

Frequency of Sustainable Initiatives in Chicago, IL
Community Areas: Green Business, Economic Development, Recycling, and Community
Gardens
Data from Institute of Cultural Affairs

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Introduction

The Institute of Cultural Affairs (ICA) began in 1962 in the West Side of Chicago. Their current location is in Uptown, a community area in northern Chicago. For nearly fifty years, the ICA has been pushing to “release the capacity for positive social change and sustainable futures”. The ICA is a grassroots organization that advocates for both local and global developmental policies and implementation of human development programming that resonates with their mission. One of their objectives is to aid in the connection of various sustainable initiatives that address social, cultural, and environmental concerns throughout Chicago. GIS technology is a tool that can greatly benefit grassroots organizations. As DePaul University students who have experience with, and access to GIS software, and as students who are dedicated to environmentalism and other grassroots community initiatives, we were drawn to the Institute of Cultural Affairs and wanted to aid them in their mission. Thus, we created four separate maps for ICA’s use and benefit, as well as any audience who may be interested in learning about grassroots initiatives and where they can be located. While ICA consolidates many categories of initiatives around Chicago, we chose to focus on initiatives from only four categories: green business, recycling, economic development, and community gardens. The four maps display graduated color to demarcate the total count of each initiative per community area, as well as address point locations to show specifically where each individual initiative is located. Because the ICA is highly interested in showing where sustainable initiatives are located in great numbers, the mapping techniques used will emphasize the community areas that are leading in each particular initiative. The following sections include an in-depth analysis of the stages involved in this mapping project including results, summaries, conclusions, recommendations, and technical appendices - all of which address the need-to-know question of “where is there an abundance / shortage of ICA’s sustainable initiatives?”.

Project Summary

As a group, we all share an interest in sustainability. Therefore, we felt it was appropriate to work with an organization that shares the same views as we do. We were very excited to work on a project that would allow us to gain a better understanding of the sustainable initiatives located here in Chicago, for both personal reasons and future career opportunities.

Because the dataset provided by the ICA contains over 800 different initiatives, we were forced to narrow down our focus to four categories. This allowed us to give each category appropriate attention and to create a map that was both accurate and informational. In an attempt to gain a better understanding of the ICA’s needs, we reached out to project manager Seva Gandhi. After having difficulty communicating with her on several accounts, we finally made contact after

completing the first two assignments used to track success in this project. By this point we had already completed our proposal, needs assessment, and system requirements independently due to communication issues with our client. When we spoke with Seva, she told us that the ICA was seeking a map that would allow website visitors to search for initiatives by name. Because we were inexperienced in creating a map with searchable features, we explained that this would not be included in our scope for this project. In addition, we had already put in a significant amount of work and did not have enough time to change the project's course at this point. This was a large obstacle for our group as we were forced to determine what mapping tasks we could complete that would be beneficial to the organization. To address this challenge, we continued working to create useful information products with little guidance from our client. We decided independently to create maps that highlighted the location and frequency of ICA's community garden, economic development, recycling, and green business sustainable initiatives.

Before we could begin mapping our initiatives we extrapolated necessary data from an online database created by ICA's "Accelerate 77" staff. We removed the appropriate data for economic development, recycling, green business, and community gardens. We then cleaned up this dataset by correcting errors in zip codes, addresses, and other fundamental sections that would ultimately affect the geocoding results in our maps. This took an extended amount of time for the field "community gardens" because many did not have concrete addresses and required the use of Google Maps street view to find exact addresses. After this data was cleaned up, address geocoding was performed with highly accurate results, which allowed the spatial locations of each initiative to be placed appropriately on each map.

An additional challenge we encountered when creating our final maps was deciding between graduated symbols and graduated colors to highlight the initiatives respectively. After discussing the matter with our group, we concluded that graduated colors were needed to demonstrate location and frequency. However, instead of using graduated symbols we used point symbols to show the locations of each, while graduated colors were used to show the frequencies in each community area. In addition, we felt that graduated colors could be useful for planning future initiatives because the ICA could see which communities were lacking certain initiatives.

After working through all of the previously mentioned challenges, we were able to create maps that are both aesthetically pleasing and informative. Visitors to the ICA website will now be able to view the location of these sustainable initiatives, and which communities are lacking particular sustainable initiatives. In addition to the ICA's use of our maps for planning purposes, these maps could also be used for determining where city funding should be allotted when creating sustainable initiatives in the future. These maps can also be used to inform members of specific community areas of the abundance of sustainable initiatives available to them.

