Geospatial Genealogy

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Geospatial science, especially in combination with Cadastral Maps, provides invaluable tools for genealogical research: (1) remote sensing, (satellite visualization technologies), as manifested via sites such as Google Earth, invites researchers to "visit" their ancestral towns/homes without leaving their current homes; (2) GPS allows for the identification of the exact locations of sites of specific significance even if they no longer exist e.g. community synagogues, cemeteries and mass graves; and, (3) Geographic Information Systems (GIS) provide the computational capacity to explore the "micro" level of individual family lineages and kinship links and the "macro" level of the economic, social, and cultural aspects of communal inter- and intra-relationships over time, the "community forest" as Wagner (2006) has termed it. This article describes the work of integrating these geospatial tools and technologies with the information and methodologies of traditional genealogical research: Geospatial Genealogy.

I. Overview

The pattern of immersion in genealogical research often begins when a parent dies and the adult children left behind begin to wonder: "Who were my people? My great-grandparents? Their parents? What was their history?" One often hears new researchers lament: "*Why didn't I ask them all these questions while they were still alive*?"

Likewise, the beginning "Jewish" genealogist also gets immersed in, and mesmerized by, the plethora of documents available online or accessible by purchase. Sometimes though, the Holocaust interjects itself, as the names of fairly close relatives who were murdered are discovered. The shock and horror of the Shoah then takes on new meaning as its proximity, and the randomness of the luck of one's existence by virtue of the courage of some long ago ancestor who left Europe "in time," comes clear.

A voice wells up inside saying: "*I want to walk the land my ancestors once walked. I want to see the hills, the streams, the fields they saw, the places they were buried. I want to find their home - where they lived, died and gave birth"*.

For many researchers, this is an unfulfillable yearning: the expense is too great or the trip too challenging, or perhaps they simply don't want to go back to such a place which, in their words, *"is dripping with Jewish blood".*

Through the tools of geospatial science, and the wonders of modern technology, researchers can now fulfill these longings from their perch at a computer: they can "visit" towns of origin, see what is left behind (and what isn't), geo-position their ancestral home, and much more. Genealogists who are lucky enough to be able to make the physical visit can take their explorations and involvement even further. For example, the Jewish genealogist descendants of the town of Rohatyn (Ukraine) have taken the holy task upon themselves of collecting the pieces of Jewish gravestones used as road pavers in World War II to create some form of memorial. If looked at from a straight genealogical perspective, there is also the possibility of collecting some names and dates from these same stones.

Geospatial genealogy

When genealogists add the step of learning about the place(s) from which their families originated, a geographic component, "geospatiality," is inserted into their research. Thus, from the perspective of taxonomy, we have labeled this approach geospatial genealogy[1]: the linking of traditional genealogical records and databases with the mapping, analysis, and visualization capabilities of online mapping programs like Google Earth and the more powerful capabilities of geographic information systems (GIS). Ruvane and Dobbs (2008) advocated combining geospatial data in the form of plat maps and other property records with genealogical records as complementary sources of evidence to recreate past ancestral landscapes.

Our work fits into a larger schema that can be referred to as geospatial macrogenealogy. Macrogenealogy, in our view, looks beyond individual family trees by combining data from a range of genealogical sources to create what Wagner (2006) calls a "community forest."[2] It goes beyond family lineages to distant kinship links and even to include all persons within a geographic area,

[1] Some of the content of this chapter appeared previously in the following: Egbert, S.L. and Roekard, K.G.R. 2010. Geospatial Genealogy: Visualizing and Exploring Ancestral Places. Avotaynu XXVI (1): 36-41; and Egbert, S.L., and Roekard, K.G.R. 2010. Geospatial Genealogy: Visualizing and Exploring Ancestral Place. Proceedings, BYU Family History Technology Workshop. Salt Lake City, Utah.

[2] We acknowledge that our view of macrogenealogy is somewhat at variance with that of Wagner, who views macrogenealogy or "global genealogy" as involving "issues and tools relevant to genealogy as a whole." Our geospatial genealogical research most likely would fall under the heading of "confined microgenealogy" in his taxonomy. Despite our differences in terminology, we are indebted to him for describing his thought-provoking vision of the scope of academic genealogical research.

irrespective of their religious and/or ethnic affiliation. Although family links are still vital, macrogenealogy examines a wide range of relationships and patterns within a community as they are revealed in the historical records, including economic, social, cultural, and political. Vogel and Stroh (2007), for example, described using Jewish surname linkages across a wide range of records to begin to construct a town-wide genealogy of Mattersdorf, Hungary from 1698 through 1939.

