructs, and critiqued emerging frameworks for waste reuse.

In this course, I emphasized that there is no right or wrong answer to design or to what waste is. The purpose of the course was to stimulate thoughtful responses, critical thinking, and exploration of the questions and contexts designers are confronted with as it relates to waste.

DOCUMENTING + ANALYZING STUDENT LEARNING

I used three main assignments and activities to document and analyze student learning in the course:

1. Critical Reading Assignment
2. Group Design-Research Project
3. Student Reflections

The Critical Reading Assignment and the Group Design-Research Project were both graded using a rubric. I also had students anonymously use the same rubric to grade their peers, which was highly informative and was used as a basis for the final grades for these assignments. 3 of the 4 student reflections were done in class and were not graded, but were mostly used to track and document student learning throughout the course. For comparison of the assignments, examples of "Exceeds Expectations," "Meets Expectations," and "Below Expectations" are presented.

Critical Reading Assignment + Presentation

This project is assigned the first day of class, and occurs over 4 weeks (Weeks 3 and 4; 7 and 8). Students were given a sign up sheet (see the end of Appendix C on page 39 for the sign up sheet) to sign up for a reading to critically exam. Additionally, students were asked to find another reading to pair with their selected reading. Students were then required to write a 1-2 page essay examining the assigned reading with their selected reading and presented their analysis to the class for discussion.

Below is the rubric (Figure 2) used for this assignment:

Critical Reading Presentation Rubric

Criteria	Ratings						Pts
Rigorous Investigation *quality, depth, and synthesis of research and analysis*	30.0 pts Exceed Expectations	28.0 pts Excellent	24.0 pts Good	20.0 pts Fair	15.0 pts Poor	0.0 pts Incomplete	30.0 pts
Critical Thinking *critically evaluate design ideas; question conventional modes of working; develop ethical considerations of waste and its design potential*	30.0 pts Exceeds Expectations	28.0 pts Excellent	24.0 pts Good	20.0 pts Fair	15.0 pts Poor	0.0 pts Incomplete	30.0 pts
Presentation *quality, depth, and clarity of presentation; fostered critical and respectful discussion; posed critical and thoughtful questions*	30.0 pts Exceeds Expectations	28.0 pts Excellent	24.0 pts Good	20.0 pts Fair	15.0 pts Poor	0.0 pts Incomplete	30.0 pts
Timely Submission	10.0 pts ALL work consistently completed on time throughout project		5.0 pts Some work completed late throughout project		0.0 pts Majority of work completed late throughout project		10.0 pts
							Total Points: 100.0

Figure 2: Critical Reading Presentation Grading Rubric

Students were given a copy of the rubric and were asked to provide an assessment of their peer's presentation and critical anlysis. At first, some students seemed a bit timid in providing critical feedback, but as the course progressed, some students seemed to grow more comfortable in being more critical of their peers. The assessment of a student by their peers was averaged with my score combined, which resulted in the final grade.

Examples of the critical short essay of the readings are provided in Appendix E on page 53. Essays by students A, B, and C exceeded expectations. They selected thoughtful companion essays, provided a critical and reflective analysis of the pairing, and posed thoughtfully constructed questions to the class that arose from the readings. Student D's analysis met expectations. They selected a reading without critically assessing its relationship to the assigned reading and asked questions that led to surface-level discussions. Student's E analysis was considered below expectations due to the lack of critical analysis of the assigned reading, and a lack of thoughtfulness in selecting the companion reading. The analysis was highly generalized and not critical enough of both the assigned and self-selected reading. Additionally, the submission was missing the questions, and classmates were unclear on the questions being asked in class, which led to short discussions that lacked criticality of the content.

Term Group Research Project + Presentation

This project is assigned the first day of class, and occurs for the duration of the whole semester as a full term group project (see Appendix B on page 30). This project was divided into 3 parts:

1. Documentation and analysis of a system that supports Lincoln, with an emphasis on the waste materials and landscapes produced by the system;
2. Case study analysis of an existing project innovatively reusing a waste material and/or landscape uncovered in Part 1; and
3. Synthesis of research through design speculation, in which two groups develop projects that reuse the waste materials and landscapes uncovered in their research.

Students were given a list of suggested topics for study, and were asked to list their top 3 choices for broad topics. I took this submission and assembled the groups based on students' interests. Following the assembly of their groups, students were then asked to select a sub-topic within their broader topic. For example, if a broader topic was "Energy" the student group then determined "Coal" based on their individual research interests. For each part, students developed final boards and presented them to their peers in class. As in the "Critical Reading Assignment," students also anonymously assessed their peers during presentation day using a rubric (Figure 3).

On the following page is the rubric used for all 3 parts of this assignment.

Examples of all 3 Parts of the project are provided in Appendix D on page 44. For Part 1 and Part 2, different groups exceeded expectations. For Part 1, Group A exceeded expectations because of the thoroughness of their research, the quality of their documentation and drawings, the criticality of their system, in this case, lettuce, and the focus on the waste generated by the industry they were analyzing. Group B, which examined the automotive recycling industry, met expectations throughout Parts 1 and 2. Their analysis was very rigorous and thorough, but their representation was inconsistent and required more focus on the overall topic. Group C, which examined the wood industry, also performed high-level analysis, but the overall documentation and representation of the work was not critical enough, and did not place enough emphasis on the waste generated by the industry, or how their case study was innovatively reusing material and spatial byproducts. For Part 2, Group D provided high-level, thorough, and critical analysis of their case study. Their representation was consistent, clear, and exceeded expectations in illustrating the information.

Term Project + Assignment Rubric (2)

Criteria	Ratings						Pts
Craft + Representation + Finalization *technical quality, legibility, precision, annotation*	30.0 pts Exceeds Expectations	28.0 pts Excellent	24.0 pts Good	20.0 pts Fair	15.0 pts Poor	0.0 pts Incomplete	30.0 pts
Rigorous Investigation *quality, depth, and synthesis of research and analysis*	30.0 pts Exceed Expectations	28.0 pts Excellent	24.0 pts Good	20.0 pts Fair	15.0 pts Poor	0.0 pts Incomplete	30.0 pts
Evolution *growth of technical ability; response to feedback; iteration of work*	15.0 pts Work evolved and improved throughout the project; incorporated and responded to feedback	10.0 pts Work reflects some evolution and response to feedback; some more improvement needed	5.0 pts Work largely reflects a lack of evolution and response to feedback; much more improvement and response to feedback required	0.0 pts Work reflects no evolution and improvement; no incorporation of feedback to work			15.0 pts
Critical Thinking *critically evaluate design ideas; question conventional modes of working; develop ethical considerations of waste*	15.0 pts Student was critical of own work and of conventions during the process; student was thoughtful and intentional of material and assembly exploration	10.0 pts Student was somewhat critical of own work and conventions during process; somewhat thoughtful and intentional of material and assembly exploration; some improvement needed	5.0 pts Student largely lacked criticality of work and conventions; lacked thoughtful and intentional approach to material and assembly exploration; much more improvement needed	0.0 pts Student was not critical of work and conventions throughout process; no thoughtful and intentional approach to work			15.0 pts
Timely Submission	10.0 pts ALL work consistently completed on time throughout project	5.0 pts Some work completed late throughout project	0.0 pts Majority of work completed late throughout project				10.0 pts
							Total Points: 100.0

Figure 3: Term Project Grading Rubric

For Part 3, there were only 3 total groups. Two groups exceeded expectations, and one group performed below expectations. Group E, which consisted of the coal and automotive recycling industry, developed a highly innovative, speculative proposal, and did an excellent job illustrating their design intent and describing how their two systems can hybridize into an entirely new entity. Group F, which consisted of wood and another individual from the automotive recycling industry, developed a proposal that lacked detail and synthesis of the two systems. The representation was not descriptive enough and the proposal was missing a layer of critical understanding of the two individual systems, and how their byproducts can support one another.

Reflection Papers

Although the outcomes from the assignments demonstrate the achievement of student learning, for me, the most important form of documentation became the reflection papers student wrote throughout the course, which were not graded assignments. These reflections were written at the start of the first class, the end of Phase 1, the end of Phase 2, and at the end of the course. The reflections (see Appendix F on page 63), combined with class discussions, became the most enlightening aspect of the course and student learning. Since these reflections were not graded and their purpose was not to necessarily find a right or wrong answer, but to document an evolving ethos around designing with waste within the course through students, a sampling in no particular order is provided in the Appendix.

For the first reflection, students were asked to answer the following questions:

+ *How do you define waste? What is your perception of waste?*
+ *What do you think we should do with waste?*
+ *What do you hope to get out of the class?*

Although there were a wide range of responses, students generally defined waste as the leftovers from a process, mostly referring to material byproducts such as "trash," "garbage," and "wastewater". In terms of the outcomes for the course, many students referred to the desire to expand their knowledge on the topic and learn effective strategies of waste management to inform their design work.

The subsequent reflections (after Part 1 and 2) respond to one repeated question:

+ *What is your perception of waste?*

with new posed questions:

+ *What are waste's opportunities for design?*
+ *How have your perceptions of waste changed?*

The biggest jump in reflection was between Reflection 1 and Reflection 2. Contrary to Reflection 1, the results varied greatly in Reflection 2 when compared with previous responses. One reoccurring theme from these reflections is that "waste" is a much larger topic than they originally thought, but each student described a different aspect of waste that has caused them to change their perception:

"Waste is not always negative and can be a resource by turning it into fuel and power…Also [better understand] the issue of where waste goes and the lengths major cities go to, to push the waste out of sight. Waste is an industry..."

"…the issue of waste is far more pervasive than I originally thought. It has touched everything from the organization of our homes, neighborhoods, cities, and urban systems as a whole. It is cultural and economic… My perception of waste has been further expanded past the narrowness of thinking it was just the trash in my kitchen."

"…I am beginning to see waste as a social and cultural definition rather than viewing what is considered waste as inherently useless."

"Waste, especially in the form of land, such as brownfields…has enormous opportunity in design…I originally related waste to disgust, as we read earlier. I thought it was a problem that had to be solved, rather than an opportunity to take advantage of."

"I didn't know space could be a waste product…I didn't realize that our perception of waste affects those who work with waste."

Additionally, during one discussion, one student described their experience in the course thus far as "learning a state of mind about waste rather than a specific solution for it," a response that has greatly impacted the way I am now considering in the future development of my courses.

The reflections greatly exceeded my expectations in achieving their intended objective–to document students' changing perception and thoughts of waste throughout the course. The most important aspect of these reflections relative to learning outcomes is that they demonstrate students gaining an expanded knowledge base and developing design approach to waste materials and landscapes, a topic they will inevitably encounter in practice.

PLANNED CHANGES

Pursuing the integration of landscape lifecycles as a design pedagogy in a seminar course has opportunities for further development and documentation that present exciting challenges. Overall, based on student and peer feedback, I belive the first offering of my Waste Ecologies course was very successful. Across the board, students seemed to have gained a lot from the course through the different assignments, with some students mentioning specific readings and project assignments that made a particular impact on them.

For future improvements to the Syllabus, the only addition I would make is to fold in the reflection paper aspect of the course into the course description. The overall organization of the course seemed to be successful as well.

Some feedback from students through the reflections provide a means to tighten some of the assignments to better meet the course objectives. For example, some weeks, the reading load was a little heavy when combined with additional readings procivided by discussion leaders. Although it was interesting for me to see the types of companion readings students selected, in many cases students were not critical enough of what readings they were selecting and why. In the future, I will instead opt for more depth over breadth - a more detailed and critical reading of an assigned reading, limiting the number to 2-3 total per reading week.

For the term project, overall, students enjoyed working on the project. However, the engineering student who does not have a design background and an understanding of the graphic programs used for graphic representation, struggled in this aspect of the class. Additionally, some students wish there was more time to meet with me to discuss their work, and more time for the last assignment, the design speculation portion. In light of this, I plan to provide students with two options for the term project:

1. A minimum 10-15 page critical term paper that delves deeper into a topic of the students' choosing related to the course. This will allow students to work individually if they would like, and gives students who are not graphically-savy to complete a different assignment.
2. Repeat the same term project, but adjust the time frame and required deliverables for the project. These deliverables and the topic explored can be more open-ended. For example, for Part 1, students were asked to develop a timeline of the industry they were analyzing, an aspect to the assignment that can be removed. I also think some Part 2 case studies were more successful than others, and some Part 1 analysis were more successful than others. In the next offering of the course, I will give students the option of working individually or in groups, and the option of either doing Part 1 (studying an existing system of their choosing to uncover the produced wastes) or doing Part 2 (performing a case study analysis that innovatively reuses waste materials and landscapes). This will give students more time to dive into more detail in these topics, and more time to meet with me. It will also allow for more time to do Part 3, in which I would combine a Part 1 group and a Part 2 group to yield different results.

Finally, I had built into the course an extra two weeks for students to revist and edit their work, and weighted this resubmission very high. Unfortunately, not many students took advantage of this, and some submitted the same drawings they produced throughout the semester. This, resulted in lost time that could have been used to extend one of the projects. Instead, I think I will opt for students submitting their final work in a pamphlet/booklet format in which I will provide a template for them. I will need to allow for extra time to produce this, but the aim for this submission would be in a more finalized, package format with accompanying text that describes the project in greater detail.

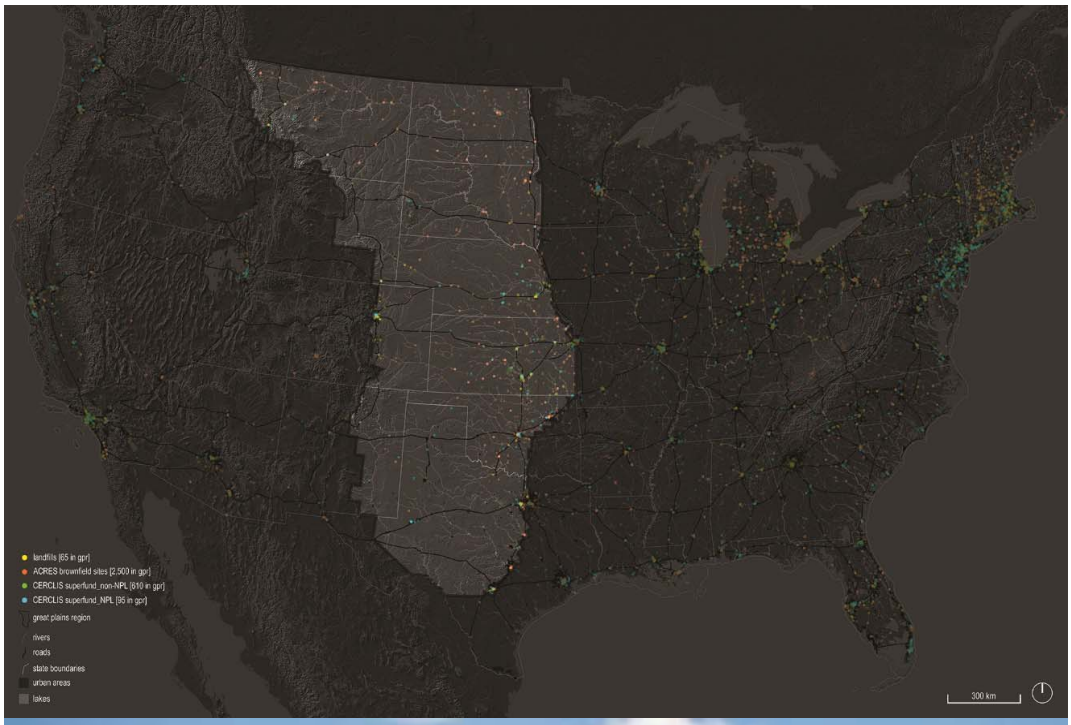
SUMMARY + OVERALL ASSESSMENT OF PORTFOLIO PROCESS

The Peer Review of Teaching program and process provided an invaluable experience that enabled me to develop a more rigorous and scholarly approach to my teaching. The success of the first offering of my course would have not been possible without the support I received from this experience. Backwards designing a course from the ground up proved to be incredibly efficient. It not only forced me to define 2-3 concise course objectives, but it also pushed me to develop assignments and activities that achieved the meeting of these objectives efficiently. Additionally, integrating student participation in peer assessment and in their in-class reflection writing are techniques I never thought to use before, and were some of the most important aspects I integrated in the course.

The production of this portfolio provides me with a roadmap to the future development of this course and others that can only help me further refine my pedagogical approach to design education. It has enabled me to reflect on my teaching critically, and in doing so, will ultimately make it easier to apply these techniques to other courses. One of the most important outcomes from my experience in the Peer Review of Teaching program is that thoroughly documenting and critically assessing courses is scholarly activity that will support my Tenure and Promotion Package.

I would like to thank all the fellow faculty I interacted with throughout this program, who provided me with invaluable feedback, alternative techniques, and various approaches I was able to implement into my course. I would also to thank the students who were enrolled in the Waste Ecologies course during the Spring 2018 semester, and were open to exploring new and interesting ideas, even though they did not fully know or understand where they would lead them. I greatly appreciate their consent in allowing me to include the work in this protfolio.

APPENDIX A:
COURSE SYLLABUS



U.S. map documenting 3,270 waste landscapes within the Great Plains Region, consisting of landfills, classified brownfields, and Superfund sites. Each of these 3,270 landscapes are real places and spaces with experiential possibility. On a landfill, a marker indicates where waste supposedly ends and where it begins. This course explores the blurry, ambiguous, culturally constructed attitudes towards waste, its spatial and material implications, and its experiential possibilities.

LARC 497/597: Waste Ecologies
Class: Th, 6:00-8:50pm, Architecture Hall 115, 3 Credits
Instructor: Catherine De Almeida, Assistant Professor
Contact: cdealmeida2@unl.edu; 2-4900; Office: Room 236
Semester: Spring 2018

Catalogue Description: Selected topics in landscape architecture; group investigation of a topic in landscape architecture.
Topic of exploration: the spatial and material implications of physical, ideological, and cultural constructions of waste and its effects on the conditions of the built environment.

Course Prerequisites: Admission to the College of Architecture; Permission by instructor

Course Introduction: Waste is ideologically constructed as the antithesis of value. The word is embedded with negative connotations retained by a long lineage of cultural attitudes towards undesired material excess. This perception has resulted in the inefficient handling, storage, and regulation of potentially valuable waste products, which should be embraced as desirable, cheap, available resources with latent benefits for producing new economies, ecologies, and cultural landscapes. The materials and landscapes associated with waste, excess, and the undesired create vulnerability within and surrounding their sites, which are typically relegated to the peripheries of urban environments along with marginalized communities.

However, waste has aesthetics, is valuable, and ecological. This course investigates the spatial consequences of waste materials and landscapes. We will explore the cultural constructs of waste, question the spatial and material consequences of these cultural constructs, and critique emerging frameworks for waste reuse.

This course emphasizes that there is no right or wrong answer to design or to what waste is. The purpose of the course is to stimulate thoughtful responses, critical thinking, and exploration of the questions and contexts designers are confronted with as it relates to waste. Students are given the freedom to explore their own interests within the context of the course.

This research seminar will use guest lectures, readings, class discussions, a field trip, and a semester long research project to explore the spatial and material performance (or lack thereof) of waste. The research project will entail the multi-scalar documentation of a supposed waste material, case study research focused on the innovative uses of waste using landscape performance as criteria for evaluating benefits, and the synthesis of this research through the hybridization of waste systems to generate symbiosis.

"…urban and structural changes were serviced by inflows (energy resources, markets, materials, personnel, operators, workflows, and schedules), but they also produced unintended outflows (discharges, emissions, effluents, and inequities) and other occupational hazards by the nature of the industrial economies that made them possible. As externalities, these pollutants today are urbanism's waste—commodities without markets, capitalism's excreta.