Needs Assessment

To determine the needs of the Institute of Cultural Affairs, it was necessary to communicate with their representative Seva Gandhi. Our group communicated mainly via email and phone to Seva to determine what specific mapping needs we could fulfill for the organization. Originally, Seva requested that our group create a map that is searchable by different criterion including: keyword, category, and “77 community areas”. After asserting our skill levels, and establishing our project’s scope, we decided that we would be unable to create a searchable map. Although this was a need that our client was highly interested in, since we were unable to meet this expectation, we had to communicate that with the organization. Working with Seva, we agreed that an appropriate need to know question would be “where are the spatial locations of ICA’s social, cultural, and environmental initiatives?”. We had originally planned on creating 4 maps to address this need to know question: three maps would detail where social, cultural and environmental initiatives are located, and one would combine the location of all initiatives. We had also considered connecting these maps to Google Maps to allow other online viewers to see these locations as well. Meanwhile, speaking with Seva about the course of this project, we were informed that there were currently individuals working with the ICA to create a map that detailed the locations of ICA’s “Accelerate 77” initiatives. After viewing the final version of the map, we decided that we again needed to re-evaluate our project needs assessment. Since the ICA’s Accelerate 77 map already detailed spatial location of initiatives, we decided to identify four specific initiatives. We chose: green business, recycling, economic development, and community gardens. We ultimately amended our final need to know questions to the following:

- 1) Where is there an abundance of ICA’s economic development initiatives in Chicago?
- 2) Where is there an abundance of ICA’s recycling initiatives in Chicago?
- 3) Where is there an abundance of ICA’s green business initiatives in Chicago?
- 4) Where is there an abundance of ICA’s community garden initiatives in Chicago?

These need-to-know questions address the client’s needs of educating ICA’s website viewers about where specific initiatives are in abundance. The client was extremely concerned with highlighting locations where initiatives are prevalent as opposed to community areas where initiatives are lacking; therefore we have addressed this need by specifically highlighting one community area on each map that has the highest concentration of that particular initiative.

To further educate ourselves about the initiatives we would be working with, we looked at literature regarding urban farming as well as the use of GIS in sustainable development. In particular, we looked at “Chicago’s Urban Farm District” in Grist Magazine, “How Google Earth revealed Chicago’s Hidden Farms” from NPR, and “Sustainable Development by GIS” in Research Journal of Agricultural Science. These articles assisted us in understanding why sustainable initiatives are important to the ICA, and why mapping these initiatives are important

to ICA's constituents. In addition to reviewing this literature, we also made sure to look at the ICA's "Accelerate 77" website page to educate ourselves further on the initiatives underway. All resources reviewed argue that there is a need to both create sustainable initiatives, as well as map their spatial locations so that people who are interested in these initiatives are able to locate and become involved with them.

System Requirements

The following section details the system requirement of our project, consisting of data requirements and processing requirements. Our data requirements include need to know questions and an ERD model representing these questions. Processing requirements consist of our specified data collection methods, data manipulation methods, data analysis methods, and data visualization methods. It also includes GIS operations for our need to know questions.

Data Requirements

Our need to know questions consisted of:

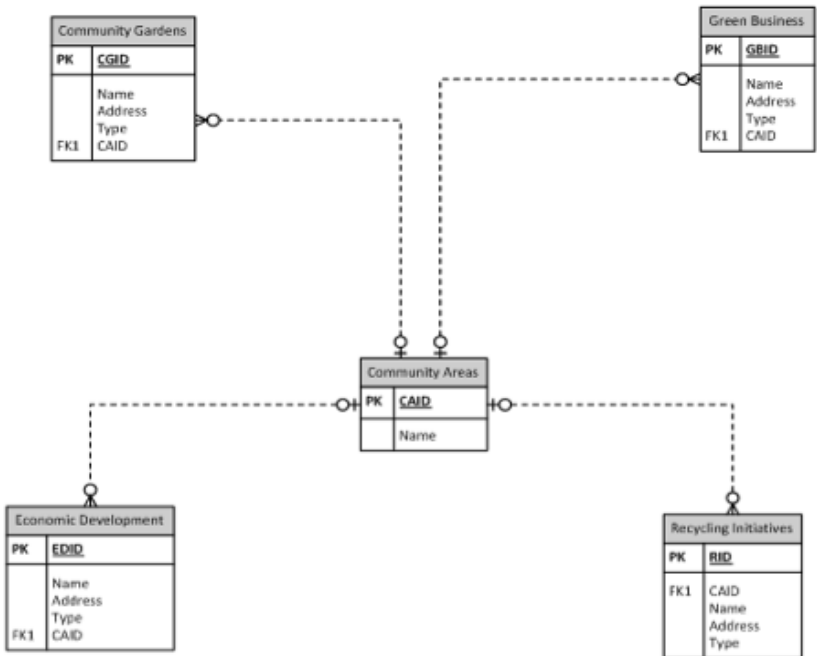
Need to know question 1: In what community areas are ICA's Green Business initiatives located?

