Making Food, Producing Sustainability

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Abstract
Many contemporary approaches to environmental sustainability focus on the end-consumer. In this panel, we explore lessons from small food producers for future development of HCI as an agency of sustainable ways of being. We argue that attention to the relationship small producers have to the environment and their experiences of interrelations between environmental, economic, and social sustainability suggest new foundational issues for sustainable HCI research.

Keywords
sustainability, sustainable HCI, agriculture, fishery, food production, permaculture, urban agriculture

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
This panel examines how the context of small-scale agriculture and fisheries opens new challenges and opportunities for sustainable HCI. Farmers and fisherpersons are on the frontlines of several emerging environmental crises including climate change, overfishing, and water shortages; they also represent the largest number of workers around the world. Given both their numbers and the vital work that they do, CHI interventions in this domain may have enormous

impact in addressing environmental concerns and improving the lives of many of the world's most vulnerable citizens.

Working with small-scale producers also challenges many of the assumptions implicit in the budding sustainable HCI movement. To date, sustainable CHI has largely focused on environmental impacts of such consumer behaviors as product recycling and domestic energy consumption. We have generally framed sustainability in terms of individual resource conservation, where consuming less is frequently understood as a normative value to be encouraged through a host of persuasive technologies directed at influencing individual behavior [1]. We have paid little attention to how these behaviors are linked to and shaped by broader social factors including economics, policy, and culture [3]. When we look further up the supply chain, we find that the problems become more complicated, but also that the potential impact is great.

Food Production and the Environment

Food production is by far the largest industry in the world. By some estimates, as many as 1.8 billion people – fully half the world's working population – are employed in agriculture. Of these, the majority engage in small-scale farming; although dominant in the US, large-scale industrial agriculture is relatively rare globally.

Farmers and fisherpersons are on the frontlines of global environmental threats. Climate change is already affecting growing seasons [9] and fish populations [1]. Water scarcity is linked to crop failures and food shortages [7]. At the same time, food producers are implicated in environmental degradation. Agriculture is by far the largest consumer of freshwater around the world [8]; the use of fertilizers is linked both to petroleum production and t o groundwater contamination [2]. Overfishing presents a serious threat to the sustainability of world fish populations [5].

Given their vulnerability to environmental change, their complicity in creating environmental threats, and the fact that most of world's population depends on their labor for its sustenance, one may well argue that small-scale food producers should be at the center of any serious sustainability movement, including the one forming within the HCI community.

Confounding Sustainability

Because their work is inexorably linked with the natural world, farmers and fishers are keenly aware of ecosystem threats, and are often deeply committed to sustainability. However, their understanding of what it means to be environmentally responsible is often conflated with concerns about economic viability and cultural identity, leading to more nuanced formulations of sustainability than is often assumed in CHI research. For example, fieldwork conducted with New Mexico farmers [4] found that some farmers considered flood irrigation to be more sustainable than drip systems – which ostensibly use less water -- because flood systems more closely mimic natural rain cycles and are less costly to maintain. Other farmers preferred ditch-irrigation systems because these were bound up with traditional culture and grassroots management which were seen as more sustainable than irrigation schemes that privatize action and must therefore rely on formal policy and hierarchical decision making.

It is also worth noting that most of the world's food producers are engaged in subsistence or near-subsistence farming and fishing. Their very existence is continually at risk from environmental phenomena resulting in fewer crops or fish in the net and social phenomena resulting in lower prices for those crops and fish. This places them in a precarious position. On the one hand, they are absolutely dependent on sustainable practices across the ecosystems they inhabit. At the same time they can be devastated by environmentally-motivated policies—for example, reductions in fishing quotas or irrigation schedules—that limit the amount of food they can produce.

These examples point to an understanding of sustainability that combines environmental, economic, and social concerns. These "three pillars" of sustainability are widely recognized among sustainability scholars and are highlighted in the 2002 United Nations Declaration on Sustainable Development [8]. However, they remain largely absent from the sustainable HCI literature—an oversight that we suggest follows from an emphasis on (predominantly urban and middle-to-upper-class) consumer behavior.

Implications for Design

Designing systems that take the needs and orientations of small-scale food producers into account places complex demands on CHI practitioners. It requires that designers and researchers account for economic and social sustainability while they contend with ecological concerns. This in turn points to the importance of research methods that can probe deeply into social and cultural dimensions of user experience that may elude traditional needs assessment activities. It also suggests that successful designs will address users' emotional, ideological and social needs at the same time that they provide practical solutions to real-world problems.

Looking at small-scale food producers also promises to extend sustainable HCI beyond its current preoccupation with personal consumption monitoring. For example, recent projects have examined the use of digital technologies to track "fairly-traded" goods [6], or encouraged knowledge sharing among rural farmers [7]. We suggest that these examples are first steps into wide range of new products, services, and usage models that address the "triple bottom line" of economic, social, and environmental sustainability.

In addition, in developed regions, citizens otherwise accustomed to consuming highly processed food from large-scale production and distribution chains have begun to reconvert urban, suburban, and semi-rural lawns and land for highly localized organic food. A positive use of interactive technologies would be to encourage such trends as a means of bridging divides between ourselves and the natural world, as well as connecting these new small-scale farmers with traditional subsistence small-scale farmers to promote social movements of global scale to *take back the land* for sustainable use.

About the Panel

The panel will focus on recent research and design addressing the needs and interests of small-scale food producers. Through case studies, spirited discussion, and audience participation we will wonder aloud at what farmers and fishers have to say to the budding sustainable HCI community, and what we in this community have to offer to them.

Panelists

Tad Hirsch is a Senior Research Scientist with Intel's People and Practices Research group. He holds a PhD and an MSc in Media Arts and Sciences from MIT's Media Lab, and an MDes in Interaction Design from Carnegie Mellon University. Tad will moderate the panel.

Phoebe Sengers is an associate professor in Information Science and Science & Technology Studies at Cornell University. She received a PhD in Artificial Intelligence and Cultural Theory from Carnegie-Mellon University in 1998.

Eli Blevis is an associate professor of informatics in the Human-Computer Interaction Design program of the School of Informatics and Computing at Indiana University, Bloomington. His primary area of research, and the one for which he is best known, is sustainable interaction design.

Richard Beckwith is a research psychologist with Intel Labs in Hillsboro, OR, and is part of the People and Practices Research Group. Before coming to Intel in 1996, he was a Research Faculty member at Northwestern University's Institute for the Learning Sciences (1991-1996), a Research Scientist at Princeton University's Cognitive Science Laboratory (1986-1991) and received his PhD in Developmental Psychology from Columbia University (1986).

Tapan Parikh is an Assistant Professor at the UC Berkeley School of Information. He holds an Sc.B. degree in Molecular Modeling from Brown University, and M.S. and Ph.D. degrees in Computer Science from the University of Washington.

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