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## Community Garden Information Systems: Analyzing and Strengthening Community-Based Resource Sharing Networks

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## Community Garden Information Systems: Analyzing and Strengthening Community-Based Resource Sharing Networks

### Abstract

Extension professionals play an increasingly central role in supporting community garden and other community-based agriculture projects. With growing interest in community gardens as tools to improve community health and vitality, the best strategies for supporting these projects should be explored. Due to the importance of inter-personal networks in providing informational, material, and human resources for community garden projects, the analytical tool of information system analysis is potentially useful for Extension efforts in this field. The evaluation reported here can be used to inform Extension and other community-based programming to articulate and strengthen such community garden networks.

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## Introduction

Community gardens have the potential to foster health, quality of life, ecological sustainability, civic engagement, cultural preservation, and social capital within human communities (Armstrong, 2008; Glover, 2004; Glover & Perry, 2005; Saldivar-Tanaka & Krasny, 2004). In urban areas suffering from lack of green space and vacant lots, these benefits can be especially pronounced. As such, garden projects have become increasingly prevalent across the country. However, obstacles that such projects face include organizational maintenance and access to resources of all types (Schukoske, 2000).

In order to facilitate the continued growth of this form of community institution, identification of strategies to overcome these obstacles is imperative. Krasny and Tidball's article (2010) on the potential for Extension leadership in community gardening and other civic ecology projects, as well as Extension's historical focus on participatory and asset-based education and outreach strategies and longtime appreciation for the connections between social and ecological systems, provide additional impetus for the study reported here (Krasny & Doyle, 2002).

A fundamental element of community garden success is access to informational, material, and

human resources. A survey by the American Community Gardening Association cites dynamics of the garden group and support from outside institutions as key to determining garden success (American Community Gardening Association, 1998). The conditions of community gardening, ranging from political to weather-related, vary widely across locations, and thus local sources of information would appear to be critical. Many projects rely on regional service agencies such as county Extension offices, as well as municipal departments offering technical and educational support. The degree to which county Extension offices have devoted resources to aiding community gardens and other sustainable agriculture efforts varies widely (Schukoske, 2000).

This article uses the concept of a cluster with reference to a place-based network of similar garden projects. This concept was explored by Brasier et al. (2008) with reference to certain types of farmer networks. Goetz et al. (of the same project) defines a cluster of firms, in this case a specific group of farmers, that:

[Are] located in relatively close proximity to each other; cooperate with one another to enhance both technical skills and market access; support, through social networks, the growth and development of individual businesses; share common inputs such as labor with specific skills; recruit support industries based upon the concentration of firms in an area; benefit mutually from new knowledge generation that is location specific; and work together to respond to new market needs or societal demands. (2005, slides 5-6)

While community garden clusters do not operate by market competition and access, other dynamics that similarly depend on resource generation through social networks are extremely relevant. Brasier et al. (2008) discuss the important role these private networks play in disseminating local knowledge among producers, especially for new or non-traditional endeavors such as small-scale alternative agriculture, that lack formal resources and frequently rely on local or regional market and other networks.

## **Information System Analysis of Community Garden Actors**

A related analytical tool of information system analysis includes this cluster of actors or projects in a community that generate place-based resources as well as exterior information sources that may also serve as inputs to these local actors. Roling (1988) defines an agricultural information system as "a system, in which agricultural information is generated, transformed, consolidated, received and fed back ... to underpin knowledge utilization by agricultural producers." The structure of the information system and the roles that the "clustered" actors of the system play affect the diffusion of both formal and informal resources through this network, which in turn affects project outcomes.

Information system and/or cluster analysis has been applied to farmer groups as well as environmental management or advocacy networks (Brasier et al., 2008; Demiryurek, 2010A; Ernstson, Sorlin, & Elmqvist, 2008), but no such analysis appears to have been previously applied to the community garden context.

For researchers and Extension professionals, evaluation of the information system encompassing a

local community garden cluster and its external information sources can be used to identify the system's strengths and weaknesses, including informational needs and gaps that exist among system actors. This can inform outreach programs and strategies for organizational networking that will improve information exchange for community garden actors.

## Methods

The study reported here used an information system analysis to evaluate the role of local information exchange within a broader information sphere—including exterior information sources. The information system analyzed is comprised of actors involved with community garden development in the area of Ithaca, NY and the means by which they give, receive, and utilize information.

The study used a guided survey to collect data, as well as informal conversations with leaders in both the Ithaca community gardening sphere and in other communities.