Need to know question 2: In what community areas are ICA's Economic Empowerment Initiatives located?

Need to know question 3: In what community areas are ICA's Recycling initiatives located?

Need to know question 4: In what community areas are ICA'S Farmers Market initiatives located?

The four need to know questions are closely related, so we consolidated them into a single ERD:



Processing Requirements

Data collection: For spatial data we used a data transfer method. For attribute data we used a data input method.

Data manipulation: For spatial data we used miscellaneous data manipulation techniques. For attribute data we used field manipulation.

Data analysis: For spatial data we used spatial query, measurements, and proximity analysis. For attribute data we used attribute query to generate field statistic

Data visualization: For spatial data we used thematic mapping. For attribute data we used graphing to create the resultant thematic map.

GIS Operations

We transferred our Chicago community areas shapefile, downloaded from the City of Chicago website, to ARCMMap. We then inputted our cleaned up excel file from ICA to ARCMMap and geocoded the addresses. We added two fields, State = IL and City = Chicago. We then spatially joined the ICA’s geocoded addresses to the Chicago community area shapefile and used graduated color maps in order to emphasize the community areas leading and slacking in particular initiatives. We did not use attribute query.

Data Acquisition

The following section will detail steps involved in data-acquisition for the creation of our four maps. Through the course of this project we have taken several measures to ensure data quality

in order to eventually create accurate maps. The data for this project was relatively clean, consistent, and current. The database provided by the ICA did require the removal of initiatives irrelevant to our particular project, as well as the addition of a field “city = Chicago” and “state = IL”. Some of the addresses and zip code’s were incorrect, which required additional work to provide accurate matches when geocoding. There are, however, certain constraints and challenges that must be clarified to understand our data acquisition process. While the data was mostly current, several factors contribute to the possibility of our map not being 100% up-to-date.

To initially clean up our data, each of our community initiatives was put into .dbf files (dbase files) and was denoted as a point spatial type object. Our processing steps did not include creating a database; however, it did include cleaning up the existing database retrieved from ICA in order to narrow it down to the specific initiatives we focused on in our project. Our attributes included Chicago community areas, street addresses for each initiative, zip codes for each initiative, and categories (i.e., green business, economic development, etc.). For our community areas dataset, we used a shapefile obtained from the City of Chicago website, which we then joined with the dbase files. The spatial object type for the Chicago community area shapefile is polygon.

The accuracy of the attribute table is strong; there were no unusual or incorrect values and the data was collected between 2012 and 2013. With that being said, if any data was altered, removed, or added within the past few weeks that which we obtained the data, these changes will not be applied to our maps. The data is consistent as well. While most information per each attribute is completely filled out, there are some attributes whose addresses are “online-only”, and thus they do not appear on the map. Similarly, while ICA has a plethora of initiatives, there are certainly many grassroots organization that they may not have added to their database. Furthermore, because the general public can add initiatives through ICA’s “Accelerate 77” website, we may not know if they incorrectly categorized if we do not have all the background information on each initiative. Additionally, if an initiative changed locations or became defunct, we would not be aware of such changes.

Our data for community areas is vector and the pixel size is N/A. Attribute and positional accuracy appear complete, and no incorrect values were detected using query and sorting tools. It is complete and consistent; the primary key was void of any problems such as duplicate instances, multi-valued attributes, irrelevant attributes, or missing values for the primary key. The shapefile is relatively current, from December 2010 and updated in November of 2011. Thus, while the data is relatively recent, any changes within the past year will not be reflected in our map. Lastly, another constraint is that a total of 5 addresses were not included in the geocoding process due to faulty location (i.e., online addresses).

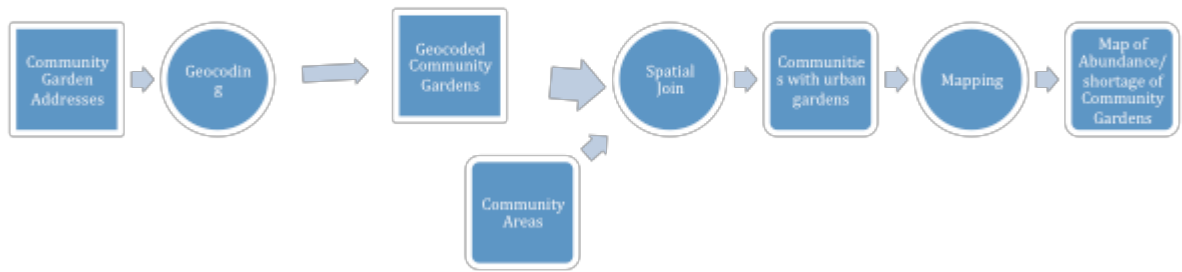
Thus, while much of our data was very clear, consistent, and up-to-date, we did meet certain constraints and limitations due to several reasons. Anyone in the general public can add

