

Stony Brook University



OFFICIAL COPY

The official electronic file of this thesis or dissertation is maintained by the University Libraries on behalf of The Graduate School at Stony Brook University.

© All Rights Reserved by Author.

**An Archaeological Examination of Economic Inequality as Seen in Domestic
Early Islamic Housing in Rural Southern Iraq**

A Thesis Presented

by

Abdul-Hameed Salman Al-Nassar

to

The Graduate School

in Partial Fulfillment of the

Requirements

for the Degree of

Master of Arts

in

Anthropology

Stony Brook University

May 2017

ProQuest Number: 10267535

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



ProQuest 10267535

Published by ProQuest LLC (2017). Copyright of the Dissertation is held by the Author.

All rights reserved.

This work is protected against unauthorized copying under Title 17, United States Code
Microform Edition © ProQuest LLC.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

Stony Brook University

The Graduate School

Abdul-Hameed Salman Al-Nassar

We, the thesis committee for the above candidate for the
Master of Arts degree, hereby recommend
acceptance of this thesis.

Dr. Elizabeth C. Stone
Professor, Anthropology

Dr. Paul Zimansky
Professor, History

Dr. Elisabeth Hildebrand
Associate Professor, Anthropology

This thesis is accepted by the Graduate School

Charles Taber
Dean of the Graduate School

Abstract of the Thesis

An Archaeological Examination of Economic Inequality as Seen in Domestic

Early Islamic Housing in Rural Southern Iraq

by

Abdul-Hameed Salman Al-Nassar

Master of Arts

in

Anthropology

Stony Brook University

2017

The goal of this study is to assess economic inequality levels in rural southern Iraq after the Arab Islamic conquest. This assessment stems from an examination of variability in domestic rooms and courtyards between the pre-conquest Sasanian (224 – 636 CE) and post-conquest Early Islamic (636 – 836 CE) periods. To achieve this goal, ethnoarchaeological and excavation data from the region are utilized to search for parallels between room and courtyard sizes. The ethnoarchaeological data are vital to establishing the correlation between courtyard and house sizes that are needed to effectively analyze the satellite-derived settlement data from the area's Sasanian and Early Islamic villages. The correlation stems from the fact that if large courtyards are associated with larger houses in the ethnographic data, then high variability patterns will suggest the presence of larger houses in satellite-derived data. The frequency of large spaces is then compared between settlements, and between each era. Then it becomes possible to examine the changes between each period by measuring inequality through standard deviations to measure variability, and Gini coefficients to measure economic differentiation. Standard deviations provide a sense of room size variability in the satellite-derived data, which are then used to compare sites, while Gini coefficients take this further as they are specifically designed to measure economic inequality. Since these sites' urban counterparts have been shown to experience rising economic inequality in the Early Islamic era in historical sources, it is likely the rural south experienced similar conditions. Indeed, my analysis of the satellite-derived data, extracted from traced architecture in high-resolution imagery, has provided new evidence supporting that hypothesis. Lastly, relevant socio-political context of each era will be cited, including an emphasis on Muslim Arab immigration into Iraq's southern countryside, providing us a better understanding of the study's results.

Table of Contents

Abstract.....	iii
List of Figures.....	vii
List of Tables.....	ix
1. Introduction.....	1
1.1. The Satellite-Derived Data.....	5
1.1.1. Courtyards.....	7
1.1.2. Rooms.....	9
1.1.3. Houses.....	10
2. Ethnoarchaeology.....	12
2.1. Aliabad.....	12
2.2. Darnaj.....	18
2.3. Comparing Aliabad and Darnaj: Implications for Analysis of Ancient Settlements.....	21
3. The Sasanian Era.....	23
3.1. Religion.....	25
3.2. Politics.....	26
3.3. Economics.....	27
3.4. Excavated Data from Sasanian Sites.....	29
3.4.1. Ctesiphon.....	29
3.4.2. Hājābād.....	32
3.4.3. Hira.....	34
3.5. Sasanian Settlements Examined via Satellite-Derived Data.....	36
3.5.1. Site 64.....	37
3.5.2. Site 532.....	40

3.5.3. Site 825	40
3.5.4. Site 842	41
3.5.5. Site 1167	42
3.5.6. Site 1229	42
3.6. Results of Satellite Imagery Analysis for Sasanian Sites.....	42
4. The Early Islamic Era	45
4.1. Wasit	46
4.2. Kufa.....	47
4.3. Religion.....	48
4.4. Immigration.....	49
4.5. Politics.....	52
4.6. Settlement	53
4.7. Economics.....	55
4.8. Excavation Data	57
4.8.1. Tall Jawa	58
4.8.2. Humayma.....	60
4.8.3. Nahal Mitnan	62
4.9. Early Islamic Settlements Examined via Satellite-Derived Data.....	64
4.9.1. Site 848	65
4.9.2. Site 890	66
4.9.3. Site 1007	67
4.9.4. Site 1133	68
4.9.5. Site 1135	68
4.9.6. Site 1193	69
4.9.7. Site 1287	70

4.10. Results of Satellite Imagery Analysis for Early Islamic Sites	70
5. Conclusion	73
5.1. Economic Inequality	76
5.2. Muslim Arab Immigration	77
5.3. Settlement	78
5.4. Change	79
5.5. Religious Conversion.....	81
5.6. Continuity	81
5.7. Concluding Remarks.....	82
List of References	84