In lieu of linear, fixed, and closed systems of industrial systems, new circular economies and systemic interconnections generate and yield contemporary waste ecologies—*the metaphorical linkages, practical interconnections, and spatial interdependencies between anthropogenic and non-anthropogenic systems of waste*—exemplified through residual solid wastes, liquid effluents, and gaseous emissions.

Through the recalibration of urban flows across this Metabolic Landscape, the reclamation of waste materials, waste fluids, and waste landscape as urban resources can radically reorganize spatial patterns by short-circuiting the distance between ecological networks and economic systems through material flows. This contraction of the urban field yields a set of unprecedented ecological formations—*protoecologies*—that are best described and formulated with the infrastructural design of historic externalities of waste, water, and energy as part of the urban project. "

Pierre Belanger, *Landscape as Infrastructure*, 2017

Learning Goals and Outcomes: The primary goal of this course is to provide students with design-research skills and criteria for evaluating, documenting, questioning, and being critical of waste, and exploring its possibilities for design.

Learning Goal One:
Critical Investigation of Waste and its Management Practices -
Students will gain a broad understanding of cultural constructions of waste, waste materials, waste landscapes, and the ways in which waste reuse in design practice may carry forward cultural biases of waste.

Learning Outcomes:
1. Analyze and question cultural biases of waste through reading discussions, reading selections, discussion paper, and a personal reflection.
2. Document the spatial effects of a waste material through mappings, visual histories, and time/process diagrams.
3. Investigate the performative effects of waste, including material, structure, function, and aesthetics.

Learning Goal Two:
Methods + Applications of Design-Research -
Students develop visual and verbal research methods and skills for understanding, documenting, analyzing, and speculating on waste materials, landscapes, and systems.

Learning Outcomes:
1. Develop a vocabulary and proficiency in conventional, sustainable, and innovative waste materials and landscapes, and apply this knowledge to a speculative research project.
2. Apply case study research documentation methods, including using landscape performance as an assessment tool.

Learning Goal Three:
Skills + Methods in Qualitative and Quantitative Representation -
Students build a literacy of visualizing and graphically synthesizing research related to waste materials, landscape, and systems. This includes speculating on waste's potential.

Learning Outcomes:
1. Utilize drawing as a communicative and an investigative method exploring the material and spatial dimensions of waste.
2. Apply GIS and other digital tools to make visible the spatial effects of waste by integrating qualitative and quantitative information.

Course Format and Structure: To accomplish the above learning goals and outcomes, this course uses guest lectures, readings, class discussions, cumulative assignments, a field trip, a research project, experimentation and evaluation.

Illustrated Lectures / Readings / Discussions
Lectures consist of illustrated and visual examples accompanied by verbal explanations. Lectures will largely be given by guests who are experts in their fields.

Course readings relate to waste materials and landscapes, and accompany each Phase of the class. Readings are assigned before each week (see Course Schedule and Course Readings for details). Students are required to read for each class with the expectation they are prepared to participate in class discussions. Students will also sign up for a weekly topic to lead discussion. Students will choose a supplemental reading to the assigned readings to fuel further discussion. Students may reference the bibliography when selecting the reading, and reading assignments may be used as references for the research projects.

Students are encouraged to ask questions during lectures and discussions. Topics in the readings and covered in lectures are designed to stimulate discussion and build a literacy and knowledge in topics related to waste. Students will also present their projects in a pin-up/presentation format in order to receive feedback from fellow peers and contribute to the overall discussion of projects.

Field Trip
One field trip will occur within Lincoln to UNL's Innovation Campus and the Theresa Street Wastewater Treatment Plant. This trip will enable students to see the ways in which waste can be reused through a partnership between different entities.

Course Structure – Phases
This course is structured into 3 Phases. The Phases are structured as a cumulative sequence, in which the content and assignment builds on the previous one(s). Below is an outline of the course structure:

> ***Phase 1: Theories + Constructs of Waste Materials + Landscapes*** *[6 weeks; 1/11-2/15]*
> This first phase investigates the ways in which waste is culturally constructed, how waste materials have come to be managed, and the types of landscapes that have resulted from the production of waste. These topics will be investigated each week through assigned and supplemental readings and class discussions. Parallel to this is Part 1 of the design-research project, in which students investigate the history, spatial trajectory, and processes of a waste material.
>
> ***Phase 2: Design + Reframing Waste as a Resource – Case Studies*** *[4 weeks; 2/22-3/15]*
> Phase 2 explores design practices and emerging conceptual frameworks for waste reuse. These topics will be investigated

each week through assigned and supplemental readings and class discussions. This phase will include guest lectures and a field trip to supplement the reading material and discussions. Parallel to this is Part 2 of the design-research project, which entails a case study investigation and analysis of a project that reuses waste materials and/or landscapes in an innovative way. Students will be exposed to landscape performance as a method of analysis for landscape-based case studies to analyze their own case study.

Phase 3: Symbiotic Waste Systems *[6 weeks; 3/15-4/26]*
In Phase 3, teams will pair up with one another and develop speculative scenarios and proposals for how their individual waste systems can hybridize and develop symbiotic exchanges and relationships with one another, grounded in landscape performance criteria of economic, environmental, and social benefits. Proposals will be highly speculative, and should be innovative by challenging and questioning conventional approaches to reusing and reclaiming waste.

All original digital documents and files must be submitted as a packaged, zipped folder via WeTransfer.com no later than Thursday, May 3rd at 8AM.

Projects and Evaluation
The critical reading assignment will be done individually in coordination with a smaller group. The semester-long design-research project will be a group project. Project briefs contain a project description, requirements, and expectations for submission and presentation. See "Grading" and "Definitions" for more information.

Projects

Critical Theory Part 1: Quote Submission -	-05%
Critical Theory Part 2: Discussion + Reading Selection -	-10%
Design-Research Project Part 1: Waste Material Study -	-20%
Design-Research Project Part 2: Case Study -	-10%
Design-Research Project Part 3: Symbiosis -	-15%
Design-Research Project: Final Submission -	**-30%**
Participation + Attendance -	-10%

Criteria + Rubric
A rubric will be used to evaluate projects, with each project worth 100 points. Work will be evaluated according to the following criteria [Note: not all criteria apply to all assignments]:

- **Craft + Representation [30 pts.]** (technical quality, legibility, precision, annotation) –
  Drawings will be evaluated for technical quality and legibility. This includes precision, composition, craft, and systematic presentation of information. Line weights, line types, appropriate notation system, scale, and the overall organization of information are critical to achieving high-quality drawing.

Sufficient level of information in drawing, annotation, and description must be presented to convey clarity of information.

- **Rigorous Investigation [30 pts.]** (quality, depth, and synthesis of research and analysis) –
  Demonstrate the ability to conduct and synthesize research with clarity, rigor, and a high-degree of detail. Ability to incorporate and communicate research with effectiveness.
- **Evolution [15 pts.]** (growth of technical ability; response to feedback; iteration of work)–
  Design and learning are iterative processes that allow students to evolve their work. The course is structured for students to learn by doing, making, experimenting, and questioning. This criterion will evaluate the ability for students to use feedback to evolve their work, techniques, and representational approaches throughout the course.
- **Critical Thinking [15 pts.]** (critically evaluate design ideas; question conventional modes of working; develop ethical considerations of waste and its and performative capacities) –
  Self-critically evaluate a design idea, including responding to the evaluation and criticism of peers by improving the work. This includes thinking critically about conventional modes of representation, waste materials and landscapes, the ways in which it is managed and redesigned, and the ways in which they may be rethought.
- **Timely Submission [10 pts.]** all work is submitted and completed on time.

Required Material:

The following are required materials for this course:

- A notebook or sketchbook for notes and drawings in the classroom and in the field, and for keeping course handouts.
- Appropriate clothing and footwear for field trip (rain or shine)

Computer Requirements:

A computer or laptop with digital programs and printing capabilities.
External hard drive – **Students are required to back up their work every week.**

Grading:

The following schedule of grades applies to all:

A+ 100-96.67	**A** 96.66-93.34	**A-** 93.33-90
B+ 89.99-86.67	**B** 86.66-83.34	**B-** 83.33-80
C+ 79.99-76.67	**C** 76.66-73.34	**C-** 73.33-70
D + 69.99-66.67	**D** 66.66-63.34	**D** - 63.33-60
F 59.99 or below		

Definitions:

A+, A, A-
An outstanding performance in which the student demonstrates superior grasp of the subject matter, and an ability to go beyond the given material in a critical and constructive manner. The student demonstrates a high degree of creative and/or logical thinking; a superior ability to organize, to analyze, and to integrate ideas; and a thorough familiarity with the relevant literature and techniques.

B+, B, B-
A good to very good performance in which the student demonstrates a thorough grasp of the subject matter, and an ability to organize and examine the material in a critical and constructive manner. The student demonstrates a good

understanding of the relevant issues and a solid familiarity with the relevant literature and techniques.

C+, C, C-
A fair performance in which the student demonstrates a general grasp of the subject matter and a moderate ability to examine the material in a critical and constructive manner. The student displays an adequate understanding of the relevant issues, and a general familiarity with the relevant literature and techniques.

D+, D, D-
A poor performance in which the student demonstrates a minimal familiarity with the subject matter, but whose attempts to examine the material in a critical and constructive manner are inadequate. The student displays minimal understanding of the relevant literature and techniques.

F
An inadequate performance. Failure

Special Accommodation:

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) Office, 132 Canfield Administration, 472-3787 voice or TTY.

Attendance and Due Date Policy:

Your punctual arrival to class is required. Furthermore, attendance (both physical and mental) for the full class period is required. It is your responsibility to be on time and attentive each day. Partial attendance for only a portion of class and not for the full duration will result in an absence. If you arrive after attendance is taken, it will count as a late. Two **(2)** late attendances will equal one **(1)** absence.

If you are absent [unexcused] for three **(3)** or more class periods, you will automatically receive a failing grade for this course, regardless of your course performance. Accidents happen, so please plan accordingly. (Should you have exceptional circumstances, you are personally responsible for explaining the reasons for your absence to your instructor and the Department Chair).

Projects are due on the date, time, and location specified by your instructor. Late work will not be accepted at all without instructor's prior approval and written agreement, to be signed by both student and instructor, as to revised due dates. Absences from any scheduled review will also result in no credit given for that particular project.

Retention of Work:

The College of Architecture has the right to retain any student work, either in part or in its entirety, for display, accreditation, documentation, recruitment, or any other educational or legal purpose**.**

Academic Integrity:

Any issues which arise relative to academic honesty or integrity will be handled in accordance with UNL Student Code of Conduct (http://stuafs.unl.edu/ja/code/). You are to do your own work on projects, exams, reports, etc. except where a group has been assigned. Any work copied from current or previous student projects or professional work examples will receive a "zero" (0) evaluation for that submittal.

Studio Etiquette: This course will abide by the College of Architecture studio culture document. This document can be downloaded from the syllabus section of Blackboard. We will maintain a professional atmosphere in the course at all times this semester. This not only refers to the attitude and seriousness of each of us in the course, but also to the physical environment. Students are highly encouraged to work in the studio in addition course hours, rather than at home. Students are permitted to work in studio at all hours but sleeping overnight in studio is not allowed.

Employment Policy: The study of architecture and landscape architecture is a demanding discipline requiring a significant commitment to succeed. For this reason, the department has adopted a policy recommending that students, who are employed, not exceed the following registration guidelines.

Credit Hours Recommended/ Work Load / Week:

Up to 18 credit hours	0 hours
13-16 credit hours	8-16 hours
10-12 credit hours	17-20 hours
Up to 6 credit hours	Full time

Course Schedule:

LARC 497/597: Waste Ecologies - Tentative Weekly Schedule						
Phases	**Week**	**Day**	**Date**	**Description**	**Deliverables**	**Required Readings (see syllabus for more details)**
Theories + Constructs of Waste Materials + Landscapes	1	Th	11-Jan	In-class reflection exercise + discussion Introduction, Syllabus, Assignments Reading Selection Project Topic Presentation + Selection	In-class reflection exercise	X
	2	Th	18-Jan	*Waste Culturally Constructed* Class discussion Visualization lecture Group Meetings on research topic Group meeting- Week 3 discussion leaders	2 quotes for each reading submitted to Canvas (6 quotes total) Preliminary Research on Topic	Di Palma, "In the Mood for Landscape," 15-29 Engler, "Contemplating Waste: Theories and Constructs," 1-41 Lynch, "Morbid and Dirty Thoughts," 11-41
	3	Th	25-Jan	*Sanitation: Emergence of [mis]managing Materials and Waste* Class discussion Group Meetings on research topic Group meeting- Week 4 discussion leaders	2 quotes for each reading submitted to Canvas (4 quotes total) Progress on Research Topic	Engler, "Repulsive Matter," 60-79 Lynch, "The Waste of Things," 42-80
	4	Th	1-Feb	*Brownfields, Drosscapes, and other Wastelands* Class discussion Group Meetings on research topic	2 quotes for each reading submitted to Canvas (6 quotes total) Progress on Research Topic	Belanger, "Airspace: The Ecologies and Economies of Landfilling in Michigan and Ontario," 132-155 Berger, "The Production of Waste Landscape," 46-75 Lister, "Trashed Space," 62-75
	5	Th	8-Feb	***Class Cancelled for Field Trip; Date TBD***		
	6	Th	15-Feb	**Research Project Part 1 Presentations** Group Meeting- Week 7 Discussion leaders	Research Project Part 1	X
Design + Reframing Waste as a Resource - Case Studies	7	Th	22-Feb	*Design, Waste, and Landscape Performance - Benefits of Waste* Class discussion Group Meetings on case study Group meeting- Week 8 discussion leaders	2 quotes for each reading submitted to Canvas (8 quotes total) Progress on Case Study	Belanger, "Landscape as Infrastructure," 80-95 Canfield and Yang, "Reflections on Developing Landscape Performance Case Studies" Ghosn and Jazairy, "Geographies of Trash," 68-81 Meyer, "Uncertain Parks," 34-57
	8	Th	1-Mar	*Reframing Waste: Concepts* Class discussion Guest Lecture: Adam Liska, UNL Guest Lecture: Tim Barker, UNL In. Campus Group Meetings on case study (if time)	2 quotes for each reading submitted to Canvas (6 quotes total) Progress on Case Study	Belanger, "Landscapes of Disassembly," 83-91 Belanger, "Metabolic Landscape," 334-357 McDonough and Braungart, "Waste=Food," 92-117
	9	Th	8-Mar	Guest Lecture: Julie Diegel, Nebraska Recycling Council Group Meetings on case study	Progress on Case Study	X
	10	Th	15-Mar	**Research Project Part 2 Presentations** Group Arrangements for Part 3	Research Project Part 2	X
Symbiotic Waste Systems	11	Th	22-Mar	***Spring Break - No Class***		
	12	Th	29-Mar	Group Meetings on Part 3	Progress on Part 3	X
	13	Th	5-Apr	Group Meetings on Part 3	Progress on Part 3	X
	14	Th	12-Apr	Draft Presentations	Final Draft of Full project	X
	15	Th	19-Apr	Final Presentations of Research Project	Digital PDF + 11x17 prints	X
	16	Th	26-Apr	Optional Group Meetings on Final Revisions	Sketches, questions, etc.	X

Note: Date of Field Trip TBD; an optional GIS tutorial will also be provided TBD- will discuss in class Your Final Project must be submitted to Canvas no later than: <u>Thursday, May 3 by 8AM</u> [no exceptions] Final Project includes: Final Research Project (all 3 parts), Final Reflection Paper, and Description of contributions to group work.

Readings and Bibliography:

Required readings are to be completed before the specified class date (see schedule for more details of dates). A discussion of the readings will take place during the first half of class, led by the students who signed up to lead discussion that week. Additional supplemental readings will also be provided by the students leading discussion, one additional reading per student. Readings will be added to Canvas 1 week before their seminar.

For the required readings, students are to submit **at least 2 quotes in Canvas by 4pm the day of class**. These help fuel discussion and allow students to keep a collective body of important ideas that develop throughout the semester. Readings are intended to compliment the Phases of the course and provide a theoretical and technical basis of knowledge. Skipped weeks indicate no required readings for those weeks. Reference readings and bibliography are provided as additional resources to course material and may be used as a source when selecting a supplemental reading.

Students are expected to obtain copies of required texts (provided on Canvas), and read the portions noted in the schedule. Additional reference texts are available in my office or in Architecture Hall library.

Course Readings:

Week	References
2	***Waste Culturally Constructed*** Di Palma, Vittoria, "In the Mood for Landscape," in *Thinking the Contemporary Landscape* eds. Christophe Girot and Dora Imhof (New York: Princeton Architectural Press, 2017): 15-29. Engler, Mira, "Contemplating Waste: Theories and Constructs," in *Designing America's Waste Landscapes* (Baltimore, MD: John Hopkins University Press, 2004): 1-41. Lynch, Kevin, "Chapter 1: Morbid and Dirty Thoughts," in *Wasting Away*, (San Francisco: Sierra Club, 1990): 11-41.
3	***Sanitation: Emergence of [Mis]managing Materials + Waste*** Engler, Mira, "Repulsive Matter: Landscapes of Waste in the American Middle-Class Residential Domain," *Landscape Journal,* 16(1), 1997: (Baltimore, MD: John Hopkins University Press, 2004): 60-79. Lynch, Kevin, "Chapter 2: The Waste of Things," in *Wasting Away*, (San Francisco: Sierra Club, 1990): 42-80.
4	***Brownfields, Drosscapes, and other Wastelands*** Belanger, Pierre, "Airspace: The Ecologies and Economies of Landfilling in Michigan and Ontario" in *Trash*, ed. By J. Knechtel, (Cambridge: The MIT Press, 2006): 132-155.

Berger, Alan, "The Production of Waste Landscape" in *Drosscape: Wasting Land in Urban America* (New York: Princeton Architectural Press, 2006): 46-75.

Lister, Nina-Marie, "Trashed Space," in *Trash*, ed. J. Knechtel, (Cambridge: MIT Press, 2006): 62-75.

7 ***Design, Waste, and Landscape Performance – Benefits of Waste***

Belanger, Pierre, "Landscape as Infrastructure," *Landscape Journal* 28(1): 80-95.

Canfield, Jessica, and Bo Yang, "Reflection on Developing Landscape Performance Case Studies," *Landscape Research Record, 2014*.

Ghosn, Rania and Jazairy, El Hadi, "Geographies of Trash," *Journal of Architectural Education*, 68(1): 68-81.

Meyer, Elizabeth, "Uncertain Parks: Disturbed Sites, Citizens, & Risk Society" in Julia Czerniak and George Hargreaves, eds. *Large Parks* (New York: Princeton Architectural Press, 2007): 34-57.

8 ***Reframing Waste: Cradle-to-Cradle, Industrial Ecology, Circular Economies, Urban Metabolism, Life-cycle Analysis, and other concepts***

Belanger, Pierre, "Landscapes of Disassembly: Waste Economies and Emerging Industrial Ecologies", *Topos*, (2007) 60: 83–91.

Belanger, Pierre, "Metabolic Landscape," in *Landscape as Infrastructure: A Base Primer*, (New York: Routledge, 2017): 334-357.

McDonough, William and Braungart, Michael, "Chapter 4: Waste = Food", in Cradle-to-Cradle: Remaking the way we make things (New York: North Point Press, 2002): 92-117.

Course References + Bibliography

Ascher, Kate, *The Works: Anatomy of a City* (New York: The Penguin Press, 2005).

Belanger, Pierre, *Landscape as Infrastructure: A Base Primer*, (New York: Routledge, 2017).