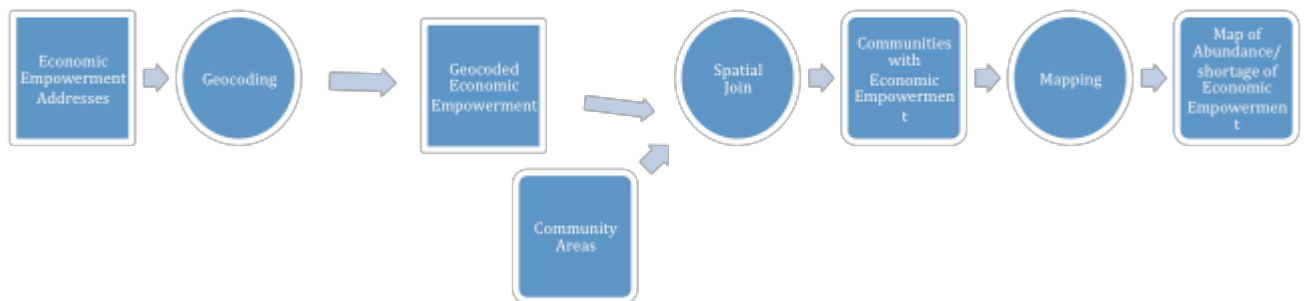
initiatives, and if the database is changed since the time we created our map, those changes will not be considered in our map. Furthermore, certain addresses could not be geocoded due to improper addressing and online addresses. Other initiatives may have possibly closed or changed locations since the database was last updated, and we similarly still would not be aware of such changes.

Data Analysis and Visualization

The data analysis and visualization portion of this project focused on solidifying need-to-know questions that would be answered in the maps we created. The questions that we posed were: In what community areas are ICA's Green Business, Economic Development, Recycling, and Community Gardens initiatives located? To demonstrate both the abundance and shortages of these initiatives in each community, we relied on two important techniques. First we geocoded the addresses of each initiative to assign coordinates and to aid in demonstration of spatial distribution. Then we used joins to connect geocoded addresses with community areas, which created a new column for the totals in each area. After the count column was created, we applied graduated colors to each community area based upon the number of initiatives they contained. In addition, we used point symbol mapping to demonstrate the physical locations of each initiative.

When addressing the Data Visualization aspect of this project we relied on six rules to help us achieve the goals set by need-to-know questions. The first rule was to use NAD83 UTM 16N for datum and map projection of Chicago community areas. This allowed us to create a shapefile representative of Chicago's individual community areas. The second rule was to use one uniform symbol in all maps with different colors to represent the location of each initiative. This reduced clutter in the maps, while also making them more readable for viewers. Next, when applying color graduation to the Cook County shapefile, we used a darker color to represent areas that contained the highest number of initiatives. We felt this was appropriate because a darker color makes it easier for viewers to understand which areas contain the highest concentrations. Because pre-set data classification methods are not very precise when presenting these materials, we decided to use manual breaks. This allowed us to objectively show which community areas contain more initiatives than others. In addition, we used between 5 and 7 classes to give a broader spectrum of color, and to further emphasize the concentrations in each community. For the fifth rule we decided that normalization was not needed for these maps because we relied upon an actual count of initiatives in each community to create color graduation. Furthermore the symbols used in our maps represented the physical location of each initiative, in which case normalization might lessen the accuracy of our maps. In addition, in an attempt to maximize readability we have chosen to include basic map features including a legend, north arrow, scale bar, and title. Lastly, we felt it would be more effective to include a zoomed-in section of the community areas that possess the highest concentrations of each initiative.