List of Figures

Figure 1. Map of Iraq During Sasanian and Early Islamic Times.....	3
Figure 2. Sasanian (Blue) and Early Islamic (Green) Settlements Chosen Between the Tigris & Euphrates Rivers in Southern Iraq, Examined Via Satellite-Derived Data.....	6
Figure 3. An Example of Measuring a Courtyard at Site 1229 using GIS.....	8
Figure 4. An Example of Measuring a Room at Site 1167 using GIS	10
Figure 5. Idealized Layout of a Muslim Courtyard House	11
Figure 6. Plan of Aliabad, Iran in 1975 CE.....	13
Figure 7. An Example of a Typical House in Aliabad	14
Figure 8. Scatter Plot Demonstrating the House-Courtyard Relationship in Aliabad	17
Figure 9. Map Showing the Location of Darnaj, Syria	18
Figure 10. An Example of a Typical House in Darnaj.....	19
Figure 11. Pearson Correlations between Wealth & Household Size & Area of Courtyard	20
Figure 12. Map of Sasanian Iraq, 224 - 651 CE	23
Figure 13. Sasanian Settlement Patterns of the Region Under Analysis.....	25
Figure 14. Map of the Sasanian City of Ctesiphon	29
Figure 15. Map of the Artisan Quarter	30
Figure 16. Housing Complex's Surface Layer	31
Figure 17. Map Showing the Location of Hājīābād, Iran.....	33
Figure 18. Plan of the “Manor House of Hājīābād”	34
Figure 19. Map of Hira, Iraq	34
Figure 20. Reconstructed Plan of the Large House in Hira	35
Figure 21. Sasanian Settlements Examined Via Satellite-Derived Data. From North to South: Site 532, Site 825, Site 842, Site 1167, Site 1229, Site 64.....	36
Figure 22. Site 64	37

Figure 23. The Northwest Area of Site 64	38
Figure 24. Site 532	39
Figure 25. Site 825	40
Figure 26. Site 842	41
Figure 27. Site 1167	41
Figure 28. Site 1229	42
Figure 29. The City of Kufa's Plan	48
Figure 30. Conventional Plan of a Mosque's Components	49
Figure 31. Early Islamic Settlement Patterns of the Region Under Analysis	53
Figure 32. Map of Tall Jawa in Jordan	59
Figure 33. Imagined Reconstruction of Field D Building at Tall Jawa	59
Figure 34. D Lower Story Room Numbers at Tell Jawa	59
Figure 35. D Upper Story Room Numbers at Tell Jawa	59
Figure 36. Map of Humayma, Jordan	60
Figure 37. General Plan of Field B100	61
Figure 38. General Plan of Field F102	62
Figure 39. Nahal Mitnan's Farmhouse	63
Figure 40. Early Islamic Settlements Examined Via Satellite-Derived Data. From North to South: Site 890, Site 848, Site 1107, Site 1133, Site 1135, Site 1193, Site 1287	64
Figure 41. Site 848	65
Figure 42. Site 890	66
Figure 43. Site 1107	67
Figure 44. Site 1133	67
Figure 45. Site 1135	68
Figure 46. Site 1193	69
Figure 47. Site 1287	70

List of Tables

Table 1. House-Courtyard Relationship in Aliabad (Single-family Houses).....	15
Table 2. House-Courtyard Relationship in Aliabad (Multi-family Houses).....	16
Table 3. Standard Deviations of Room Sizes between Sasanian Sites	43
Table 4. Gini Coefficients of Room Sizes between Sasanian Sites	43
Table 5. Standard Deviations of Courtyard Sizes between Sasanian Sites	43
Table 6. Gini Coefficients of Courtyard Sizes between Sasanian Sites	43
Table 7. Standard Deviations of Room Sizes between Early Islamic Sites	71
Table 8. Gini Coefficients of Room Sizes between Early Islamic Sites	71
Table 9. Standard Deviations of Courtyard Sizes between Early Islamic Sites.....	72
Table 10. Gini Coefficients of Courtyard Sizes between Early Islamic Sites.....	72
Table 11. Standard Deviations and Gini Coefficients of Courtyard Sizes between Sites from Different Eras	73
Table 12. Standard Deviations and Gini Coefficients of Courtyard Sizes between Sites from Different Eras	74

1. INTRODUCTION

The question posed by this thesis is whether there were changes in social structure—and especially in inequality—in rural Iraq between its Sasanian (224 – 636 CE) and Early Islamic (636 – 836 CE) periods. Evidence for increasing inequality exists for the urban centers, but until now we have lacked the data needed to make this appraisal for the rural hinterland. The metric to be used will focus on room, courtyard and house sizes from the pre-Islamic Sasanian period to its post-conquest Early Islamic period. These data can be derived from high resolution satellite images which record sub-surface architectural patterns. These data will be evaluated using the most common measure of inequality, the Gini coefficient, which in this instance is applied to domestic housing.

In the long run, the results of this study should be tested against the excavation of Early Islamic houses, but unfortunately these data are not available currently. Donald Whitcomb, professor at the University of Chicago's Oriental Institute advises against completely relying on current Early Islamic excavation data and instead suggests a way forward with the ethnographic data from the region (email to author, June 2, 2016). Indeed, the ethnoarchaeological data on architectural variability and economics in households in Aliabad, Iran conducted by Carol Kramer, and in Darnaj, Syria, carried out by Katheryn Kamp, are incredibly valuable and can be used as benchmarks for relatively egalitarian lifestyles for comparison with the Early Islamic settlements of rural southern Iraq. The similarities between these villages and the sites I have chosen, such as their environments and cultures, make them ideal to compare, for modern-day villages in the Near East frequently resemble earlier sites (Kamp 2000:84). Elizabeth Stone has also compared household data from Aliabad to settlements in southern Iraq, regarding it as a benchmark for housing variability in a mostly egalitarian community (Stone n.d.:3).

