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Team Panda: Food Waste at UCSD

1. Design Challenge

Food waste—that is, food discarded at any step in the process of the food supply chain from the farm to our plates—is a serious modern global issue that could impact millions. Any piece of food that is wasted squanders the resources (water, land, labor, etc.) in the production of that food. A recent report by the United Nations Environment Programme (UNEP) and World Resources Institute (WRI) estimates the amount of food wasted at 1.3 billion tons per year, approximately one-third of all food globally produced ("Food Waste: The Facts"). To help put the resources lost in perspective, the amount of oil lost annually to global food waste totals the annual flow of the longest river in Europe (Royte, "One-Third of Food..."). Additionally, food is the most common type of municipal solid waste in landfills according to the U.S. Environmental Protection Agency ("Food Loss and Food Waste"). While food waste and sustainability movements have increased general consumer awareness and efforts to reduce waste at multiple links of the supply chain, the issue still stands in the exacerbation of water scarcity, small farmer economies, and the loss of energy and labor.

Although this current class project cannot directly affect the foreign farmlands and transportation that provide food for society, we are free to observe and influence within local constraints on our college campus at UC San Diego (UCSD). Aware of food waste and waste in general, the UCSD administration declared their ambitious goal of becoming a "zero-waste campus by 2020", diverting approximately 66% of waste from landfills in 2012 (2187 tons of organics, of which 178 tons were food waste) and provided several ongoing programs and efforts to reduce, recycle, and reuse materials. There are also several sustainability efforts on campus, with UCSD aiming to become at least 30% sustainable by 2020 ("Focus Areas").

When thinking about food waste on campus, the humble and ubiquitous trashcan is the first thing that comes to mind. In my daily routine around campus, I noticed the wide variety in

both designs and types of trashcans. The images below are meant to provide the reader with examples and do not represent the entire scope of trashcan styles that exist on campus.



Figure 1. Solar-powered trash compactors next to Sun God Lawn. The recycle bin cover was the same blue as the one in Fig. 2, but has been sun bleached over the years. (*Left*) Frontal view. (*Right*) Side view.



Figure 2. Trashcans on Library Walk. Similar to Fig.1, but note the addition of foot pedals, different side poster, and removal of frontal graphics. (*Left*) Frontal view. (*Right*) Side view.



Figure 3. Trashcans in Price Center at UCSD next to the West entrance of the food court. (*Left*) Standalone general trash and recycle receptacles. (*Right*) Trashcans similar to those in Figs. 1 and 2.



Figure 4. (*Left*) Simple trashcan located in the outdoor patio of Café Ventanas. (*Right*) Trashcans common to the Eleanor Roosevelt College and Village neighborhoods.

Although clearly there is a great diversity in trashcan style, you may notice that in these examples (and indeed in all outside trashcans) there is a distinct lack of a separate bin for food scraps. The only food scrap bins, it seems, are in the campus dining halls, where many students often do not separate their trash (either correctly or even at all). While UCSD does divert food waste from landfills, the process is hindered much by the design of these trash cans and the lack of physical food separation.

Besides the physical component of this issue, the problem of punishment (or rather, the lack of it) regarding food waste also appears on the UCSD campus. There is an absence of negative social feedback in throwing away extra food, on both the individual and at the business level. When someone throws away food after a meal, there is negligible psychological and physical impact and so leads to personal habituation of ecologically damaging behaviors (Royte, "One-Third..."). Places that deal with large quantities of food, such as the markets and dining areas, hide the massive amount of food waste from the eye of the consumer; consumers may notice trash bins emptied out every so often by workers, but never really understand the sheer scale of trash that accumulates over the daily course of a university with a sizable population. There is a disconnect in coordination between "actors in the food supply chain" ("Key Facts..."). While the Housing Dining Hospitality (HDH) university department promotes sustainability and minimizes food waste through tactics such as pre-consumer composting, small-batch cooking, and expired/damaged food donations, the consumer has little to no knowledge of these efforts behind the scenes of their plate.



Figure 5. Large food scrap compost bin next to Café Ventanas.

Conceptually, people generally know that food waste is an issue. However, awareness of this issue must compete with the great extent of inputs and other concerns people face in everyday life, as well as ingrained cultural habits and practices that enable massive amounts of food waste.