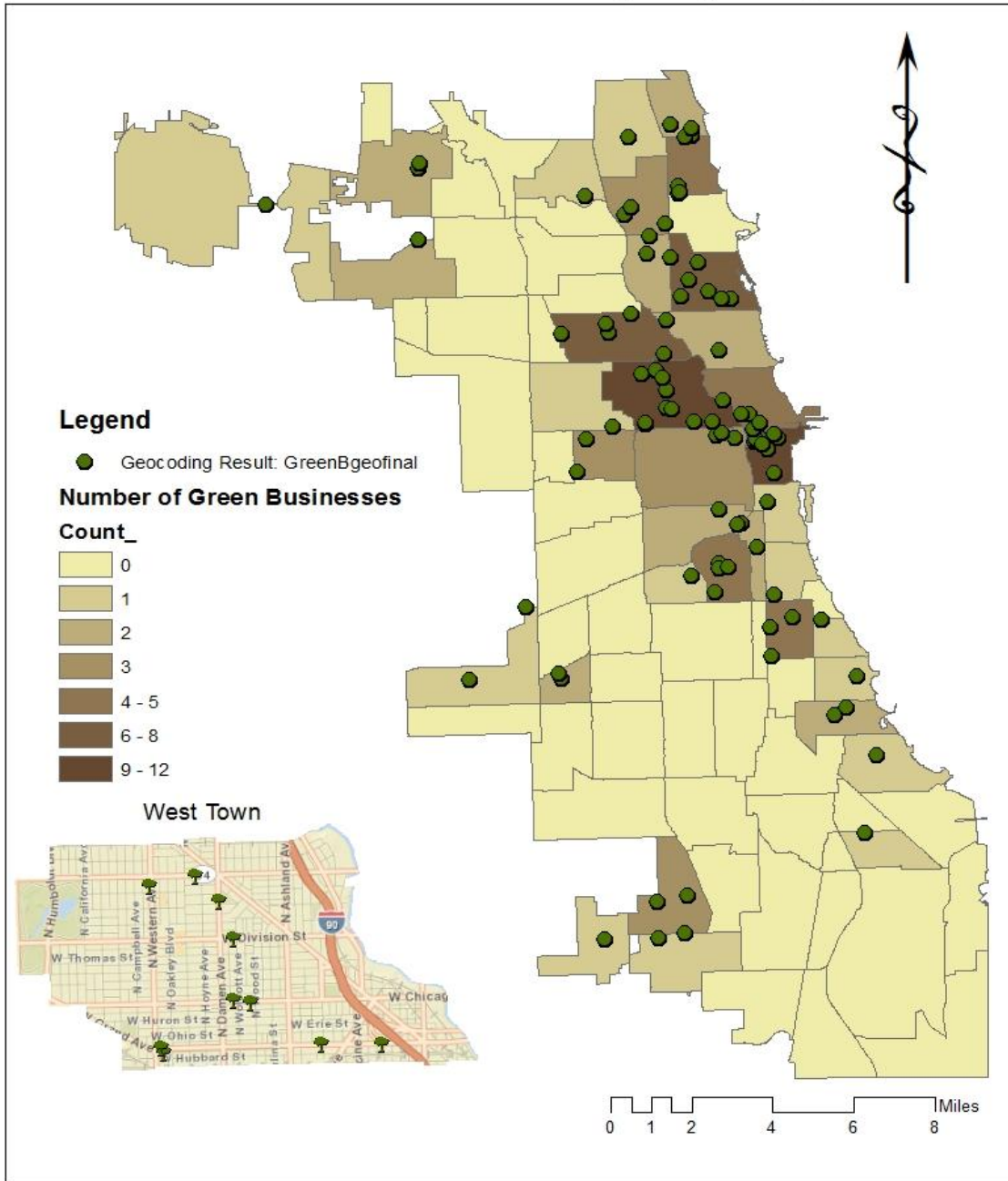
Results

Our Analysis resulted in four maps, each displaying the spatial distribution of an initiative: green businesses, economic development, community gardens, and recycling. Three of the four maps - including green businesses, community gardens, and recycling - revealed a spatial distribution in which initiatives were disproportionately concentrated in north side community areas in comparison to the south side community areas. The economic development map was the only map that did display this trend; instead, initiatives were concentrated in downtown and west side community areas. The in-depth results for each map are as follows:

The green business map reveals a spatial distribution in which green businesses are highly concentrated around the downtown and north side communities of Chicago. In comparison, there is a clearly a lack of green businesses in the south, west, and northwest communities of Chicago. The community area with the most green business initiatives is West Town.