From these ethnographies, standard deviations and Gini coefficients of their towns' rooms and courtyards can be computed, as well as Pearson correlations between total house and courtyard sizes. This correlation then establishes the fundamental association between courtyard and house size that enables me to effectively compare these sizes in order to determine how the economic inequality levels changed. I will determine these changes by measuring inequality through use of standard deviations to measure variability and Gini coefficients to measure economic differentiation. Standard deviations provide us with a sense of room size variability in the satellite-derived data, which will then be used to compare between sites, since if larger courtyards are associated with larger houses, then larger standard deviations will also be associated with larger houses. Gini coefficients take this further as they are specifically designed to measure economic inequality, making them ideal for this study. While they are primarily used to study modern economies, they have also been utilized by archaeologists to examine pre-industrial societies (Lindert & Milanovic 2011, Stone n.d.). Moreover, utilizing these methods with the thesis's dataset is quite effective, as domestic architecture is the "most sensitive indicator of social differences" (Stone et al. 2004).

Southern Iraq, and more specifically the rural lands between the Euphrates and Tigris rivers that formed the greater part of the Sawad, was initially chosen because I have access to high resolution satellite imagery for that area. Moreover, it is in that area of Iraq that the Muslim Arab conquerors primarily built their key cities from scratch. These cities were called the *asmar*,

the newly founded garrison cities built by the conquerors that initially housed them, and later, as soldiers brought their families, these military encampments turned into the bustling urban centers of Basra, Kufa, and Wasit. Much of this has been documented in the historical texts, and archaeologists have tended to focus on these cities (Lapidus 2014). What has not been well-researched however is what those cities' rural hinterlands were like during the Early Islamic era.

It has been argued that economic inequality levels rose in Iraq's cities during the Early Islamic period (Bonner 1996). The conquest therefore was a turning point for the region, enabling several forces that eventually culminated into rapidly rising inequality levels throughout southern Iraq. One such force was the change under the new Early Islamic administration from a focus on agriculture to that of commerce, through the growth of unrestricted markets (Bavel et al. 2014). The question posed by this thesis then is whether the wealth inequality that plagued the inhabitants of Iraq's southern cities after the Sasanian era also affected their rural neighbors. Did the countryside's inhabitants go through a similar economic experience as those living in major urban settlements? This issue is significant since it will indicate the degree to which economic inequality affected the entire region rather than just its urban centers.

Three possible outcomes are therefore linked to the variability of room and courtyard sizes that will be used to represent change in house size in this study, and were likely driven by relentless plagues, population fluctuations and government policies such as repressive taxation measures, included torture and a focus on ensuring the success of their urban centers the *asmar*, rather than the rural Sawad, the heartland of Sasanian economic prosperity. Moreover, developments in trade and factor markets, the decline in economic status of a large portion of society, the Arab fighters, called *muqatila*, and the introduction of African slaves, known as the *Zanj*, all contributed to increasing inequality. These events and policies will be evaluated as the primary driving forces behind three possible outcomes: A.) If a pattern of high variability of room and courtyard sizes is significantly greater in the Early Islamic settlements than in the Sasanian settlements, as seen in higher standard deviations and high Gini coefficients, that would indicate more economic inequality ensued after the conquest; B.) If a pattern of a similar variability of room and courtyard sizes appears between the Early Islamic settlements and the Sasanian settlements, as seen in similar standard deviations and Gini coefficients, that would indicate little to no change in economic inequality levels after the conquest; C.) If a pattern of less variability of room and courtyard sizes appears between the Early Islamic settlements and the Sasanian settlements, as seen in lower standard deviations and low Gini coefficients, that would indicate that less economic inequality ensued after the conquest.

These possible outcomes from the data under analysis will contribute to our broader understanding the livelihoods of Iraq's inhabitants in the rural south during the Early Islamic period. Outcome A's higher economic inequality levels would suggest that the new Muslim rulers were extracting more resources from the rural hinterlands than their Sasanian predecessors. Outcome B's no change in economic inequality levels from the Sasanian to the Early Islamic periods would suggest that the Islamic conquest was focused on consolidating centers of power, (i.e. cities), and hence had little impact on the countryside. Outcome C's lower economic inequality levels would suggest an increase in rural autonomy, and that the Muslim conquerors were more interested in administering urban than rural populations.

