GUIDELINE FOR SPATIAL REGENERATION IN IOWA

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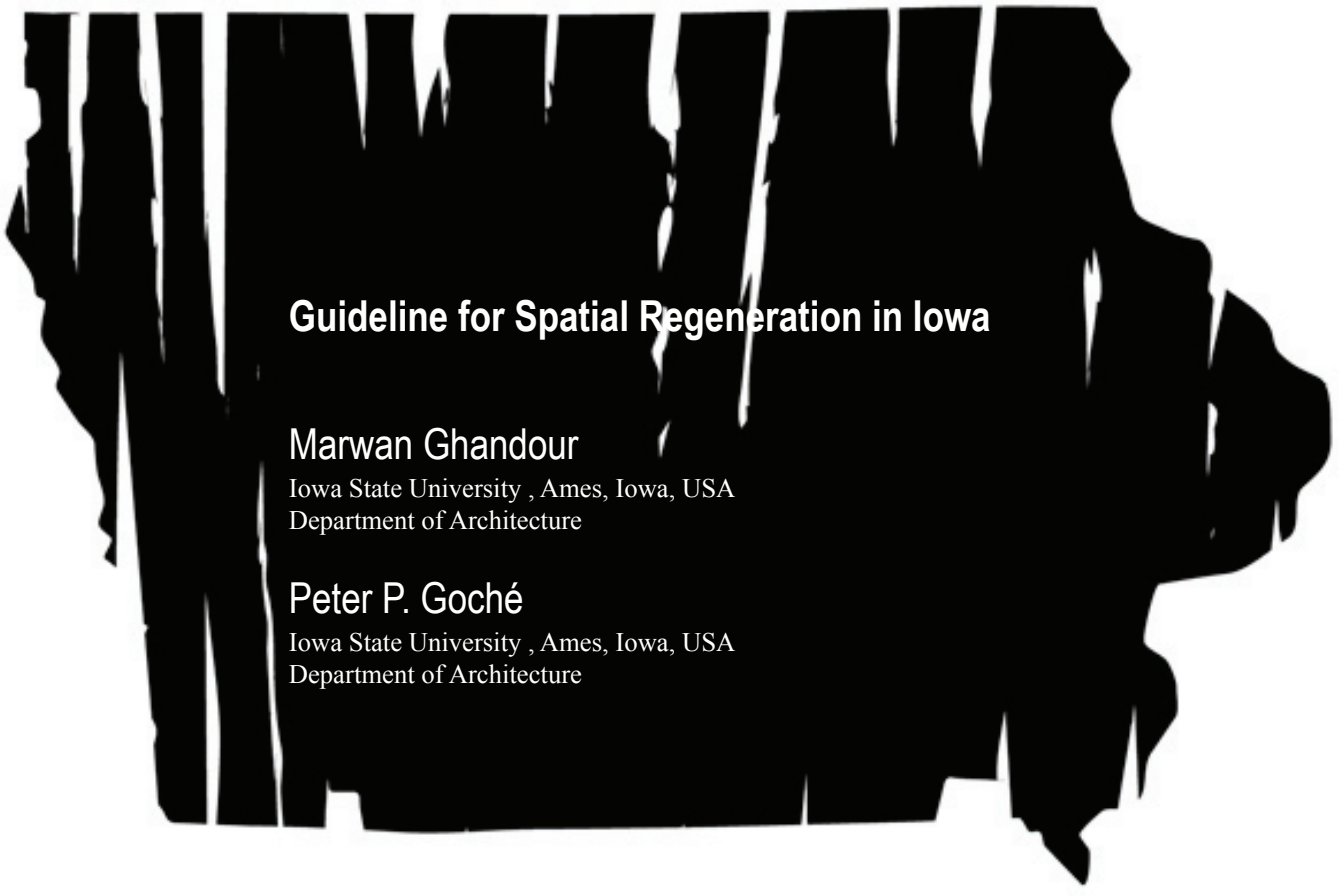
The space of Iowa was reinvented in the nineteenth century as a reflection of the modern rationality of capital production. This resulted in the overlay of a grid system of surveys that indiscriminately subdivided the land subduing its embodied natural and cultural characteristics. The grid provided the structure whereby farms, towns and cities were created to cover the entirety of the state and established a network of agricultural and industrial production. This modern landscape also produced the culture of the family farm which, until the mid twentieth century, was the dominant production unit in Iowa. Iowa is currently experiencing significant challenges on social, economic and environmental levels that accentuate the tension between the modern cycles of production and the sustainability of the social and natural environment. This research is an attempt to negotiate this tension by proposing a spatial regeneration scheme for Iowa that is developed through interdisciplinary research and cartographic analysis and production.



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I. Introduction

Communities in Iowa continuously adapt to changes in the agricultural production processes. Since its start in the nineteenth century, this production process was lead by family farmers – a form of farming in which labor is supplied primarily by family members. Family farming has become a consolidated social symbol that Iowans are attached to which is based on a form of independence through private farm property and its production process. This form of independence is also translated through social distance whereby farmsteads are equally spaced across the landscape leaving ample fields between farming families (Figure 2). This sense of spatial and symbolic independence has largely defined the quality of life in Iowa. However, this spatial and federally advocated form of independence was associated with economic dependence on market forces, food industries and federal policies. Given that family farms have been consistently mechanizing and increasing production, the demand for more farm land has also been increasing, which resulted in 'successful' farmers purchasing production ground from other less successful farmers. This has made the family farmer's space unstable as it is consistently under market competition pressure and trends of federal policies. This economic condition has produced spatial and communal instability because it has caused frequent reconfiguration in the living space. For instance, some farmers have sold their production grounds and continue to live on their farmsteads away from public services and employment opportunities that they have become increasingly dependent on.

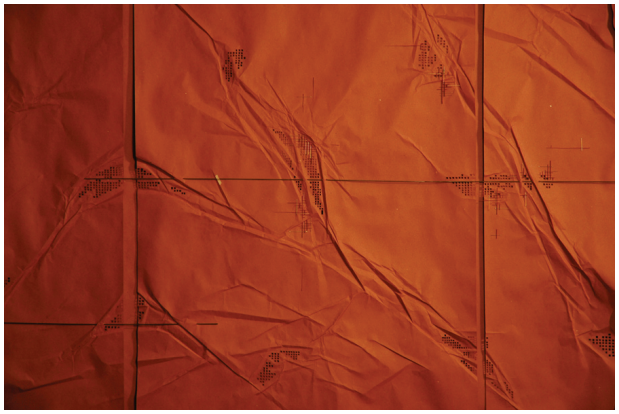

Figure 1. Detail of the tectonic map of Iowa.

Figure 2. Iowa from the plane. Photo by Marwan Ghandour.

The impact of farming development has been even more apparent in the various small towns that were dependent on providing services for the family farmers. The need for these services has been decreasing to a level whereby vacant retail sites along the towns' main street are a common scene. The current statistics demonstrate the degree to which these communities are struggling, a condition which is exasperated by the new forms of larger retail stores that are attracting the bulk of customers.[2,3] For several decades, these conditions in the farming and small town landscape have economically favored particular practices at the expense of some communities.[4] It is this form of disparity between social and economic conditions that we want to address in our project. Our main challenge is to create a condition in which continuous agricultural innovation does not destabilize the social space of communities within Iowa.

This paper and corresponding cartography develop guidelines for spatial regeneration in Iowa to establish a socially sustainable environment without comprising the economic competitiveness of the state both in agriculture and industry. We will start by briefly discussing the evolution of the American landscape of Iowa and its spatial characteristics before we articulate the principles that lead the development of our project. Afterwards, we will propose a new map for Iowa that embodies the criteria we developed for spatial regeneration as well as discuss the processes that this regeneration entails. Due to the nature of the study, our project engages many disciplines and will require various disciplinary perspectives in order to facilitate its development beyond this proposal. Accordingly, we believe that the current project is the first phase within a long-term interdisciplinary study on future spatial regeneration in Iowa.