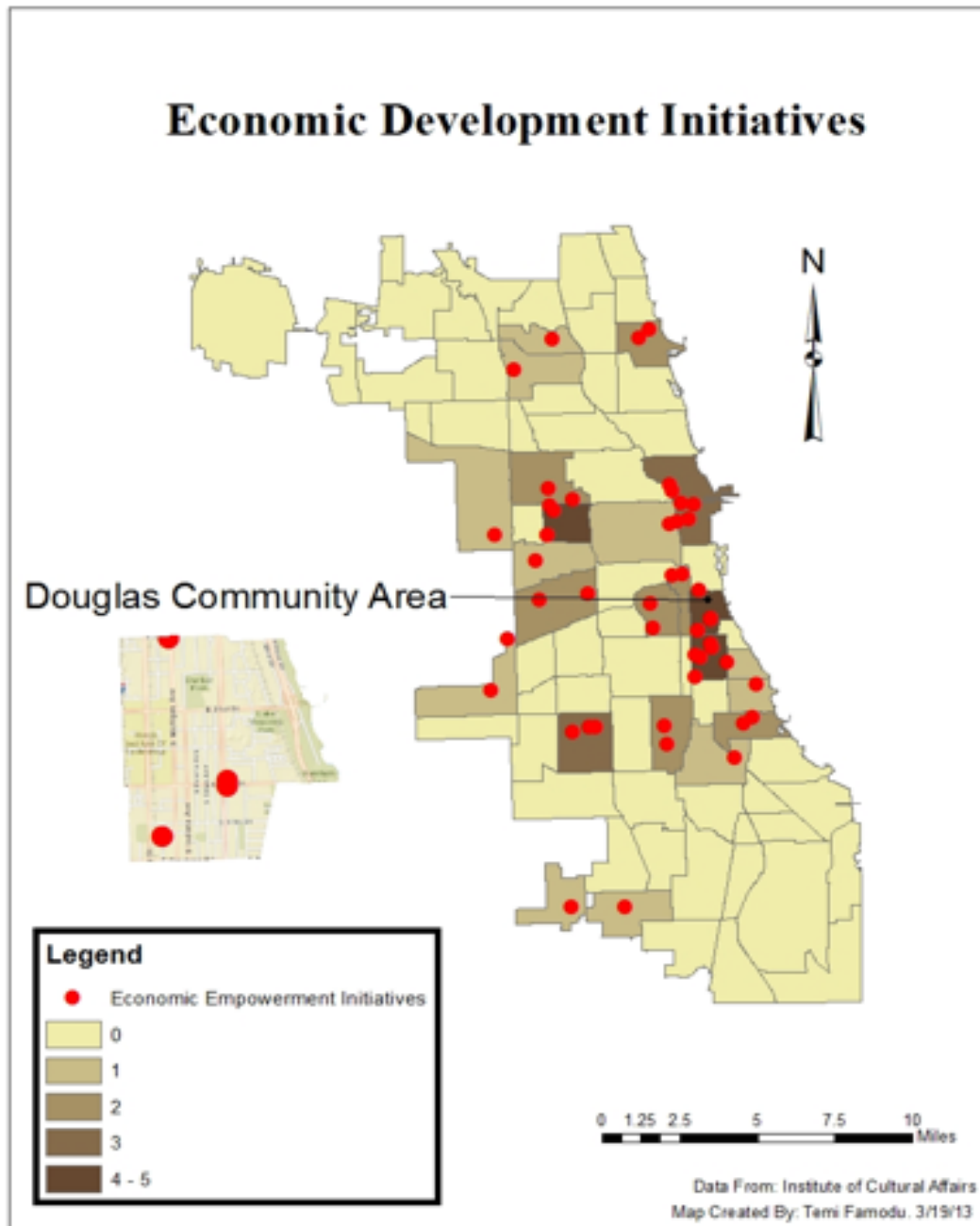
Green Business Initiatives in Chicago, IL