Berger, Alan, *Drosscape: Wasting Land in Urban America* (New York: Princeton Architectural Press, 2006).

Berger, Alan, *Reclaiming the American West* (New York: Princeton Architectural Press, 2002).

Carson, Rachel, *Silent Spring*, (New York: Houghton Mifflin Company, 1962).

Chrysoulakis, Nektarios, Eduardo Anselmo de Castro, and Eddy J. Moors (eds.), *Understanding Urban Metabolism: A Tool for Urban Planning*, (New York: Routledge, 2015).

Corner, James, "The Agency of Mapping: Speculation, Critique, and Invention" in *Mappings* ed. Denis

Cosgrove (London: Reaction Books, 1999): 231-252.

Corner, James, ed., *Recovering Landscape* (New York: Princeton Architectural Press. 1999).

Czerniak, Julia, and Hargreaves, George, eds. *Large Parks* (New York: Princeton Architectural Press, 2007).

Desimini, Jill and Waldheim, C., *Cartographic Grounds* (New York: Princeton Architectural Press, 2016).

Di Palma, Vittoria, *Wasteland: A History*, (New Haven: Yale University Press, 2014).

Engler, Mira, *Designing America's Waste Landscapes* (Baltimore, MD: John Hopkins University Press, 2004).

Engler, Mira, "Waste Landscapes: Permissible Metaphors in Landscape Architecture," *Landscape Journal* 12(1): 11-25.

Ferrao, Paulo and John E. Fernandez, *Sustainable Urban Metabolism* (Cambridge: MIT Press, 2013).

Gallaud, Delphine and Blandine Laperche, *Circular Economy, Industrial Ecology, and Short Supply Chain*, (Hoboken: John Wiley & Sons, 2016).

Girot, Christophe and Dora Imhof (eds.), *Thinking the Contemporary Landscape*, (New York: Princeton Architectural Press, 2017).

Ghosn, Rania and El Hadi Jazairy, *Geographies of Trash*, (New York: Actar, 2015).

Hawkin, Paul, *The Ecology of Commerce: A Declaration of Sustainability*, (New York: HarperCollins, 1993).

Hawkins, Gay, *Culture and Waste: The Creation and Destruction of Value*, (Oxford: Rowman & Littlefield Publishing Group, 2006).

Hawkins, Gay and Muecke, S., *The Ethics of Waste: How We Relate to Rubbish*, (Oxford: Rowman & Littlefield Publishing Group, 2003).

Ibanez, Daniel and Nikos Katsikis, *New Geographies, 6: Grounding Metabolism*, (Cambridge: Harvard GSD, 2014).

Jackson, J.B., *The Necessity for Ruins and other Topics*, (Amherst: University of Massachusetts, 1980).

Kirkwood, Niall, *Manufactured Sites: Rethinking the Post-Industrial Landscape* (London: Routledge, 2004).

Kirkwood, N., Hollander, J., and Gold, J., *Principles of Brownfield Regeneration* (Washington D.C.: Island Press, 2010).

Kirkwood, N., and Kennen, Kate, *Phyto: Principles and Resources for Site Remediation and Landscape Design* (New York: Routledge, 2015).

Knechtel, J. (ed.), *Trash*, (Cambridge: MIT Press, 2006).

Lacy, Peter and Jakob Rutqvist, *Waste to Wealth: The Circular Economy Advantage*, (New York: Palgrave Macmillan, 2015).

Laporte, Dominique, *The History of Shit*, (Cambridge: MIT Press, 1978).

Lynch, Kevin, *Wasting Away*, (San Francisco: Sierra Club, 1990).

McDonough, William and Braungart, Michael, *Cradle-to-Cradle: Remaking the way we make things* (New York: North Point Press, 2002).

Mostafavi, Mohsen and Gareth Doherty (eds.), *Ecological Urbanism*, (New York: Lars Muller, 2010).

Mumford, Lewis, *The Brown Decades: A Study of the Arts of America 1965-1895*, (New York: Dover, 1931).

Rahm, Dianne (ed.), *Toxic Waste and Environmental Policy in the 21st Century United States*, (London: McFarland & Company, 2002).

Strasser, Susan, *Waste and Want: A Social History of Trash*, (New York: Henry Holt and Company, 1999).

Swyngedouw, Erik, Heynen, Nik, and Kaika, Maria (Eds), *The Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism* (New York: Routledge, 2003).

Tufte, Edward, *The Visual Display of Quantitative Information* (Berkshire Press, 2001) and *Visual Explanations: Images and Quantities, Evidence and Narrative* (Berkshire: Graphic Press, 1997).

Waldheim, Charles (ed.), *The Landscape Urbanism Reader*, (New York: Princeton Architectural Press, 2006).

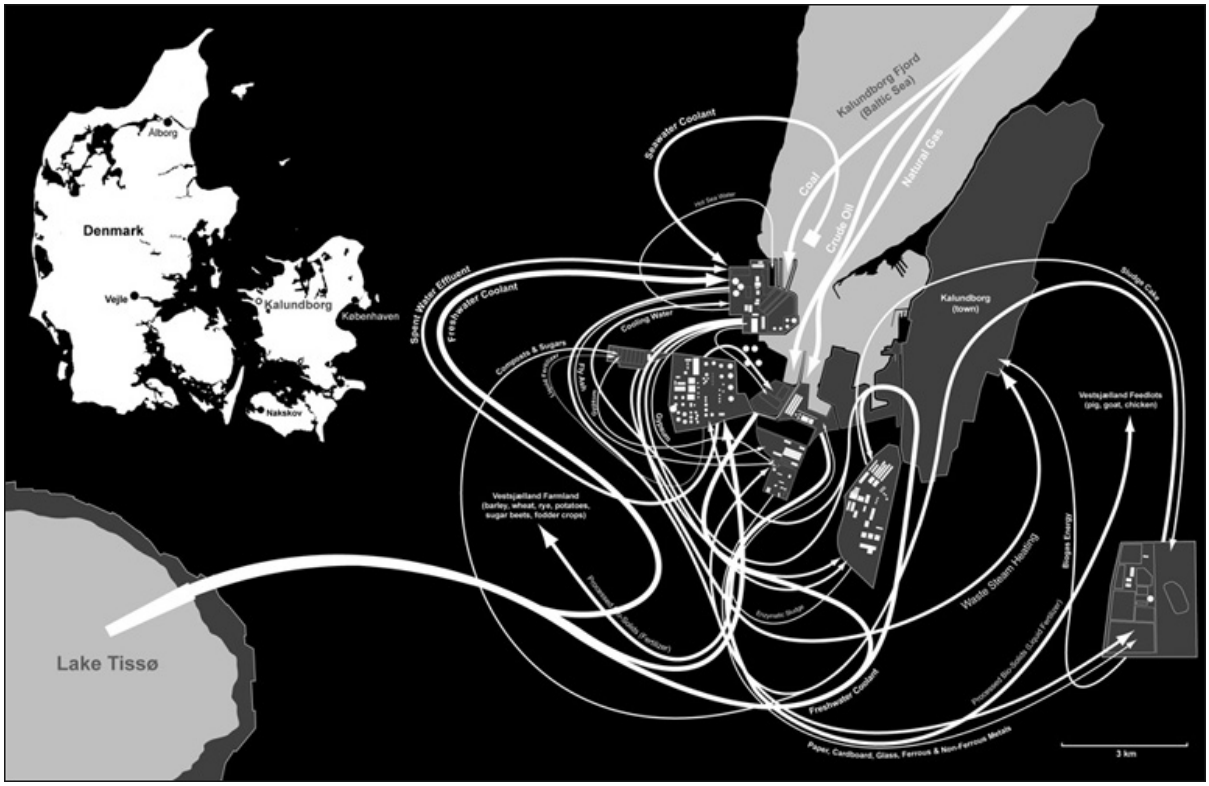
Webster, Ken, *The Circular Economy: A Wealth of Flows*, (Isle of Wight: Ellen MacArthur Foundation, 2015).

Online Resources
Landscape Architecture Foundation: Landscape Performance Series
https://landscapeperformance.org/
Landscape Architecture Foundation: Benefits Toolkit
https://landscapeperformance.org/benefits-toolkit
Landscape Architecture Foundation: Case Study Briefs
https://landscapeperformance.org/case-study-briefs

Selected Journals

BioScience
Ecological Applications
Ecology & Society
Environment and Behavior
Environments
Human Ecology
Journal of Architectural Education
Journal of Env. Planning & Management
Journal of the American Planning Assoc.
Journal of Architecture & Planning
Journal of Urbanism
Landscape Architecture
Landscape Design
Landscape Research
Places
Urban Design International
Urban Ecosystems
Conservation Biology
Ecology
Environmental Management
Environment and Ecology
Ethics, Place, and Environment
Journal of Applied Ecology
Journal of Environmental Management
Journal of Industrial Ecology
Journal of Landscape Architecture
Journal of Urban Design
Landscape and Urban Planning
Landscape Architecture Magazine
Landscape Journal
Landscape Ecology
Scenario Journal
Urban Ecology

APPENDIX B:
TEAM PROJECT BRIEF



Kalundborg Industrial Ecology, Material and Energy Flows, Pierre Belanger, OPSYS; from "Landscapes of Disassembly: Waste Economies and Emerging Industrial Ecologies" in Topos 60 (2007): 83-91.
"This diagram explains the flows and feedback loops of fluids (waters, coolants, effluents), solids (gypsum, ash, sulphur), and gases (steam, flue gas, condensate) between urban and industrial sites in Kalundborg, Denmark." - Belanger
The diagram not only visualizes the material connections between various Industries within a region, but it also described the industrial ecology and waste cycling between these sites, showing the geography of wastes from on process becoming food for another.

LARC 497/597: Waste Ecologies
Class: Th, 6:00-8:50pm, Architecture Hall 115, 3 Credits
Instructor: Catherine De Almeida, Assistant Professor
Contact: cdealmeida2@unl.edu; 2-4900; Office: Room 236
Semester: Spring 2018

Term Project: Mapping + Synthesizing the Ecologies, Economies, and Geopolitical Landscape of Waste Materials

Project Description:

The proliferation of geospatial data and aerial photography, coupled with the increase of ecological awareness and remote sensing, has led to an explosion of mapping. Such developments have provided a wide range of tools for landscape architecture and allied design, planning, and policy disciplines around the globe. The continuous expansion of the internet has increased public access to massive amounts of data and repositories

containing geographic information. This, in turn, is shifting cartography to an open design process through the production of maps and diagrams for analyzing networks, including the construction of projections, design, compilation, drafting, and reproduction. These tools and developments have provided the means to visualize and further understand complex urban information, and have become a form of spatial, social, and ecological research to empower and pursue social action. Revealing geographic networks, cataloging ecological processes, visualizing invisible and buried systems, and tracing temporal flows are only a few outcomes from this emerging, contemporary practice. One major objective of this Term Project is to explore geographic tools in the design field for reaching deeper and more engaging approaches of using geospatial information as an index and instrument in design-research.

This Term Project requires the research, mapping, and documentation of a waste material within the Great Plains Region. Projects should highlight the regional and spatial infrastructures that support the production of the waste material, placing emphasis on existing anthropogenic and biophysical systems. Research will be done in a case study format to visually describe regional networks through mapping, cataloging, and diagramming their influences, histories, economies, and time-based processes at multiple scales. These scales should encompass the system's time and geographic scale, the way it operates at a spatial, site based scale, and the materials involved and/or being manipulated by the system, revealing the invisible geographic networks supporting the production of waste materials and landscapes. Emphasis is placed on ecological, operative, performative, and logistical conditions of the networked waste systems.

The main objective of this Term Project is to graphically describe the waste material's regional system, and the dynamic processes at work within each network at the macro scale. Another objective of this Term Project is to define and represent the organizational patterns of macro-scaled systems, and how they operate at the micro scale. The purpose of this Term Project is to explore how a waste material effects and is supported by multiple anthropogenic and biophysical systems at regional, national, and even global scales.

Additionally, students will complete a short case study project that documents how their waste material is effectively reused. Students will use landscape performance criteria of environmental, economic, and social performance to evaluate their case study. By revealing gaps and potentials within waste networks, coupled with the knowledge gained from a case study, one can speculate on strategic moments of recalibration to transform a waste system for greater performance.

Students will grasp methods in which research is synthesized and translated as a form of representation, highlighting the importance of how the process of interpreting dense and complex layers of research becomes graphically synthesized and is used as the basis for a speculative design project.

What might happen if you combined…?
What solutions would you suggest for…?

EVALUATION QUESTIONS
Making value-based decisions about issues
Resolving controversies or differences of opinion
Development of opinions, judgements, or decisions
What do you think about…?
Place the following in order of priority…
How would you make decisions about…?
What criteria would you use to assess…?

Project Schedule: **Date to be selected: 4-5 students per session; January 25 – March 1**

Final Requirements:
1 Newly Selected Reading to compliment or contrast with 1 required reading, posted 1 week before assigned discussion day
1-2 page written review summarizing critique and thoughts of both readings
2 critical questions for discussion

Project Evaluation: The critical reading assignment will be worth 10% of your final grade. Grading will place emphasis on clarity, research synthesis and precision, quality of verbal description, and presentation.

Reading List Topics:
1. Sanitation: Emergence of [mis]managing Materials + Waste [1/25]
2. Brownfields, Drosscapes, and other Wastelands [2/1]
3. Design, Waste, and Landscape Performance – Benefits of Waste [2/22]
4. Reframing Waste: Concepts [3/1]

Each board should have a title (36 pt. font) and a 150-200 word description (16 pt. font) of the waste material as characterized above. Students are encouraged to expand their research beyond basic GIS datasets through internet based references, articles, literature, journals, etc. I will present examples in class of visualization techniques for representing geospatial data and will provide an optional GIS tutorial on a day and time as agreed upon in class. I will also provide a board template for the project during Week 2.

The initial presentation for Part 1 is on **February 15th at 6:00pm in Room 115**. Students will use the screen to present their work. **Please have digital PDF files submitted to Canvas by 4pm.**

Part 2: Innovative Case Studies reusing Waste

Part 2 of the Term Project entails the documentation and analysis of an innovative Case Study that reutilizes the studied waste material and landscapes uncovered in Part 1.

Each student group will find and select an existing landscape architecture project or industrial program/process to analyze and represent. Diagrams and composite images consisting of plans, sections, diagrams, digital models, aerials and/or images are to be used to analyze and highlight the performative and aesthetic aspects of waste reuse, including remediation strategies, material flows (particularly those related to the waste material), and operational landscape processes at macro and micro scales. Students are to use metrics, the size of objects, the space they require, and their movements, to more accurately describe the case studies and the way they perform.

Case study analysis will also apply landscape performance as a framework for understanding the economic, environmental, and social benefits provided by the case study. Emphasis should be placed on the material, the operative processes that are being used to reuse and repurpose the material, alternative uses for that material, and its larger benefits.

The final submission is two 24”x36” boards in PDF format, and presentations should highlight relationships, lessons, and techniques students believe to be successful. Students should also be critical of aspects that can be improved upon.

Board 1 should be at the macro scale (time and space), and describe strategic relationships between ecology and operations within and around the site. A planimetric diagram should clearly describe relationships between biophysical (hydrology, biota, etc.) and anthropogenic (transportation, materials cycling, etc.) systems. An accompanying timeline may also be used to situate the project or site in a larger historical context.

Board 2 should graphically represent the strategy's aesthetic and dynamic process and the operative sequences over time (for remediation strategies or industrial processes). It should illustrate how factors at the larger scale operate at the site scale, exploring spatial and material relationships between users and the site's programming. This should be done using sections, axonometric, and/or perspectives.

Students are expected to produce their own drawings illustrating project information, rather than relying on drawings and diagrams they find.

Each board should have a title (36 pt. font) and a 150-200 word description (16 pt. font) of the case study as characterized above. The presentation for Part 2 is **March 15th at 6:00pm in Room 115**. Students will use the screen to present their work. **Please have digital PDF files submitted to Canvas by 4pm.**

Part 3: Hybridizing Systems to Create Waste Symbiosis

After mapping and analyzing their individual waste materials and systems, and documenting an innovative case study, students will team up with 1-2 other groups (determined by me) to develop and design landscape planning strategies and strategic interventions for waste materials and systems. Groups will create a scenario for the year 2050, and speculate how their hybrid, symbiotic systems will adapt and perform within that context. The objective of this part is to synthesize multiple single stream waste systems into one new multi-stream system that supports the Great Plains Region, forming new relationships between different systems. This will be accomplished by closing waste material loops, reclaiming waste landscapes, and finding ways in which wastes from one system can become food for another, creating symbioses that merge systems together to make them more efficient and self-sustaining.

The final submission for Part 3 is two 24"x36" boards in PDF format, highlighting how the new relationships are created geospatially at a macro scale (Board 1) and operationally at the micro scale (Board 2). Mappings, diagrams, and photographs from Parts 1 and 2 should be hybridized between within the group.

Each board should have a title (36 pt. font) and a 150-200 word description (16 pt. font) of the newly recalibrated, hybrid, symbiotic, regional, infrastructural landscape as characterized above

The presentation for Part 3 will occur with a final presentation of the entire project on **April 19th at 6:00pm in Room 115**. Students will use the screen to present their drawings and pin up 11"x17" colored prints of their work. **Please have digital PDF files submitted to Canvas by 4pm.**

Project Schedule:

Part 1

1/11 Term Project Description, Format, Schedule
Topic Presentation + Selection

1/18 Reading discussion with quotes
Data and Research Acquisition, Preliminary Ideas about Board Contents

1/25 Reading discussion with quotes
Research development and Graphic Organization

2/1 Reading discussion with quotes
Final Graphic Development and Draft Text – Preliminary Layout (digital format) (11x17 Landscape Format of both Boards for discussion)

2/8 *Class Cancelled for Field Trip; date TBD*
Optional group discussions about projects

2/15 **Part 1: Presentations – PDF projection;**
Part 2 Discussion

Part 2

2/22 Reading discussion with quotes
Data and Research Acquisition, Preliminary Ideas about Board Contents

3/1 Reading discussion with quotes
Guest Lectures
Research development and Graphic Organization (if time)

3/8 Guest Lecture
Final Graphic Development and Draft Text – Preliminary Layout (digital format) (11x17 Landscape Format of both Boards for discussion)

3/15 **Part 2: Presentations – PDF projection;**
Part 3 Discussion + Group Assignments

Part 3

3/22 *Spring Break*

3/29 Preliminary Concepts and Graphic Development for merging systems

4/5 Final Graphic Development and Draft Text – Preliminary Layout (digital format) (11x17 Landscape Format of both Boards for discussion)

4/12 Draft presentations of full project

4/19 **Final Presentations of Term Project – PDF projection format in Room 115, with 11x17 prints pinned up in presentation order by 6:00pm.**

4/26 *Optional Group Meetings for Final Revisions before Final Submission*

Final Requirements:

Part 1

Boards:	Three 24”x36” panels, Landscape format, PDF files submitted to Canvas by 4pm on 2/15.
Scale:	Board 1 – Aerial Geospatial Composite Image (tbd) Board 2 – Historical Study Board 3 – Time Sequence Series / Cross Sectional Analysis (tbd)
Description:	Project title (36 pt. font), 150-200 word description (16 pt. font)
Presentation:	Each project has ~20 minutes total; ~10 minutes for presentation, and ~10 minutes for discussion.

Part 2

Boards:	Two 24”x36” panels, Landscape format, PDF files for digital projection in Room 115 submitted to Canvas by 4pm on 3/15.
Scale:	Board 1 – Aerial Geospatial Composite Image (tbd) Board 2 – Time Sequence Series / Cross Sectional Analysis (tbd)
Description:	Project title (36 pt. font), 150-200 word description (16 pt. font)
Presentation:	Each project has ~20 minutes total; ~10 minutes for presentation, and ~10 minutes for discussion.