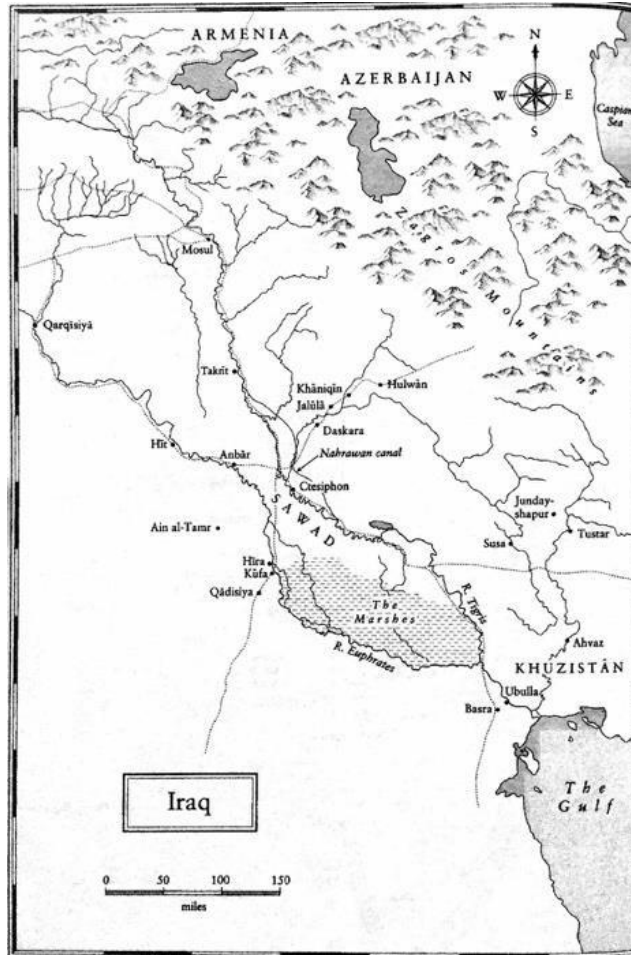


Figure 1: Map of Iraq During Sasanian and Early Islamic Times (Kennedy 2007:Map 4)

I will test the three possible outcomes by comparing the Sasanian and Early Islamic data consisting of room and courtyard sizes of 13 rural settlements: six Sasanian and seven Early Islamic. However, before delving into the satellite-derived data, I examine available ethnoarchaeological data, as well as historical and excavation data in both the Sasanian and Early Islamic sections, from sites in Iraq, Iran, Jordan, and Syria. I examine these data sets for the following reasons:

First, I examine the ethnoarchaeological case studies of Aliabad and Darnaj to better understand the relationship between society and architecture in rural areas in the Middle East. Rooms and courtyard sizes in Aliabad will be measured, while both Aliabad and Darnaj will provide further crucial information regarding the relationship between house, courtyard, and room sizes, and the information they provide regarding wealth. What these data show is that larger courtyards were associated with larger houses, as is demonstrated in Table 1 and Figure 10 in the ensuing ethnoarchaeology chapter. Given that I cannot make out doorways in the imagery, I will utilize measures such as the Gini coefficient as proxies for the variability in house size, since the largest courtyard would be the driver for higher Gini coefficients. Thus, the ethnoarchaeological data sets up the study, specifically the Gini coefficients that will indicate if there were changes in houses sizes over time. The Gini coefficients will then indicate whether there were any changes in economic inequality after the conquest.

Second, I will provide a historical overview of the Sasanian period, and a historical-based economic analysis of the Early Islamic period. Throughout historical sources will be explored to determine whether the overall trends in economic inequality that ensued after the Islamic conquest in southern Iraq were associated with changes in house sizes. The sources will stem from an exploration of the following key sources: changes in taxation laws (Campopiano 2012), the numerical records regarding those taxes (Waines 1977), the retraction of the irrigation system due to a refocus from rural to urban centers and related repressive policies (Adams 1981), possible Muslim Arab immigration to the countryside and population fluctuations with increases and decreases in settlement (Morony 1994), the economic decline of the significant *muqatila* (Bonner 1996), the introduction of the *Zanj* (Popovic 1976), and the appearances of epidemics attributed to cyclical reoccurrences of plague (Dols 1974).

There is a broad literature on the negative economic changes that impacted the region during the new Early Islamic administration and the effects it had on the inhabitants of urban areas, the *asmar*. However, there is little information on whether their rural counterparts experienced a similar increase in economic inequality during that same time, and if so, whether any of it was due to any shift in policy, (i.e. increased resource exploitation from the countryside), from the incoming administration. Accordingly, uncovering the rural region's economic environment will be the focus of my thesis, with the sources on the overall region and the *asmar* providing my analysis with the data needed for comparison. Thus, this segment of my paper entails a complimenting component on the *asmar*, employing historical archaeology to help figure out what may have driven the numbers in the satellite-derived data from the rural south.

Third, due to the lack of available excavation data on small settlements, I will use excavation data from other sites for comparative purposes. These are the Sasanian sites of Ctesiphon and Hira in Iraq and Hājīābād in Iran, and the Early Islamic sites of Tall Jawa, Humayma, and Nahal Mitnan in Jordan as examples that can be compared to the data I will be developing for Iraq. These sites, except for Ctesiphon, are similar to the settlements in rural southern Iraq, and while Ctesiphon was a major urban center, possessing excavation data on an urban Sasanian household is useful. I then present tables with the calculated lows, highs, medians, means, and standard deviations of both rooms and courtyards in Ctesiphon, Hājīābād, Tall Jawa, Humayma, and Nahal Mitnan. These data will help us understand what rooms, courtyards, and domestic structures overall should look like in the Sasanian and Early Islamic periods in rural southern Iraq. These data, like the ethnoarchaeological data, are central to identifying any changes in rural society which accompanied the conquest. Even though the sites do not include all their rooms, courtyards, and total house sizes, the measurements that are available can still be utilized for comparative purposes, which is vital to figuring out any change in house size and what that may have been in rural Early Islamic southern Iraq.