Data From: Institute of Cultural Affairs - Chicago & City of Chicago



Map By: Michelle Hauer

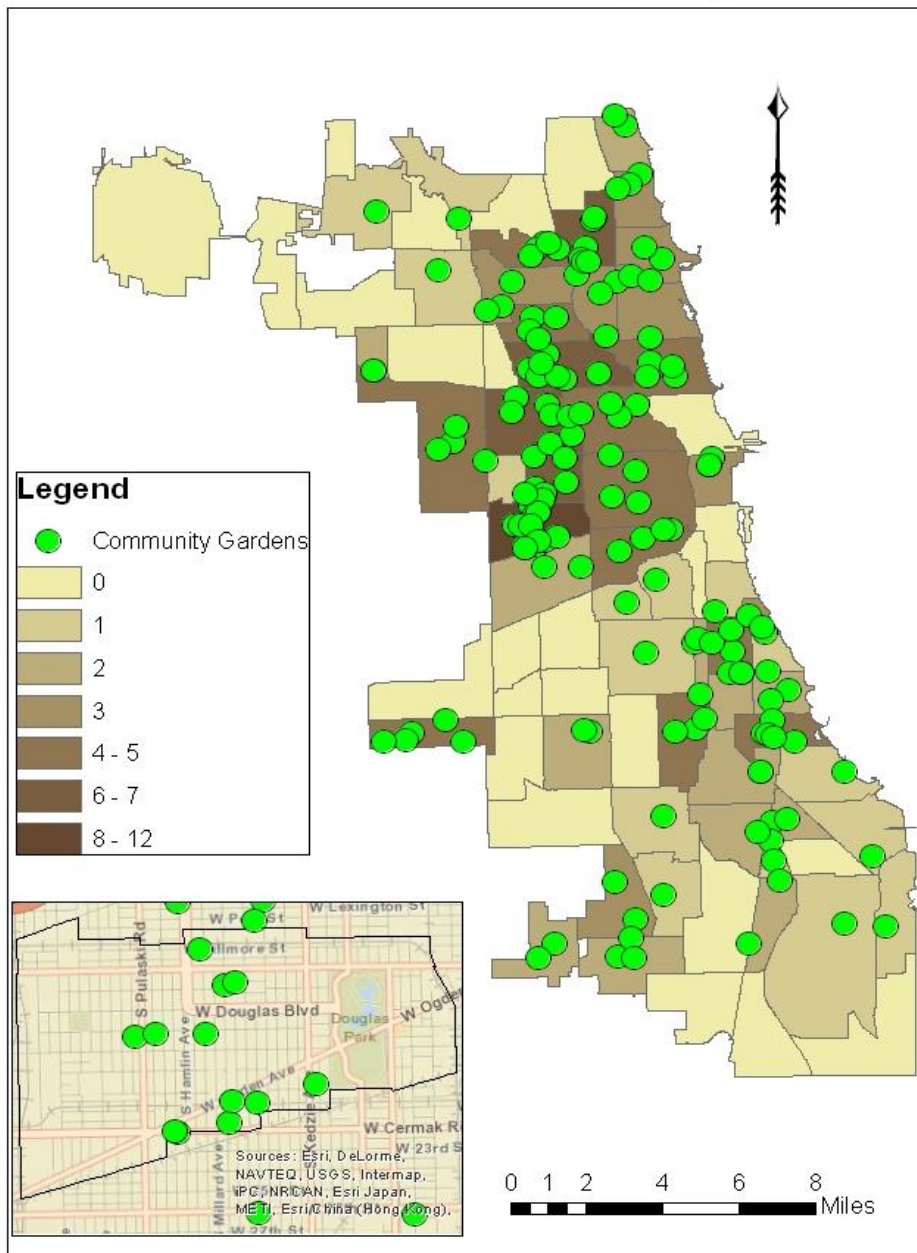
The economic empowerment initiatives map reveals a spatial distribution in which initiatives are predominantly concentrated around the downtown and westside areas of Chicago. In comparison there are very few economic empowerment initiatives on the far north side and far south side. The two community areas with the most initiatives are Douglas and Grand Blvd where each had 5 initiatives. It should be noted that of the four maps, this map displayed the least spatial disproportion in initiatives between the north and south side.



The community gardens map revealed a spatial distribution in which initiatives are most highly concentrated on the north side of Chicago, although a fair concentration of community gardens also exists on the south side. From looking just at the points representing community gardens, it might seem that the spatial distribution is equal; however, the graduated colors reveal a disproportion. The community area with the most initiatives is North Lawndale.