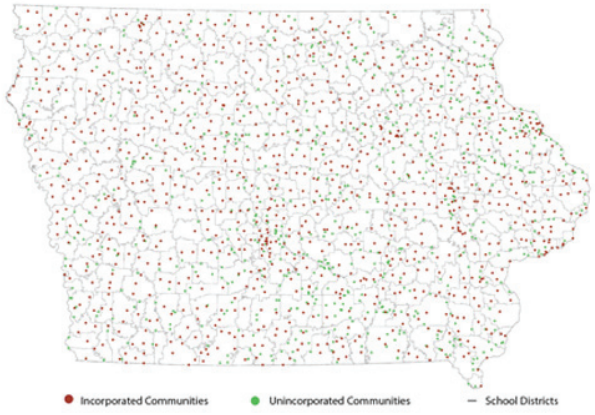

Figure 3. Iowa Communities and school districts. Source: Iowa Department of Natural Resources, U.S. Bureau.

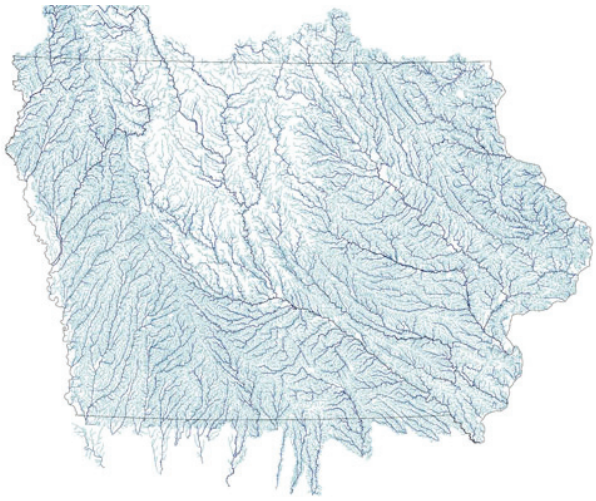

Figure 4. Iowa waterways. Source: Iowa Department of Natural Resources.

2. The evolution of the American landscape of Iowa

Contemporary Iowa is a reflection of strategies that were developed during the late eighteenth century and the nineteenth century, which included methods of quantifying newly acquired land by the United States, ways of representing the land, ways of settling it and incorporating it into national economy. Though they produced the contemporary spatial characteristics of the state and inscribed its political boundaries, the majority of these strategies were developed before Iowa joined the union in 1846. The strategy for settlement offered little recognition of the physical and ecological particularities of the geographic space of Iowa. The landscape was thus quickly and dramatically transformed immediately after its settlement. Although this spatial rationalization marginalized the ecological characteristics of the landscape, it remains symbolically significant because it shaped the lives of generations of Americans that inhabited the state and contributed to its spatial production. Our project addresses this historical dichotomy since it seeks to connect the ecological characteristics, which have environmental and social value, to the characteristics of the modernized landscape, which has symbolic and productive value. In the following section we will analyze the different characteristics of this historical dichotomy.

2.1 The township grid

The 1785 Land Ordinance specified the six mile township grid as a basis for future land surveys in the United States. This system was primarily employed in the original Northwest Territory which is bounded by the Ohio and Mississippi rivers and was eventually ceded to the United State by the British in the treaty of Paris of 1783.[5] Iowa was annexed as a part of the Louisiana Purchase in 1803 and offered a topography which allowed surveyors to inscribe one of the most orderly and complete applications of the system. With the exception of the eastern and western boundaries, most of the land in Iowa is subdivided orthogonally following the six mile township grid which in turn is divided into a one mile sectional grid. This form of subdivision of the land allowed an even distribution of American and European settlers to inhabit the state who simultaneously turned the predominantly native prairie landscape into farms. Figure 3 represents the even distribution of the towns and cities in Iowa along with the corresponding school districts as of 2000 (Figure 3). This uniform system of distribution was overlaid on an uneven distribution of natural resources and geographic configuration (Figure 4), which were the main features that shaped pre-American native Indian settlements.

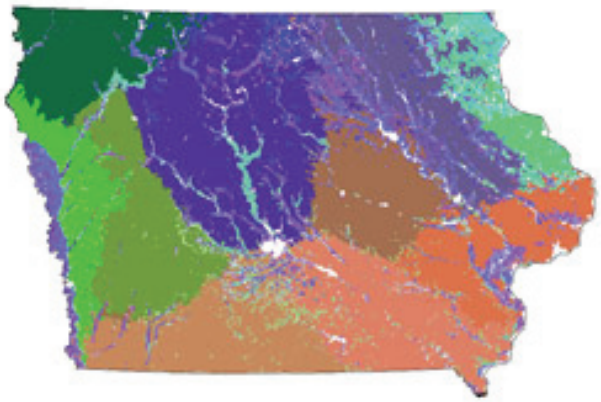

Figure 5. Iowa's agroecozones determined through climate, social and topographic conditions. Source: Williams, C.L.; Hargrove, W.W.; Liebman, M.; James, D.E. (2008). Agro-ecoregionalization of Iowa using Multivariate Geographical Clustering. Agriculture, Ecosystems, & Environment 123: p. 161-171.

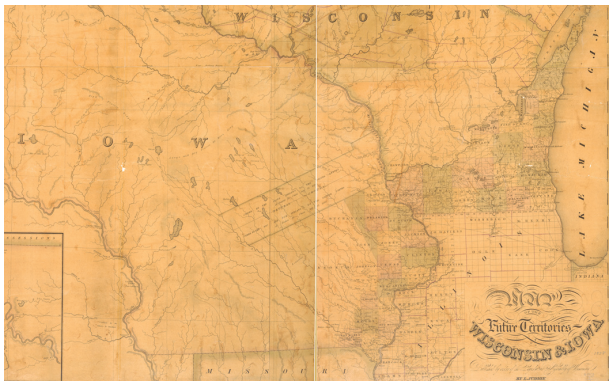

Figure 6. Map of the Entire Territories Wisconsin and Iowa, 1838. Source: Wisconsin Historical Society.

Due to the continuous innovation and increasing efficiency in the farming practices, the number of people employed through agriculture in the United States has steadily decreased since 1930.[6] This has created a disparity in the spatial distribution of inhabitants as more of Iowa's population is employed in the service sector or in the growing industrial sector, both of which function through a concentration of population.[7] Additionally, the intense network of roads throughout the state, originally created to service the state's disperse residents and agricultural production, is inherently problematic with respect to maintenance requirements. It is important to note that some of these roads are infrequently used while others have increased traffic. Another result of the even distribution is a tension between the agricultural production of commodity crops and the natural cycle of the land and its resources and characteristics, a condition which requires continuous soil reclamation efforts to sustain (Figure 5).[8] However, the political and social conception of Iowa is dominated by the spatial distribution of the township grid, which is reinforced by the way Iowa has been represented since its American settlement. It is this form of representation which we will discuss in the following section.

2.2 The Maps

One of the principal tools for the transformation of the landscape into a rationalized ground for family farming practices was the production of new maps during the first half of the nineteenth century. These maps solidified the prominence of the township configuration over the landscape. Commercial maps were produced concurrently with the surveys by major map publishers such as J. H. Colton of New York and S. Augustus Mitchell of Philadelphia. Travel guides were also published during this period which described the new system of surveys and explained how to go about settling in the new territory. Our current understanding of the landscape of Iowa was largely shaped by these new images which defined the means through which the new spatial order was mentally consolidated.[9] The Judson map of 1838 shows the way the grid was drawn over the rivers as an extension of the reference lines already laid out in western Illinois and Wisconsin (Figure 6).