Finally, I will trace each settlement for architectural remains and measure the appropriate traces from the Sasanian and Early Islamic satellite imagery, using the survey data to determine the date from these traces. Given the difficulty of identifying doorways in the satellite imagery, I will compare the sizes of the rooms and courtyards, and the resulting standard deviations and Gini coefficients from the ethnoarchaeological and excavation data sets with the data derived from the satellite imagery. It is important to stress however that this comparison is only one facet of my study, as the correlation between courtyard size and overall house size will provide the

study's backbone with its measure for inequality. Regarding the use of Geographic Information Systems (GIS) for the tracing, it also allows me to assess the accuracy of Adams's survey results by measurements based on the satellite imagery with his proposed estimated occupational areas.

My primary evaluation for the Early Islamic period in rural southern Iraq comes from satellite-derived data together with the ethnographic and excavation data. The combination of room and courtyard sizes will be presented for each era's settlements in tables displaying the calculated standard deviations and Gini coefficients. Moreover, since courtyard sizes correlate with house size, if one were to calculate Gini coefficients for space sizes, the greater the inequality of house sizes, (and therefore of courtyard sizes which are the largest spaces and will drive the coefficient), the higher the Gini coefficients of all space sizes. This not only enables me to compare the economic inequality levels between each era, but provides us with one of the key features of Early Islamic households in rural southern Iraq: their house sizes.

This thesis would not have been possible without the satellite-derived data, which are available thanks to Stone, who in the summer of 2003 acquired new high-resolution QuickBird imagery from a satellite launched by the Digital Globe Corporation earlier that year. In 2015, she shared this imagery with me at Stony Brook University so that I might carry out a concise study focusing primarily on the Early Islamic era in rural southern Iraq. That mostly neglected period and landscape therefore deserves more extensive research, and it is in this context where remote sensing and GIS analysis come into play, by practicing archaeology via the computer thousands of kilometers away. It is hoped then that this study will help contribute to the establishment of this digital platform for future archaeology.

1.1. The Satellite-Derived Data

The settlements in question have all been designated as rural sites in this study, which is important to confirm as this thesis focuses on rural southern Iraq, an overlooked region. Consequently, it is key to explaining why the settlements I chose have been designated as rural.

Kramer argues in *Spatial Organization in Contemporary Southwest Asian Villages*, argues that a village, as opposed to a city, can be defined as "a small rural settlement with few functions, where most activities pertain to occupants' subsistence and in which the vast majority of architectural structures are secular and residential in nature" (1983:352). This definition seems to hold true for the settlements whose satellite imagery I analyzed. Since they were primarily residential and secular in nature, monumental architecture like palaces and religious structures like churches or mosques were not part of these settlements' architectural landscape.

The sites I chose have also been primarily designated as rural because they were not adjacent to any major Sasanian or Early Islamic city, and were in the agricultural countryside. I am using Adams's designation of 10 hectares or less to be considered non-urban, and most of the sites fall within this range, though it is important to note that some do not. In regard to density, many settlements are quite dispersed. The population numbers, suggested by Adams's work and my own GIS analysis, do not justify calling them large urban centers. When taking into consideration what is known of the area archaeologically, it is unlikely these mostly dispersed sites that range from 2.00 to 25.00 hectares were major cities, such as the large population center of Kufa that was approximately 140000 people in a diameter of 2 km (Bosworth 2007:291-292).

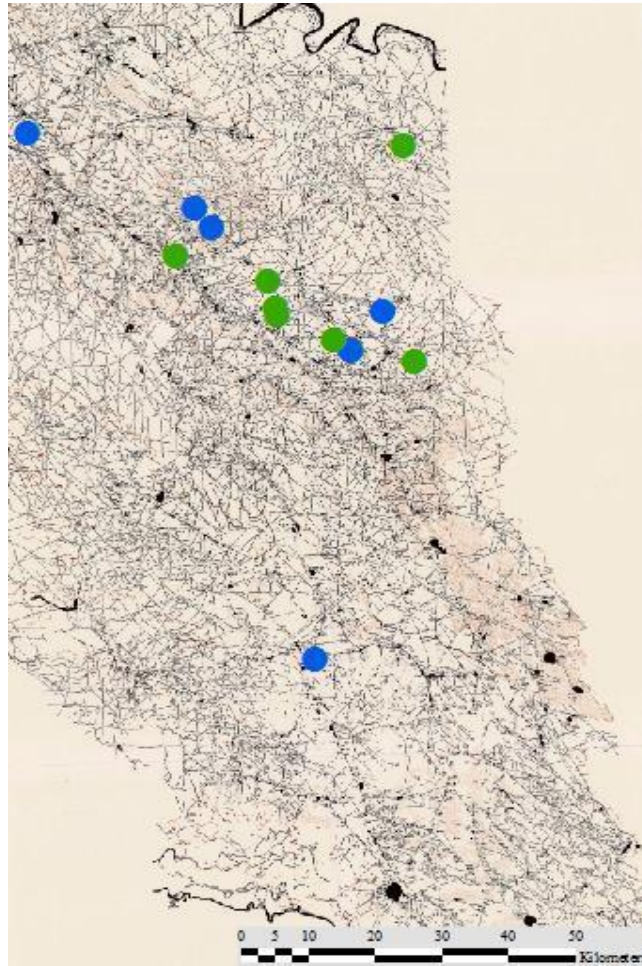


Figure 2: Sasanian (Blue) and Early Islamic (Green) Settlements Chosen Between the Tigris & Euphrates Rivers in Southern Iraq, Examined Via Satellite-Derived Data (Adams 1981:383)