2. Finding the Target Audience

Following the "double diamond of design", one must first research and immerse themselves in the user's world to find and define the need. To discover more about how food waste is viewed and implemented locally, I interviewed and observed several members of the UCSD community. A full list of interview questions and the transcripts of the interviews and observations used can be found in the appendix. Looking at recent data provided by Academic Affairs (Fig. 6), the UCSD student body is quite diverse, although Asians and Caucasians compose the student majority. I have tried to reflect these demographics in my interviews and observations (see Fig. 7 and Fig. 8) with a sample size of 10 people.

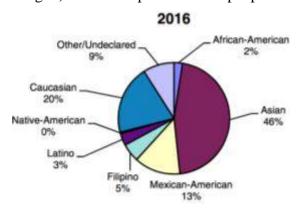


Figure 6. UCSD student body demographics in 2016.

Interviews

These user interviews consisted of open-ended questions concerning food waste and sustainability, with a short briefing beforehand. The "interviewee" panel (Fig. 7) consisted of four UCSD students (*Int-1* through *Int-4*, respectively) and one representative of HDH (*Int-5*).

| Number | Age | Gender | Ethnicity | Food Involvement | |
|--------|-----|--------|------------------|--------------------------------------|--|
| Int-1 | 19 | Female | Indian/Persian | Works at retail food location (café) | |
| Int-2 | 20 | Female | Asian | Held two positions with HDH | |
| Int-3 | 22 | Male | Caucasian | Part of the Ellie's Garden group | |
| Int-4 | 22 | Female | African-American | Purchases meals at HDH locations | |
| Int-5 | 30 | Male | Caucasian | HDH representative | |

Figure 7. Table detailing the "interviewee" panel.

In interviews with students, I inquired about what drove their purchasing decisions. Cost appeared to be the most important factor in purchasing food, although nutrition was also a consideration. When planning for long-term meals, bulk items were a topic of contention; while they were more cost-effective, the sheer amount of food (sometimes coupled with expiry dates) meant more food waste and less cost-effectiveness at times.

Most people slightly overestimated the amount of food that is globally wasted, knowing that it is a serious issue. However, they also claimed to be not wasteful, which may be a human tendency to not notice the actual effects of personal habits or an unwillingness to admit fault to another person. Separation of trash after a meal in a dining hall was also problematic; *Int-1* admitted to not separating trash at all, while *Int-2* commented that the trash was "always mixed", which leads to food scraps in landfills. *Int-5* detailed various ways HDH deals with the minimization of food waste, although these methods dealt mostly with pre-consumer processes. Multiple interviewees raised the possibility that awareness of food insecurity or composting might help to reduce food waste by inducing mindfulness of how one's personal actions might influence the larger communities.

Observations

Immersing oneself is not only to find out about people's conscious biases, but also discover their actions and how they relate to the environment. To accomplish this on campus, I observed students in the process of their meals in Price Center and various dining halls, from the

beginning of purchase to the disposal of their meals. The "observed" panel (Fig. 8) consisted of five students at various dining areas (labeled *Obs-1* through *Obs-5*, respectively).

| Number | Gender | Ethnicity | Location |
|--------|--------|------------------|----------------|
| Obs-1 | Male | African-American | Price Center |
| Obs-2 | Female | Asian | Price Center |
| Obs-3 | Male | Hispanic | Pines |
| Obs-4 | Male | Asian | Café Ventanas |
| Obs-5 | Female | Caucasian | Village Market |

Figure 8. Table detailing the "observed" panel.

Referring to the trashcan examples earlier, there are no food scrap bins to be found in Price Center. The recycling bins in the Price Center food court were also not visually salient, as they were separate from, fewer in number, and were often smaller than the general trashcans in the food court. This was highlighted in my observation of *Obs-1* (Fig. 9), who disposed of the remnants of his meal in a general garbage can (Fig. 3, left), despite having recyclable materials and a small recycling bin next to the trashcan.



Figure 9. Not-creepy-at-all picture of *Obs-1*. Faces have been concealed to protect confidentiality and identities. (*Left*) *Obs-1* with meal. (*Right*) Remnants of meal.