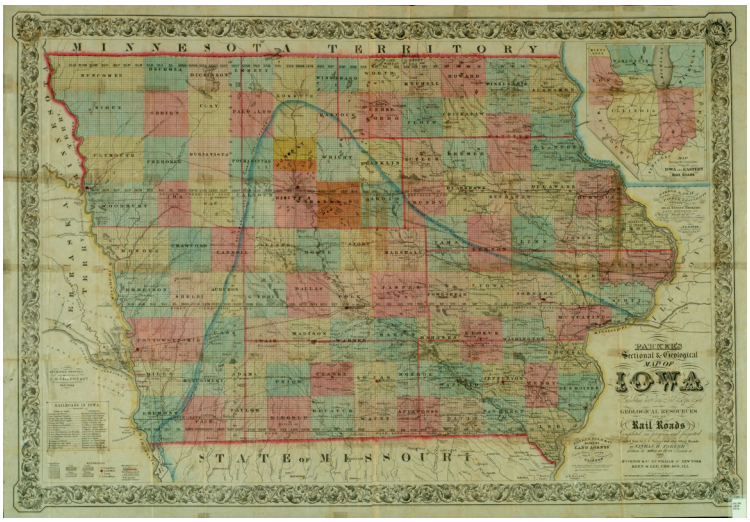

Figure 7. Parker's Sectional and Geological Map of Iowa, 1856. Source: Iowa State University Library/ Special Collections Department.

During this period, the rivers of Iowa territory were the graphically dominant elements which reinforced the north-south continuity in the landscape between the Missouri and Mississippi Rivers before the state political borders were established. Parker's map, dated 1856 (Figure 7), shows a very different image, one where Iowa is graphically detached from its surroundings, especially the northern and southern border that cut off the continuous flow of waterways. At this moment, the township system became the dominant image for the state, and thus, marginalized the spatial continuity of its landscape. In this sense, the image had a tremendous impact conceptually, in the way the settlers perceived the land through these maps - legally, in the way the land was parceled and distributed, and physically, in the way roads farms and fences were constructed. Thus, the contemporary landscape is a reconstitution of the space of Iowa in the image of the nineteenth century map. Based on this understanding, we sought to re-conceptualize the cultural landscape of Iowa in a manner that would accentuate its ecological layer through a new form of cartographic imaging.

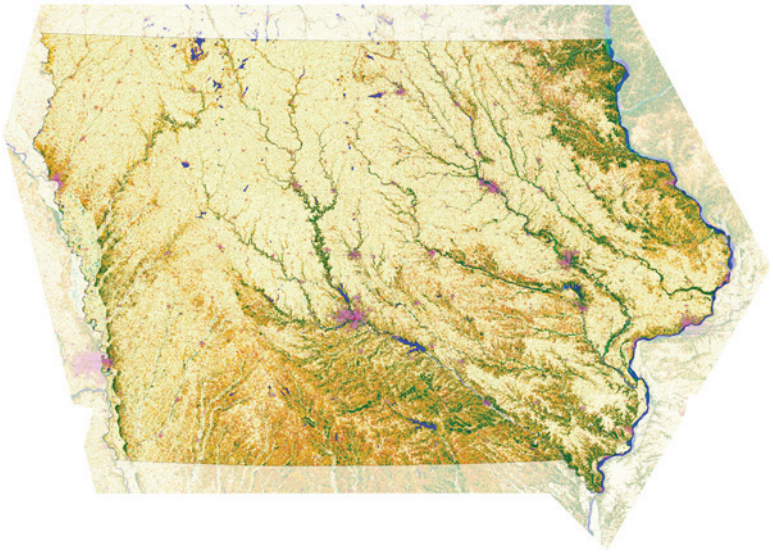

Figure 8. 2002 State of Iowa Land Cover. Source: Iowa Department of Natural Resources Geological Survey.

2.3 The Productive Landscape

As mentioned earlier, settlement in Iowa during the nineteenth and twentieth century rapidly erased the pre-American landscape to produce the iconic American landscape of the family farms. Even though family farms were initially autonomous as economic and social units, their production and farming practices have become dependant on the federal government policy and distant food industries. This logistical connection between the 'cellular' family farm economy and the national industrial economy was facilitated through the establishment in the second half of the nineteenth century of an elaborate, largely speculative, railway system which carried the agricultural products of Iowa to Chicago and from there to supply the food industries in the East.[10] Coupled with the development of crops as industrial raw material, such as livestock feed and most recently alternative energy, this new market dependency led to the monoculture industrial agriculture of today that is primarily dominated by two crops: corn and soy beans (Figure 8).

In addition to mechanization, biological research, and the extensive use of fertilizers and pesticides that have contributed to more efficient methods of production and thus increased yields, federal policy and demand have created a significant increase in the area required for both family and corporate farming operations. Inversely, this increased scale of operation has led to a population decrease in Iowa's farming communities.[11] It is evident that such a trend is unlikely to change in the near future especially with the growth of the bio-fuel industries that should increase the demand for corn as an industrial raw material. This method of industrial agricultural production in Iowa, and other states, has created a negative impact on the environment;[12] a situation which has stimulated the development of several government incentive programs to mediate agriculture's detrimental effects.[13] However, this is not the subject of our current project. Rather, we seek to focus on the production of spaces that have some resilience to these large-scale industrial operations by creating opportunities for small scale production operations that are internal to the state and, thus, can be controlled locally. These spaces provide opportunities for a diversified economy and the absorption of the population that is leaving the farming industry. Most importantly, these spaces need to allow for the invention of the community-based family farm as a sustainable unit of production for local food.

3. The Four Principles of the Project

It is evident that farmers within the industrial agriculture sector need to periodically reorganize their working space and farming techniques to maximize production rates in order to survive within a market dictated by large scale industries and federal policies of crop subsidies, to which farmers have very little ability to challenge or transform. While these reorganization processes help create more foodstuffs and industrial inputs, industrial agriculture becomes an intrinsically unstable space. When production space and living space are thus intertwined, continual reorganization can negatively affect the social stability of communities. In the current project we acknowledge the space of industrial agriculture as a space of work that can retain the flexibility necessary for its development and create within it a more locally sustainable place which reinforces communal interaction. Within the family farming era these two spaces - the space of living and the space of industrial agricultural production - were identical, which explains the immediate impact that the recent development in agricultural production has had on the sustainability of the living spaces of town and farms.

Concurrent with this development in production is the migration of workers out of certain regions in the state where farm sizes are getting bigger, and fewer people are taking on farming as an occupation.[14,15] As a response to these conditions, we seek to develop a set of guidelines that support a spatial regeneration for Iowa that holds the livelihood of its communities as the main concern without compromising the state's economic competitiveness which is largely determined by the continuous innovation in the agricultural industry. We base this project on the following four principles:

First, geographically consolidate communities to achieve a critical population that is closely networked without necessarily being spatially dense. This is particularly achieved by designating spaces where communities can exist that are not directly affected by the changes in industrial agricultural production. This requires that the economic sustainability of this living space is only partially dependant on the economy of industrial agriculture. While employment in the state will remain connected to agricultural production, these locally sustainable places are not immediately threatened by changes in federal policies or new farming techniques.[16] The shear population living in these communities will allow for a more efficient provision of public services. It will also provide more communal stability given workers can change their jobs within the industrial farming sector without necessarily changing their place of residence. In addition, community consolidation increases the diversity of the local job market where workers have more possibility to change their jobs and remain within their community, a condition which is not easily available within current small town economies.[17]

Second, recognize the landscape morphology of Iowa with new patterns of settlement and land-use boundaries. The six mile grid of the American surveys reduced the sensitivity toward the natural formations of the land of Iowa, which we propose to reverse. Two particular land features influenced our proposal. The first feature is the waterway which we understand as a natural line of differentiation that we adopt as a spatial boundary. The second feature is the watershed crest area which we designate as a prime area to preserve, by limiting use to minimal land exploitation, in order to preserve the integrity of the watershed system.[18] Within this spatial configuration, the sectional grid exists through the property divisions, infrastructural network, and transportation routes. Accordingly, the grid will retain its historical significance but will be incorporated within boundaries that reinforce and preserve the natural cycle of the landscape. One of the major impacts of this principle is the need to dissolve the county system of governance whose boundaries rely solely on the geometry of the grid. As a consequence, a new division of local government would need to be established which adopts the new allocation of spaces as its basis of division.