Community Gardens in Chicago, IL

Data From : Institute of Cultural Affairs - Chicago & City of Chicago

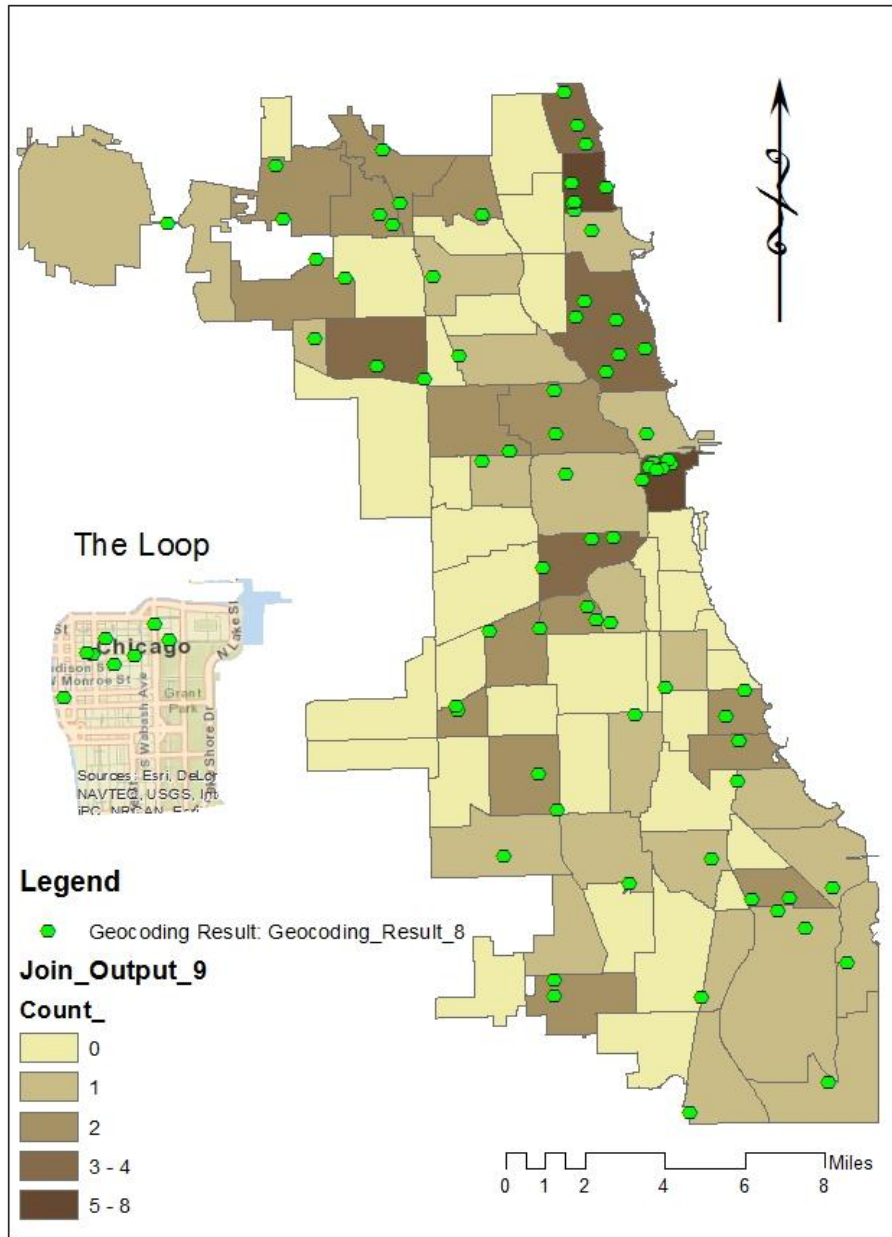


Map by: Matt LeMoine

The recycling initiatives map reveals a spatial distribution that looks to be distributed equally when looking at the points representing individual initiatives. However, the graduated colors reveal community areas with the most initiatives are more likely to be located on the north side. The community area with the most initiatives is the Loop with 8.

Recycling Initiatives in Chicago, IL

Data From: Institute of Cultural Affairs - Chicago and City of Chicago



Map By: Kathleen Cook

Summary, Conclusions, and Recommendations

As stated previously, our project consisted of creating four maps for the ICA, each displaying the locations of four separate initiatives in community areas of Chicago: green businesses, economic

development, community gardens, and recycling. We acquired our data sets from the ICA and then cleaned up the data by correcting errors and missing attributes. We then geocoded the addresses so that the spatial location of each initiative would be displayed on its respective map. Unique symbols and graduated colors were used to represent the spatial distribution of the initiatives, and once the maps were created were able to analyze and evaluate where initiatives are in abundance and where they are lacking with the results from a spatial join.

Overall, we believe that our research goal was met by the results we achieved from this project. Chicago is a large, extremely diverse city and we believe that a spatial representation of these four initiatives is the most effective way to present them to the public. The spatial distributions within our maps reveal where initiatives are in abundance and where they are lacking; an indication of their accessibility depending on what community area you live in. The ICA will use these maps on their website to inform viewers about the locations of their initiatives, and ultimately extent of their scope in Cook County.

The approach we took with creating our maps was effective, time-efficient, and certainly repeatable for other initiatives in Chicago. We were able to meet the needs of the ICA within the scope of our project. We recommend that the next step is to create maps of all the initiatives tracked by the ICA and that the spatial distributions of the maps are compared. It would also be useful to look at unique factors within each community area, such as socioeconomic data and access to public transportation. These factors are important because they may reveal why certain initiatives are abundant in some community areas and lacking in others.

Technical Appendices

The following technical appendices section contains information that was useful in the creation of this report. Each appendix displays data that was used at some point to better the findings of this report.

APPENDIX A: CONTACT INFORMATION

ICA Primary Contact:

Seva Gandhi: Program Coordinator, ICA

Phone Number: 773-769-6363 x312

Email Address: sgandhi@ica-uas.org

ICA Address: 4750 N Sheridan Road, Chicago IL 60640

APPENDIX B: ACCELERATE 77 ONLINE DATABASE

Database used to create point locations for initiatives can be found here:

<https://docs.google.com/spreadsheet/ccc?key=0ApxTUbQ6CbNpdFRXUy1jbTFxQXJOZDhGNWZvX21zWIE#gid=0>

APPENDIX C: ACCELERATE 77 COMMUNITY AREA MAP

<http://www.accelerate77.net/map>

APPENDIX D: DATA FROM CITY OF CHICAGO

Chicago Community Area Shape-File can be found at the City of Chicago website:

http://www.cityofchicago.org/city/en/depts/doi/dataset/boundaries_-_communityareas.html