3. Problem background and need, description of the existing situation (1 page, 10 points) – Fri., Oct. 21

• Overview of the problem from a broad point of view. For example, if you were researching water conservation on city park athletic fields, what is the overall issue of water in California? Why does water conservation in this region matter? Have other cities looked at this issue?

• Grounding the problem in place: what exactly does this problem look like in Santa Cruz or at UCSC? Why does it matter? You're using both the big overview and the specific problem description to make a case for why it's important to address this sustainability problem.

• Data support: what data you have found to backup your understanding of this local aspect of the problem and where you found it, any conclusions you can draw from it or trends you see in it so far, and any limitations of the data.

• Key players: describe who is working on the problem (public officials? Non-profits? Educational institutions?) and what kinds of work they are doing.

• Include at least 5 references from high-quality sources (e.g., peer-reviewed academic literature, government or NGO documents, newspaper articles, or your own interviews. If in doubt about the quality of your reference, ask one of the instructors, the TA, or the undergraduate tutor)

***Problem Overview: Food & Waste***

**Food Waste from Broad Point of View**

**http://www.toxicsaction.org/problems-and-solutions/waste**

*Food Waste In America*

<http://hub.jhu.edu/magazine/2015/fall/america-food-waste/>

*Food waste in California---> San francisco, Berkeley, etc.*

<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=938>

**Food Waste from a Local Point of View**

*Food Waste in UCSC*

<http://sustainability.ucsc.edu/topics/files/ucsc-assessment-food-systems.pdf>

<http://sustainability.ucsc.edu/governance/files/CSP_2013_2016.pdf>

<http://housing.ucsc.edu/dining/pdf/CompostGraph.pdf>

*Interviews*

Angela Duong - Part of the Zero Waste Team at UCSC

**Key Players**

Food Scrap Collection Pilot Program

* Collects food scraps and creates compost to grow more food

<http://www.compostsantacruzcounty.org/Business_Composting/food_waste_pilot.htm>

*Food Not Bombs*

* Provides meals to homeless using produce that would normally be discarded

<http://santacruz.foodnotbombs.net/?about-us>

Zero Waste Team at UCSC

<http://sustainability.ucsc.edu/get-involved/student-projects/zerowaste/index.html>

<http://sustainability.ucsc.edu/governance/files/waste-task-force-report-compressed-%207.31.12.pdf>

**Challenges facing UC santa cruz dining halls:**

• Existing software and vendor tracking of sustainable food procurement/sales data is lacking detailed context. • No primary vendor has been identified that will take the pulped compost from the dining halls in a consistent and coordinated fashion. • Several common recyclable items used by the dining halls are not currently accepted by the city (aseptic containers, waxed cardboard containers, etc.). • Recycling is not picked up often enough to provide sufficient room in the bins, which sometimes overflow. This can cause recyclable items to be put into landfill waste. However, there are plans to purchase more compactors, and add new bins for mixed recycling.

**Overall problem from a broad point of view: (Tessa)**

**-Waste problem in California as a whole**

* Even though in 2011 California set out to be 75% waste free by 2020, there have been unforeseen problems. As the economy has continued to grow and expand, California faces more waste problems than in years prior. See bullet points below for statistical information.
* In 2015, California disposed of 33.2 million tons of material compared with 31.2 million tons in 2014 for residential, business and industry sectors. The new figures mean that Californians disposed, on average, 4.7 pounds per person per day. This is an increase from 4.5 pounds per person per day in 2014, CalRecycle says.
* About 40 percent of the increased disposal was organics, such as food waste and grasses. This material readily decomposes and generates greenhouse gases, such as methane.
* If the additional 2 million tons of material that went to landfills in 2015 had instead been recycled or composted, CalRecycle says, greenhouse gas emissions would have been reduced by about 2 million metric tons of CO2 equivalent.
* There is a high rate of diversion of waste that is clearly possible, however without the proper education Californians are throwing out millions of pounds of organic and recyclable waste every year.

**Why does it matter?**

* Increasing amounts of waste going into the landfills which ends up taking more and more space, these landfills could “leak,” causing destruction of resources, especially groundwater.
* Increased waste going into landfills is usually toxic, emits chemicals, odors, etc. which in some cases have been proven to cause birth defects to surrounding communities. (also think carcinogenic-- could be potentially cancer causing and harmful to humans & animals)
* Waste that has been incinerated from landfills poses the same problems-- can release toxic chemicals into the air, which can harm us even if it “disposes” of the waste.
* There are also harmful effects on the environment from waste, most prominently greenhouse gas emissions from landfills that create harmful CO2 emissions.
* There is a growing need for recycling and waste diversion to avoid harmful effects of the landfills, habitat loss, environment, and overall health of everyone etc. It is through these tactics that we can reach a solution to our growing waste problem, by attaining zero waste in communities and eventually worldwide.
* If we don’t try to go zero waste the damages will be irreparable, communities will see rises in birth defects, cancer, and other harmful diseases. The damage to the environment may be even worse if CO2 levels continue to rise due to landfill disposal, as well as pollution overall to the environment.