Demiryurek (2010B) describes the key aspects of an information system as the following:

- Sources, content, and exchange of information
- Extent of information contact
- Degree of usefulness of information
- Type of information needed by members of the system

The survey tool was designed to collect this information. The parameters of what constitutes a community garden or related organization are somewhat subjective. For the study reported here, a valid community garden project had to involve or seek to involve members of either a certain restricted community (e.g., school or apartment complex) or the general community at large. They also had to be located in the City or Town of Ithaca, NY. A garden project was defined as one working on a specific garden location, while a support organization is one that advises on community garden projects but does not directly lead one such project.

The interview pool was identified via previously established contacts involved in community garden work and subsequent "snowball" collection—continuing to ask new contacts for other community gardens they knew of to form the final interview pool. A community garden database and Google map established by Cornell Cooperative Extension in Tompkins County available online was also used to form the initial group of contacts (Dolan, 2009). This listing was the only aggregate listing of community gardens available. Some actors were identified as leaders for multiple garden projects, or alternatively, no leader could be identified. From these sources, all currently active community and school garden projects and supporting organizations were contacted via email or phone, with follow-up contact if necessary. A pilot survey was conducted with a local Extension educator to test and modify the survey instrument before data collection was initiated.

In an in-person guided survey, participants were asked to rate the usefulness of each information

source on a Likert scale (0 for not at all useful, 0.25 for a little useful, 0.50 for somewhat useful, 0.75 for useful and 1.00 for very useful). A quantitative figure for communication quality was obtained using the Total Information Score (TIS) (Demiryurek, 2010A), which was obtained by multiplying the value for frequency of communication by the usefulness value. Contact rated not at all useful was thus not included in an actor's information score.

Interviewees were also asked about the desired outcomes and effectiveness of their garden project or organization. The intent of the study was to evaluate correlation between these variables and the nature of a garden actor's information network.

Finally, interviewees were asked several open-ended questions regarding the quality of the local communication network among community garden actors, specifically what types of information they feel they were not currently able to access, and whether and how communication and collaboration could be improved among community garden actors.

Interviews using the guided survey tool were conducted in May and June of 2011. Of the 25 community garden actors contacted, 11 agreed to be interviewed, for a response rate of 44%.

## Results

Adult education (11 votes), food security (10 votes), food production (9 votes), and nutrition (9 votes) were most frequently cited as desired project or organization outcomes. In ranking desired outcomes of their garden projects or organizations, adult education (5 votes), followed by youth education (3 votes), were most frequently selected as the highest priority outcome (Table 1).

Overall, the participants' perceived effectiveness in achieving desired outcomes was similar across the potential outcomes, though respondents reported that their projects were less effective at achieving food security and project development. A testable method for evaluating effectiveness in a way other than how it was perceived by the garden actors was not easily identified, and additionally, it was thought that perceived effectiveness would inform the information or other needs of actors. Actors generally predicted that their group's perceived effectiveness in achieving desired outcomes would improve over the next five years, indicating a shared sentiment that community garden projects were in a state of growth, and that potential for improvement exists.

As demonstrated by a pooled ranking of information sources across participants (Table 1), local information sources are a significant (though not exclusive) component of the information system of community garden actors. Usefulness of contact with members of one's own project was rated on average .89 by participants, books received an average rating of .66, and contact with Extension and local university professors/professionals/students earned an average usefulness rating of .95 and .89, respectively.

**Table 1.**  
Information Sources Ranked by Pooled TIS

Information Source	Total Information Score
Members of own project/organization*	1440.5