Little is known about these rural sites, and whatever is known primarily derives from Adams's extensive survey of the region. His research mostly includes a general record of the sites with a few notes. He also did not usually map out their structural remains. Adams did not have access to the high-resolution satellite imagery, and I will be tracing the settlements' architectural remains he surveyed for the first time, using a form of remote sensing that involves digital image interpretation and analysis, with the aid of computer software. Satellite data, even in high resolution, can only represent architectural remains to a certain extent, since salt traces, irrigation, sand dunes, looting holes, the overlapping of various architecture at times from different periods, and other environmental and human activities, makes it difficult to discern every room and courtyard, and nearly impossible to distinguish houses. Consequently, walled spaces will be the specific units of focus, and their degree of variation will be used to reflect levels of economic differentiation. I determine such levels by first looking for the areas of those rooms and courtyards in each site, and then calculate standard deviations and Gini coefficients from the total of each settlement's rooms' areas, and then separately for the courtyards. These will then be used for comparison between each era, Sasanian and Early Islamic, and with the ethnographic and excavation data. These statistics will then help interpret whether the inequality increased, decreased or stayed the same over time, and therefore changes in house size, as previously discussed.

Much is still not known about what Early Islamic sites looked like, "for the question of the organization of the earliest Islamic cities, there exist plans of specific institutions (e.g. mosques) and of idealized types (often drawn from much later periods), but there is no (extant) overall plan of an actual early Islamic city" (Whitcomb 1992:155). Even less is known about Early Islamic dwellings, and almost nothing about rural sites overall. There has been a "poverty of excavated and published sites" (Morony 1994:221) regarding Sasanian and Early Islamic times, and whenever excavations did occur, they fixated on monumental, not domestic architecture. Work has only been done on the urban Sasanian sites of al-Hira (Rice 1934) and Ctesiphon (Reuther 1928, Cavalier 1966), and the Early Islamic Kufa (Mustafa 1963) and Wasit (Safar 1945), with the only rural site being the Early Islamic Tell Abu Sarifa (Adams 1970). Work at the latter focused on surveying and ceramics (Morony 1994:222). Much has been done however on change and continuity between Sasanian and Early Islamic ceramics, economics, and irrigation. Although even in those areas, differentiation between the two periods is lacking, for even when it comes to ceramic styles, little is known regarding their temporal distribution other than that completely new glazed styles are to be found in most of southern Iraq sometime following the Arab Islamic conquest (Adams 1981:237). Moreover, in sites such as Samarra in central Iraq where archaeological surveys and excavations took place between 1983 to 1989, the distinction between Sasanian and Umayyad pottery remains unclear (Northedge 2006:27,72,74). There is therefore a need for more research on rural domestic architecture to identify any differences and similarities between the Sasanian and Early Islamic periods. These differences and similarities may be manifested in how any changes in economic inequality levels may be shown, by any changes in house size.

As stated before, since room and courtyard comparison is only one facet of the study, the linkage between large courtyard size and house size are key to framing my analysis. Before tackling these issues, I will define the three household components under study: courtyards, rooms, and houses. I have used a variety of factors to attempt to distinguish which archaeological wall traces are the likeliest to be rooms, which to be courtyards, and what houses mean in this study. Though I cannot be completely certain, creating a well-established set of factors to identify each component will increase the accuracy of the results.

1.1.1. Courtyards

The courtyard house, a common form of domestic housing which has had a long tradition in Mesopotamia, was the choice of Sasanians and especially Muslim Arabs in southern Iraq (Edwards 2006:4). This was likely the case because that house plan has deep roots, stemming from a third millennium BCE Mesopotamian development (Edwards 2006:41). Arab nomads utilized that development, using the concept of a courtyard by setting up their tents in the desert around central spaces (Edwards 2006:41). Benefits such as additional safety and shelter for their animals were likely enticements for such an adoption (Edwards 2006:41). Hence with the advent of Arab Islamic architecture, "the courtyard became an essential typological element" for the Early Islamic Arab dwellings of southern Iraq, as it heavily influenced their once nomadic, and now sedentary, lifestyle (Edwards 2006:41). The courtyard then was, and still is, a generic type in hot and arid climates, forming the "basis of urban pattern in the *madinas* of the Islamic World" (Edwards 2006:xiv), and possibly that of the Islamic world's rural landscape as well.

In Iraq, the family unit tends to spend a lot of its time in semi-open spaces at the southeastern parts of their courtyards (Edwards 2006:33). The courtyard is defined by its "ability to enact the following functions: the demarcation of limits of the property, the definition of a place of privacy for the family, the unification of spaces and elements in a house, the provision of a

circulation element, the creation of a garden or cool place, and the promotion of ventilation" (Edwards 2006:28,29). Many of these functions are carried out in most Arab and Iranian courtyard houses, but usually never at the same time (Edwards 2006:29).

With both the Sasanian and Early Islamic sites, I found courtyards easier to define than rooms due to issues of clarity of the imagery, especially for the latter period, simply because the larger sizes of the courtyards made them easier to spot and define. I was, however, able to discern a larger quantity of Sasanian rooms than for the Early Islamic. To identify courtyards, we can assume that each house had at least one courtyard, since this is the case for numerous villages in the Zagros Mountains of Iran, like Aliabad. This can then be used to approximate the number of houses present in our data (Kramer 1983:360).