**Data Support (Emma):**

* **Santa Cruz County**: Santa Cruz County has awarded a series of small grants to link food waste generators with end users and to provide technical assistance and funding to schools, camps, and other small food waste generators for on-site vermicomposting (worm bin composting) systems. (<http://www.calrecycle.ca.gov/LGCentral/Library/Innovations/FoodWaste/>)
* Food Scrap Collection Program (Composting), Santa Cruz County: Separate food scraps and soiled paper from regular refuse. Food scraps go into biodegradable cornstarch bags. From the kitchen it then goes into green carts or yellow bins. Green Waste Recovery sends a special truck to collect this material and transport it to the compost site. The food scraps are mixed with ground yard waste and shredded before placement in the compost bag.The material is bagged and composted for three months. Air is blown through the bag to facilitate the compost process. The bags prevent odors and retain excess liquids.Large items and any inorganic contaminants are screened out of the finished compost.The [finished compost](http://www.visionrecycling.com/recycled-products) is laboratory tested and is suitable for growing food and flowers. (<http://www.compostsantacruzcounty.org/Business_Composting/food_waste_pilot.htm>)
* **Waste Reduction:** Zero Waste events are held throughout the year to bring attention to minimizing our carbon footprint. Uneaten food scraps are collected at dining halls during “waste audits” to help raise awareness about this growing concern. Through friendly competitions, students learn what factors create waste and how to reduce them. Not sure if you will like something? Ask for a sample first… take what you like, but eat what you take.
* **Composting:** our composting partnership with Monterey Regional Waste Management helps us divert over 600 tons annually of food scraps from the landfill and turns it into nutrient-rich compost which is used to replenish the soil and grow more produce. Compostable paper products are used throughout our dining operations. (<http://housing.ucsc.edu/dining/sustainability/index.html>)

**Grounding the problem in place: what exactly does this problem look like in Santa Cruz or at UCSC? Why does it matter? (Rosalie)**

* At UCSC, food waste is actually a huge problem because of all the food that is being wasted at the dining hall. We have 5 dining halls on campus, and many different cafes as well.Thousands of students eat at the dining hall, so imagine how much food is getting wasted every single day.
* In 2012-2013: 1,369 tons of waste went to the landfill, 1,722 tons in 2010-2011, and and a 2,740 ton annual average from 2005-09. Even though UCSC has made a significant progress with this, there is still a very long way to go, especially if we want to reach our goal for the “Zero Waste by 2020.”
* There was a Food Waste Buffet Done at UCSC Dining halls in order to find out how much food was getting wasted everyday. The dining hall workers and other volunteers helped gather uneaten food that is left on the student's plates, and measured it.
* For Crown and Merrill, 2.91 oz of food per day is wasted per person.
* For Rachel Carson and Oakes there was 2.9 oz of wasted food per person per day
* For Porter college, there was 2.14 oz of wasted food per person per day.

(<http://ucscsustainability.blogspot.com/2016/03/waste-buffets-on-campus.html>)

* Not only this, but leftover food that is not eaten at the dining hall (dining halls that make a little too much food) also gets wasted too.
* Therefore, we can clearly see that this is still a humongous problem at UCSC, especially since a majority of students do not realize or stop to think how much food is being wasted.
* This matters profusely because many students are continuously wasting food when they are the ones that can actually help prevent UCSC’s food waste that are going to the landfills.
* This also matters because food waste can cause a variety of environmental issues. Not only at our school, city, or state, but around the world in general.
* It creates methane, and affects the climate change as well.
* That is why the issue of food waste as a whole matters a lot, especially to our planet because of all the horrendous problems that arise when food is getting wasted.

**Key Players (Isaiah):**

Key players: describe who is working on the problem (public officials? Non-profits? Educational institutions?) and what kinds of work they are doing.

* There are quite a few people who are working on this food waste problem.
* An example would be the “Food Scrap Collection Pilot Program,” which helps composting in Santa Cruz County.