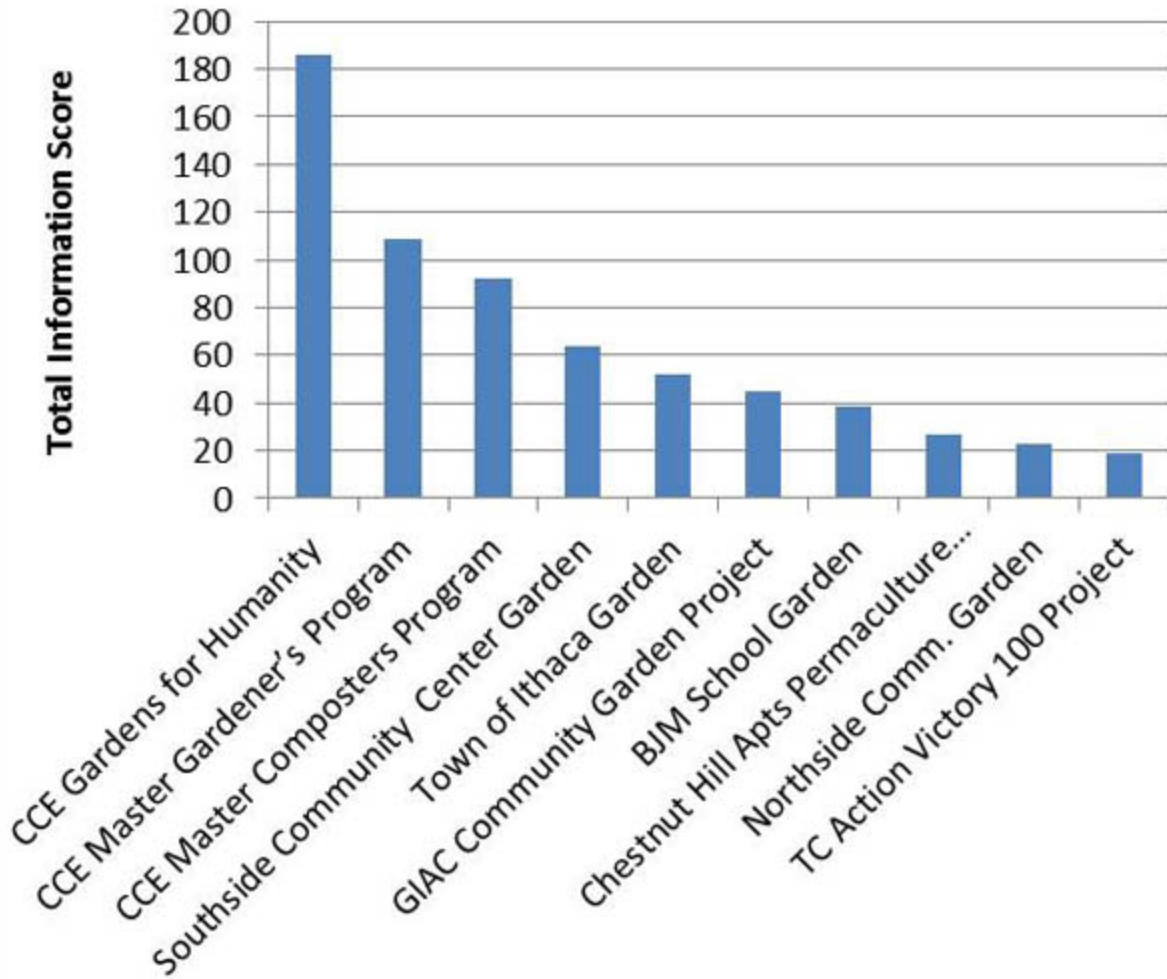
Books	590.8
Cornell Cooperative Extension professionals*	394.5
Professional or outreach published material**	332.3
Other community organizations*	150.0
Local University professors/professionals*	149.8
Members of other garden projects*	145.5
Meetings	115.0
Academic literature	78.8
Magazines	55.0
National organizations - personal	37.0
Non-professional websites	25.0
Conferences	7.0
Courses	6.0
Research institutes	5.0
*local information source **some or all local information sources	

## Structure and Strength of the Local Information Network

In Figure 1, it can clearly be seen that the local Cooperative Extension office plays an extremely important role as an information provider for community garden efforts in the Ithaca community. These programs and the individuals that lead such programs constitute "nodes" within the community garden network - actors that communicate with the majority of gardening projects and serve as a resource hub. It should be stated that use of Cooperative Extension itself in locating actors for the sample pool could have exaggerated the nodal role Extension holds in this analysis. However, consultation with most if not all community garden actors in the community qualitatively confirms the very important nodal role Extension holds currently.

**Figure 1.**

Garden Actors Ranked According to TIS (highest to lowest)



Besides the Extension actors, however, TIS scores for the garden projects are low. Indeed, most interviewees (except Extension professionals) indicated not only a lack of communication but a lack of awareness of the numerous other garden projects currently active in the Ithaca community. All respondents thought that communication between garden actors could be improved, especially for the purpose of sharing the activities and experiences of different projects in the community. Information needs, as well as strategies to improve communication and collaboration between actors as reported by respondents, are shown in Table 2.