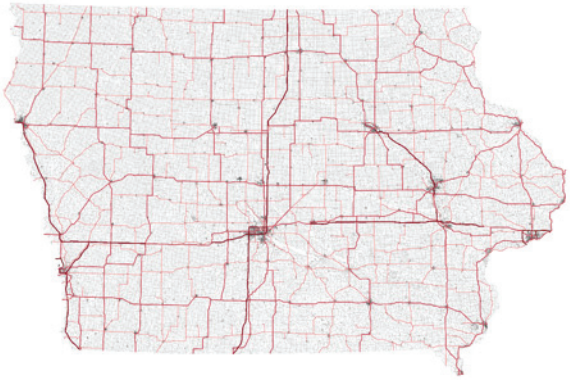

Figure 9. Iowa's Primary Road System including interstates, U.S. highways, state highways and county roads. Source: Iowa Department of Natural Resources.

Third, maintain a small cycle of exchange that is centered on reinforcing community relationships. This cycle of exchange needs to coexist with the industrial larger cycle of exchange. Retaining a short cycle of exchange reinforces an economic cycle internal to the state of Iowa which can be locally administered while the larger scale farming remains directly connected to national and international cycles of exchange. This would be achieved mainly by encouraging organic and community supported agriculture (CSA) within areas of population where the farmer is directly linked to the consumer.[19] Hence, one can ensure that more of what is consumed in Iowa is produced in Iowa.[20] At one level, this reinforces social and economic relationships within communities as well as opens the opportunity for a new type of family farmer to emerge. This new family farmer, which we call the urban farmer, is closely connected to urban centers and therefore, shares the same social space as his/her customers. The main purpose of this proposal is to create an economic and social condition which is more resilient and can endure changes in the larger working conditions of the state, hence reinforcing a sense of place centered on communal relationships and local food production.[21]

Fourth, reduce transportation commutes and the energy waste associated with it. Part of the benefits of consolidating communities and reinforcing short cycles of exchange is reducing the travel distance in the transportation of goods for daily consumption. In addition, we want to develop strategies to encourage less reliance on private cars as the only form of travel. The Iowa transportation system suffers from the large quantity of roads that need to be maintained annually given the increase in private car travel even though a lot of county roads are scarcely traveled (Figure 9).[22] We propose to use the current infrastructure more efficiently by encouraging the use of the existing railway system for passenger transportation between the locally sustainable places within the state. One of the main factors in determining the location of these places is to maintain a maximum of 30-40 minutes travel time from the edge of these places and any point in the industrial agricultural territory. We believe this makes public transportation more feasible given the population would be more concentrated in the spatial configuration we are proposing. Additionally, we anticipate that railway and vehicular public transportation will become more feasible in the long term. On the other hand, roads circumscribed by large farming operations can be gradually sold back and incorporated in farms hence reducing the overall cost of road maintenance.

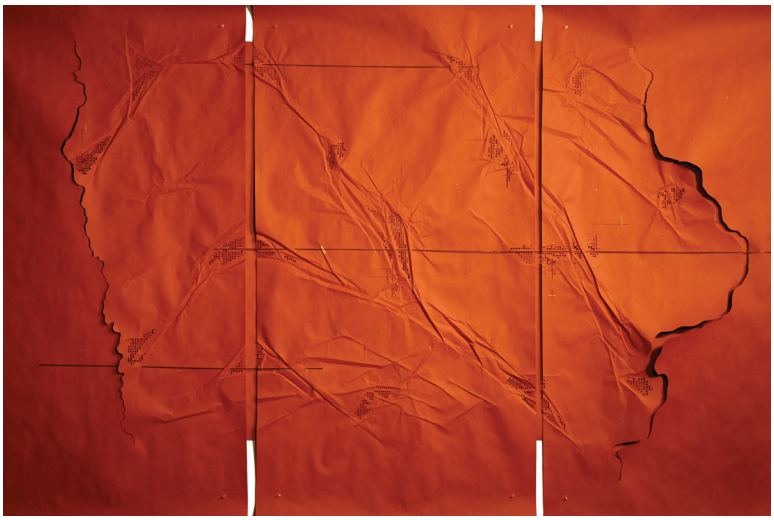

Figure 10. The tectonic map of Iowa with 'locally sustainable place.'

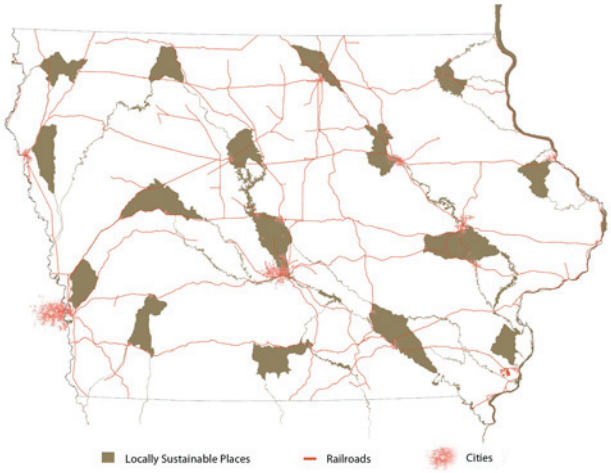

Figure 11. Map of locally sustainable places in Iowa.

4. The Production of a New Map for Iowa

Starting with a plain sheet of rosin paper, the new image of Iowa emerges out of this flatness via a series of manual actions. The initial action consists of two *incisions* that demark the Missouri and the Mississippi rivers that delimit the Eastern and Western boundaries of the state and define our site of operation. This space is also delimited by two imaginary lines to the north and south that we decide not to act beyond so that we are not governed by interstate politics. Within this space we set to *shape* new areas which act as catalysts for spatial regeneration in the state; we refer to them as "locally sustainable places." It is in these areas that we want to create conditions that support and promote a way of life that is environmentally and socially sustainable hence initiating spatial regeneration on the scale of the state. The appearance of waterways, which are the major boundary determinants for these areas, are established by *folding* and *creasing* the paper in a manner that causes positive and negative deformations which *subdivide* and *bind* the site of operation similar to that generated by the ecological cycles within the actual land form. The mile square grid is then cut within the areas bounded by the banks of deformation and simultaneously connected to each other by the linear folds along the paper which we associate with the waterways and their corresponding watersheds, a system of basins that defines the topography of the landscape. The watershed crests folds are the prime areas that define the watersheds configuration that feeds the waterways and thus need to remain intact; unharmed by forces of development. This is achieved in the map by omitting the grid along these contours.