(<http://www.compostsantacruzcounty.org/Business_Composting/food_waste_pilot.htm>)

* People who help do this would separate the food scraps and the soiled paper. The food scraps are then combined and mixed with a ground yard waste, and it is shredded into pieces before being put in a compost bag.
* In the end, the compost is tested in the lab and is used for the plants.
* Another group of people who is working on this issue is the Zero Waste Team at our school on UCSC. They are helping by keeping the waste out of the landfills. This can be done by recycling, composting, and reusing.
* The goal for Zero Waste is by 2020. They play a huge role at our school when it comes to waste reduction.
* Food Not Bombs is another example that is helping with this issue. They gather food that cannot be sold at grocery stores anymore, and they provide meals and groceries to a huge amount of people who need it.

([**http://www.foodnotbombs.net/new\_site/faq.php**](http://www.foodnotbombs.net/new_site/faq.php)**)**

One major issue facing the environment and our earth today is waste. In 2015 alone California disposed of 33.2 tons of material, a number which has risen 2 million since 2014 alone. On average, this means that Californian residents threw out approximately 4.7 lbs of trash per person, per day for an entire year. Moreover, out of all this waste, a significant portion (40%) was made up of organic compostable material, or recyclables. Now you may be asking, “Why should we care about waste going into the landfills?” The answer lies in the hidden cost of landfills, which contain a number of hazardous materials, many of which are toxic to human life. An increasing amount of landfills are beginning to “leak,” destroying precious resources like groundwater, which is already scarce in California due to drought. Not only that, but the very presence of different fumes and toxic waste from growing landfills has been proven to cause birth defects in the communities that surround them. So the increasing amounts of waste and growing landfills are not only harmful to our resources, but also to our health. If that wasn’t enough already there is also the issue of CO2 emissions. Landfills often produce many greenhouse gasses and promote high level of CO2 emission, which is harmful to our ozone layer among other things. If we do not make big changes soon, there will be irreparable damage to the health of our citizens as well as our environment as a whole.

In Santa Cruz County, efforts have been made to minimize food waste. For one, in the food scrap collection program, participants separate their food scraps into biodegradable cornstarch bags which Green Waste Recovery collects. This food waste is taken and to be mixed with other waste and left to compost and can eventually be used for growing more produce. Here at UCSC specifically, we are partnered with Monterey Regional Waste Management which allows dining halls to divert more than 600 tons of food scraps annually into compost instead of ending up in a landfill. Zero Waste events are also held on campus throughout the year to bring awareness to carbon footprints and minimizing waste. While good efforts are being made to reduce food waste in Santa Cruz, there is still a lot of room for improvement. The massive amount of food scraps from dining halls diverted yearly is impressive, but wouldn’t it be better if there was less food wasted to begin with? Measures promoting compost systems seem to be fairly effective, but since it is not mandatory like in some other parts of the world, not everyone is putting in the effort to separate their food waste.

Furthermore, at UCSC, food waste is actually a huge problem because of all the food that is being wasted at the dining hall. We have 5 dining halls on campus, and thousands of students eat at the dining hall, so imagine how much food is getting wasted every single day. There was a Food Waste Buffet that was done at UCSC Dining halls in order to find out how much food was getting wasted everyday. The dining hall workers and other volunteers helped gather the uneaten food that was left on the student's plates, and they measured it. For Crown and Merrill, there was 2.91 oz of food per day wasted per person. For Rachel Carson and Oakes there was 2.9 oz, and for Porter college, there was 2.14 oz of wasted food per person per day. Therefore, we can clearly see that this is still a humongous problem at UCSC, especially since a majority of students do not realize or stop to think how much food is being wasted. This matters profusely because many students are continuously wasting food when they are the ones that can actually help prevent UCSC’s food waste that are going to the landfills. This also matters because food waste can cause a variety of environmental issues. Not only at our school, city, or state, but around the world in as well.

To conclude, here are quite a few people who are working on this food waste problem. An example would be the “Food Scrap Collection Pilot Program,” which helps composting in Santa Cruz County. For this, there are people who would separate the food scraps and the soiled paper. Then, the food scraps are mixed with a ground yard waste, and then it is shredded into small pieces before being placed in a compost bag. In the end, the compost is tested in the lab and is used for the plants. Another group of people who is working on this issue is the Zero Waste Team at our school on UCSC. They are helping by keeping the waste out of the landfills. This can be done by recycling, composting, and reusing.