Geospatial at its simplest refers to using maps to record and analyze geographic, or spatial, patterns. Traditionally, the tools employed were printed maps and perhaps map overlays on transparent paper or plastic. Today the tools of the geospatial analyst focus on computer-based geographic information systems (GIS) and related tools such as GPS and remote sensing (air photos and satellite images). Technological advances over the past 30 years have enabled geographers to combine these geospatial methods, using GPS to identify locations, remote sensing to identify objects visible from overhead and geographic information systems for electronic mapping and analysis. Together, these geospatial technologies provide a powerful means for conducting pattern-and-process research.

We view geospatial macrogenealogy as being multi-scalar geographically, ranging from the community level (town, village, shetl, etc.), through the regional level (multiple to numerous communities in a county, raion (district), voivodeship (province), etc.), and up to the state or national level and beyond. The scale concept is flexible and is best viewed as a continuum from the smallest settlement to the globe, rather than as discrete groups segregated by size. In our initial research, we focus on the single town of Rawa Ruska, Ukraine.

An Example of the Geospatial Macrogenealogical Approach

In Rawa Ruska, as in most of Eastern Europe in the 1830s and 1850s, cholera epidemics raced murderously through the Jewish, Greek Catholic and Roman Catholic communities. Straight genealogical research through death records allow us to find out if specific ancestors of Roekard's died from the disease in either of these epidemics. When we incorporate the house numbers – the house in which births or deaths were recorded on official documents – the component of geospatiality is added and additional questions can be looked at such as: Who else was born or died in the same house? Were they in some way related to her ancestors (i.e. potential new family lines)? Where exactly in the town did her ancestors live or die? Where did all the people to whom she is related in this town live? Where did all the Jews live? Are there patterns that can be discerned from housing arrangements? And so on.

When we take our research to its next level and input the geospatial data from vital records for all the townspeople into a geographic information system (GIS) – not just Roekard's family or the Jewish population – we are able to look at

the pattern of deaths in the cholera epidemic as they occurred to specific individuals within each of the three religious groupings (Jews, Roman Catholics, Greek Catholics), as well as across the entirety of the town – the macrogenealogical component. We can then look at questions such as: Are there differences in the patterns of death in each of the three groupings? Did cholera show up more or less in different geographic areas in town, based on the religious group that lived there? Did the epidemic start with the Jews? Within a certain family?

When we overlay an animated visualization on top of the GIS using Adobe Flash software, for example, we can visualize, possibly using a different color for each religious grouping, the patterns of death as they occurred by individual and within each group over time. We can examine questions whose answers will come to us visually; and we can't even predict the totality of what we will find because the visualization adds information that the purely intellectual may not even know is possible.[3]

Research Context

Our work in geospatial genealogy fits broadly under the umbrella of a nascent field known as historical GIS. Ann Kelly Knowles (Knowles 2000, 2002, 2005) has been a pioneer not only in conducting research in historical GIS, but in elucidating potential avenues of research. This work also has links to the digital humanities movement, one part of which has involved using geographic information systems to map and recreate historical landscapes, a key example being Re-Mapping Segregated Atlanta: A Spatial History Project (Emory Libraries, 2012).

The past three to five years also have seen accelerating interest in applying computer-based mapping technologies to various aspects of family history. For example, Moore, et al. (2008) used the term "geospatial family history" and described a tool, Family Tree Mapper, which could be used to map the locations (towns) of multiple generations from a single family. Similarly, Shular (2009) described using geographic information systems technology (GIS) to map ancestral homesteads, migration trails and key events, surname distributions and settlement patterns, and DNA groups.

Timothy and Guelke (2008) published an edited volume exploring a wide range of similar topics relating to geography and genealogy.