The following criteria were utilized to best identify courtyards in the satellite data, although where the imagery was blurry due to salt traces, irrigation activities, and/or looting holes, these data could not be counted or measured.

I interpreted large square spaces as courtyards since they would have been difficult to roof with poplar or split palm logs, grown particularly for this purpose (Wright 1969:18). Moreover, the courtyard house was typical of southern Iraq both before Islamic times and up to the present. It is "defined by the house itself and by high walls, an 'open to sky' space and used primarily as an extension of the living quarters" (Edwards 2006:xv). Since they were unroofed, they could be larger than the rooms, or at least relatively large spaces. While the ideal courtyard would have been surrounded by rooms, ethnoarchaeological evidence shows that this was not always the case (Edwards 2006:5). The number of rooms depended on family size and income; as the family expanded, so did the number of rooms around the courtyard (Edwards 2006:6). Courtyards tended to be in the center of the house to maximize its functions as indicated previously, (i.e. privacy, defense, etc.). I then compared the mean sizes of the areas that I perceived as courtyards in the satellite imagery to the courtyard sizes in the excavation data, and the ranges, (Sasanian: 31.38-34.38 m², Early Islamic: 21.38-35.69 m²), are the same as the sizes I observed in satellite-derived Sasanian and Early Islamic sites. The comparison included not only mean courtyard sizes, standard deviations and Gini coefficients from the excavation data, but ethnoarchaeological data from Aliabad as well, further strengthening this interpretation.

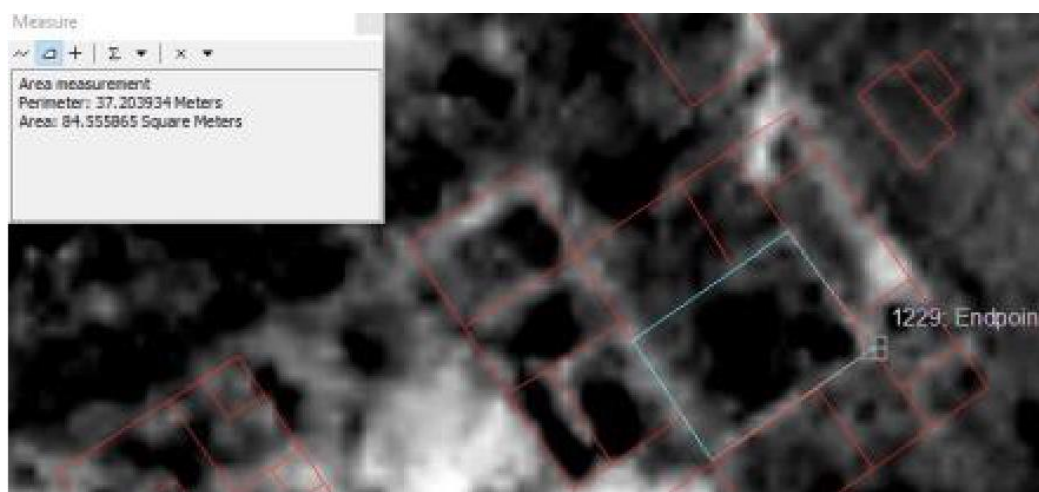


Figure 3: An Example of Measuring a Courtyard at Site 1229 using GIS

1.1.2. Rooms

Rooms tended to be built around a courtyard, or perhaps a main hall that functioned as one, and therefore open onto it. They were linked both directly and indirectly to the courtyard (Almagro 1992:352). Householders tended to begin with one room and proceed to enclose the courtyard in no order or size (Almagro 1992:353). There may have been several reasons for this, such as family expansion or other families setting up their dwelling spaces nearby.

There are various types of rooms in the domestic structures of both the Jordanian settlements and the towns of Aliabad and Darnaj. While they share numerous similarities, there are a few differences that need to be taken into consideration when analyzing southern Iraqi settlements. For example, artisans likely carried out their professions at home in Jordan, while in Aliabad and Darnaj they were inclined to export labor outside of their homes because of globalization (Almagro 1992:353, Kamp 1982:248, Kramer 1982:62). Another difference is that in Jordan inhabitants seemed to have generally cooked in their courtyards, while those of Aliabad and Darnaj mostly cooked and ate in their own kitchen-based rooms (Almagro 1992:353, Kamp 1982:82, Kramer 1982:99). Regardless of the few differences, the ethnographic data suggests that the houses included kitchens, storage rooms, animal/pens, and of course, living rooms (Kramer 1982:122). In addition, these rooms needed some form of sunlight and so they must have either opened onto the courtyard or been on the outside of an architectural cluster to allow sunlight through the doors and windows. The exception to this at times, both seen in the satellite settlements and the excavation data, are storage rooms (Kamp 1982:136).

I used the following criteria to identify rooms in the satellite data. First, rooms were likely to be smaller than courtyards, for rooms were limited by the length of roof beams whereas courtyards were not. Essentially then, every space that did not look like a courtyard, was designated a room if it had four walls, especially if it surrounded or was attached to a courtyard. Then, as with the courtyard sizes, I compared the mean room sizes from the satellite imagery to the mean room sizes in the excavation data from the Sasanian and Early Islamic sites that I have chosen in Jordan, Iraq, and Iran. The Early Islamic excavation data substantiates the pattern seen in the satellite-derived data, as not only are rooms not that distant in mean size, (12.37-18.28 m²), but the mean Gini coefficients, (0.24198-0.27018), and mean standard deviations, (6.23-6.47), are not wildly far off, further supporting the validity of my analytical results of observation. The same applies to the Sasanian excavation data for the most part, with mean room size in comparison to the satellite imagery, (13.50-22.40 m²), and mean standard deviations and Gini coefficients within a reasonable range of likelihood. Moreover, the ethnoarchaeological data from Aliabad, with its mean room size of 21.50 m², again supports my interpretation of the satellite-derived data.