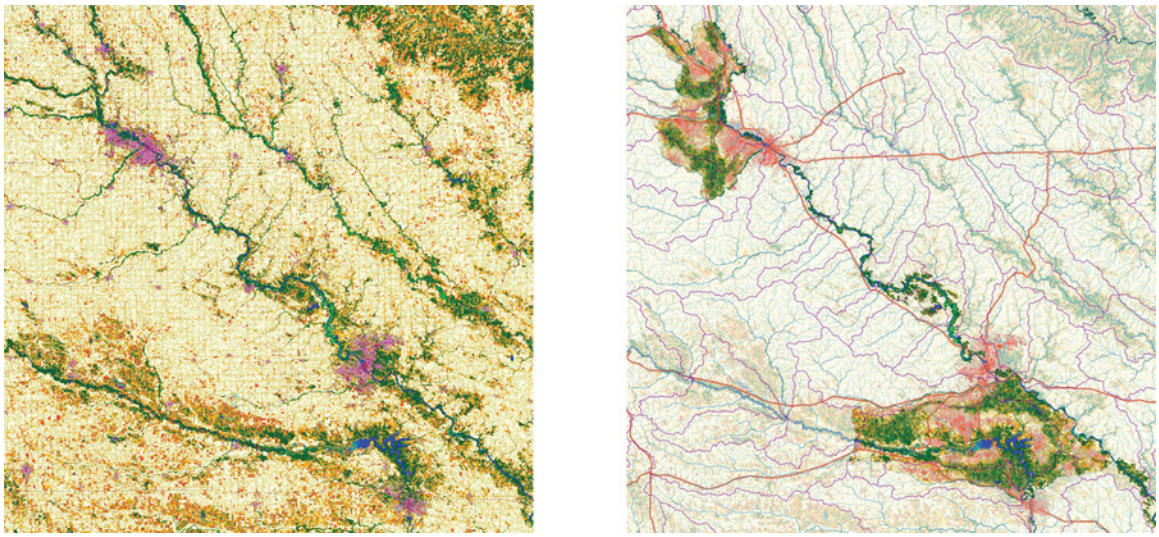

Figure 12. Comparative map detail of Cedar Rapids – Waterloo area of Iowa before and after the establishment of 'locally sustainable places.' Base map: 2002 State of Iowa Land Cover of the Iowa Department of Natural Resources Geological Survey.

Since we stipulated a requirement that the travel distance from any point in the state to one of the regions should not exceed 40 minutes, we have deliberately *spread* the locally sustainable places across the landscape. This distribution was influenced by two factors: the first is the current concentration of population which provided the social mass to these regions and the second are the existing operational railways that *connect* the different regions to each other. Steel rods of the railways are *superimposed* on the map and held in place by *piercing* the positive deformations of the rosin paper. These straight line wires signify the flow of goods, and potentially bodies, across the landscape and into the bordering states. The cities and towns are *seated* within the landscape and township grid. This *intercourse* signifies the concentration of material goods and bodies that transform its space. Due to the fact that a number of cities and towns are currently located along rivers, the majority of the 'locally sustainable places' have towns and cities along their boundary. These communities play an important role as potential conduits for the spread of practices internal to the 'places' beyond their boundaries. Accordingly, we identified sixteen regions in Iowa with specific characteristics that are shaped by landscape formations and social configurations.

Outside these regions is Iowa as we know it; a landscape shaped by large industrial operations that will require continuous consolidation due to ongoing industry growth. In this industrial region the township grid will likely dissolve over time and, thus, reflect the increasing efficiency of farming practices. Within the boundaries of the locally sustainable regions, the township grid is divided into a finer grain by a set of second piercing. This new scale of order accommodates the increase in population and small-scale urban farmer. We anticipate that this new spatial configuration will increase local consumption, thereby encouraging larger scale sustainable farming to develop just beyond the regions' boundaries.

5. Processes for Regeneration

The implementation of the new spatial regeneration outlined in the previous section is dependent on several processes which require further interdisciplinary investigations. In this section we will outline four major subjects of investigations; state policy, local government, redistribution processes, and historical heritage.

5.1 State Policy

The first act of initiation of the projected spatial regeneration is to issue a state policy that would define the sites of 'locally sustainable places' based on geographic boundaries of waterways, watershed crests, population density, railway lines, and commuting distances. While we recommend that the state monitor farming practices, energy consumption and develop state-level programs to promote a sustainable environment for all spaces in Iowa, the policies in these particular 'places' need to focus on promoting a locally sustainable economy in which communities and the spaces they inhabit are largely stable on the social and environmental level. Social stability is derived from the growth of employment opportunities because of the denser population, the creation of a local food production processes, and reduced energy cost due to larger reliance on public transportation. State policies need to define and monitor farm size in order to maintain farming practices that support sustainable organic production and remain a vital component of the community within its immediate context.[23,24] Policies should also cover the reduction of energy consumption by promoting public transportation both locally through bus networks and regionally through existing railway lines. In addition, they need to guide the protection of watersheds by specifying areas of landscape restoration within the sixteen 'places' as well as developing regulatory requirements for local farming practices. While environmental issues are critical statewide, promoting them within the populated 'locally sustainable places' induces the possibility for that ethic to propagate to the outlying territories. Accordingly, the areas of landscape restoration would act as an educational tool where communities can develop an awareness of environmentally sustainable landscapes through engagement with it, thereby initiating change in the collective perception towards the landscape.

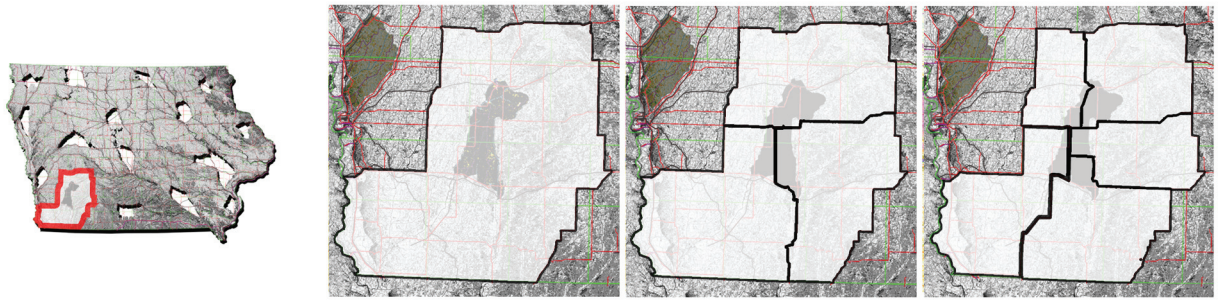

Figure 13. Three options for county divisions in southwest Iowa.

5.2 Local Government

Part of the risk of dissolving current county boundaries is that local government bodies can become large in scale, thus decision making will become more complex and multi-tiered.[25] It is important that such a condition not occurs and that within each 'place' the local governments remain small enough to provide immediate access to individual constituents on the county and municipal scale.[26] Another factor that needs to be avoided is to associate boundaries of local governments with those of the 'locally sustainable places' specified for spatial regeneration. Such an association can entrench these boundaries over time and accentuate the division between these 'places' and the industrial agriculture territories. Such a division can have harmful long term consequences as the two areas that are supposed to be dependent on each other might adopt development policies that might draw them apart. In order to avoid the development of 'hard' political boundaries that separate the predominately work/living 'places' from the predominately work territories, the boundaries of the 'locally sustainable places' should remain 'soft' boundaries, that is boundaries that are determined by policy only.

Over time, we anticipate that the 'locally sustainable places' will initiate change outside their boundaries where the practices within might be adopted in the industrial agricultural territories. Such fluidity of practices should be facilitated through the political continuity between the two regions. An illustration of such designation of local governments, Figure 13 depicts three patterns of subdivision within an area of southwest Iowa. The series of maps represents three options for county divisions which are bounded by state roads. The second three-county option has an estimated population per county that is similar to the current average within the same area; however, multiple county divisions do not refute consolidated services to the counties that share the same 'locally sustainable place.' The criteria for establishing local government structures should facilitate a balance between spatial division, complexity of administration, and efficiency of services.