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[3] The Spatial History Project at Stanford University has conducted research related to the ideas in this paragraph: the spatial and temporal aspects of the Yellow Fever epidemic in Rio de Janeiro in 1850. They created a highly effective visualization that "…*explores the way different temporal aggregations of data can shift interpretations of the spatial pattern of epidemics*." (http://www.stanford.edu/group/spatialhistory/cgi bin/site/viz.php?id=133&project_id=0)

It has been suggested to us that in some senses our work with geospatial genealogy has linkages to the subfield of history known as prosopography, the function of which is *"to record information about individual persons in order to analyze a collection of such records in certain ways. … Although the study of individuals is a pre-requisite of prosopography, prosopography is not about individuals. The study of individuals is the province of biography or genealogy and is very limited. Prosopography is about what the analysis of the sum of data about many individuals can tell us about the different types of connection between them, and hence about how they operated within and upon the institutions – social, political, legal, economic, intellectual – of their time"* (Keats-Rohan, 2000, p. 2).While prosopography does indeed correspond to many aspects of our research, we focus on explicit and specific geospatial dimensions that appear not to be present in most prosopographical research to date.

In the following pages, we describe the origins of our research and outline our study area and data sources; then we develop two threads. The first corresponds to the use of Google Earth to visualize and explore ancestral places, ranging in scale from individual homes and buildings to entire towns. The second focuses on using geographic information systems (GIS) together with genealogical records to explore the patterns of life in Rawa Ruska spatially and temporally. We conclude by exploring some potential research themes for geospatial genealogy.

Initiating Our Research

One of the authors, Karen Roekard, is a descendant of Hasidic Jews who lived for centuries prior to the Holocaust in two towns in present day Ukraine. She describes how our collaboration began:

> *"In 2005, I was fortunate to be able to live out my long-term desire to visit Rawa Ruska and Belz, the eastern European towns in which my father was born and brought up. On a torrentially raining day, when it was impossible to drive anywhere, I did research in the Scientific Library in L'viv and found a tax list from 1812. On it were my ancestors' names, names that have been passed down so that my nephews now carry them in this generation. One of the houses for which they paid taxes in 1812 was the same house in which my father grew up.*
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> *In 2006, I went back and spent two weeks in the Historical Archive in L'viv, collecting and photographing many other records including the "key" to identifying where each house and building was located in the town: the cadastral map. I was able to follow my ancestors throughout the 19th and early 20th centuries, as they stayed put, changed residences or expanded throughout the town, as they gave birth, as they died.*
>
> *I became interested in the idea of seeing where every Jewish resident of 1812 and 1854 lived; I enlarged the maps and hand wrote in the names of every Jewish family. The outlines of the old Jewish neighborhood*

became obvious as did the fact that the Christian and Jewish residents of the town were not entirely segregated, though they were quite clustered.

In June 2008, while participating in the Silberman seminar at the US Holocaust Memorial Museum, I showed my maps to University of Kansas Geography Professor Stephen Egbert. He insisted that the map and data I had collected, the information I had input by hand onto the map, should be put into a GIS. Thus began our collaboration to explore, and define, what could be learned from examining genealogically relevant material through the lens of geography, of 'place.'"

II. Rawa Ruska and Our Data Sources

Our prototype study community is Rawa Ruska, a town located in what is now the western border of Ukraine, but known to pre-World War II Jews as Galicia (in the Austro-Hungarian empire) or Poland (1918-1939). Historically it was a "mixed" town of Jews, Poles, and Ukrainians.

During World War II the town's Jews were murdered in various "actions" at nearby mass gravesites (Desbois, 2008) or gassed in the Belzec extermination camp, 14 kilometers away. At the end of World War II, the Polish residents of Rawa Ruska were ethnically cleansed by Ukrainian nationalists, and today Rawa Ruska is almost entirely Ukrainian. Although we have selected Rawa Ruska as our prototype, it should be noted that these methods of analysis could be applied to any location for which cadastral maps and house-linked datasets are available.

Data Sources

The keys to our research, the Rosetta Stone, so to speak, are cadastral maps, maps of property ownership. They show, at a minimum, the boundaries and ownership of real property parcels (real estate) within a given jurisdiction such as a city, county, or parish. Kashuba (2008) underscored the value of land and property maps in genealogical research by noting that, "when combined with other sources such as deeds, city directories,and federal census records, they become a power reference source when one attempts to reconstruct past landscapes, study employment opportunities, search for nearby churches … or identify nearby schools…" (p. 37). Fortunately, during the time that Galicia was under the rule of the Austro-Hungarian Empire, an extensive program of detailed cadastral surveying was carried out and the maps still exist in historical archives (Kain and Baigent, 1992; Lenius, 2005)

We use the cadastral map of Rawa Ruska as the basis for our mapping. On it, the outlines of all buildings are shown and, more importantly, the lot numbers for each parcel are noted (Figure 1). The cadastral map would be meaningless without other records that link the parcel numbers to the house numbers, i.e., the

"addresses" of each house, and then the house numbers to the individuals who owned or resided in the houses.[4]

Figure 1: Rawa Ruska cadastral map, cropped to highlight the town itself and surrounding fields..