**Table 2.**  
Top Ten Highest Scoring Garden Actors, Ranked According to TIS

Information Needs	# Responses
Garden Information and material resources/sources	3
Curriculum resources/ how to work with children or teens	3
Fundraising information/resources	2
No need for additional info	2
Evidence for effectiveness/pedagogy	1

Volunteer management	1
Effective knowledge transfer	1
Land tenure or acquisition	1
Community input preferences and strategies	1
<b>Strategies to Improve Communication between Actors</b>	<b># Responses</b>
Central listserv, network or blog	8
Annual community event or conference	2
More centralized organization/collaborative funding	2
Gardens must take initiative	1
Central directory of gardens	1
<b>Strategies to Improve Collaboration between Actors</b>	<b># Responses</b>
More centralized organization/collaborative funding	4
Central listserv, network or blog	2
Not priority/not useful	2
Better coordination and sharing of potential volunteers	1
Increased communication with CCE	1
More funding for staff	1
More collaboration with local government	1

Interestingly, the desire for a strengthened local communication network appeared to stem not from a sentiment that actors lacked necessary practical information or resources, but more a desire to know about other community garden happenings more generally, to glean ideas and inspiration from other projects, and maximize the development and use of potential partnerships.

## Discussion

Due to the small sample size of the analysis conducted, the intent of this article is to present a potential methodological tool and potential facets of such an analysis, rather than adopt any conclusions about the nature of the Ithaca community garden system itself. Though I present the results of my data collection and discuss possible dynamics to be examined within the data, I must emphasize that the conclusions drawn from the data are limited by the small sample size. A conclusion I do believe I can safely present is that local information exchange is important within community garden information systems in Ithaca, with local information sources being both frequently utilized and reported as highly useful for community garden projects. The discussion that follows is a result of a wider literature analysis of scholarly work as well as more informal information sources, one that explores possible factors for success within such information systems, and is



not based on the data collected by my own study.

## Forging a Strong Community Network

Brasier et al. (2008) note that "the qualities and characteristics of the relationships within the clusters' underlying social networks become crucial for understanding the potential community effects." Flora and Flora (1993) specify that network diversity, as well as stronger and more numerous horizontal ties within the network and vertical ties to resources outside the network, contribute to better outcomes in terms of the positive influence that members of the network have on the surrounding community. An additional important factor is the explicit articulation of a grouping of projects as a cohesive cluster or network. The ability of members to identify themselves as belonging to a certain definable cluster and additionally to identify other members as such also factors into these positive outcomes within the community.

Various communities across the country are increasingly identifying and articulating the garden network existing in their communities, as numbers of community gardens grow and corresponding networks arise. These can combine more commonplace resource provision with network articulation—for example, The Providence Community Growers Network in Providence, RI seeks to provide access to gardening resources, education, and relationship-building among community gardens, school gardens, market gardens, and home gardens in the geographic area. Tompkins County Cooperative Extension's Google map of all community gardens, used as a resource for the study reported here, demonstrates another tool for network articulation (Dolan, 2009).

The levels of organization and amenities offered by these entities are diverse; some offer simple listings of garden projects, while others offer an array of resources, classes, regular meetings, social events, and even rallying calls for advocacy and political action (Ames Community Garden Coalition; NYCCGC). The establishment of such a network need not require significant resources, either financial or temporal; a well designed website can be a significant community resource by simply aggregating the information of garden projects in the area.

Such a formalized network has potential to further these assistance efforts by facilitating the benefits of a strong "cluster"—resource generation and dissemination. Indeed, the formal "clusters" evaluated by Brasier et al. (2008) are self-defining and self-coalescing; examples include dairy cooperatives and women grower networks. These benefits are especially important in community-based efforts such as community gardens, but interestingly the cluster model has largely been applied to businesses and other market-oriented groups to date.

Another analytical tool that holds potential for such analysis is social network analysis (SNA) to create a visual network mapping of communication between actors (Springer & de Steiguer, 2011; Bartholomay, Chazdon, Marczak, & Walker, 2011). Such an SNA could be used to evaluate the significance of garden actors based on network centrality measures. Such analysis measures importance of network actors in a way similar to the Total Information Scores, but also accounts for secondary connections that are not included in the TIS.

Though the model of the community garden network has become prevalent in the United States and beyond, it appears that an analysis of this model had not previously been done in the academic

literature. This article thus serves as an example of methodology for Extension professionals or researchers to use in further evaluation of such community garden information systems. More broadly, the study provides a framework for thinking about the local networks of communication that are crucial to community-based food production and the strategies for strengthening such network-based forms of resource provision.

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