5.3 Redistribution Processes

The successful long term development of the 'locally sustainable places' is highly dependent on the settlement of communities within their boundaries. For that to occur there need be incentives that would encourage farmers and communities to move into these regions. Most of these incentives are qualitative, even though one can develop quantitative incentives based on efficiency and waste reduction. The promotion of a sustainable way of life would depend on a set of qualitative incentives based on quality local food production, close community network, a relatively stable social environment, and good services.[27] Unique to these new 'places' is the emergence of the 'urban farmer' based in sustainable organic agricultural practices; a grass root occupancy that embodies values characteristic of some family farmers such as spatial and economic independence in addition to a land stewardship ethic. This is coupled, through the CSA system and local food distribution, with a community that is uniquely close to its food source and hence can lead a healthier way of living. Similarly, the industrial territories will remain significant as a space of employment for each of these 'locally sustainable places.' However, through state incentive policy for resettlement of communities into the 'locally sustainable places,' massive population migration may occur within the state. This would generate transformation in both regions that would foster the breaking down of property into smaller entities of real estate and urban farming within the 'locally sustainable places' while encouraging consolidation of farms into larger scale operations in accordance with new developments in industrial production within the industrial territories.

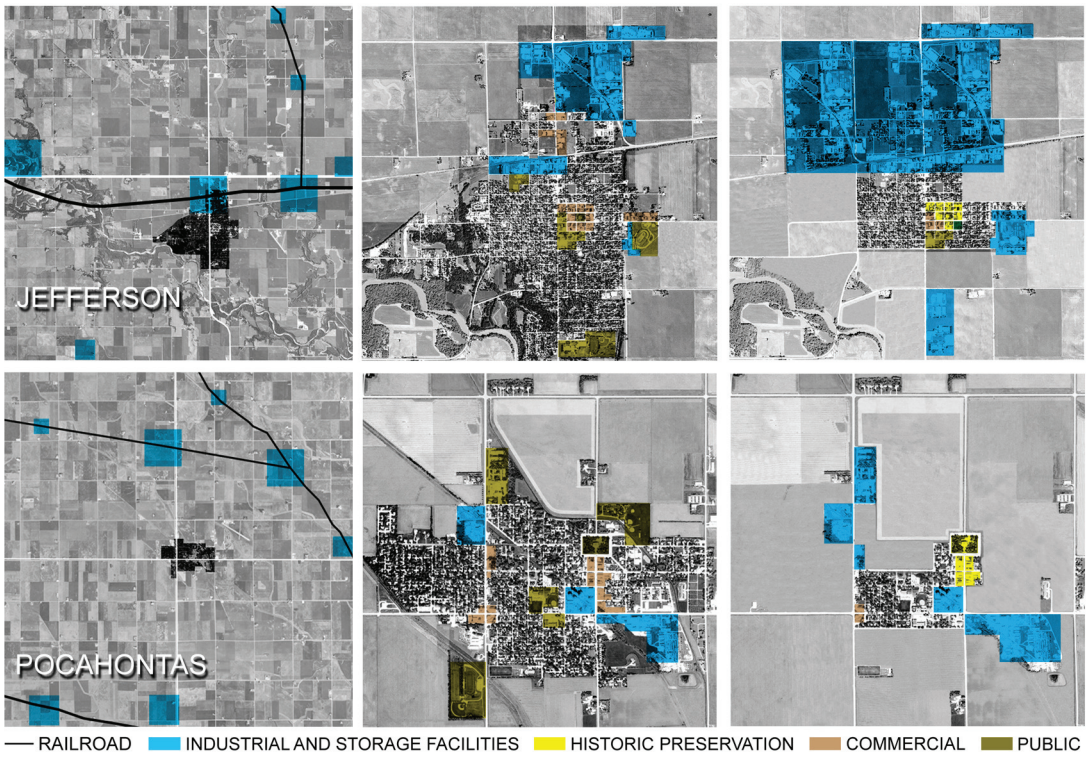

Figure 14. Patterns of change in the towns of Jefferson and Pocahontas before and after the establishment of 'locally sustainable places.' Base map source: 2007 Orthophotos. USDA National Agriculture Imagery Program (NAIP). Downloaded from ISU GIS Facility.

We examined two current county seats within the industrial territories to illustrate the possible pattern of change within that area. The first is Pocahontas, which is the county seat for Pocahontas County, and the second is Jefferson, which is the county seat for Greene County (Figure 14). Jefferson lies on the Chicago and Northwestern Railroad and is in the proximity of two recently established bio-fuel industries while Pocahontas does not have such infrastructural and employment opportunities. Both towns will witness change where Pocahontas can be completely engulfed by industrial agriculture and the Jefferson population will become completely dependent on the nearby industries. This shift of population will entail movement of households and homes into their new locations within the 'locally sustainable places.' Processes that facilitate the transportation of these material goods need to be developed to make sure that material waste is minimized.

5.4 Historical Heritage

Buildings and places of historical significance will require particular attention since their significance, in most cases, is correlated with their current geographic locations. This includes such buildings as county court houses, town main streets, religious and communal buildings, historical barns and corncribs, and in some cases grain elevators. This set of historic landmarks and places throughout the industrial territories would serve as reminders of the even distribution of townships and people that previously occupied Iowa's landscape.[28] Such places need to be surveyed, preserved and reprogrammed. For example, court houses could become museums that archive the physical and social history of their current county as well as serving as administrative spaces for the industrial operations in their context. The latter functions can also be housed in historical main street buildings. In short, these historical places need to be reprogrammed in relationship to two sectors in which they can best operate. The first is entertainment and tourism due to their historical significance. The second is administrative and service programs for industrial agriculture, a necessary occupation that would support long term building and grounds maintenance costs.

Historical preservation programs already exist in Iowa such as the ones administered by the Iowa Barn Foundation, however with the increased migration of family farmers into the 'locally sustainable places,' the quantity of unused historical farm buildings will increase.[29] Such buildings will either be included as historical heritage sites and hence preserved and reprogrammed or documented and dismantled to recycle their material in new constructions. The latter category will likely include a number of corncribs that, due to their nature, have been difficult to reprogram with the exception of the few that are still used for equipment storage on operational family farms.

6. Conclusion

Map making has a long history as a tool through which spaces were colonized, reinterpreted, marginalized or created. In that sense maps are powerful symbols that have long been associated with powerful agencies. While they remain highly useful tools for representing places, they also reduce place into a set of characteristics that have been selected by the map maker. It is this dual characteristic of the map, its representational efficiency and incompleteness, which we were interested to engage in this research. Thus our analysis of Iowa was largely conducted in correlation with Iowa's different representations, complemented by an analysis of the historical and political conditions that produced these representations. Our proposal for spatial regeneration is based on negotiating the various representations in order to identify the conditions that can produce locally sustainable places. The map we produced constructed the space of Iowa tectonically in order to highlight the different spatial characteristics that this landscape embodies. It is through this tectonic image that we want to initiate a discourse on places, the processes they include, and the agencies they empower. Ultimately this discourse needs to be inclusive and interdisciplinary since place is by nature a complex phenomenon of natural and human intersections. Iowa represents a particular spatialization of this phenomenon that has local as well as global ramifications. Accordingly, while we perceive this research to be particular to Iowa, it also develops as an alternative approach to the analysis of places and their spatial manifestation.

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[1] Sue Headlee defines the family farm as "…a family-owned farm with enough land to support the family and no more land than could be farmed by the labor force of the family." Headlee, S. (1991). *The Political Economy of the Family Farm*. Praeger Publishers, New York. P. 2.