Following are some of the other primary record sources for our project that Roekard accessed: (1) The Tabula Register Collection that comprises the original town books into which people copied the contracts they had undertaken – business, real estate, marriage, and probate; (2) Property Owners/Taxpayer Lists containing listings of people who owned property and/or paid taxes, including the 1812 Taxpayer's List, the 1854 Property Owner's List, and the 1934 Jewish Taxpayer's List; and (3) Vital Records, covering legally sanctioned or acknowledged life cycle events for which records were kept – births, deaths, and marriages.

III. Exploring Rawa Ruska Using Google Earth and a Cadastral Map

One way to visualize geospatial change in Rawa Ruska is to overlay the 19th century cadastral map on top of present-day satellite images – in Google Earth, for example. To do this, we added a photo of the cadastral map in Google Earth as an "image overlay." The map was then moved and stretched into place using features we could see on both the map and the satellite image as reference

[4] There are several "versions" of the Austro-Hungarian cadastral maps, including final copies and working draft copies. Additionally, some versions include house numbers (as opposed to parcel numbers) and some even include the name of the owner at the time of the survey. The map we have includes parcel numbers but does not include owners' names.

points.[5] These might be road intersections or large permanent buildings such as churches.

The best part of overlaying the cadastral map is that once it is positioned correctly the slider in Google Earth can be used to make the map appear transparent or opaque, or anything in between (Google Earth refers to this as the opacity setting). This makes it possible to see where buildings and roads have disappeared or still exist, where they have been added or changed, and perhaps most exciting of all, where one's ancestral homes were positioned and whether they are still there. The image overlay of the map can be saved to your Google Earth Places and can also be shared with others.

Figure 2 illustrates the effect created by overlaying a cadastral map on a satellite image in Google Earth. It can readily be seen that the building on the town square and the synagogue (to the right) no longer exist. The two Christian churches (Sct. Josef and Sct. Maria), on the other hand, are still standing. Further examination reveals that many of the residential structures, especially around the town center, have disappeared. In some cases, new structures have been built while in others the land is vacant.

We have found that in some cases where a building has disappeared it is possible to zoom in to Google Earth and see the outlines of the foundation of the building, even after it has long disappeared. Such outlines, which may be from stones or cement rubble or perhaps from vegetation growing poorly in the shallow soil over the former foundation, are "relict" features from bygone eras that provide visual cues and reminders of what once was. As geographer David Lowenthal said of such relicts, "features and patterns in the landscape make sense to us because we share a history with them" (Lowenthal, 1975, p. 5). In other cases, of course, there are no traces at all, except the virtual or "ghost" features seen only on the old cadastral maps.

Visual exploration in Google Earth of an ancestral village like Rawa Ruska is only the beginning, of course. As hinted at in our introduction, by cross-referencing the house numbers found in vital records with the corresponding parcel numbers on the cadastral map it is possible to identify geographic coordinates for specific homes, buildings, and other locations such as a cemetery or *mikveh* bath. These coordinates can then be uploaded to a GPS that can guide the genealogical tourist to the exact spot (usually within a few meters) of where the building or feature stands today – or, in the case of the destroyed synagogue in Rawa Ruska, where it once stood.

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[5] The tools in Google Earth for matching cadastral or other maps to the underlying satellite imagery are essentially rudimentary tools for performing a procedure known as image rectification. Ideally, image rectification would be done using image processing software, where numerous control points are combined with mathematical models to "rubber sheet" an image to more precisely fit the earth's geographic coordinate system.

Figure 2: Using Google Earth to display a cadastral map on top of a current satellite image. The top view shows the satellite image of modern Rawa Ruska in Google Earth with no overlay. The bottom view shows the 1850s cadastral map overlaid on top of the satellite image with about 50% transparency/opacity. The two Christian churches that have survived are outlined in black squares, while white squares highlight the building in the market square (center) and the synagogue (center right) that have disappeared.

