



Citizen Science and Food waste existing research: literature review

Brief method

Using google scholar to search for each combination of food waste and citizen science search terms led to 822 results in total (April 2018). Results were then filtered for online accessible resources only, relevance to food waste and citizen science, peer-reviewed, conference papers or reliable sources (e.g. NGOs) only, and in English language. This left 17 remaining papers. A brief web search for non-academic citizen science and food waste projects was also carried out.

Food waste search terms: *Food waste, Food loss, Unavoidable food waste, Avoidable food waste, Food spill*. Citizen science search terms: *Citizen science, Community science, community monitoring, volunteer monitoring, crowdsourcing, participatory monitoring*.

Summary

- Many projects dealt with *measuring* food waste and investigating *why* food is wasted (6), whilst other projects explored the implementation of food waste *reduction strategies* or *solutions* (5). Other relevant papers dealt with the engagement of participants with food waste, and the theory of citizen participation in waste management strategies.
- Methods include filling bags with food waste, using cameras (by participants, inside bins, on participants, inside fridges), diaries, surveys, training sessions, and creating or analysing online user communities.
- Projects work with citizens in several places, including prison, schools, participants' homes, online, and through apps.
- Researchers are mainly from Europe and the USA: USA (6), UK (3), Australia (1), Austria (1), Belgium (1), Finland (1), Germany (1), Greece (1), Malaysia (1), Uganda (1).
- Gaps:
 - Most projects looked at waste at the consumer level, rather than at earlier stages within the food system (e.g. in retailers, at the production stage).
 - Projects are not evenly distributed across the world (focus on Europe/USA)
 - Even at the consumer level, most projects focused on households, rather than other points of consumption such as catering institutions.

Project examples

The Great NSW Food Waste Study (Australia)

- New South Wales government in Australia launched a citizen science food waste study April to Jun 2017. Participants asked to empty any expired food from their fridges into bags provided by the researchers, instead of the bin. For the next two days, they were asked to add their food waste to the bags, and then upload the results to a website. Read more about it [here](#) and in the press: '[A handle on food waste](#)', *The Young Witness* (Australia, NSW), 4 May 2017.



Ecologists and prisoners (USA)

- Ulrich and Nadkarni (2009) carried out several sustainability projects with inmates in a corrections centre work. These included a vermiculture and thermophilic composting system to reduce kitchen waste, which resulted in reduced landfill-bound waste. Academic staff, prisoners and non-prisoner administrators worked together to adapt these systems to the prison environment, and along with the other sustainability projects there were results in terms of positive psychological and social aspects.

Using 'photovoice' to connect with environmental issues (USA)

- Cook and Quigley (2013) asked students to take photographs around their campus which showcased an element of their chosen environmental issue (food waste is one of several examples listed). Students were also asked to write narratives about the issue, answering prompts which explored the intricacies of the issue (who is affected, why is it important, what could happen next). The authors argue that photovoice connected students to science and “empowered students to dialogue with informed community members”.

School kids as researchers (USA)

- Mills et al. (2014) describes a school in the US with “collaborative inquiry” at the heart of its system. Some third graders noticed issues in the school cafeteria, and the class decided to collect and record data in the cafeteria over several days. The task was to simply document what they saw, and among other issues, food waste was identified. The students decided to collect further data, saw that vegetables were the most wasted food, and surveyed the school to find out which vegetables kids prefer, and discussed the results with the cafeteria manager.

Fieldwork in households, and a food waste diary app (Austria)

- Ganglbauer (2013) carried out fieldwork in 17 households to understand how the passage of food into waste occurs in everyday life, and how/if technology can intervene. Methods included interviews and contextual inquiries at participants' homes. In Ganglbauer et al. (2013), researchers used a FridgeCam technology probe to capture time-lapse films of participants' fridges, and later researchers (Ganglbauer et al., 2015) developed a food waste diary app, to enable people to reflect on issues around food waste. They then analysed the entries to understand what people throw away and why.

BinCam: taking photos of bin contents (UK, Germany)

- Thieme et al. (2012): a project to encourage behaviour change by automatically logging kitchen waste through placing a smartphone on the inside of a bin lid. Captured images were automatically uploaded to a BinCam application on Facebook which all BinCam users could see.



This increased users' awareness and reflection on their waste habits, and their motivation to improve. See also Comber and Thieme (2013), and Comber et al. (2013).

Fruit foraging trends (USA)

- Arrington et al. (2017): used user-generated data from the citizen science application Falling Fruit (fallingfruit.org) to investigate the social-ecological and demographic dynamics of urban foraging. They found high ethnic diversity in the gathering communities and a bimodal income distribution. Falling fruit asks users to map the urban harvest.

Wearable cameras to understand food consumption lifecycles (Malaysia, UK)

- Ng et al. (2015): researchers provided participants in the UK (8) and in Malaysia (10) with wearable cameras which passively took still images every 10-30 seconds. The researchers argue that this is more reliable than traditional methods, such as diaries. The images were then used as prompts in interviews, and the results used to investigate food consumption lifecycles (from planning through to waste).

Using an online research community in packaging research (Finland)

- Joutsela and Korhonen (2015): a study which demonstrated that using an online research community could be useful for collecting information, user experiences and ideas from a community of packaging users. The authors argue that this method can be used for quantitative and qualitative research.

Connecting food donors, charities and citizens: SavingFood (Belgium, Greece)

- Veeckman et al. (2018): SavingFood is a project which develops a collective awareness platform for connecting food donors, charities and citizens in a more efficient way, and creating an online community in which actors are motivated to take direct action against food waste. The project included behaviour change techniques, grounded in data from surveys and interviews to investigate barriers and enablers of participating in food distribution.

Synthesis review of household waste prevention intervention campaigns, e.g. *Love Food Champions* (UK)

- Sharp et al. (2010): this synthesis review includes many examples of household waste prevention intervention campaigns, and compares how much waste they reduced. One project example is *Love Food Champions* (WRAP, *Love Food Hate Waste* campaigns), which provided participants with workbooks, information, and kitchen containers to measure waste, and asked them to rate their ability to reduce food waste. A training day was held to distribute resources that would help enthusiastic champions to engage other residents. Self-weighing was found to be effective in connecting participants to their own consumption practices, and providing personalized feedback helped reinforce participants' commitment.



Citizen participation in waste management policies and decision-making

- Community involvement in waste management decision-making. Youngquist et al. (2015) (USA): the authors present a case-study of a collaborative effort between Washington State University researchers and a small US town. Methods include participant observation and a survey.
- See also Morrell (2017) (USA) and Okot-Okumu and Myenje (2011) (Uganda)



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