Part 3

Boards:	Two 24”x36” panels, Landscape format, PDF files for submitted to Canvas by 4pm on 4/19; 11x17 prints of FULL project pinned up in Room 115 by 6pm.
Scale:	Board 1 – Aerial Geospatial Composite Image (tbd) Board 2 – Time Sequence Series / Cross Sectional Analysis (tbd)
Description:	Project title (36 pt. font), 150-200 word description (16 pt. font)
Presentation:	Each project has ~30 minutes total; ~10 minutes for presentation, and ~20 minutes for discussion.

Project Evaluation:

The Term Project is worth 75% of your overall grade for the course (Part 1=20%, Part 2=10%, Part 3=15%, and Final Submission=30%). Grading will place emphasis on graphic development and clarity, research synthesis and precision, quality of visual description, and presentation.

Waste Material Systems List:

1. Agricultural Waste
Crop-based Production Waste (corn, alfalfa, etc.)
Animal-based Waste (chickens, cows, pigs, etc.)
Food / Post-consumer Waste (fruit or vegetable)

2. Wastewater
Includes sludge, stormwater, and other materials that result from wastewater processing

3. Building + Construction Industry Waste
Material Production (brick, concrete, metals, bio-based materials such as wood, nurseries for plantings, etc., sand, etc.)
Post-building or demolition (construction waste, demolition waste, etc.)

4. Waste in Energy Production
Nuclear Waste (mining uranium, post-energy nuclear waste, etc.)
Coal (mining coal, post-production residues, etc.)
Petroleum (extraction oil, processing and refining, spills, etc.)
Geothermal (extraction, processing, post-production residues, etc.)
Natural Gas (extraction through fracking, processing and storage, post-production residues, etc.)

5. Manufacturing+ Industrial Waste/Manufactured Consumer Goods
Precious metals or stones (mining, manufacturing, post-consumer, etc.)
Plastics (extraction, production, use, end-of-life, etc.)
Paper (extraction, production, end-of-life, etc.)
Electronic Waste (extraction, production, use, end-of-life, etc.)
Fabrics (cotton, nylon, polyester, etc.)

6. Soils + Sediments (treated as undesirable)
Contaminated Soils (extraction, processing, disposal, etc.)
Dredged sediments (extraction, processing, disposal, etc.)

7. Bio- or Biomass-based Wastes
Human sourced (hair, bodies, blood, teeth, etc.)
Contaminated Objects (biomedical waste)

APPENDIX C:
CRITICAL READING PROJECT BRIEF

LARC 497/597: Waste Ecologies
Class: Th, 6:00-8:50pm, Architecture Hall 115, 3 Credits
Instructor: Catherine De Almeida, Assistant Professor
Contact: cdealmeida2@unl.edu; 2-4900; Office: Room 236
Semester: Spring 2018

Critical Reading Presentations

Project Description:

This research seminar offers a forum for debate and critical reflection on the emerging body of knowledge and inquiry relating to cultural attitudes towards waste, waste management practices, and designing with waste. Through a dynamically curated, collectively generated, shared reading list, course members will be introduced to a range and breadth of material drawn from current academic scholarship to professional practice to popular culture. Readings will demonstrate a diversity of perspectives, including paradigm shifts, culturally-specific approaches, competing ideologies, critiques, and evidences to support design.

While students are expected to come to class prepared for debated and informed discussion with submitted quotes from reading the assigned material in advance, this assignment allows each class member ***to study and critique a selected reading in depth for presentation and discussion with the class***. The collective learning experience will largely depend on the initiative and diligence of each class member in contributing to and being *actively* engaged in the course material. The readings aim to enrich each student's knowledge base and provide inspiration or provocation for other related areas of investigation—in particular, for the Term Project and other outside projects students may be involved with such as Thesis.

Project Format and Structure:

Each student will commit to a topic, reading, and presentation date by signing up for a selected date and reading choice in class. An even distribution of discussion leaders is highly desirable.

Each member ***will thoughtfully, critically, read carefully, and present effectively*** a critique of the main issues, themes, or arguments made in **TWO (2)** readings**: the first** must be chosen from the weekly readings to which everyone has access, while **the second** reading is **YOUR OWN CHOICE**—one that you feel serves as a complement or foil to the required reading and to the curriculum. (A maximum of 2 students per required reading is allowed).

As a guideline, peer-reviewed scholarly articles and essays in scholarly texts are preferred reading choices. Selected readings can also be a reference listed in an assigned reading, and may also be selected from the course bibliography. However, students are encouraged to find their own sources and may not use any already assigned readings.

Drawing from both selected readings, each member will ***present a critique*** and ***lead a discussion*** in class on their selected presentation date, relating the material to their selected topic and situating it within the curriculum.

Prepare a ***1-2 page written review that summarizes your critique of both readings*** and circulate copies to all members at the beginning of the class in which you are presenting. *Be sure to include the* ***full reference*** *for each paper selected.*

Students will email and post to Canvas the author name and title of both readings that their presentation addresses, as well as an electronic copy (PDF) of chosen article **ONE WEEK** in advance of the seminar. Be sure to list the week#, author, date (ex. Week 2: Di Palma, 2017) in the SUBJECT HEADER of your post to make it easier for other students to access your posted article.

Provide a ***5-10-minute oral presentation of your critique in class*** and conclude by ***posing two carefully selected and constructed questions*** to the class to be explored or debated through discussion. Questions should related to the topic for the same day, and should present an opportunity to facilitate scholarly exploration through **respectful** dialogue, debate, and reflection. Each presentation will be followed by 10-15 minutes of discussion, with a session summary and reflection provided by the instructor.

Good discussion questions are ***higher-order*** questions; they are never rhetorical, are not merely factual, nor can they be answered simply on some point of fact. Based on *Bloom's Taxonomy of Inquiry* (Bloom, et. al 1956), discussion questions go well beyond mere memory-testing or comprehension, and should focus on ***synthesis, analysis, or evaluation***. For example:

ANALYSIS QUESTIONS
Subdividing something to show how it is put together
Finding the underlying structure of a communication
Identifying motives
Separation of a whole into component parts
What are the parts or features of…?
Classify…according to…
Outline/diagram…
How does…compare/contrast with…?
What evidence can you list for…?

SYNTHESIS QUESTIONS
Creating a unique, original product that may be in verbal form or may be a physical object
Combination of ideas to form a new whole
What would you predict/infer from…?
What ideas can you add to…?
How would you create/design a new…?

What might happen if you combined…?
What solutions would you suggest for…?

EVALUATION QUESTIONS
Making value-based decisions about issues
Resolving controversies or differences of opinion
Development of opinions, judgements, or decisions
What do you think about…?
Place the following in order of priority…
How would you make decisions about…?
What criteria would you use to assess…?

Project Schedule: **Date to be selected: 4-5 students per session; January 25 – March 1**

Final Requirements:
1 Newly Selected Reading to compliment or contrast with 1 required reading, posted 1 week before assigned discussion day
1-2 page written review summarizing critique and thoughts of both readings
2 critical questions for discussion

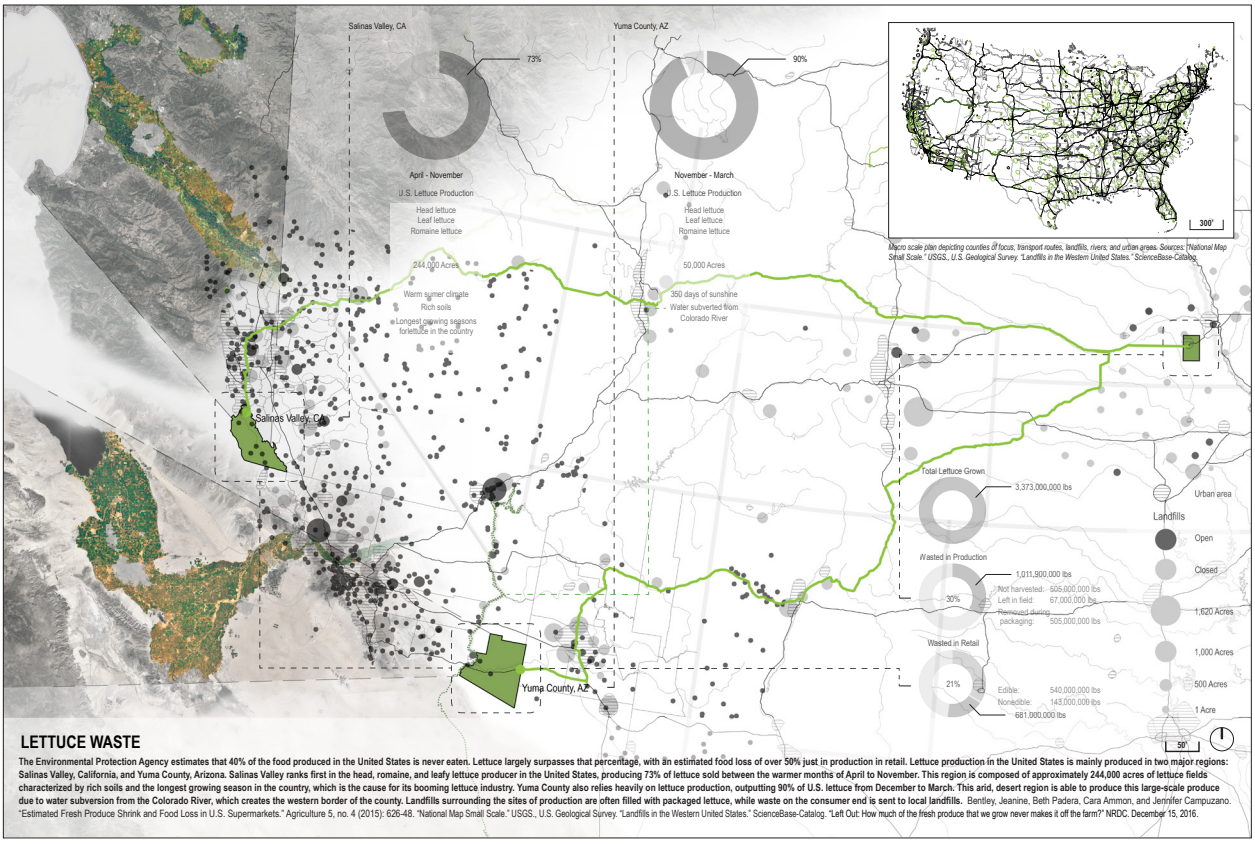
Project Evaluation: The critical reading assignment will be worth 10% of your final grade. Grading will place emphasis on clarity, research synthesis and precision, quality of verbal description, and presentation.

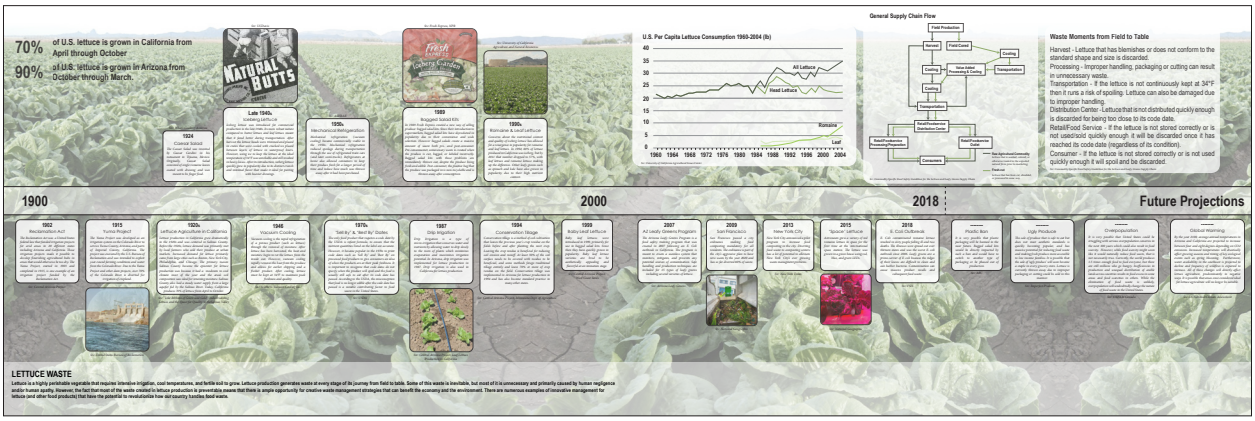
Reading List Topics:
1. Sanitation: Emergence of [mis]managing Materials + Waste [1/25]
2. Brownfields, Drosscapes, and other Wastelands [2/1]
3. Design, Waste, and Landscape Performance – Benefits of Waste [2/22]
4. Reframing Waste: Concepts [3/1]

WEEKLY TOPICS AND READINGS: SIGN-UP SHEET

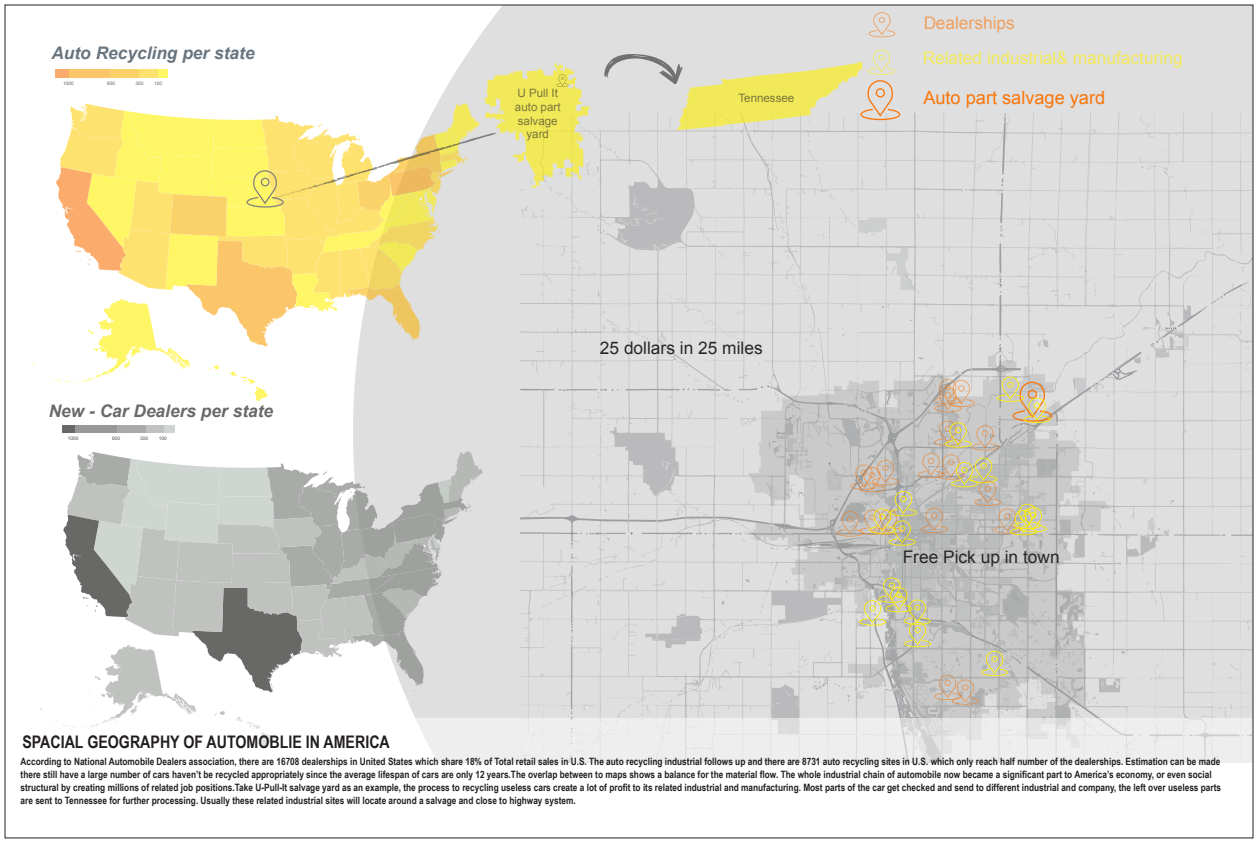
Week	References
3	***Sanitation: Emergence of [Mis]managing Materials + Waste*** Engler, Mira, "Repulsive Matter: Landscapes of Waste in the American Middle-Class Residential Domain," *Landscape Journal,* 16(1), 1997: (Baltimore, MD: John Hopkins University Press, 2004): 60-79. Lynch, Kevin, "Chapter 2: The Waste of Things," in *Wasting Away*, (San Francisco: Sierra Club, 1990): 42-80.
4	***Brownfields, Drosscapes, and other Wastelands*** Belanger, Pierre, "Airspace: The Ecologies and Economies of Landfilling in Michigan and Ontario" in *Trash*, ed. By J. Knechtel, (Cambridge: The MIT Press, 2006): 132-155. Berger, Alan, "The Production of Waste Landscape" in *Drosscape: Wasting Land in Urban America* (New York: Princeton Architectural Press, 2006): 46-75. Lister, Nina-Marie, "Trashed Space," in *Trash*, ed. J. Knechtel, (Cambridge: MIT Press, 2006): 62-75.
7	***Design, Waste, and Landscape Performance – Benefits of Waste*** Belanger, Pierre, "Landscape as Infrastructure," *Landscape Journal* 28(1): 80-95. Canfield, Jessica, and Bo Yang, "Reflection on Developing Landscape Performance Case Studies," *Landscape Research Record, 2014*. Ghosn, Rania and Jazairy, El Hadi, "Geographies of Trash," *Journal of Architectural Education*, 68(1): 68-81. Meyer, Elizabeth, "Uncertain Parks: Disturbed Sites, Citizens, & Risk Society" in Julia Czerniak and George Hargreaves, eds. *Large Parks* (New York: Princeton Architectural Press, 2007): 34-57.
8	***Reframing Waste: Cradle-to-Cradle, Industrial Ecology, Circular Economies, Urban Metabolism, Life-cycle Analysis, and other concepts*** Belanger, Pierre, "Landscapes of Disassembly: Waste Economies and Emerging Industrial Ecologies", *Topos*, (2007) 60: 83–91. Belanger, Pierre, "Metabolic Landscape," in *Landscape as Infrastructure: A Base Primer*, (New York: Routledge, 2017): 334-357. McDonough, William and Braungart, Michael, "Chapter 4: Waste = Food", in Cradle-to-Cradle: Remaking the way we make things (New York: North Point Press, 2002): 92-117.