A further dimension can be added once the original site of interest has been located on the ground. Photographs of a location can be "geotagged" by adding the geographic coordinates to the metadata of each photo. This can be done manually using any one of several free or inexpensive pieces of geotagging software or directly in the field with a GPS-equipped camera or smart phone. The advantage of geotagged photos is that they can easily be added to Google Earth or similar programs as an additional and important way of visualizing the ancestral

village or home. It would be a relatively simple matter to modify the photo's popup in Google Earth to include genealogical information about the former occupants of a home, for example.

IV. Using GIS for Deeper Exploration

At a very superficial level GIS is sometimes thought of as computerized map making. While there is some truth to this, the capabilities of GIS go far beyond the ability to use computer programs to draw maps. A geographic information system consists of computer hardware (normally a high-end PC with sufficient memory, disk storage, and a good graphics card), specialized GIS software, and geographic ("geospatial") data. One definition of GIS puts it this way: "A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information." (Environmental Systems Research Institute (ESRI), 2010)

The roots of GIS go back to the 1950s and 1960s, when government agencies and university laboratories began harnessing the power of computers to assist in collecting, storing, and mapping complex data sets for purposes such as censuses, land use planning, and utilities management (Longley et al., 2005). With ever increasing computer hardware capabilities, especially in data storage, processor speeds, and graphics, coupled with developments in spatial analytical algorithms, GIS has become a powerful analysis and management tool. Today, virtually all levels of government, from municipal up to national, have GIS departments, sections, or "shops" to manage and communicate their geospatial data. GIS is also used extensively in the private sector for applications ranging from transportation route planning to analyzing potential locations for warehouses or retail outlets. GIS is a multi-billion dollar industry, complete with specialized university programs, textbooks, and annual industry conferences.

GIS databases

In GIS databases, the key piece of information is always location, whether it is latitude and longitude or other map coordinate system. Everything else in the GIS database is tied to the location – the "everything else" might include things like the street address, the name of the property owner, the number of occupants of the home, the value of the property, the size of the home on the property, and so on. These pieces of information are called "attributes" in GIS. Conceptually, we often think of a GIS database as consisting of a series of maps or map layers stacked on top of each other, with each map layer representing a separate attribute.

Because of the underlying database structure, GIS is much more than the computer equivalent of a paper map. In particular, GIS combines the power of database queries with graphic presentations. For example, a GIS analyst might

ask, *“Show me all the houses within the city boundaries that have an assessed value of less than $250,000 that are located greater than 300 feet from a fire hydrant.”* In this case, we are assuming that map databases already have been created for city boundaries, assessed property values, and the locations of fire hydrants. The result of the query can be displayed on a map or in the tabular form familiar to database or spreadsheet users. In only a matter of seconds, the query can be changed to another set of variables and parameters. Because of this ability to access the underlying databases and display the results graphically, GIS maps are sometimes referred to as “smart maps.”

Creating our GIS Database of Rawa Ruska

In our case, the key map layer is an 1854 cadastral map of Rawa Ruska showing the locations of houses and buildings along with the numbers for the parcels or lots upon which they were built (Figure 1). These parcel numbers are tied to house numbers in some of our other record sources, thereby enabling us to tie individuals and various other attributes (births, deaths, tax value, etc.) to the houses through time.

The Rawa Ruska cadastral map was photographed using a digital camera. To prepare the map for inclusion in a GIS, the photograph was used as a visual backdrop in ArcGIS, a commercial GIS software program, and each of the buildings was traced using the mouse cursor, a process called screen digitizing, then saved in the GIS. The outlines of Rawa Ruska’s buildings and houses shown in Figure 3 formed the base map layer for our GIS and were now ready for attributes such as owner’s name, house type (brick or wood), tax value, religion of owner, and many others.

Figure 3: Buildings and houses in Rawa Ruska (shown in beige) after being digitized from the cadastral map and saved in the GIS database.

Attributes were entered and organized using an Excel spreadsheet – we also could have used a database program or entered the attributes directly into the GIS program's own database. The spreadsheet was then imported into the GIS database. This was done by cross-referencing the parcel numbers in the spreadsheet with the matching parcel numbers in the GIS database – in essence we did this by creating a lookup table between the parcel numbers and house numbers. With the base map and attributes in place, we were now ready to perform some basic queries to explore the residential patterns in Rawa Ruska.