Leftovers are somewhat ignored when discussing food waste. Although modern prevalence of Tupperware, takeout options, and refrigerators allow food to be finished in multiple sittings, degradation of food over a period can be a serious factor in the consumer's decision to consume. On a university campus with students with hectic schedules and tight budgets, leftovers and Tupperware containers are common sights. People usually intend to finish their meals, but are occasionally unable to do so due to time, appetite, or other constraints. This was especially noticeable in the case of *Obs-2*, who failed to finish her meal but took it back to her refrigerator (Fig. 10). However, she did not finish it until two days later.







Figure 10. Unfinished meal of *Obs-2*. (*Left*) Original state of meal. (*Middle*) Meal status before leaving seat. (*Right*) Takeout box in *Obs-2*'s refrigerator.

From online research, I found that the amount one can carry has a significant effect on how much one takes; trays facilitate food waste despite seeming efficient for the consumer ("Food Waste: The Facts"). I observed this in *Obs-3* and *Obs-4*: *Obs-3* had no tray, a square pizza on a ceramic plate, and chicken tenders, while *Obs-4* had a tray, three food items on plastic dishware, and a drink in a reusable cup (Fig. 11). While both disposed of their trash correctly, *Obs-4* had more trash than that of *Obs-3*. While this may be because of appetite or other confounding factors, the core principle remains – trays enable larger purchases of food, and generally correlates to a greater amount of trash at the end of meals.



Figure 11. Non-stalkerish pictures of the "observed". Faces have been concealed to protect confidentiality and identities. (*Left*) *Obs-3*. (*Right*) *Obs-4*.

In all my observations but one (*Obs-3*), I noticed that they used digital technology while in the process of their meals. While this makes sense from a time-efficiency standpoint, especially in a rigorous educational sphere, these devices may distract users from events in the physical world. This, combined with the growing mundanity of campus food and dining locations, results in a decreased cognitive load in the process of a meal. Without prodding from the environment, less attention and top-down processing focused on the present meal result in less mindfulness of the disposal process and thus more food waste.

Given that the UCSD undergraduate student body is quite complicit in food waste and every person in this population needs food, it constitutes an ideal target audience for this issue. However, considering the scale of this population and our team size, we can further narrow down the target audience by focusing on a smaller location, such as a specific dining hall, or a narrower aspect of this problem, such as changing social retaliation or improving mindfulness of this issue. This is a topic for further discussion with my team as we synthesize our results in the coming weeks.

3. Conclusion

In the investigation of the issue of food waste, I have identified key components of the matter on the UCSD campus and possible problematic areas to target, considering both the social and physical. Immersing myself in the community through user interviews and observations has helped me understand more about the perspective of the general UCSD population, as well as revealing some surprising insights and new regions of consideration of this topic. While the general undergraduate student body of UCSD is a good starting point, further team discussion will determine a narrower target audience through location or aspect of the campus.

Works Cited

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Appendix

Interview Questions

- How is food involved in your life?
- How do you usually acquire food?
- What do you know about [food waste? Where food comes from?]
- How do you feel about food waste?
- What about food insecurity?
- What do you know about disposal methods?
- What do you think would help you waste less food?
- Describe process of [meal? Shopping routine?]
- How do you choose your groceries?
- How long do you usually plan for groceries to last?
- Why do you [throw away food? Buy this specific meal? ...]
- How do you feel about food waste?
- (*Int-3 only*) Tell me more about the sustainability orgs you are part of. How does your involvement in Ellie's Garden impact your habits?