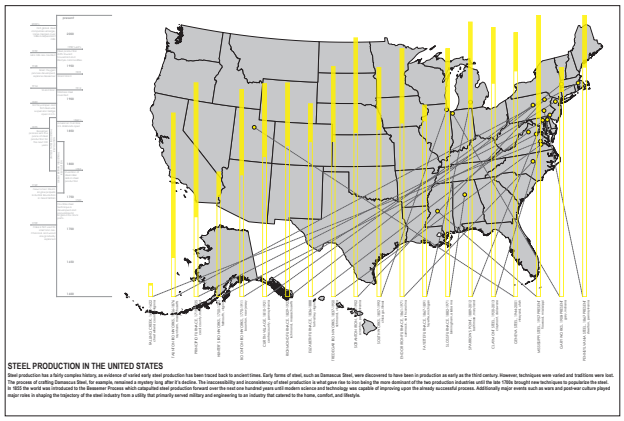
APPENDIX D:
SAMPLES OF STUDENT WORK - TEAM PROJECT

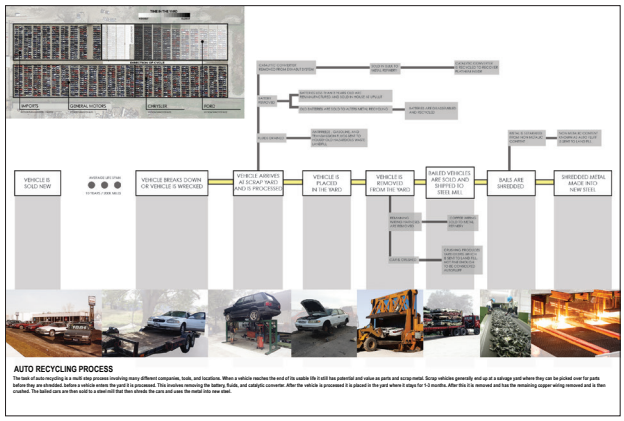




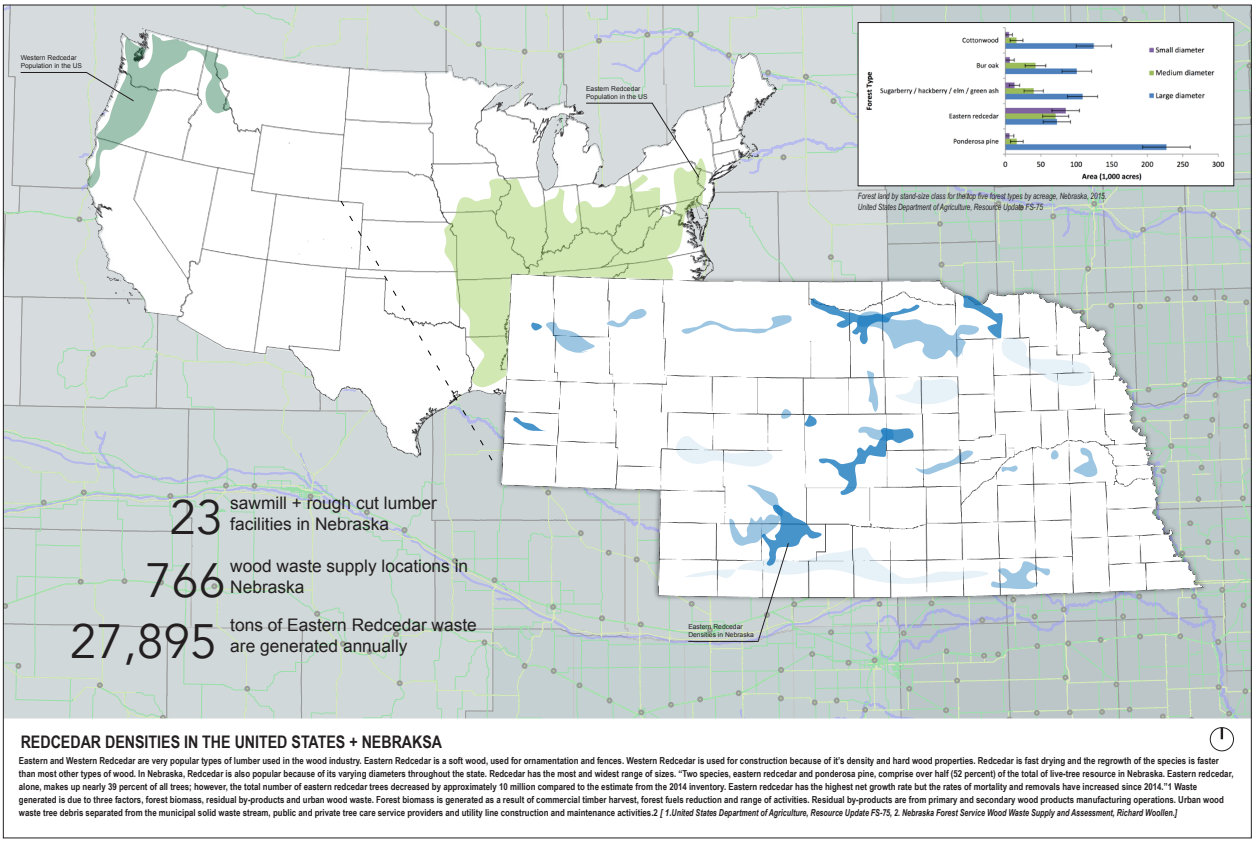
Group A [Lettuce Waste]_Part 1





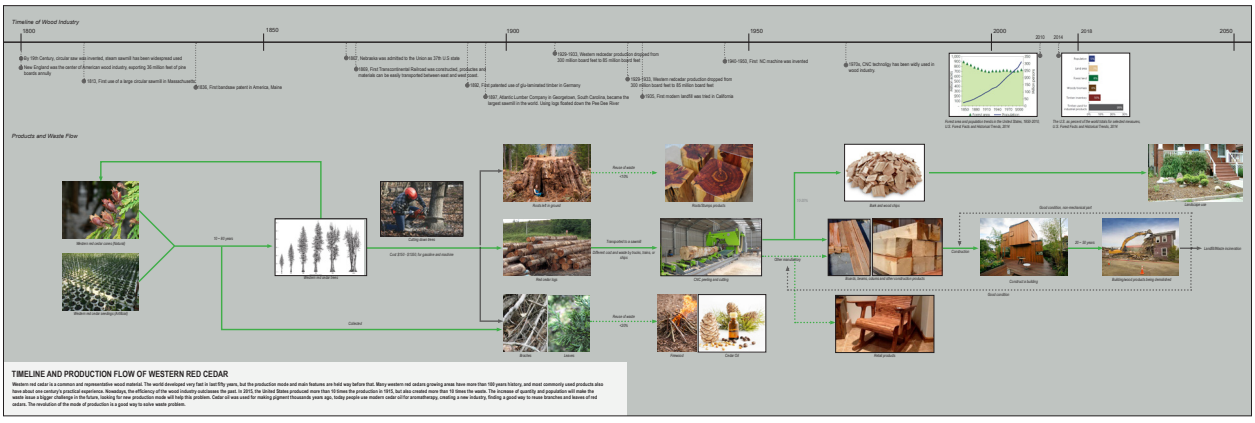


Group B [Automotive Recycling Waste]_Part 1

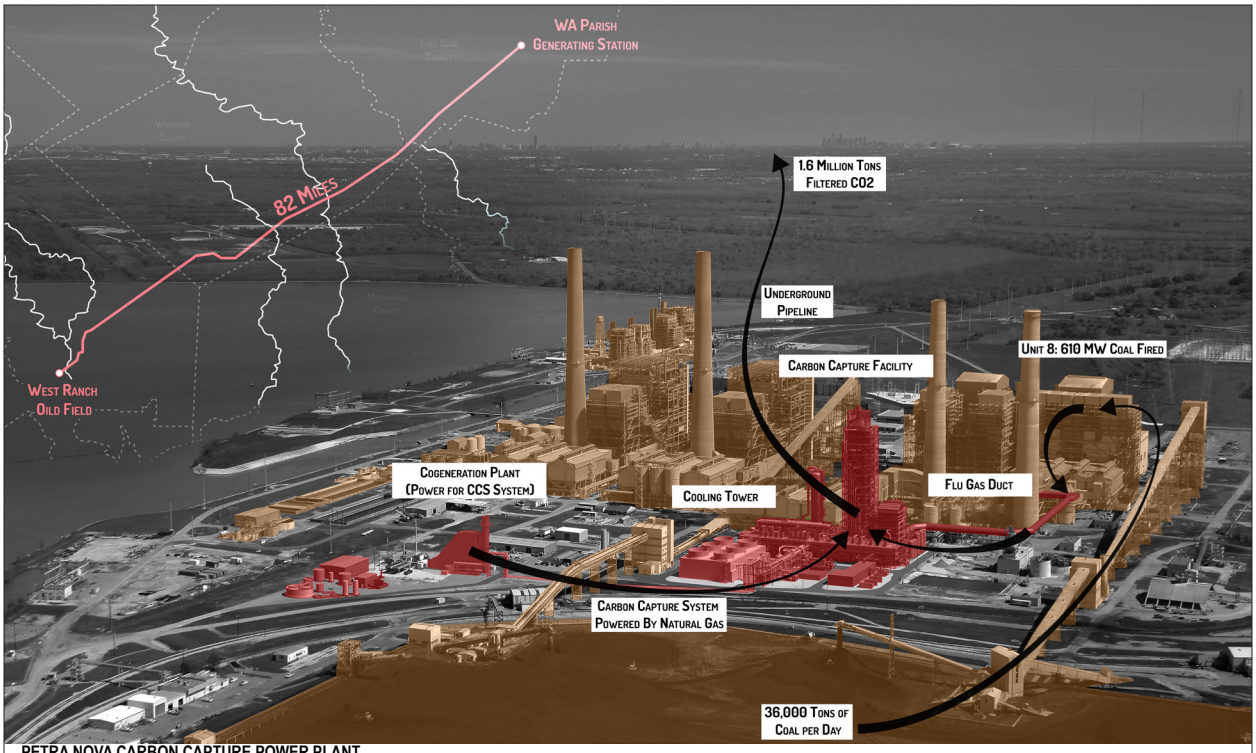


REDCEDAR DENSITIES IN THE UNITED STATES + NEBRAKSA

Eastern and Western Redcedar are very popular types of lumber used in the wood industry. Eastern Redcedar is a soft wood, used for ornamentation and fences. Western Redcedar is used for construction because of it's density and hard wood properties. Redcedar is fast drying and the regrowth of the species is faster than most other types of wood. In Nebraska, Redcedar is also popular because of its varying diameters throughout the state. Redcedar has the most and widest range of sizes. "Two species, eastern redcedar and ponderosa pine, comprise over half (52 percent) of the total of live-tree resource in Nebraska. Eastern redcedar, alone, makes up nearly 39 percent of all trees; however, the total number of eastern redcedar trees decreased by approximately 10 million compared to the estimate from the 2014 inventory. Eastern redcedar has the highest net growth rate but the rates of mortality and removals have increased since 2014."1 Waste generated is due to three factors, forest biomass, residual by-products and urban wood waste. Forest biomass is generated as a result of commercial timber harvest, forest fuels reduction and range of activities. Residual by-products are from primary and secondary wood products manufacturing operations. Urban wood waste tree debris separated from the municipal solid waste stream, public and private tree care service providers and utility line construction and maintenance activities.2 *[1.United States Department of Agriculture, Resource Update FS-75, 2. Nebraska Forest Service Wood Waste Supply and Assessment, Richard Woollen.]*



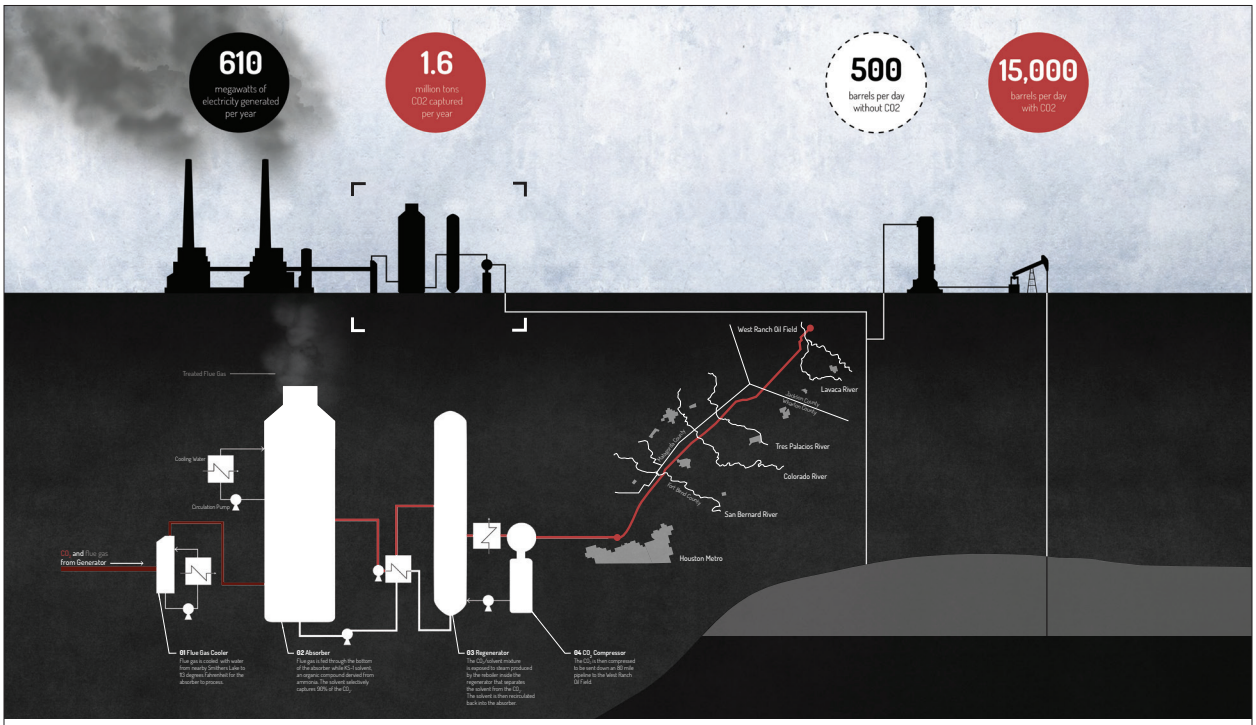
Group C [Wood Waste]_Part 1



PETRA NOVA CARBON CAPTURE POWER PLANT

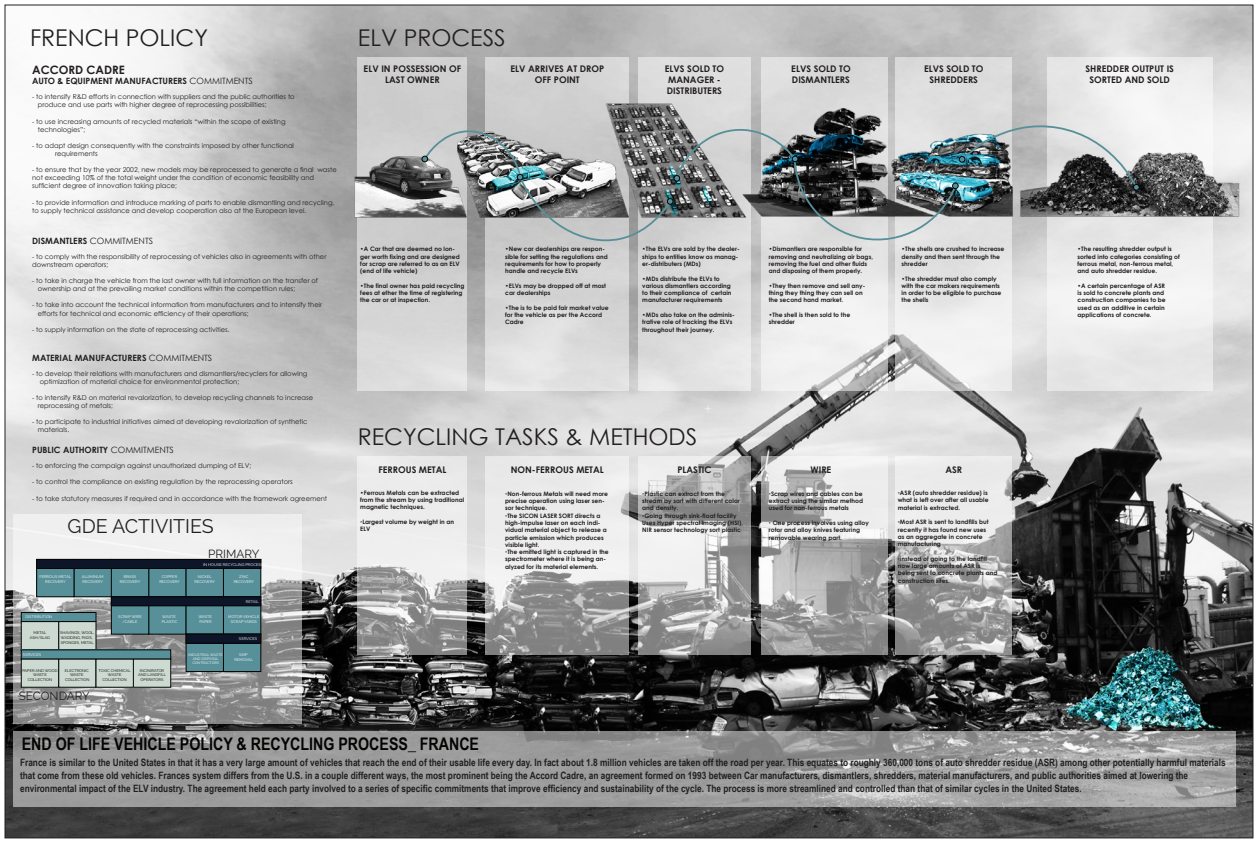
Petra Nova's post-combustion CO2 capture system began operations in January 2017. The 240-megawatt (MW) carbon capture system that was added to Unit 8 (610 MW capacity) of the existing W.A. Parish pulverized coal-fired generating plant receives about 37% of Unit 8's emissions, which are diverted through a flue gas slipstream. Petra Nova's carbon-capture system is designed to capture about 90% of the carbon dioxide (CO2) emitted from the flue gas slipstream, or about 33% of the total emissions from Unit 8. The post-combustion process is energy intensive and requires a dedicated natural gas unit to accommodate the energy requirements of the carbon-capture process. The carbon dioxide captured by Petra Nova's system is then used in enhanced oil recovery at nearby oil fields. Enhanced oil recovery involves injecting water, chemicals, or gases (such as carbon dioxide) into oil reservoirs to increase the ability of oil to flow to a well. [1]

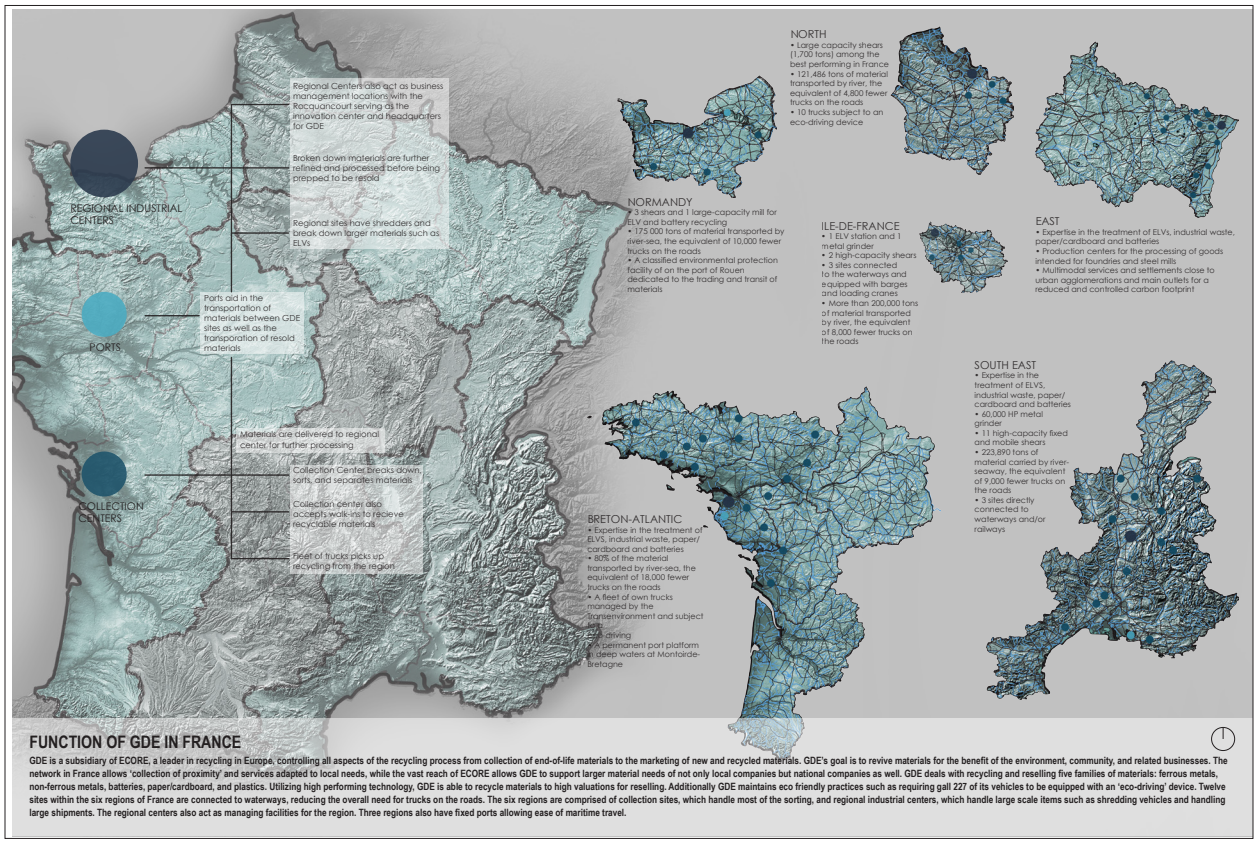
1. Kenneth Dubin, "U.S. Energy Information Administration - EIA - Independent Statistics and Analysis," Petra Nova Is One of Two Carbon Capture and Sequestration Power Plants in the World - Today in Energy - U.S. Energy Information Administration (EIA), accessed March 29, 2018, https://www.eia.gov/todayinenergy/detail.php?id=33552.



