

# Accepted Manuscript

Improving attributional life cycle assessment for decision support: The case of local food in sustainable design

Yi Yang, J. Elliott Campbell



PII: S0959-6526(17)30027-6

DOI: [10.1016/j.jclepro.2017.01.020](https://doi.org/10.1016/j.jclepro.2017.01.020)

Reference: JCLP 8767

To appear in: *Journal of Cleaner Production*

Received Date: 22 September 2016

Revised Date: 5 January 2017

Accepted Date: 5 January 2017

Please cite this article as: Yang Y, Campbell JE, Improving attributional life cycle assessment for decision support: The case of local food in sustainable design, *Journal of Cleaner Production* (2017), doi: 10.1016/j.jclepro.2017.01.020.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 [words: 6200]

2  
3 **Improving attributional life cycle assessment for decision support: the case of**  
4 **local food in sustainable design**

5  
6 Yi Yang<sup>1\*</sup>, J. Elliott Campbell<sup>2\*</sup>

7  
8 1. CSRA, Inc.

9 2. School of Engineering, University of California, Merced

10

11

12 \*Correspondence should be made to: yyandgin@gmail.com, ecampbell3@ucmerced.edu

13

14

15 **Abstract**

16 Life cycle assessment (LCA) has become widely used to evaluate the environmental sustainability of  
17 products. It has been increasingly realized, however, that the conventional framework, attributional LCA  
18 (ALCA), may be inadequate for steering decision making. Here we show how ALCA can be improved for  
19 decision support if we recognize its limitations. Using local food production in the U.S. as a case study,  
20 we show that ALCA can be enhanced by relaxing some of the restrictive assumptions (e.g., static,  
21 aggregate, site-generic, linear), by evaluating the situation in question from a more dynamic and  
22 prospective angle, and by accounting for the important role of decision makers to introduce innovative  
23 systems that reshape the status quo. For local food, studies of food miles have shown that transportation is  
24 a minor source of carbon emission, with an implication that local food is not an effective means of  
25 helping the environment. But these studies fail to realize other potential benefits which food localization  
26 may uniquely enable including recycling of energy, water, and nutrients. These benefits cannot be derived  
27 from a simple presentation of the status quo as often done in ALCA studies. Our results show that for  
28 some crops, irrigation could contribute up to 50% of the cradle-to-gate carbon emissions, thus they may  
29 benefit from food localization making use of water from wastewater treatment plants. Our results also  
30 show that local food could reduce the water footprint of lettuce by 50%. Our study suggests that exploring  
31 future scenarios, beyond assessing historical outcomes, is critical if ALCA is to support sustainable  
32 decision making.

33

34 **Key words**

35 Attributional, local food, sustainability, wastewater treatment, dietary change, food miles

36

37 **1. Introduction**

Download English Version:

<https://daneshyari.com/en/article/5481628>

Download Persian Version:

<https://daneshyari.com/article/5481628>

[Daneshyari.com](https://daneshyari.com)