[2] According to U.S. Census statistics, between 1990 and 2000 nearly 40 percent of Iowa's 962 communities lost population. In 1990, 52 percent of communities in Iowa had populations under 500. 48 percent of these lost population from 1990 to 2000. Population loss appears to decline as community size increases. In 1990 33 percent of the 305 communities between 500-1,999 people lost population; 26 percent of the 82 communities between 2,000-5,000 lost population; 40 percent of the 40 communities between 5,000-9,999 lost population; 32 percent of the 19 communities between 10,000-30,000 lost population. None of the eleven communities over 30,000 lost residents.

[3] In 2000, Iowa towns over 50,000 garnered more than 44 percent of the state's retail trade. In 1976 this amount was only 36 percent. In 1998, Iowa's smallest towns with populations under 1,000 accounted for 5.9 percent of the state overall retail sales. This was down from 13 percent in 1976. According to researchers, the growth of mass merchandise stores in larger towns and cities has contributed significantly to the outmigration of retail trade from smaller towns. Stone K. E.; Artz, G. (2001). *Iowa Retail Market Share of Various Size Towns*. ISU Extension Retail Trade Analysis Program, Spring 2001. According to one study, while communities with Wal-Marts economically fare somewhat better than those without Wal-Marts, even those communities with Wal-Marts have experienced an average decline in retail sales by 4 percent of their pre-Wal-Mart levels over a period of ten years. During the same study period, total retails sales in towns without a Wal-Mart declined by an average of 15 percent during the course of ten years in which they were competing with a nearby Wal-Mart town. In 1996, the year of the study, the average Iowa consumer spent 42 percent more money in department stores (primarily discount mass merchandisers) than in 1983. The study notes that towns with populations under 5,000 are most negatively impacted by discount mass merchandisers. Stone, K. E. (1997). *Impacts of the Wal-Mart Phenomenon on Rural Communities*. Iowa State University.

[4] In the 2006 Iowa Farm and Rural Life Poll, nearly one-half of respondents felt that the economic prospects for rural Iowans will become worse or much worse in the next five years. Seventy percent of respondents saw new farming technology replacing the need for neighbors' help, thereby potentially contributing to a loss of social connectivity. Only 29 percent of those polled feel their neighborhood is closely knit, down from 37 percent in 1996. Eighty-one percent of respondents felt that neighbors visiting each other have greatly or somewhat declined in the past 10 years. Additionally, 72 percent of respondents felt that rural population loss is more severe in Iowa than nationally. Over 50 percent felt that rural population loss is a moderate or severe problem. Korsching, P.; Lasley, P.; Gruber, T. (2006). *2006 Summary Report, Iowa Farm and Rural Life Poll*, Iowa State University Extension.

[5] Joseph W Ernst argues that the township surveying system, "an artificial division of the public lands which ignored the natural features," was refined and perfected through its application in parts of Ohio, Indiana, Michigan and Illinois from its inception in 1785 to 1816. For a full discussion of these surveys see Ernst, J. W. (1979). *With Compass and Chain: Federal Land Surveyors in the Old Northwest*, 1785-1816. New York: Arno Press.

[6] Farm employment declined dramatically during the twentieth century. In 1930 12.5 million people were employed in the sector while in the 1990s this figure was down to 1.2 million, though the total U.S. population had more than doubled. Conte, C.; Karr, A. (2001). *An Outline of the U.S. Economy*. Prepared for the Department of State and issued by the U.S. Information Agency. http://usinfo.state.gov/products/pubs/oecon/chap8.htm.

[7] Between 1971 and 2000, Nonfarm industries gained 713,000 jobs. 44 percent were in the service industries, 21 percent in trade industries and approximately 7 percent were in manufacturing industries. Between 1971 and 2000, service sector employment in Iowa grew from 17 to 28 percent. While manufacturing employment declined from 16 to 14 percent, agricultural employment decreased more, from 13 to below 6 percent. Swenson, D.; and Eathington, L. (2002). *Multiple Measures of the Role of Agriculture in Iowa's Economy.* Iowa State University.

[8] A study identified 5 to 25 Agroecozones in Iowa which were determined using eight climate parameters, ten topographic parameters, and fourteen soil parameters. Williams, C.L.; Hargrove, W.W.; Liebman, M.; James, D.E. (2008). *Agro-ecoregionalization of Iowa using Multivariate Geographical Clustering*. Agriculture, Ecosystems, & Environment 123: p. 161-171.

[9] For further discussion on this issue, see Ghandour, M. (2007) "The Early American Maps of Iowa and their Politics." Swenarton, M.; Troiani, I.; Webster, H.; eds. *The Politics of Making*. Routledge, Oxford.

[10] "In Comparison with the world of wagons and canalboats that preceded it, the postrailroad landscape would require much higher levels of trade, production, and resource consumption for its own sustenance, let alone its imperatives towards growth. More and more of the Great West would be drawn into that landscape, and more and more of western nature would become priced, capitalized , and mortgaged as the new capitalist geography proliferated." Cronon, W. (1991). *Nature's Metropolis: Chicago and the Great West.* W. W. Norton & Company, New York & London.

[11] Data from the Agricultural Census shows a decline in the number of farms in Iowa. In 1974, 126,104 farms were recorded while by 2002 this number had declined to 90,655. During the same time period, those reporting their primary occupation as farming dropped from 102,163 in 1974 to 61,935 in 2002. Corporations grew from 2,668 in 1978 to 5,279 in 2002.

[12] For the impact of Iowa agriculture on the environment see Manning, R,(2004) *The Oil We Eat.* Harpers Magazine. February 2004. Pollan, M. (2006). *The Omnivore's Dilemma: A Natural History of Four Meals.* Penguin Books, Ltd., London. Wagner, M.; Gobster, P. (2007). *Interpreting Landscape Change: measured biophysical change and surrounding social context*. Landscape and Urban Planning. 81. Elsevier. Kirschenmann, F. (2005). *Potential for a New Generation of Biodiversity in Agroecosystems of the Future*. A presentation prepared for the 2005 Trisocieties International Annual Meetings, Nov 6-10, 2005. Salt Lake City; http://www.leopold.iastate.edu/pubs/staff/files/biodiversity_Trisocieties1105.pdf.

[13] In the Conservation Reserve Program, farmers are paid for setting aside marginally productive cropland in order to reduce erosion, increase wildlife habitat and improve water quality. The Conservation Security Program provides financial and technical assistance to farmers for the conservation, protection and improvement of soil, water, air, and other conservation purposes. For more information about these and other conservation programs that pertain to Iowa, visit the United States Department of Agriculture's Natural Resources Conservation Service at http://www.ia.nrcs.usda.gov/Programs/Guide.

[14] While U.S. Census of Agriculture figures reveal that the average sizes of farms in Iowa are increasing (averaging 350 in 2002, 325 in 1992, 283 in 1982 and 262 in 1974), this is occurring at the differing rates across the state. For example, in 1997 Fremont County in southwest Iowa had an average farm size of 506 acres, the highest in the state. In 1950, this average was 170 acres while in 1990 it was 155 acres. In northern Iowa, Hancock County is one of the few counties in the state that experienced a decline in average farm size at times during the 20th century. In 1900, the average farm size was 205 acres and by 1950 this average had decreased to 177 acres. However, by 1997 the average farm size had increased to 205 acres. Linn County has experienced more stable farm sizes. In 1997, the average farm size was 229 acres, in 1950 it was 124 acres, and in 1900 121 acres. 1997 and 2002 U.S. Census of Agriculture.

[15] In 1978, 21 percent of agricultural farm operators were under 34 years old. In 1997, this figure had dropped to under 10 percent. Conversely, the age of farm operators has increased. In 1978, just over 10 percent of farm operators were over 65 years. By 1997, 22 percent of farm operators were over 65 years. 1997 U.S. Census of Agriculture.