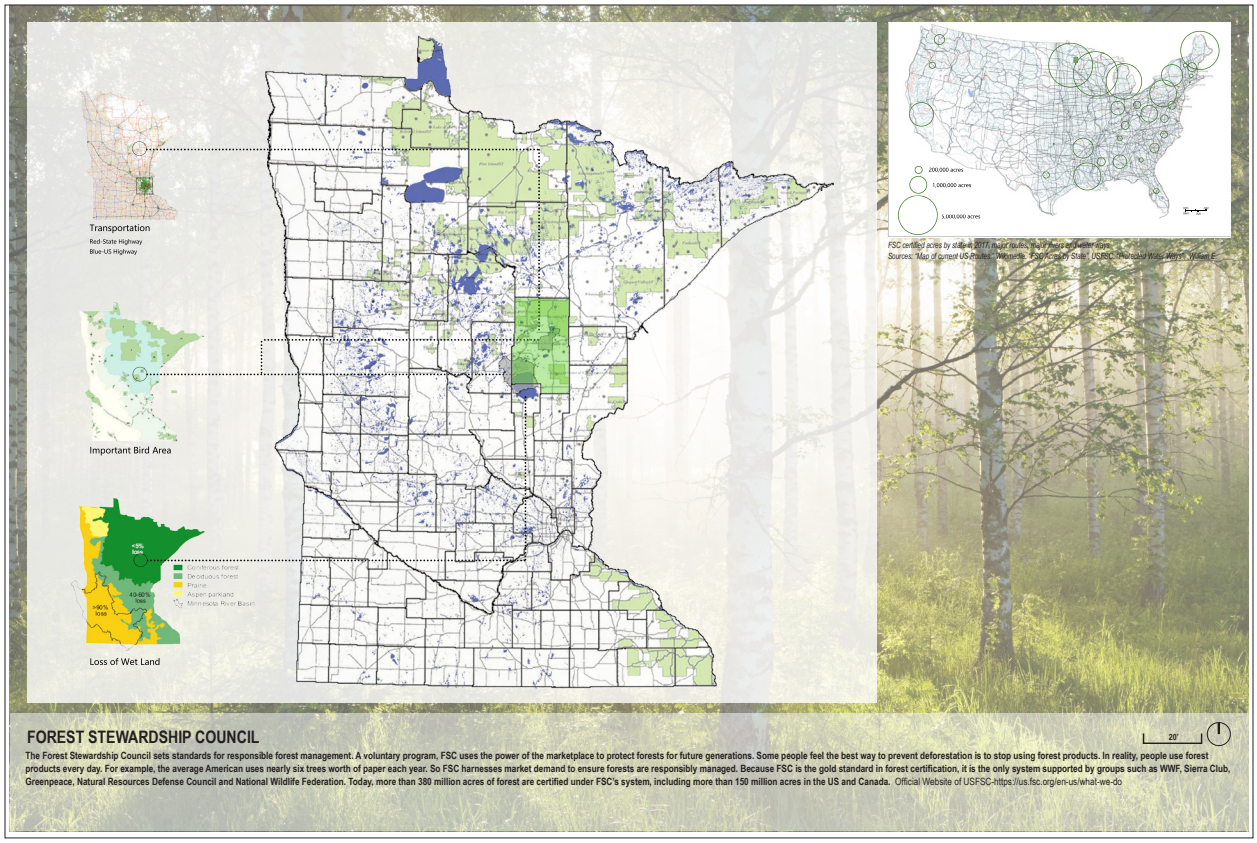
DYNAMIC PROCESSES OF CARBON CAPTURE IN COAL PRODUCTION

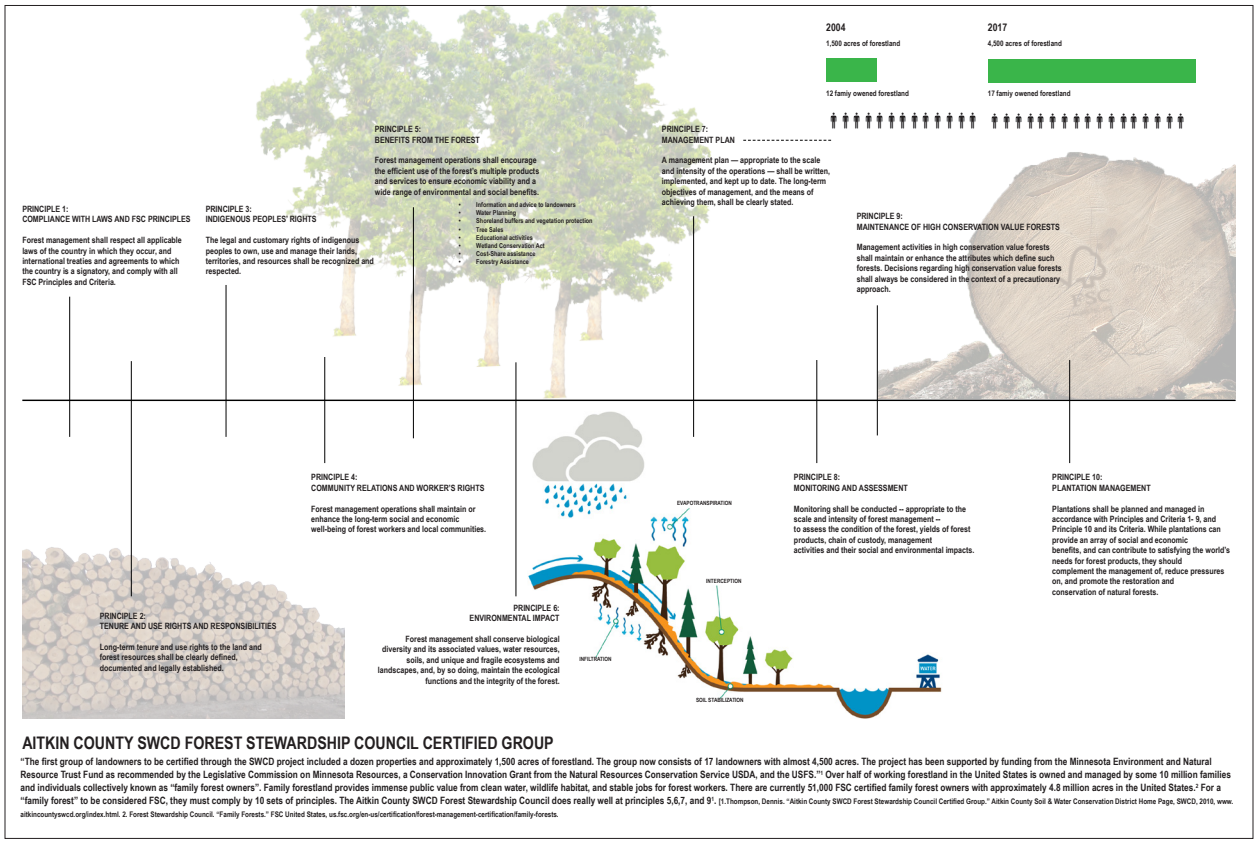
The Petra Nova Coal Plant in Texas became the first coal power plant in the US to implement a system to capture CO_2 emissions from coal production. In a joint effort between NRG Energy and Mitsubishi, engineers developed a system to extract CO_2 from the flue gas and utilize the CO_2 at the West Ranch Oil Field. The 610 MW plant captures 1.6 million tons of CO_2 (90% of what is produced) or the equivalent of 350,000 cars per day. The process begins by cooling the captured flue gas with lake water that is recirculated back to the lake. The cooled gas is then sent to an absorber which contains a solvent called KS-1 that captures the carbon and treats the flue gas. The flue gas is then emitted into the air and the CO_2-solvent mixture is sent to the regenerator which uses steam to separate the CO_2 from the KS-1 solvent. The solvent is recirculated back to the absorber to be reused, and the CO_2 is compressed to be transported to the oil field. At the oil field, CO_2 is used to pressurize the oil deposit to increase oil production. Since the introduction of CO_2, oil production went from 500 barrels a day to 15,000 barrels per day. Sources: 1. NRG Energy, Inc. "Petra Nova: Carbon Capture and the Future of Coal Power." NRG Energy. Accessed March 20, 2018. https://www.nrg.com/case-studies/petra-nova.html. 2. Mitsubishi Heavy Industries, Ltd. "CO2 Recovery Plants: Prevention of Global Warming and Air Pollution." January 10, 2017. Accessed March 20, 2018. http://www.mhi.com/products/environment/carbon_dioxide_recovery_process.html



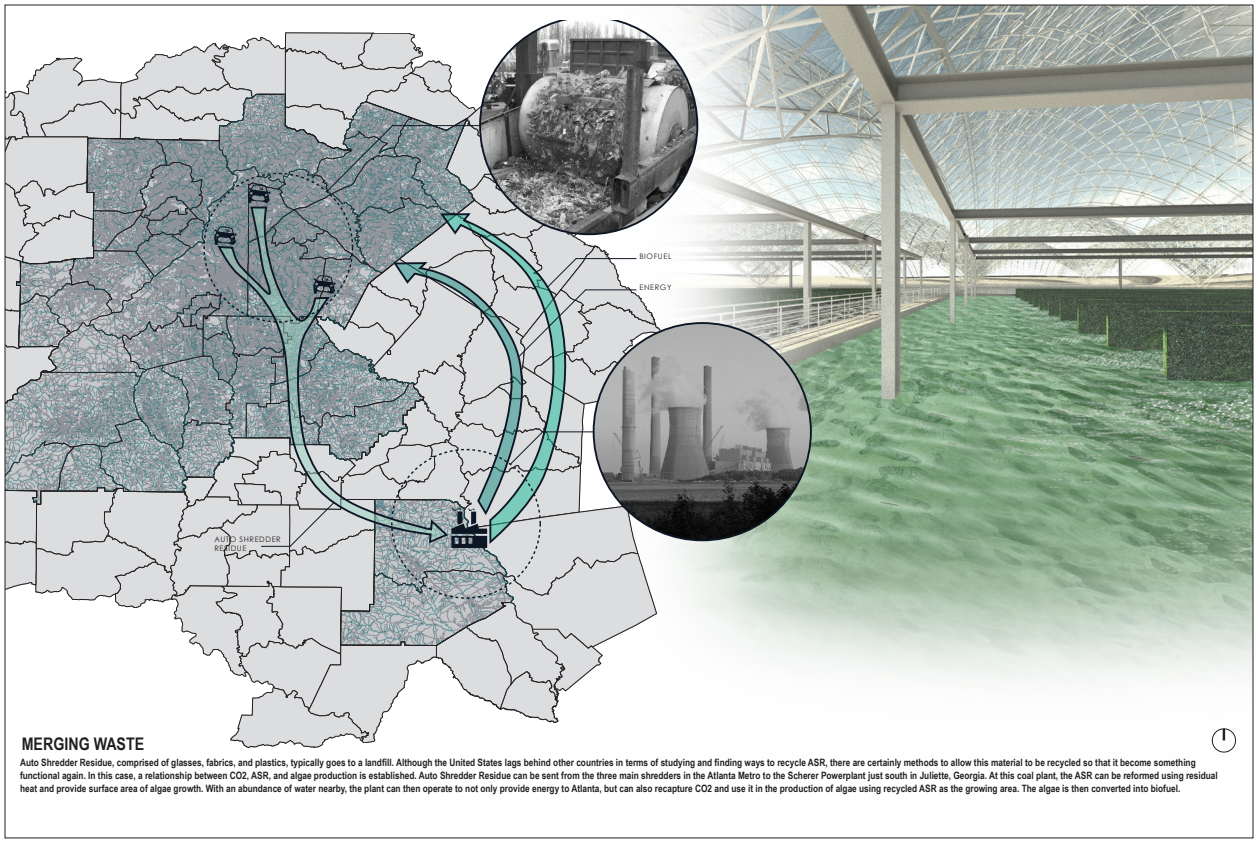


Group B [Automotive Recycling Waste]_Part 2



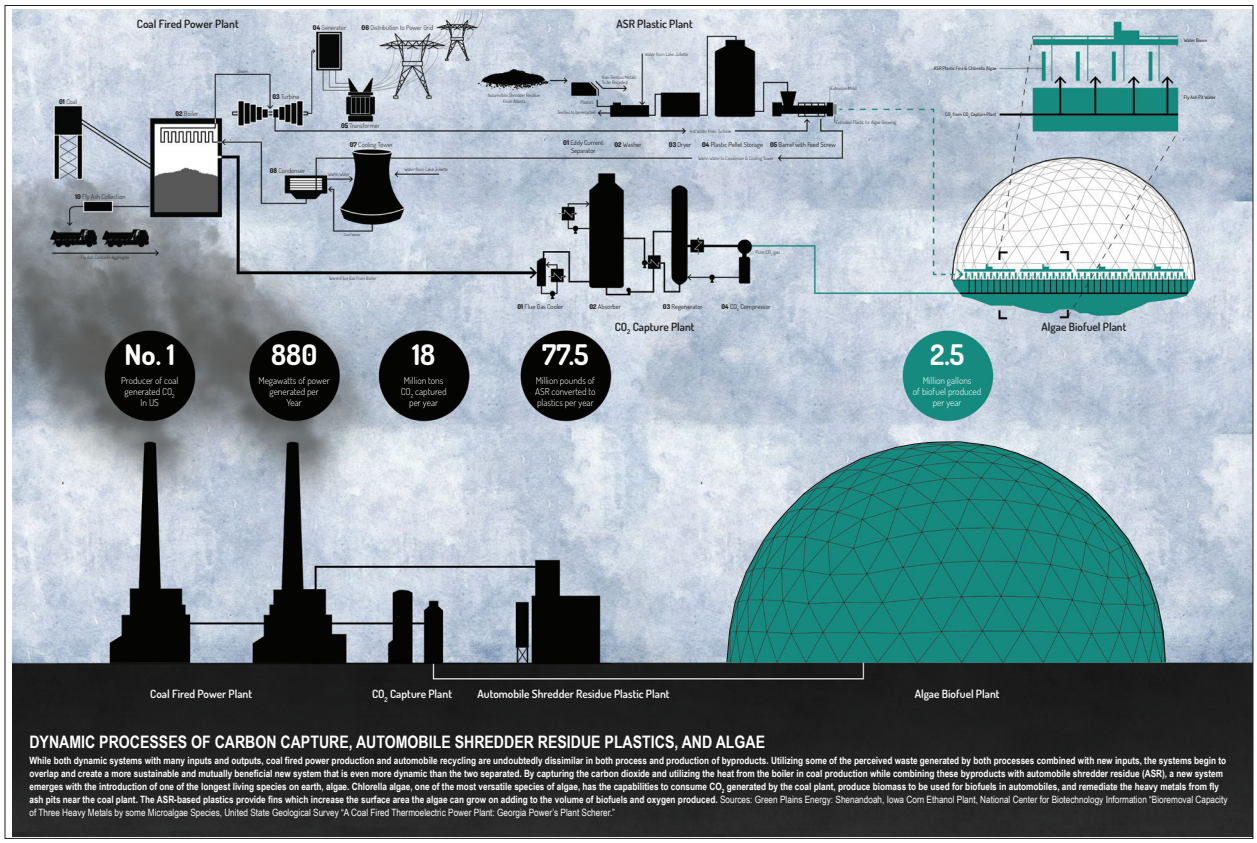


Group C [Wood Waste]_Part 2



MERGING WASTE

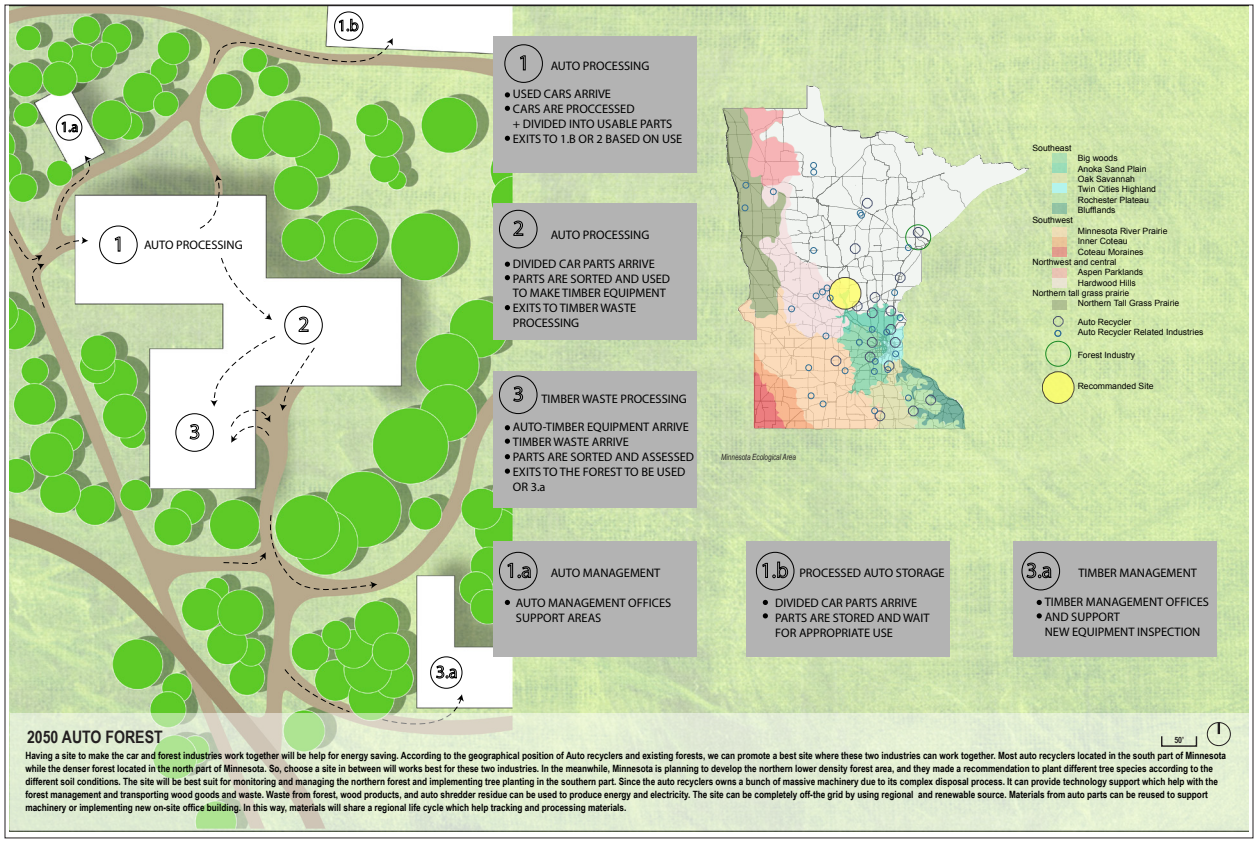
Auto Shredder Residue, comprised of glasses, fabrics, and plastics, typically goes to a landfill. Although the United States lags behind other countries in terms of studying and finding ways to recycle ASR, there are certainly methods to allow this material to be recycled so that it become something functional again. In this case, a relationship between CO2, ASR, and algae production is established. Auto Shredder Residue can be sent from the three main shredders in the Atlanta Metro to the Scherer Powerplant just south in Juliette, Georgia. At this coal plant, the ASR can be reformed using residual heat and provide surface area of algae growth. With an abundance of water nearby, the plant can then operate to not only provide energy to Atlanta, but can also recapture CO2 and use it in the production of algae using recycled ASR as the growing area. The algae is then converted into biofuel.