Interview Transcripts and Notes

- **1.** *Int-1* (19, Indian & Persian, works at on-campus cafe)
 - Food waste: There's a lot of it. Major supermarkets have extreme amounts, spray food with pesticides and chemicals so people won't dumpster dive. Farmers. Farms. Some are chemically engineered. Lots of produce is grown on farms and other food (canned, not naturally made) in factories.
 - Yes, I throw away food. I tend to buy a lot of food, if I'm the only person eating, but it gets spoiled because I don't have enough time to finish it (perishables like cheese, bread), and I have an overabundance of snacks. I usually have lots of stuff in my fridge and leftovers, and I don't want to eat them so it just gets moldy.
 - Choosing groceries: how fresh it looks, cheaper versions, don't buy a lot of vegetables, just buy from markets (not a lot of variety), buy cleanest/freshest ones in supermarket. Risk it with vegetable bags. Spent 2 hours in grocery store, bought too much extra stuff. Mom usually knows what to get, don't spend more than an hour there. Mindset affects how much you buy hunger, create list, sales (buying in bulk is cheaper but more wasteful)
 - o Getting meal at Cafe V: Poke bowl, likes salmon
 - Usually go to market, buy sandwich, pasta, or sandwich; balance with Hot Cheetos and M&Ms, then banana/orange, sometimes replace MMs and Cheetos with apple/orange
 - Make food at home: croissant at home, sandwich for lunch, fruit for breaks, Oreos for snacks, water bottle
 - o Empty water bottle: 21 ounces, finish midday, refill in dining hall, then refill back at dorms.
 - Usually don't like throwing away food, especially fruit (but gets to abused fruit stage). Throw out stale food, old coffee, leftovers. I learned how much rice I need but I threw out a lot before. I'm pretty good with my snacks, like only opened chips or cookies. Not cleaning out fridge hate smell of old food, touching food once it's in fridge, not enough time, think you're going to eat it later.
 - I don't separate trash in dining halls because it's too much work to separate the trash. I just want to throw it out. If people did it for me I would separate it. Maybe it would be more effective if the pictures are more descriptive, or if you write out what to throw out. Current pictures are so not

- helpful. UCSD sucks. I'll throw out seasonings/sauces on sides because I can't eat them by themselves. I'll throw out food if I don't like it or if I'm not hungry.
- UCSD can help combat food waste by raising more awareness of fact that some people don't have food, some people don't know the amount of food they waste, some people buy a lot of things at market they don't need
- Food insecurity: I spend money on a lot of stupid stuff like shoes, so when I buy groceries I have less money in my budget. One time I lost my ID and I skipped my meals (one per day) and I got sick. I don't know anyone personally, but I volunteer in homeless shelters and food banks. Restaurants and grocery stores waste a lot, so doing something more beneficial than that with the food. People don't know how lucky they are to have food security so they don't really value the food they have on their plates. Try to change the way people deal with waste. At day-old pastries (fresh ones delivered every morning) are put in a box that we throw out. If coworkers don't eat it, we can donate it but they're not packaged so food pantries don't accept them. If a wrong drink is made, it just goes in trash. Lots of coffee (spillage, wrong drink), milk, coffee beans, shots, whipped cream, half & half (expired) gets wasted. Wrapping of food also affects shelf life of food.
- Composting: people talking about but idk what it is.

2. *Int-2* (20, Asian, works at HDH)

- Food waste is troublesome. We waste so much food and my co-worker tried to get us to collaborate with a donation program but it's super hard and liability difficult to get through.

 Pickups after client is done, so lots of waste. Student workers generally eat the extra stuff.
- We wouldn't throw away old pasta sauces, reuse it the next day if it was still okay. We would always mark food on the day it was made and try not to waste it. Trash is totally mixed. Students are blind. Students wouldn't pay attention to signs. The display cases (color-coded) help, but students in a hurry probably wouldn't read it. Maybe not connecting the trash cans together and having individual color-coded trash cans would help students pay more attention.
- Food comes from the ground.
- Food insecurity:
 - o UCSD mindfulness: lower the expensive prices
 - Don't know anyone affected by food insecurity
- Yes, I throw away food, because I can't finish it. If I can save it I will, but will throw away on rare occasions. I don't feel like I generate that much food waste.
- Grocery shopping: buy everything on my list, mostly look at cost (big factor). How much I buy depends on whether I go to Costco. I prefer not buying in bulk, especially if it has an expiration date. Rather go to Market and get what I need in the moment instead of storing up for future if it's perishable. I eat leftovers. Would eat friend's leftovers.
- Process of Meal (at Goody's): Got in line, got wheat tortilla, scoop of Spanish rice, half scoop black beans, chicken, corn, pico de gallo, sour cream, lettuce, cheese, guacamole. Ingredients taste good. Beans make me gassy but I like eating beans. Threw away trash after.
- Knowing people have food insecurity would probably discourage me from generating food waste