[16] In 2000 the value added economic impact of agriculture and related industries was $13.4 billion or 16.4 percent of the state total. In an absolute measure of Gross State Product, Iowa ranks fifth with $3.1 billion behind first place California ($13.3 billion) and second place Texas ($5.75 billion). However, when the percentage of agriculture's contribution to the total GSP for the state is considered, agriculture and related industries comprise 8.7 percent in Iowa. This relative measure places Iowa second behind only South Dakota in relative importance of the agriculture industry to the state economy. Additionally, agriculture has a significant multiplier effect throughout the state's economy. For every dollar's worth of labor income generated from agriculture, $1.27 in labor income is generated in the rest of the economy. Also, for every job in agriculture, nearly three quarters of another job is retained in the rest of the economy. Swenson, D.; Eathington, L. (2002). *Multiple Measures of the Role of Agriculture in Iowa's Economy*. Iowa State University, December 2002.

[17] Slack, E.; Bourne, L. S.; Gertler, M. S. (2003). *Small, Rural and Remote Communities: The Anatomy of Risk*. Urban Renaissance Institute. http://www.urban-renaissance.org/urbanren/publications/rural.pdf.

[18] Shaxson, F.; Barber, B. (2003). *Optimizing Soil Moisture for Plant Production: the significance of soil porosity*. FAO Soils Builletin 79. Food and Agriculture Organization of the United Nations.

[19] The growth of CSAs in Iowa is noteworthy. In 1995 there were only three operations while currently
there are at least fifty CSAs operating in the state. Many are certified organic and nearly all implement
practices that contribute toward organic farming. According to research conducted by Iowa State
University, by 2005 the demand for CSAs in Iowa well exceeded the ability of local CSAs to satisfy it. For more information see: Iowa State University Extension Publication. (2006). *2006 Statewide List of Iowa CSA Farms, Producers and Organizers*. Available at: http://www.extension.iastate.edu/Publications/PM1693.pdf. Tegtmeier, E.; Duffy, M. (2005). *Community Supported Agriculture (CSA) in the Midwest United States: A regional characterization.* Prepared by the Leopold Center for Sustainable Agriculture, January 2005.
2005. Available at: http://www.leopold.iastate.edu/pubs/staff/files/csa_0105.pdf. Iowa State University
Extension Publication. (2005). *Using Organic Agriculture and Sustainable Crops in the Local Food System*. Available at: http://www.extension.iastate.edu/Publications/PM1995.pdf.

[20] A 2005 study by Dave Swenson of Iowa State University reveals that there are significant economic impacts of increasing consumption of locally produced fruits and vegetables. If Iowans were to consume 25 percent of their fruits and vegetables from local sources the net value added to the Iowa economy would be nearly $140 million in sales, $54 million in labor income and 2,031 additional jobs. A study of Iowa's farmers' markets in 2004 found that they created $31.5 million in gross sales, $12.2 million in personal income directly or indirectly related to market activity and over 140 full-time jobs indirectly related to market activity. , Swenson, D. (2005). *The Economic Impacts of Increased Fruit and Vegetable Production in Iowa*. Prepared for the Regional Food Systems Working Group and the Leopold Center for Sustainable Agriculture. Iowa State University.

[21] Production of local energy could be another reinforcing dimension to the production of these places. This could be achieved mainly through promoting wind farms, which are becoming more popular in Iowa.

[22] According to a December 2006 report by the Iowa Department of Transportation, Iowa is on the verge of a transportation crisis with deteriorating infrastructure and a $27.7 billion budget shortfall in the next 20 years. In Iowa, the Primary Road System (interstates and numbered Iowa and US routes) comprise 9,373 miles of roads and 3,975 bridges In 2005, 31.6 billion vehicle miles were traveled on Iowa's roads. Nearly 61 percent of that amount was on the Primary Road System, though these roads account for only 8 percent of Iowa's total roads. Vehicular travel in Iowa has increased by approximately 36 percent between 1990 and 2005, and this increased traffic has primarily occurred on the Primary Road System. The study reveals that roads across Iowa are deteriorating. From 1999 to 2005, the miles of deficient pavements on the Primary Road System increased from 1,968 to 2,836, a 44 percent increase. Over one-fourth of all Primary Road System pavements are of a condition below an acceptable level. On a local level, county officials estimate that nearly 1,000 miles of paved county roads need to be resurfaced each year to maintain current conditions. In an effort to save money, 14 counties are currently sharing a county engineer and have reduced other staff positions. We would like to thank Omar Smadi for bringing this publication to our attention. Iowa Department of Transportation. (2006). *Study of Iowa's Current Road Use Tax Funds (RUTF) and Future Road Maintenance and Construction Needs.* A report to the Iowa Legislature, December 29, 2006.

[23] In the Midwest, sizes of CSA operations range from 0.07 acres to 45 acres with a mean of 6.7 and a median of 3.5 acres. 98 percent of the study's respondent report that they farm organically for the CSA operation, and most (92 percent) have done so since starting their operation. Tegtmeier, E.; Duffy, M. (2005). Community Supported Agriculture.

[24] Our conceptualization of sustainable organic farming is enriched by Michael Pollans discussion of PolyFace Farms and organic farming in The Omnivores Dilemma. Pollan notes that the organic ideal originally sought to establish not just an alternative mode of production, but an alternative system of distribution as well as an alternative mode of consumption. Pollan reveals that while organic consumption and production has increased in the United States, the majority of organic produce is now produced in a highly industrialized manner, with little difference in organic versus non-organic production processes, a much greener machine, but a machine nevertheless (p. 159). A sustainable organic system seeks to model natural cycles by keeping the cycles of birth, growth, death and decay on the farm. Through their smaller scale tied to particular places, these types of farms help reinforce social relationships. This type of practice necessitates local exchanges, and therefore must avoid industrialization. As Pollan suggests, farms produce a lot more than food; they also produce a kind of landscape and a kind of community (p. 258). Pollan, M. (2006). *The Omnivore's Dilemma.*

[25] 45 percent of counties lost population between 1990 and 2000. In 2000, the average population for Iowa counties was 29,559. Polk County is Iowa's most populous county with 374,601 residents while Adams county is the least populated with 4,482 people.

[26] Rural residents express significant concerns about local governments consolidation including loss of control and self-determination over local issues; loss of control over service level, convenience, and quality; increased taxes, increased likelihood that local revenues will go to other communities; and loss of community identity. Edelman, M. A. (2000). *Potential Cost Savings and Framework of Strategies for Improved Delivery of Governmental Services*. Prepared for the Governor's Strategic Planning Council. Iowa State University.

[27] Studies suggest that county administration costs exhibit a U-shaped cost curve. That is, there is a population level at which services are most efficiently provided. Too little or too many people constrain resources and service delivery. Studies suggest that in Iowa per capita county administration costs are minimized at an optimum county population size of 50,000 to 75,000. It should be noted that this is range is above the current average county population of 29,559. Ibid.

[28] For more information on historic places in Iowa, see the National Park Service National Historic Landmarks Program at htt://tps.cr.nps.gov/nhl/ and Iowa Registered Historic Places at http://www.nationalregisterofhistoricplaces.com/IA/state.html

[29] The Iowa Barn Foundation is a non-profit which provides barn restoration matching grants to help property owners restore their barns. The foundation has awarded more than 45 matching grants to date, totaling over $400,000, and provides these funds for barns irrespective of their National Historic Registry eligibility. To qualify barns must be at least 50 years old, located on the original site, and should have some architectural significance or social/cultural significance to the community. The Iowa Historic Preservation Association estimates that over 200,000 barns were built in Iowa, and that approximately 60,000 remain. They also estimate that the state loses nearly 1,000 barns per year. www.iowabarnfoundation.org.