References

<http://ucscsustainability.blogspot.com/2016/03/waste-buffets-on-campus.html>

[**http://www.foodnotbombs.net/new\_site/faq.php**](http://www.foodnotbombs.net/new_site/faq.php)

<http://www.compostsantacruzcounty.org/Business_Composting/food_waste_pilot.htm>

<http://www.calrecycle.ca.gov/LGCentral/Library/Innovations/FoodWaste/>

<http://sustainability.ucsc.edu/get-involved/student-projects/zerowaste/index.html>

<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=938>

<http://hub.jhu.edu/magazine/2015/fall/america-food-waste/>

**Proposal Outline:**

*Goals and Objectives*

* Get more people to Reduce and minimize food waste
* Food waste= composition
* We want everyone to become more educated with the issue at hand.
* Have more accessible compost bins on campus

*Proposed design*

* Education
* Enforcement/Regulation
* Accessibility/Facilities: Having the tools (example: different bins) accessible to people;

-Educate youth & general public on effective waste disposal, in order to create greater waste diversion and take stress off landfills. Potential for a class to be implemented in high schools or new legislature to be passed to make this possible.

-Better mechanisms of enforcement (ie: fines or legislature that can be used to make sure people are not creating more excessive waste.

-Accessibility and better facilities-- making composts, recycling, and waste diversion opportunities available to all communities. Providing better facilities (especially in Santa cruz) to promote more diversion.

*Economic feasibility*

* Cost of implementing a program to educate students about food waste/diversion
* Different regions have more/less funds to be able to pay for such a program or not

*Political and social obstacles*

* People might not want to put their time and effort in taking a class that will educate them with this issue.
* Funding- Would we get enough funding if we were to implement these classes.

*Infrastructural integration*

**-Landfill methane gas recovery systems**. A system has been installed that captures 75% of methane emitted from the landfill and burns it to create energy.

-**Home composting**. Home composting is promoted through low-cost bin distributions, workshops and information.

In recent years, California alone has been guilty of throwing out over thirty million tons of trash in a single year, with numbers rising. That amounts to about 5 pounds of trash per person per day, nearly half of which being either compostable (food waste) or recyclable. Seeing as landfills have negative consequences such as greenhouse gas emissions and toxic materials entering groundwater systems, we want to reduce the amount of food going into landfills so that we eventually achieve zero waste. By initiating a 3-step program, we could achieve this goal by first educating the public, then making sure that there are plenty of available resources and locations to be able to compost and recycle, and finally enforcing that people follow the guidelines and not dump their food waste into landfills.

Our project theme would integrate nicely with existing framework and infrastructure already in the Santa Cruz area. We are fortunate enough to reside in a place like Santa Cruz, which can be deemed more “green,” than a lot of its counter-cities in the United States. The city of Santa Cruz itself contains a landfill, called the Buena Vista landfill. This landfill can receive up to 500 tons of waste daily, which may seem counterintuitive to our plan to reduce waste, however there is an upside. Since October of 2000, Santa Cruz has adopted the “Zero Waste Initiative,” meaning they are aiming to have a waste diversion rate of 100%, or zero waste going to landfills or incinerators. What’s more is Santa Cruz plans to shut down the Buena Vista landfill by the year 2036, after recently expanding the landfill to its last module. The city hopes that their 70% diversion rate can be increased in the next 20 or so years and there will be no further need for these types of facilities. These goals set by existing infrastructure in the city as well environmental protection agencies will only serve to benefit our project plan. If we were to combine Santa Cruz’s zero waste initiative and waste diversion programs with our ideas for education, accessibility, and enforcement, the city itself would be well on its way to 100% waste diversion. The use of education may be the most important tier of the project proposal because we believe if there were better education programs available, or even a high school course on sustainability, citizens would be better educated on how to properly dispose of waste, and even how to create less waste overall. Furthermore, accessibility to compost bins and recycling bins will go a long way in waste diversion. If everyone has equal access to these mechanisms, we are optimistic that overall waste diversion would increase. Finally, through city legislature, if Santa Cruz were to adopt certain enforcement policies (fines for incorrect waste disposal, etc.), there is no doubt that we would see a decrease in overall waste. These three factors combined with Santa Cruz’s existing zero waste initiative and landfill situation could have the potential to formulate a great alliance against the ever growing problem of waste.