3. Int-3 (22, Caucasian, Ellie's Garden)

- How is food involved in your life?
 - It's pretty important, grew up eating healthy and junk food, came from decent class, never had to worry about food insecurity, fine to go out to MD every once in a while, mother's vegetarian forerunner, got to school, went vegetarian, made him think about what he's eating, portions, diet
 - Hope to make conscious decisions about where it's from, if it's healthy
- Tell me more about the sustainability organizations you are a part of. How does your involvement in Ellie's Garden impact your habits?
 - o EG: really involved first 3 year, over 10 hours per week
 - O Promotes sustainable gardening: converted plots between freshman buildings into garden. Get community involved, composting pit, self-sustained soil source. Good way to get

people involved subconsciously in sustainability, bc they might be unaware of where food comes from, "never sees the process", you can see how lettuce growing process works, how seasons work

- Ex. Strawberries in winter: where are they from? Energy use, resources
- Harvest Day healthy mentality, free food, brings people together
- Made me rethink food process, work goes into every bite; look at meat vs veg production energy requirements, seeing food process is really influential in decisions you want to make
 - Soil: depletion of nitrogen phosphorus, important for humans, "fixing nitrogen" messing up ecosystem, like coal or gas industries
 - Keeping soil healthy = garden lesson, like we planted Russian red kale continuously, it gets mold. Rotating crops, refreshing soil = really helps, small scale. Brings more joy to people mulberry small to big tree over 2 years, really tastes good. Strawberries all the way red through. Organic grow = more delicious.
- How do you usually acquire food?
 - Sometimes salad from garden and Café V, buy [eggs, bread, yogurt, granola, fruit] from campus market, pizza from Café V, [pasta, nuts, beans, rice] from Whole Foods
 - O Work: bring yogurt and granola
- What would influence more people to become vegetarian?
 - Cost-effective: (can save money, go to restaurant, save money by buying veg option instead of meat) and
 - Cultural practices: I was raised in culture of Southern California, mom was vegetarian, family is vegetarian. But, different for families based off of meat, not advocating from everyone to become vegetarian, don't know if vegetarian is something good for everyone
 - Want people to think about where food is coming from
 - o "Is that food for environment? Where is meat coming from? Chicken vs beef patty?"
 - o "I have the option to go vegetarian so why not?"
- What do you know about [food waste? Where food comes from?]
 - Huge, US a lot of food is not eaten.
 - o Guessed 50% food waste out of global food production.
 - o Developing world: a lot is wasted due to transportation, distribution to markets
 - Don't know exactly where this stems from, markets that don't get bread sold in time
 - O Shopping for Icelandic yogurt expired in 4/20, but idk if it's actually expired so I guess it'll just be thrown away by the market
 - O Copenhagen: dumpster diving (not expired but perishable), eat it distribute it
 - Most food waste comes from big corporations
 - o I eat pretty much all the food that I buy so I'm not that wasteful
- Describe process of [meal? Shopping routine?]
 - o [Breakfast] banana, one piece of toast, two eggs
 - o [Snack] apple and bag of nuts hour later,
 - o [Lunch] beans (quinoa) and rice, yogurt granola, sandwich from whole foods,
 - Protein bar break (work out)
 - o [Dinner] pasta, cereal, potatoes, ALWAYS salad everyday
 - Used to Uber to Whole Foods before having car
 - Goes to Whole Foods because Triton Cash RA stipend, Trader Joes too expensive
- How do you choose your groceries? How long do you usually plan for groceries to last?
 - Nutrition label, price, check advertisements (local, Fair Trade, organic in that order; no-GMO etc.)
 - I think GMOs are good, just need limits and protections, don't over-engineer but small improvements are good