<u>Visualizing Rawa Ruska in GIS</u>

At the simplest level, a query can be made in GIS to discover information about each house or building. For example, by opening a database query window in ArcGIS we can search for any houses owned by individuals with the surname of Prufner (Figure 4). Once the query is complete, the houses are highlighted on the map, enabling us to view their locations. We also could have made a selection by using the mouse to click on any particular house, in which case an attribute window would pop up showing all the data attributes for that house. Conversely, we could have opened the attribute database table from which we selected a house number or owner and have seen the house highlighted on the map.

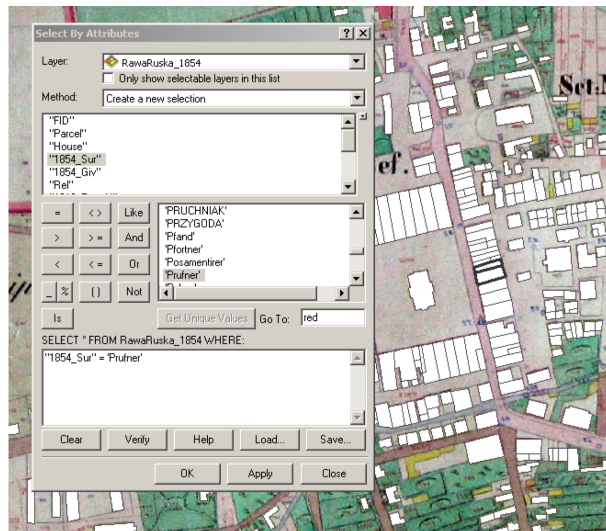

Figure 4: Example of a simple query to locate homes owned by a person (or persons) surnamed "Prufner." Two homes were located (on the right side of the town square) and are highlighted with a black outline

In a somewhat more complex fashion, a query can be built that will highlight all the houses and buildings that fall into a particular category. For

example, we can ask the GIS to show us all the houses owned by Jews in 1854 (Figure 5). As a result of the query, we can see the geographic, or spatial, patterns of Jewish residences in Rawa Ruska in that year. Not surprisingly, we see several clusters or neighborhoods of homes where Jews lived in close proximity to each other.[66] Also not surprisingly, we see very few Jewish residences in the neighborhoods of the two Christian churches, Saint Joseph and Saint Mary ("Sct. Josef," "Sct. Maria" on the maps). As expected, we found that the majority of Jewish-owned homes were located on or near the rynek, or town market square and most, though not all, of the Jewish homes were made of brick, probably indicating a relatively higher level of wealth. Furthermore, virtually all the Jewish homes were clustered near the center of Rawa Ruska and not in rural areas, while the homes of Ukrainians and Poles were more rural and stretched out along roads extending to the east and south.

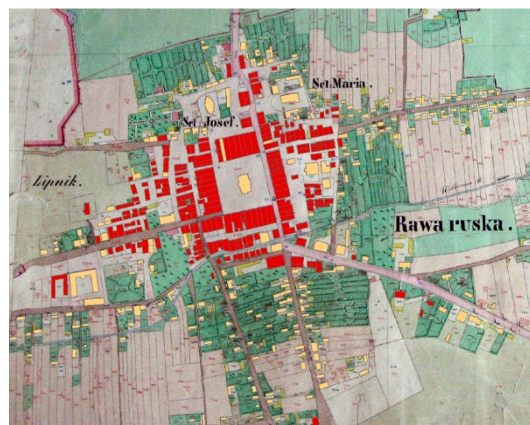

Figure 5: Homes listed as owned by Jews in Rawa Ruska in 1854 (shaded in red). Other homes are shown in beige.

V. Some Research Themes for Geospatial Genealogy

As we began our research, at first we envisioned somewhat limited goals – maps of individual residences or perhaps all residences by religion or ethnicity for a single year, for example – such as those seen in our initial results. Now our

[6]In earlier reports of our preliminary work (see footnote 1), we mistakenly created maps of Jewish residences based on an assumption that the numbers on our cadastral map were house numbers rather than parcel numbers. The resulting map erroneously showed Jews living in a much more dispersed pattern than the actual pattern shown in figure 5 in this chapter. We are grateful to Brian Lenius for pointing out our error.

goals have begun to expand as we increasingly have come to understand the potential power of geospatial technologies and genealogical databases.