Taking this further, there are definitely a few obstacles that could arise and be problematic. For example, implementing a potential high school or college class that help educate people about effective waste disposal, especially when it comes to food waste is a substantial idea. However, the downside to this is if we would have enough government funding. There are many schools that heavily depend on federal funding, a large amount being universities, so we can see how funding can become a main issue. Not only this, but if congress were to pass a new law requiring students to take a food waste class, many problems can actually become apparent. College courses already range from costing hundreds to thousands of dollars, so making another class a requirement can be really expensive. Many students are already taking out thousands of dollars in student loans, putting them in debt. According to “A Look at the Shocking Student Loan Debt Statistics for 2016,” there are $1.26 trillion of U.S. student loan debts in total, and 44.2 million Americans have a student loan debt. Looking at these statistics, it will undoubtedly raise student loan debt. Another problem can arise from this because then there may be students who might not want to take the class, considering how much money it would cost. Or in general, there could be people who refuse to put their time and effort in taking a class on food waste. That is why if congress were to pass a law about this issue, many obstacles would emerge. Also, if the U.S. were to make a law on food waste and fine people if not followed, it would actually not be as simple as one may think. The reason for this is because already approximately 40% of food produced goes uneaten and gets thrown away, especially from grocery stores and supermarkets. Even if there were a fine, how would we reduce that much food from getting wasted? In addition, there could be many riots and protests that arise if there was enforcement on food waste.

The cost of doing any huge project that can have a major impact on society will always cost a lot of money. Focusing on enforcing a program to educate students about food waste and whether the different regions would have enough funds to pay for it is a significant problem because of how expensive it would be. Even coming up with an estimated cost for a university would be very costly. Using the University of California, Santa Cruz as an example, if we implemented a class that was required at this school, it would cost around $270 tuition fee per unit. If each unit costs $270, and there are 5 units in one course, then reinforcing a food waste class at UCSC would cost around $1350 per student. For the 2015-2016 year, there is an approximate total of 17,335 students for a 3-quarter average. If every student from UCSC were to take this class, it would cost about $23,402,250. If there was a fine that cost $200 for every 17,335 student that threw away uneaten food or produce, then that would be about $3,467,000. Now, if every affiliated college at UCSC had a bin for compost and food waste, considering the bin to be around 80-120 dollars, and there are 5 bins at each college, the cost of it would be at an estimate of $5,000, maybe even more. When adding all of the overall cost together, it would be approximately $26,874,250. It would most likely cost way more than this amount because even with a fine on throwing away food, students will probably throw away food more than once. Also, we might need more than 5 compost and food waste bins at each college, but in general, this is how much it could possibly cost if there was only this amount. When looking at how much each proposal would cost, it is clear that it would be very expensive, which then makes us wonder if this is reasonable. If we want to keep people from throwing away so much food, and these are some solutions that can help, then in a way, it does seem reasonable. The only problem is that it will be a huge obstacle because of how difficult it can be to actually make all of this happen.

For our proposed design, we wanted to focus on Education, Accessibility and Enforcement. When it comes to education, it is crucial to educate everyone on food waste because unfortunately, it is common to find people who are not properly educated when it comes to waste disposal. Due to this, many people may not know what the appropriate compostable food scraps are, which could be a key reason as to why such a large amount of food gets thrown away instead of composted. If we had the proper education by having classes to teach students and the general public, then that could help reduce food waste simply by being better educated on the matter, especially if we implemented it as a mandatory course. This would help food scraps from going into landfills, and it is a good idea to stay away from throwing anything that can end up in there since landfills are extremely hazardous, causing danger to humans and the environment. If we had a law making it a requirement to take a waste disposal class, people would become more educated and would know better how to help make an area more sustainable. Furthermore, accessibility is another crucial element in helping us achieve our goal of zero waste. If everyone is educated on proper waste disposal and how to create less waste, the next step in this process is accessibility. We would like to make recycling and compost bins easily accessible to everyone, at home and in public. A big problem with waste is that there simply aren’t the resources to limit improper disposal. If these resources were more easily accessible and provided at low costs to all, there is a high chance that the city of Santa Cruz would be able to divert much more waste and in turn reduce overall landfill reliance. Our last step is enforcement, which is equally as important as the first two. Often, humans need set rules in order to actually play by them, so by creating local laws requiring better separation of trash, recyclables, and compost, people would have an actual reason to start making their waste diversion a habit. One simple way to enforce this (as observed in some other countries) is that if the people collecting garbage see that there is food waste or recyclables mixed in with their general trash, it will not be collected. Another option is to set fines for not properly sorting. This should teach people quickly to sort their trash from compost and recycling and solve the problem at hand.

Structural Integration

-Existing programs at UCSC like “Dining University” (one day training program on food waste reduction) already exist, and would be complementary to our proposal.

(Also use Waste Task Force link from background section)