- When Uber Used to plan for 2 weeks. Now (with car) can last a week, but can go to Whole Foods whenever, so I can restock easily whenever I pick up beer. Go to the market once a week.
- If I didn't have quarters changing or 8-5 schedule, I would like to plan my trips better. Just don't have time to plan with this schedule.
- 4. *Int-4* (22, African-American, student)
 - Where do you acquire your meals?
 - At least twice a day, generally dining halls, high fiber low fat (unless pizza), health related diet, wheat pasta, fruit, oatmeal, salads, no cooking
 - What do you know about food waste?
 - From videos and people sometimes dining halls and grocery stores surplus of products = throw away
 - o Estimated 40-60% thought thrown away from global food production
 - O Bothered by the idea, the problem is how to convince orgs to not dump surplus food? Give out economically?
 - What do you know about disposal methods?
 - o Landfill and recycling centers, biodegradables
 - Try not to get more than I can eat, more likely to throw away to get too much, unless can save for later, separate trash because "I don't see why not"
 - o In end, solution is tracking how much you know you can eat
 - Food insecurity: constant threat to those who are poor or have financial difficulties, but can happen to anyone at any time, not keeping track of budget
 - People would also need clear, obvious examples of knowing that extra food is actually going to people that are food insecure
 - Grocery shopping: buy simple stuff, like sandwich supplies, yogurt, easy transportation, had a list, decided on price (from younger dad shopping), on sale
- 5. *Int-5* (30, Caucasian, HDH department)
 - Specifically with food waste:
 - Dining takes part in a pre-consumer composting program, which allows us to divert all
 compostable materials from being put in the trash that arise during the preparation and
 cooking of menu items before being served to customers.
 - o In our residential dining locations, we have moved to small batch cooking or made-to-order, to help cut down on the risk of waste by overproducing food. If there is prepared food that we are no longer able to sell, we have partnered with a student organization on campus, Food Recovery Network, to direct this food to communities in need.
 - o Items in our markets, that may have passed their sell-by date or have become damaged, are donated to the San Diego Rescue Mission.
 - I do not have numbers on food waste generated daily at UCSD, but because of the reasons I outlined above, the amount of waste that HDH generates is very minimal.
 - One of the ways we try to educate our students is through peer-to-peer interactions with the EcoNauts. They put on various sustainability programs to bring greater awareness of how to handle waste.

Miscellaneous Background Info:

- Village Market:
 - O Donates expired sandwiches, composts expired pastries/coffee grounds/extra food/sushi; waste a lot of milk making drinks for customers
 - Can't donate pastries because they're not in closed container
- Notable Test Interviewee Answers:
 - Reduce food waste by having better tasting food; don't like wasting food because see it as waste of money

Observation Notes:

Obs-1 (African-American, Price Center)

- Bought food from Bombay Coast
- On his laptop with food behind laptop (plastic bowl, napkins), beside laptop (unfinished Naked Juice), and in front of him (plate, napkins)
- Threw away everything in silver trashcan next to Sunshine Market except Naked Juice, which he took with him

Obs-2 (Asian, Price Center)

- Spent a few minutes deciding which restaurant to go to -- did not go to east side because it was "too far"
- Stood in line at Rubio's, considered pricing and menu options, bought Chicken Quesadilla (had this item several times before)
- Waited for food, filled plastic sauce containers with two different types of salsa for chips I knew would be included
- Sat down to eat and browsed internet on phone -- ate slightly faster than normal because of time management -- mostly finished red salsa with chips; left one quesadilla slice and a few chips to take home and put in fridge
- Finished green salsa with chips at home, threw away sauce container in trash (not recycling)
- Did not eat quesadilla for breakfast
- Forgot about it day after, thought about it occasionally but wasn't hungry
- Did not eat it until Sunday afternoon
- Put takeout container in the recycle bin

Obs-3 (Hispanic, Pines)

- Did not take off backpack
- Had one square pizza thing on ceramic plate and chicken tenders in cardboard box
- No tray; sat until he was finished with all food
- Threw away cardboard box in landfill, placed ceramic plate on dishwashing station counter

Obs-4 (Asian, Café Ventanas)

- Two Asian males watching separate videos on their phones
- Each had a tray with same amount three food items (Student 1 had ceramic plate, two cardboard boxes; Student 2 had ceramic plate, yogurt and fruit in a plastic cup, and cardboard box) and a drink (reusable cup)
- Did not leave table until everything was finished
- Separated trash into proper bins at Cafe V; some students immediately after them did not do this correctly

Obs-5 (Caucasian, Village Market)

- On stone bench with market paper bag beside her was eating a round cake with frosting (without utensils) and drinking milk directly from jug. Licked fingers several times.
- Finished cake, threw plate into general trash bin