A critical goal is to develop the interface between the disparate database worlds of genealogy and GIS. This is one of the most important issues facing us. To this point, we have primarily used "brute force" methods to link genealogical and GIS databases. We need to identify and develop more elegant solutions that will permit broader application of these technologies by more family history researchers; in short, we need to be able to combine the powerful familial linkages inherent in traditional family tree software with the spatial analysis and visualization capabilities of GIS. A key problem is that places, while important in family history research, often are poorly represented in genealogy databases.

In genealogical research, locations typically are thought of as a nested hierarchy of places, starting at the national scale and proceeding down to the name of a town or village at the finest level of detail. Traditionally, locations have been given as town, county, and state for the US or, in the case of countries outside the US, town, province, and country (this, of course, varies from location to location). In GEDCOM files (the Genealogical Data Communication files used as a de facto standard for exchanging genealogical data), places are treated as strings of characters rather than as separate data fields (e.g, latitude and longitude) that could be more easily searched and parsed as can name and date fields. Some current family tree software implementations do include non-standard fields for geographic coordinates, but these are generally designed for giving the coordinates of locations like cities or counties, rather than fine-scale features such as grave markers or home sites.

A second research need is to develop novel ways to visualize complex spatial relationships over time, e.g., between and among: neighbors of differing religions, members of extended families, landlords and renters, sellers and customers, lenders and borrowers, or the nature of external relationships; and how to make our results and visualizations available and accessible via Google Earth or similar interfaces. The rapidly developing field of digital humanities, coupled with the more mature field of scientific visualization, promises to provide the means of exploring this.

A third needed area of research emphasis is the development of crowdsourcing methods to create the large-scale databases that will need to be available for recreating and analyzing community trees for literally thousands of lost communities. The name indexing efforts of JRI-Poland and the Church of Jesus Christ of Latter-day Saints offer templates for doing this work, although in some cases, critical locational information has not been extracted or indexed since the primary emphasis for most indexing projects is family relationships rather than other information such as house numbers. An interesting part of such an undertaking might be the use of maps in Yizkor books to identify features that

would not usually appear on cadastral maps, such as *shuls*, *mikvaot*, and others that would help recreate the patterns of life in Rawa Ruska, or any other town.

Finally, with the development of an extended geospatial database, we need to further explore the spatial patterns in Rawa Ruska as the basis for understanding the processes that led to the observable patterns in the first place. For example, were Jewish residences always clustered around the central rynek (town square) or did this happen over time? Also, we know that there were occasional edicts from the Emperor of Austria-Hungary that discriminated against Jews in terms of places of residence, or in terms of businesses in which they could (or could not) engage. Are the results of such edicts visible in the historical records and, more importantly for our purposes, in the patterns on the maps? These sorts of questions are potentially endless, but they hold the keys to understanding our ancestors' lives in Rawa Ruska, (or whatever town or city they came from) through understanding past pattern and process. This part of our research would become truly cross-disciplinary, involving not just geographers and genealogists, but historians, political scientists, economists, and others.

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BIOGRAPHIES

Stephen L. Egbert is an Associate Professor and Associate Chair in the Department of Geography at the University of Kansas and Director of the Kansas Applied Remote Sensing Program. Dr. Egbert's work, his teaching, research and international consulting, has primarily focused on the use of satellite imagery and geospatial analysis to characterize and study land use. His interest in integrating disciplines - using these tools to study, and teach about, the geopolitics of genocide - led to an invitation to be a Silberman Scholar at the US Holocaust Memorial Museum in 2008. Most recently, he has been building on his genocide work through collaboration with Karen Roekard in the application of geospatial tools for creating "macro-genealogies" at village and town scales.

Karen Rosenfeld Roekard MBA, is an award-winning author and Independent Scholar who utilizes her very eclectic background, education and training to work at the cross-roads where macro-genealogy, cultural anthropology and spatial history meet in two small towns in western Ukraine. She has spent months collecting data from archives in Poland, Ukraine, Israel and the USA and years translating, transcribing, analyzing, inputting, writing and speaking about it. Bit by bit, in collaboration with Professor Stephen Egbert, and from a geospatial perspective, she is utilizing her 40,000 data point database to broaden our understanding of the complex, ethnic-based, context in which 19th-20th century Galician Jewry lived.