DYNAMIC PROCESSES OF CARBON CAPTURE, AUTOMOBILE SHREDDER RESIDUE PLASTICS, AND ALGAE

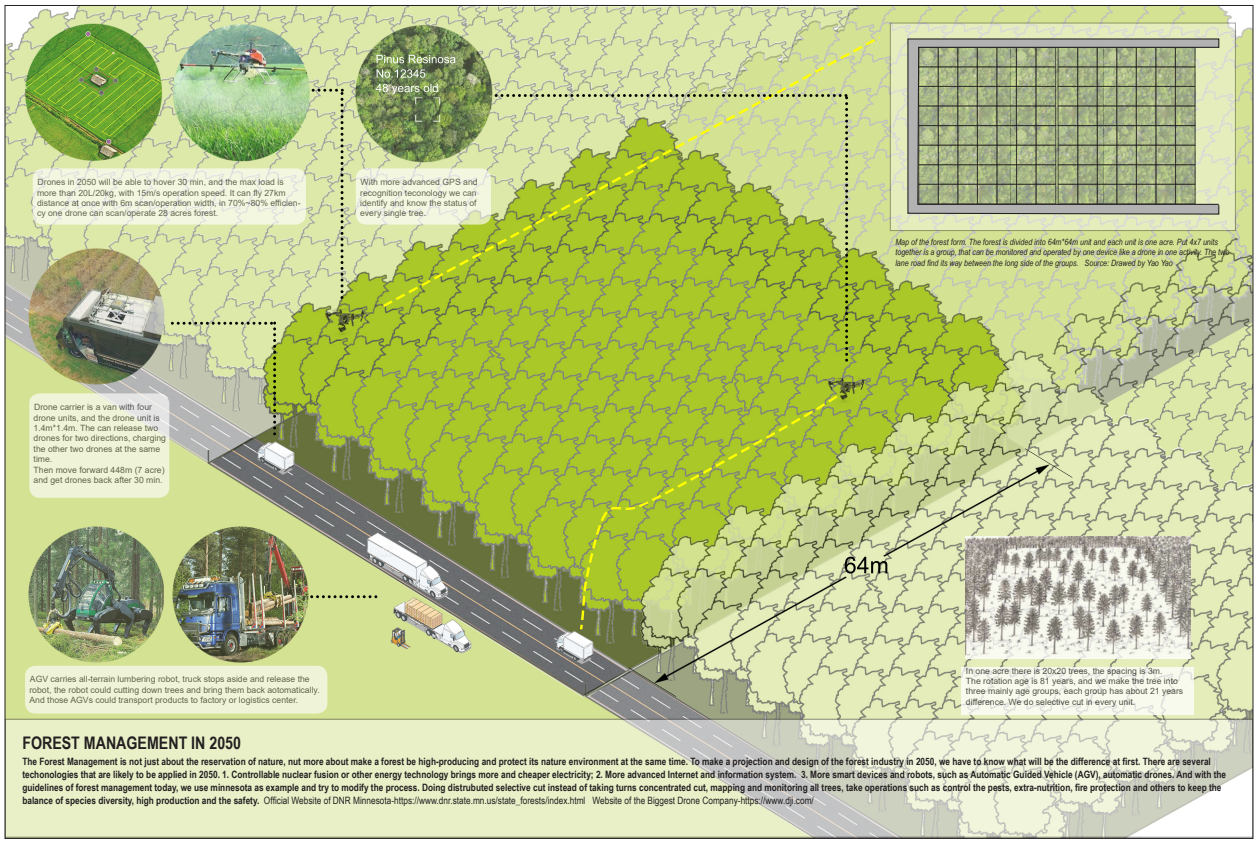
While both dynamic systems with many inputs and outputs, coal fired power production and automobile recycling are undoubtedly dissimilar in both process and production of byproducts. Utilizing some of the perceived waste generated by both processes combined with new inputs, the systems begin to overlap and create a more sustainable and mutually beneficial new system that is even more dynamic than the two separated. By capturing the carbon dioxide and utilizing the heat from the boiler in coal production while combining these byproducts with automobile shredder residue (ASR), a new system emerges with the introduction of one of the longest living species on earth, algae. Chlorella algae, one of the most versatile species of algae, has the capabilities to consume CO_2 generated by the coal plant, produce biomass to be used for biofuels in automobiles, and remediate the heavy metals from fly ash pits near the coal plant. The ASR-based plastics provide fins which increase the surface area the algae can grow on adding to the volume of biofuels and oxygen produced. Sources: Green Plains Energy: Shenandoah, Iowa Corn Ethanol Plant, National Center for Biotechnology Information "Bioremoval Capacity of Three Heavy Metals by some Microalgae Species, United State Geological Survey "A Coal Fired Thermoelectric Power Plant: Georgia Power's Plant Scherer."

Group E [Automotive Recycling Waste + Coal]_Part 3



2050 AUTO FOREST

Having a site to make the car and forest industries work together will be help for energy saving. According to the geographical position of Auto recyclers and existing forests, we can promote a best site where these two industries can work together. Most auto recyclers located in the south part of Minnesota while the denser forest located in the north part of Minnesota. So, choose a site in between will works best for these two industries. In the meanwhile, Minnesota is planning to develop the northern lower density forest area, and they made a recommendation to plant different tree species according to the different soil conditions. The site will be best suit for monitoring and managing the northern forest and implementing tree planting in the southern part. Since the auto recyclers owns a bunch of massive machinery due to its complex disposal process. It can provide technology support which help with the forest management and transporting wood goods and waste. Waste from forest, wood products, and auto shredder residue can be used to produce energy and electricity. The site can be completely off-the grid by using regional and renewable source. Materials from auto parts can be reused to support machinery or implementing new on-site office building. In this way, materials will share a regional life cycle which help tracking and processing materials.



FOREST MANAGEMENT IN 2050

The Forest Management is not just about the reservation of nature, nut more about make a forest be high-producing and protect its nature environment at the same time. To make a projection and design of the forest industry in 2050, we have to know what will be the difference at first. There are several techonologies that are likely to be applied in 2050. 1. Controllable nuclear fusion or other energy technology brings more and cheaper electricity; 2. More advanced Internet and information system. 3. More smart devices and robots, such as Automatic Guided Vehicle (AGV), automatic drones. And with the guidelines of forest management today, we use minnesota as example and try to modify the process. Doing distrubuted selective cut instead of taking turns concentrated cut, mapping and monitoring all trees, take operations such as control the pests, extra-nutrition, fire protection and others to keep the balance of species diversity, high production and the safety. Official Website of DNR Minnesota-https://www.dnr.state.mn.us/state_forests/index.html Website of the Biggest Drone Company-https://www.dji.com/

APPENDIX E:
SAMPLES OF STUDENT WORK - CRITICAL READING PROJECT

Student A

Waste places, *postindustrial spaces*, *crudscapes*, *TOADs*, and lastly, *junkscapes* are used interchangeably to describe the forgotten landscapes of today's cities. The issue is not choosing between the array of terms and critical definitions of these overlooked sites, but rather how we should approach these unused spaces. Author of *Trashed Space*, Nina-Marie Lister, defines the term *junkscape* as, "space that is literally being wasted: space within the landscape that is no longer functional, or has never been productively used."

Lister explains multiple examples of these spaces, many of which never cross our minds and often are the unpredicted byproduct of development. The first is a temporary, obsolete, abandoned, or derelict site (TOADs); these can be the innocuous shopping malls, dotting the landscape of the United States, more so than anywhere else, as Lister mentions the U.S. has twice the square footage of retail space per citizen than any other country, otherwise known as "mall glut."[1] This greatly outlines the issue of the consumption-driven capitalist society that drives the United States. When the economic value of a thing depletes, we deem it as useless and throw it away, or in the situation of a retail store, forget about it, leaving it subject to decay. The root of the issue of waste, at most scales, lies not in natural tendency, but in the tendency of the society which has developed to the point where we are at today, where we frame waste and *junkscapes* as someone else's problem.

The point where lively discourse might begin, however, lies in the creative potential for these dormant, inactive sites, referred to as brownfields. Artists, urbanists and designers are increasingly being drawn to these spaces, in attempt to reactivate them "in constructive and ingenious ways." Too often, we treat these situations as a "nature Band-Aid," as Lister explains, re-greening them often as unprogrammed parks "with no discernable site function or legible connection to place." I feel as if these are seen all over the place in our own region specifically with community volunteer organizations, no doubt with good intention, but often little to no results. When realms such as ecology, biology, culture and nature are and woven into contemporary urban fabric and its inhabitants we can begin to see improvements in how we might reinvent these spaces. Through successful redevelopments of brownfields, we might also see improvements in society's engagement in the reuse of these waste spaces.

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[1] Lister, Nina-Marie, "Trashed Space," in *Trash*, ed. J. Knechtel, (Cambridge: MIT Press, 2006): 67.

Lister adds that when reconsidering these junkscapes, we must resist the want to sweep away the past in the areas found in the postindustrial, postmodern metropolis. In the same light, noted by author David Gute, we must be attentive to the effects of reinventing brownfields on the health and wellbeing of citizens. It wasn't until 1850 that the built environment began to consider health, and now these same issues are being considered in the reuse of brownfields. We must look at this issue not only in the terms of risk, but more so by questioning 'risk to whom?' A major idea behind residential brownfield revitalization is that the "social and financial benefits provided by redevelopment exceed the costs imposed by the interventions and that the reuse of site can further local sustainability objectives by reducing growth pressures in underdeveloped areas. However, even with great intentions, we must be certain that both the risks and benefits are spread equally across all stakeholders, to ensure health regardless of socioeconomic status. I think this is something that must be considered in not only waste scapes, but also any aspect of design that will serve society. Historically, there have been numerous accounts of well-intentioned designs, or policies, that have resulted in gentrification or racial segregation, among many other things, such as the well-known Pruitt Igoe project. The design and revitalization of urban waste spaces is no different, and should be taken equally as seriously.

Questions:

"While [re-greening] perhaps pretty in a pastoral sense, paving our past with sod is both dangerous and meaningless; it is a fitting companion to urban sprawl, a homogeneous landscape that is as uninteresting as it is vapid." (Lister, p71, pg 2)

In response to this idea on re-greening spaces, does this deplete the meaning or importance of many small projects, green spaces, and parks we often see in our own community?

When talking about revitalization of brownfields and so-called "junkspaces," we realize that these places are the result of our consumer driven society. Revitalization is the first step, but how might we envision an urban environment where these waste spaces are no longer created? Or will waste spaces always be apart of our society?

Gute, David M. "Sustainable brownfields redevelopment and empowering communities to participate more effectively in environmental decision-making," in Local Environment, Vol. 11, No. 5. Taylor & Francis, 2006. 473-478. DOI: 10.1080=13549830600853015

Lister, Nina-Marie. "Trashed Space," in Trash, ed. J. Knechtel. Cambridge: MIT Press, 2006. 62-75.

Student B

Critical Write Up and Analysis:

The two publications by William McDonough and Michael Braungart, *Cradle to Cradle* (2002) and *The Upcycle* (2013) are part of a 3-part series discussing the concepts of sustainability, recycling, and commenting on societies view towards waste as well as proposing their cradle to cradle system and demonstrating how it could be implemented. In *Cradle to Cradle* Chapter 4 '*Waste Equals Food*' two main concepts are presented; Cradle-to-Grave and Cradle-to-Cradle. Cradle-to-Grave is the description of our current condition and the way our society treats objects and waste. Our society functions as a throw away culture. We no longer desire or care to fix things because the hassle to fix something provides a lower opportunity cost then replacing it with a new one. Furthermore, our society does not create things to be recycled. McDonough and Braungart use the example of a car, the fact that this item could not be fully recycled because of its complexity of parts and systems, although it contains valuable materials, is a "source production problem". Another example given was that the plastic used to protect common items will outlive the actual items. Items are not designed to be recycled therefore they can not be recycled by the consumers of the products. Cradle-to-Cradle begins to address this issue with the idea that if items were design items to be recycled then the waste produced from these products would not be waste at all but could be efficiently recycled and loop back into the Cradle-to-Cradle system.

In Chapter 1 *"Life UpCycles"* McDonough and Braungart tackle an interesting concept one that leaves more questions than answers but delivers their view on sustainability. In the chapter they question why humans, being highly intelligent and sophisticated, can we not exist with nature in symbioses like all other animals and eco systems? The example provided by McDonough and Braungart compares the fact that ant biomass exceeds that of human biomass, yet the earth is not over run with biomass from ants. This provides the realization of nature's ability to adapt and work in symbioses with all living organisms. In the chapter McDonough and Braungart address the issue of Ecologism and our desire to be net zero. This concept, although slightly exaggerated, begins to talk about a standardization of sustainable strategies in buildings through programs like LEED and Green Building Challenge. This check list style of sustainable design actually begins to bring 'generic design' into the world of sustainable design. A process intended to be specific to site and building. In addition, this generic-ism through sustainable checklists is stunting the innovation and creativity originally found in sustainable design.

Questions:

1. In *The Upcycle* McDonough and Braungart address the relationship between economics and sustainability and how companies become motivated to proclaim their sustainable cutbacks only to expose the inefficiencies they previously possessed. Drawing from earlier discussions and the Cradle to Cradle system proposed by McDonough and Braungart are (and how are) companies

motivated to rethink the way they make goods so that they could be responsibly recycled within the cradle-to-Cradle system?

2. In *The Upcycle* reading McDonough and Braungart address the issue of Ecologism and its impacts on speculation, evolution, and innovation in design processes of products as well as the built environment. What effect do organizations such as LEED, Green Building Challenge, and Cradle to Cradle have on the innovation of sustainable practices?

Student C

In *Geographies of Trash*, authors Rania Ghosn and El Hadi Jazairy begin mapping some of the formal qualities of waste generation both in terms of a larger network but also the forms it creates at certain junctures in the system. They note that throughout history cities themselves have become less filthy by relocating the waste from inside the city to the dots on the urban fringe and beyond further expanding these waste networks. Their research positions that designers have taken larger roles in fields that had typically been reserved for engineers, planners, and ecologists and will continue to do so. Through an analysis of forms waste management creates, Ghosn & Jazairy speculate on what those forms (i.e. cap, collect, contain, preserve, & form) can do if reappropriated and thoughtfully designed. I believe they have an interesting line of thinking in the redesign of these specific sites in a broader waste system; however, I am critical of a few of their approaches. Should these waste sites have humans in mind or should they be designed in such a way that fosters an uninhibited remediation of these sites? It likely depends on the context to answer this question, but we should be aware that we as humans have violently intervened in these landscapes and perhaps the best solution is to do our best to reduce the impact we have had on these sites instead of redesigning spaces for humans.

The design solutions found in *Geographies of Trash* are a direct result of observation, but most importantly mapping. Ghosn & Jazairy were likely influenced by mapping techniques utilized and explained by James Corner in *The Agency of Mapping: Speculation, Critique, & Invention*. Corner utilizes mapping exercises to not only create an understanding of certain situations and systems, but also as a method for design that “unfolds potential.” He says, “Mapping is already a project in the making,” and argues that the map is first a method of “finding” places to intervene and then the “founding” of new projects in existing systems. Using this definition, he contrasts the map as a generative method of design that is provides direction

with the plan to an end or something static and unmalleable. Within the context of the map and the evolution of space and time, the systems that are part of our world are also evolving. Air travel, cell phones, and the internet have all had a drastic impact on how we perceive space, and it becomes challenging to map those systems in a physical sense and understand how that affects the built environment. I also found a lot of Corner's arguments about mapping compelling and extremely helpful in how he uses the many mapping techniques (drift, layering, game board, rhizome techniques) to think critically about a system, to have a position on that system, and intervene with design into the system. While the reading is not contextualized within waste systems, it has a lot of relevance to the mapping of waste and understanding the inefficiencies within it by assembling information together to tell a larger narrative.

Questions:

1. Corner discusses at length a lot of the benefits of mapping and various techniques to go about it; however, if we examine mapping critically, what are some of the pitfalls of mapping as a form of representation and method of design?
2. Design has some strong overtones in both of the readings, but in *Geographies of Trash*, they do not discuss how to reduce the waste we generate but rather unique ways of dealing with it once its present. Which do you think is a more urgent design problem to solve first, how we can leverage design to generate less waste or how we can we deal with the waste we already have?
3. Corner discusses very briefly mapping of space and time as it relates to air travel and how drastically spatial systems were altered. What are some of the influences altering spatial systems today, and how should the technique of mapping change?

Corner, James. "The Agency of Mapping: Speculation, Critique, and Invention." In *Mappings*, 231-52. London: Reaktion Books, 1999.

Goshn, Rania and Jazairy, El Hadi, "Geographies of Trash," *Journal of Architectural Education*, 68-81.

Student D

Elizabeth K. Meyer:
Uncertain Parks: Disturbed Sites, Citizens, and Risk Society
The Public Park as Avant-Garde Architecture

Brownfields, gray fields, Environmental Protection Agency- designated Superfunds sites, manufactured sites, wastelands or toxic sites are all names used interchangeably to describe a once unusable site. Elizabeth Meyer uses the term "disturbed" to capture the effect and character of those sites. "They have been disturbed by new processes- interrupted and interfered with- and that alteration disturbs us, makes us uneasy, anxious, worried and agitated."[1]

Meyer states that "much of the writing about large parks on disturbed sites focuses on the processes of remediation necessary to cleanse them before human use can be considered safe. Although the eco-technologies and operational design strategies deployed in turning these wastelands into parks are fascinating and innovative, this particular focus fails to show what these large parks might mean to the communities that surround and use them."[1] Meyer recalls that two centuries ago, parks were created from royal gardens and hunting ground, one century ago, they came from large rural parcels. However today, parks are built on available urban areas that are abandoned or obsolete. These sites are often polluted.

The question of the social impression comes up and how it may have changed since the ninetieth and early twentieth centuries. "Urban landscape was viewed through two lenses, a medical discourse and a social reform agenda."[1] Are those still relevant topics when discussing a "disturbed" large park? Is "disturbed" a word designers, society and leaders should use when discussing these types of sites?

Fifteen years prior to Meyer's *Uncertain Parks* article, she wrote an argument discussing two Parisian parks and the interpretation between Avant-Garde Landscapes or Architecture Design. Similarly to a "disturbed" site, the two Parisian parks were both "sited by governments with specific social and political objectives and had a history of neglect and unrest".[2] Meyer sites Tschumi's text about the Parc de la Villette: "However, the Parc de la Villette had a specific aim: to prove that it was possible to construct a complex architectural organization without resorting to traditional rules of composition, hierarchy and order."

Overall, Meyer's argument of the two Parisian parks and identifying them as either Avant-Garde Landscapes or Architecture Design is a somewhat similar connection to the case she made about coining the term "disturbed sites" over fifteen years later. All of the sites discussed have similar governed and neglected attributes. The argument of defining a landscape was a topic in the nineteenth century, twentieth century and today.

Questions:

1. Are the two lenses typically used with a large park -a medical discourse and a social reform agenda- still relevant topics when discussing a "disturbed" large park?

2. Is "disturbed" a word designers, society and leaders should use when discussing these types of sites?

Bibliography

1. Meyer, Elizabeth K. "The Public Park as Avant-Garde (Landscape) Architecture: A Comparative Interpretation of Two Parisian Parks, Parc De La Villette (1983-1990) and Parc Des Buttes-Chaumont (1864-1867)." *Landscape Journal*, vol. 10, no. 1, 1991, pp. 16–26., doi:10.3368/lj.10.1.16.

2. Meyer, Elizabeth K. "Uncertain Parks: Disturbed Sites, Citizens, and Risk Society."*Large Parks*, Princeton Architectural Press , 2007, pp. 58–85.

Student E

Summary

Landscape as infrastructure makes an argument for the landscape being able to tackle jobs that built infrastructure usually encompasses. The reading provides a few examples, such as Love Canal and the Leslie Street Split. Love canal was built over a waste landscape without proper infrastructure in place to negate the toxicity of the site, which was formerly used for chemical dumping. On the other hand, the Leslie Street Split served as an example of a dump site that grew into a piece of infrastructure that serves as an ecological recreation. Although, unplanned and undesigned, with nature taking hold the site became an ecology of plants, birds, and mammals- all within walking distance of the downtown area. Additionally, the headland serves as a protection barrier for island communities.

This is where the additional reading, The Value of Biodiversity, comes in. This reading is from a conservationist point of view, and while it doesn't necessarily tackle the designed landscapes, it makes strong cases for the tangible and intangible value of biodiversity. This mirrors the Leslie Street Split example because biodiversity and the 'accidental' intervention of nature is part of what made the Leslie Street Split a strong example of landscape as infrastructure. The reading starts off by addressing the 'fire-brigade period' where conservation efforts were primarily in response to something needing to be rescued. Issues were handled with 'museum' approach, where the aim is to rescue, save, or present examples and case studies within a range of natural habitats, such as a selection of scientific interests, or habitats for tourism.

The reading continues on to question the value of biodiversity in both seen and unseen ways. For example, an environmental crisis brings to light the significance and scarcity of biodiversity as a natural resource. The need for economic analysis then becomes an important piece of determining tangible value. An approach is then to define resources as goods and services, which quantifies the resources in economic terms. In this way, the argument can be made that the ability to measure biodiversity in economic terms is what creates tangible value for us to understand the significance of conservation. A counter argument brought up by some conservationists is that the issues are too important for economics. This would mean that if we cannot add tangible to value to something, decision makers may assume that it is unimportant. The depletion of natural resources are not valued in economic terms, which is why it is easy for so many to turn a blind eye. It is mainly in low income countries or in devastating natural disasters where the value of biodiversity is actually correlated to economic/tangible value. The issue is exacerbated by the fact that the methodology of measuring landscape/biodiversity value is neither consistent nor certain. The true economic value of biodiversity may never be truly understood. For example, the value of the Leslie Street Split was not understood until the natural intervention of biodiversity.

APPENDIX F:
SAMPLES OF STUDENT WORK - REFLECTIONS

Student A: Reflection 1

01/11/18

PERCEPTION OF WASTE?
DEFINITION OF WASTE?
WHAT SHOULD BE DONE WITH IT?

WASTE IS SOMETHING THAT IS NO LONGER USEFUL OR DESIREABLE, IS DISCARDED, AND NO LONGER THOUGHT ABOUT. I KNOW THIS ISN'T THE RIGHT MENTALITY TO HAVE WHEN IT COMES TO APPROACHING WASTE, SO I DO THE THINGS I KNOW TO MITIGATE THE AMOUNT OF WASTE I GENERATE. I RECYCLE, SHUT OFF ELECTRIC APPLIANCES & FIXTURES, BIKE, ETC. TO HELP REDUCE WASTE. WASTE, WHEN THINKING ABOUT ELECTRICITY, IS THOUGHT TO BE SQUANDERED, SO THAT'S ALSO A BIG PART OF THE DEFINITION. THAT SQUANDERED, WASTED POWER COULD HAVE BEEN PUT TO USE ELSEWHERE. TO THAT END, I THINK WE SHOULD UTILIZE DISCARDED WASTE TO ITS FULLEST POTENTIAL, WHATEVER THAT MIGHT BE.

I HOPE TO UNDERSTAND IN WHAT WAYS SPECIFIC WASTES CAN BE REAPPROPRIATED TO SATISFY OTHER PROBLEMS WE FACE OR HOW IT CAN BE RECIRCULATED. WHERE THE U.S. IS ONE OF THE LARGEST CONSUMERS, I'M INTERESTED IN HOW WE CAN BECOME ONE OF THE LEAST WASTEFUL.

02.01.18
Student A: Reflection 2

1. CURRENT PERCEPTION?

WASTE IS MANY THINGS. DISCARDED GARBAGE, INDUSTRIAL BY-PRODUCTS, SEWAGE, POOR USE OF RESOURCES, ETC. IT IS, HOWEVER, NOT MEANT TO BE TAKEN FOR GRANTED. WASTE HAS A LOT OF POTENTIAL TO SOLVE OTHER PROBLEMS FACED IN OUR WORLD.

2. OPPORTUNITIES FOR DESIGN

MANY WASTES HAVE AN UNTAPPED POTENTIAL TO RECYCLE, UPCYCLE, AND EXPLOIT (PROBABLY A BAD WORD), WE ARE STILL LEARNING NEW WAYS TO DEAL W/ WASTE & USE IT AS A RESOURCE INSTEAD OF A DETRIMENT, WHICH IS ABSOLUTELY FASCINATING TO ME.

3. PERCEPTION OF WASTE & HOW ITS CHANGED?

I HAVE REALIZED THUS FAR THAT THE ISSUE OF WASTE IS FAR MORE PERVASIVE THAN I ORIGINALLY THOUGHT. IT HAS TOUCHED EVERYTHING FROM THE ORGANIZATION OF OUR HOMES, NEIGHBORHOODS, CITIES, & URBAN SYSTEM AS A WHOLE. IT IS CULTURAL & ECONOMIC, NOT JUST SOMETHING TO BE DISCARDED. IN SHORT MY PERCEPTION OF WASTE HAS BEEN FURTHER EXPANDED PAST THE NARROWNESS OF THINKING IT WAS JUST THE TRASH IN MY KITCHEN.

Student A: Reflection 3

03.08.18

1. WHAT IS YOUR CURRENT PERCEPTION?
2. OPPORTUNITIES FOR DESIGN?
3. CHANGE?

WASTELAND IS BEING MANAGED IN POOR WAYS. WE CONTINUE TO OPERATE IN A SYSTEM THAT IS BROKEN & THE PROBLEMS ARE SO PERVASIVE NO ONE REALLY KNOWS HOW TO FIX IT. THESE SYSTEMS BEGIN WITH HOW WE MANUFACTURE & HARVEST MATERIALS FOR CONSUMPTION TO HOW WE DISPOSE OF THEM POST CONSUMPTION.

INTERVENING INTO THIS SYSTEM IN RADICAL WAYS REALLY SEEMS TO BE THE ONLY LOGICAL OPTION FOR DESIGNERS & POLICY-MAKERS ALIKE. NOTHING IS REALLY HAPPENING WITH GRADUAL CHANGE OVER TIME & IT SEEMS A LARGE SCALE OVERHAUL OF THESE SYSTEMS IS LONG OVERDUE.

I AM STILL IN AWE OF HOW PERVASIVE THE ISSUE OF WASTE IS. PERHAPS, I CAME UNTO THE CLASS WITH A VERY NARROW MINDSET BUT MY UNDERSTAND OF WASTE IS VASTLY DIFFERENT IN TERMS OF ITS SCOPE & HOW NO ONE REALLY WANTS TO TACKLE THIS ISSUE YET.

Waste Ecologies Final Reflection **Student A: Reflection 4**

Looking back at my first reflection I wrote for the first class, I realized my view on waste was limited. While I knew there was some potential to exploit waste for beneficial purposes, I never really understood the potential of waste. I think within the first class I realized that waste has so much design potential in architecture, landscape architecture, engineering, etc. My scope of understanding was narrow, and it feels much more open today writing this having been through this course this semester. The course and the content covered has honestly lead to lifestyle changes for me, and I feel more aware about my own habits.

Waste, as I know it today, is what people perceive as something undesirable but has many potential design opportunities. I used to be in the “out of sight; out of mind” mindset, but I have become more aware of the systems that come into play with certain materials I previously perceived as waste. I now know there are many aspects of our consumer-based economy in the United States that are problematic. Plastics, for example, are used in extremely unthoughtful ways in terms of packaging. This is because design hasn’t fully impacted the way we package things yet. This is where the negative connotations of waste become reversed through the understanding of a design problem and creating a viable solution for the problem.

My own personal thoughts on waste have certainly gone through a radical change throughout this semester. It has impacted my thinking so much that I contemplate everything I throw away now and ask myself if it can be recycled. For better or worse, I have even become bold enough to point out to my friends what can and cannot be reused. At the very least, this course has taught me to think about waste issues and the ecologies created by them and frame them in a new light where designers can have a tangible impact on our world through something we perceive as bad and make it something for the better.

Waste is something our global society is just starting to think about or perhaps just now have the technology to address. Good engineers and designers are finding ways every day on

many fronts to deal with issues of waste and closing ecological loops just the same as nature. I have certainly gained an increased awareness for these design solutions whether created by engineers, landscape architects, urban designers, architects, scientists, or a varied team of them to address issues of waste. We have an infinite amount of possibilities when it comes to reusing waste and closing some of the loops we find ourselves in. When in practice, I want to engage in conversations involving waste including minimizing construction waste on-site, creating a building that wastes less energy, or even helping an engineer brainstorm on creative solutions to create more efficient building and non-building systems that create less waste.

I think the design-research portion of the class was a great way to engage in some ways of dealing with waste in a way that readings alone could not have done. We were able to exercise our designer skills to address issues somewhat addressed by people outside of our respective fields of work. Even though it was speculative in nature, I still feel like we were able to contribute to a larger conversation about some of the waste issues we were talking about. Perhaps somebody who can fully design the systems we were proposing may get inspired and create a viable solution.

I certainly appreciated all of the things we learned about how we've dealt with waste up to this point in history and what people are doing today to combat new waste generation, but I think I am most curious to learn about waste we have generated but has been around for a long time. I want to know what we can do about landfills that have been remediating waste for years and help speed up the process of breaking the waste down and returning it to the earth/cycle. We have massive areas of space dedicated to waste management, and I want to know more about designing to accelerate the processes of pre-existing waste and the landscapes it has created.

Student B: Reflection 1 01/11/2018

What is your perception of waste?
- What is it?
- How do you define it?
- What should be done with it?

Naturally, I percieve waste as a negative thing, as the first thing that comes to mind is landfills. I think of these giant pits full of things that could be recycled, and it seems best to want to cut down or eliminate heavy waste loads. More recently, however, I have realized that waste is a much broader topic than this, which reaches far beyond just trash and landfills. It comes in many forms such as energy waste, animal waste, etc. So I would define waste as something that is percieved as valueless or functionless. I think that new ideas should be formed around waste, so that it can have a function and create a positive effect on society, at least moreso than is seen today.

What do you hope to get out of this course?

I hope to be involved in higher level conversations and ideas regarding waste, what is it, and innovative ways it is being, or potentially could be dealt with. I also just hope to be able to better see a problem as an opportunity in design innovation, as a whole. I am also interested in discovering how systems I would have never imagined could possibly relate to waste and its potential solutions.

Current Perception of waste? Feb 01, 2018

Waste has a much bigger realm than I initially thought. Now, I define waste as really anything that exists that we consider as useless, or even just useless to us at that point in time. Waste can be actual trash, as it is most commonly referred to, it can be vacant land, roof spaces, emissions, materials, energy - really anything that is usually the result of human consumption.

What are its opportunities for design?

Waste, especially in the form of land, such as brownfields as we discussed this week, has enormous opportunity in design. It can take a cheap, forgotten, unused space and turn it into an amenity for communities or residents. I also believe that waste could serve as monetary value, whether its for methane harvesting or something completely different.

How have perceptions changed?

I originally ~~thought waste was~~ related waste to disgust, as we read earlier. I thought it was a problem that had to be solved, rather than an opportunity to take advantage of. Waste is so familiar to our every day lives, I don't think we are even aware of how much we are constantly wasting things.

March 8, :

1. Current Perception + Definition of Waste ——
   Waste is anything that is deemed unusable / unvaluable at any given time in its cycle of existence. I want to put emphasis on value here, because we have seen that monetary value plays a huge role in production of waste, as well as stopping / lessening production of waste. In short, a thing can be usable, but if it does not produce money for whoever has ownership / control, it is deemed waste. Waste is no longer a term of disgust, but rather an enormous issue for the future of society.

2. What is Waste's opportunities for design ——
   The evolving concept of waste will / can play a large role in design. I can change how design is thought about, for instance, in architecture - putting just as much emphasis on deconstruction and reuse design as construction. I think there is also opportunity to create impactful, positive change at a large scale through design. We have the responsibility of designing part of the built environment, and therefore designing how people live.

3. Change in Perception ——
   As I stated above, waste no longer applies just to garbage we see sitting on the street side. Its scope is much larger than that. It is a huge problem right now, but can also be a huge opportunity when framed + handled in the right way.

Waste Ecologies

Final Reflection

Student B: Reflection 4

May 3, 2018

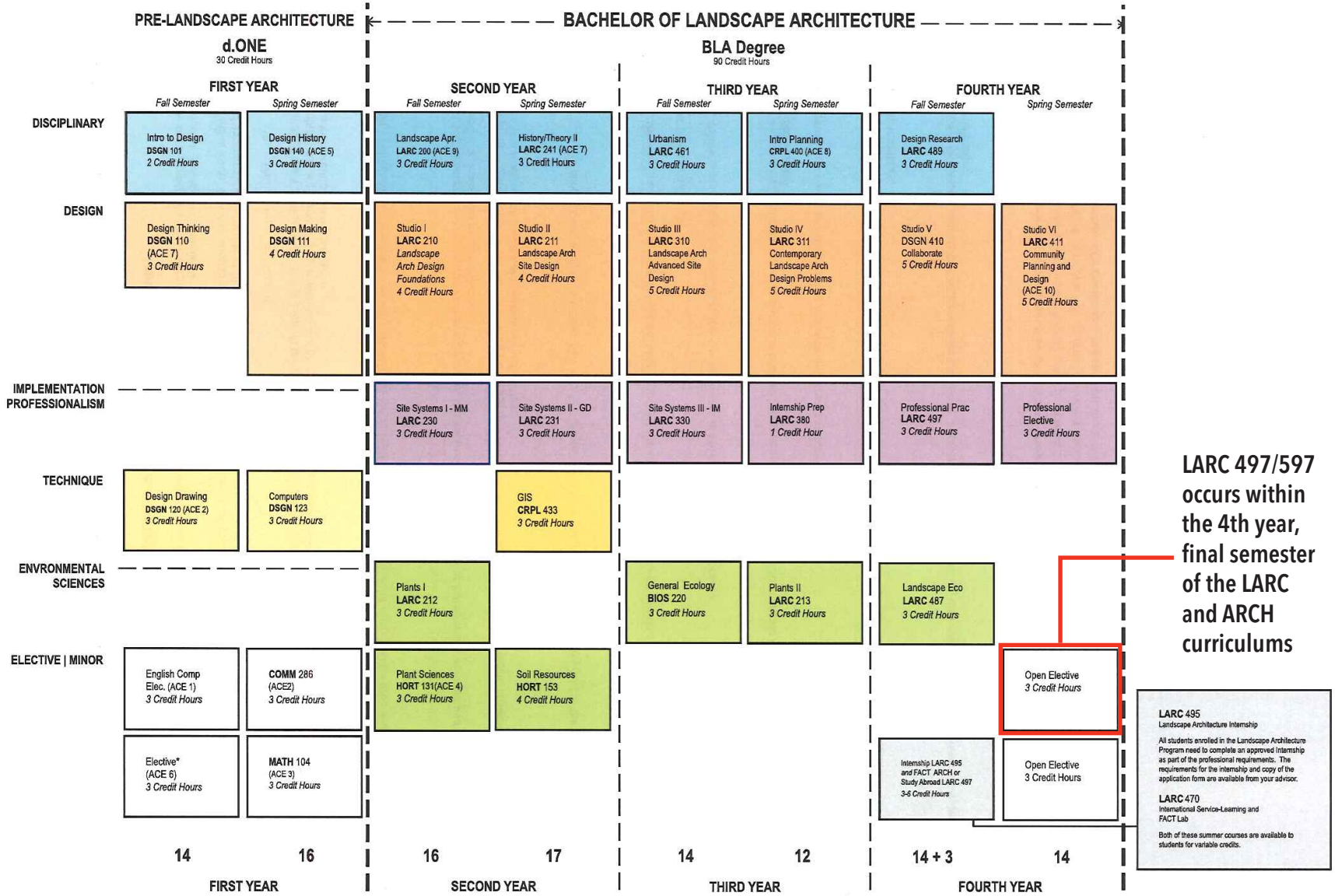
This course was definitely a learning experience for me. My mind and attitudes changed in drastic ways, which are almost comical when looking back and reviewing what I had written at the beginning of the semester compared to now. I think the first step was realizing what waste is and how we should define it. At the beginning of the semester, I thought of waste exactly how some of the authors we read defined it: disgusting, useless, and a problem.

I never framed waste as an opportunity for design at all. When I learned otherwise, this class became even more interesting. My idea of the definition of waste evolved very quickly as we progressed through the readings. It went from a point of not realizing what waste was, due largely to the fact that our society pays no attention to this issue, to understanding its processes and sub categories. One of my favorite readings throughout the course was the one where we read the evolution of waste, specifically with the bathroom. It made me realize that often times, the issue doesn't need to change, but rather people's perception of the issue.

The projects really helped to open my eyes as well. When I began this course, I would not have chosen lettuce as a major waste product; if I had, I would have not thought it was such a complex issue. For example, I realize that waste occurs at multiple different levels due to multiple different reasons, and that most times, these reasons are not blatantly obvious.

Overall, I learned that through design, problems that occur in society should be better understood and evaluated. I learned that often times, problems can be solved in ways that we might not have thought of. And lastly, I learned that often times, things function with higher efficiency if they start to include other processes and systems, almost as if it were mimicking nature's processes.

APPENDIX G:
LANDSCAPE ARCHITECTURE PROGRAM [BLA] CURRICULUM CHART



College of Architecture/University of Nebraska-Lincoln (updated 3.23.16)
*Please consult the Undergraduate Bulletin, Achievement-Centered Education (ACE) requirement.