For a more accurate comparison regarding both rooms and courtyards, the site of Humayma was left out due to its unique history of originally being a church.

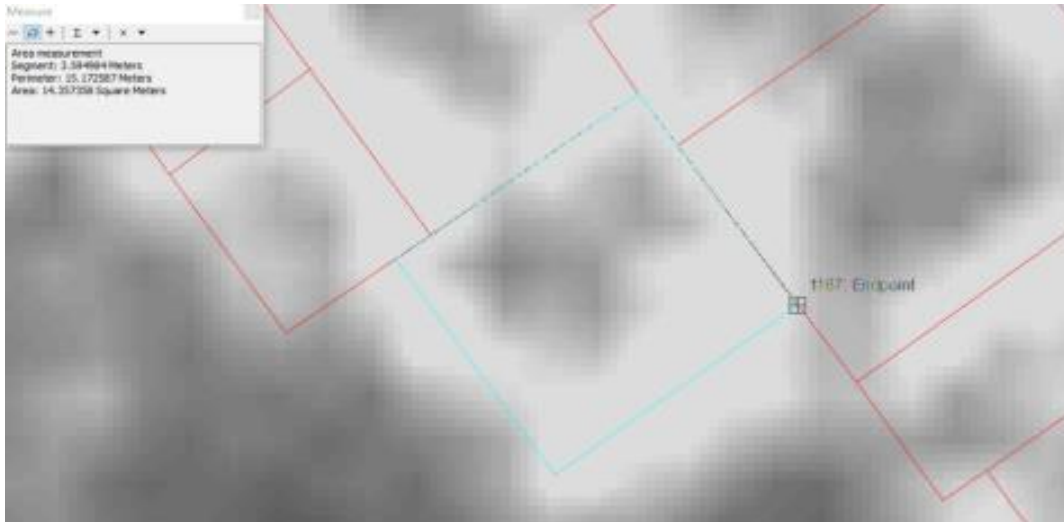


Figure 4: An Example of Measuring a Room at Site 1167 using GIS

1.1.3. Houses

“The Islamic house displays structural complexity in the organization of the building.”
 - Brian Edwards 2006:9.

As Richard E. Blanton noted in his classic monograph, *Houses and Households: A Comparative Study*: “Although housing will probably provide the best overall indication of wealth variation, there is an important bridge between wealth on the one hand, and the material expression of wealth on the other, that has not been adequately explored in the material culture literature” (Blanton 1994:187-188). My thesis acknowledges this inadequacy, and while the study does not explore this bridge in its entirety, it is hopefully contributing to the material culture literature by attempting to determine the wealth and household variation of Early Islamic households.

It is also quite difficult to identify these households using the satellite imagery, because access from outside a typical house in the Arab Islamic world is usually attained through only one exterior door (Almagro 1992:351-352), and so since the imagery's resolution is usually too low to identify doorways, my focus is on rooms and courtyards. Households however are the subject matter of the thesis, and so further clarification on houses in southern Iraq is in order. With both Iran and Iraq, the north-east/south-west orientation was typical of most houses (Edwards 2006:32), but this cannot help us in identifying actual houses. Households were usually organized around one courtyard, although in some cases there were two courtyards. It has been suggested that this is due to a “type of tribal or patriarchal-family social arrangement occupying each of the buildings, in a fashion that each secondary family unit would reside in a *bayt*. This would designate the courtyard as the site for community living and social interaction” (Almagro 1992:353). This is important to understanding the relationship between rooms and courtyards during both the Early Islamic and Sasanian periods in southern Iraq.

Following Blanton’s study, the primary category of houses under his analysis, termed the “main series,” which includes Aliabad, Iran, and Darnaj, Syria, and the Dokan dam area in eastern Iraq, tend to have the following features:

(1) load-bearing walls of mud-brick construction, with narrow rooms spanned by flat roofs made of beams and mud (but sometimes domed mud roofs); and (2) one story of rooms (sometimes two), variably positioned around and facing onto an external walled courtyard (by external I mean that the courtyard is external to the rooms rather than enclosed by the rooms); in some cases, the addition of many rooms around the court may give the appearance of an internal court. (Blanton 1994:48)

Blanton concluded that houses found within the Islamic world, specifically his main series, demonstrated substantial flexibility for variation when it came to their layouts and use of space, as they "militate against assigning symbolic or hierarchical significance to particular spaces within the house" (1994:98). This was likely as his main series mostly consisted of rural dwellings, as were the ones I chose, which are often more chaotic and less organized than their urban counterparts. The fact that there was so much open space, offers less restrictions and allows for more flexibility in creating a house's layout. This perhaps helps us better understand the satellite-derived data, proving the housing more organic and random, rather than structured with a set amount of storage rooms, kitchens, courtyards, and so forth. So, while we have patterns from the excavation and ethnoarchaeological data which can be compared with the satellite-derived data, their comparison should be approached cautiously.

It has been seen that it is most common for houses in the Muslim world to use what has been labelled as polyvalent, (nonspecific), domestic use of space (Petherbridge 1978:199), which likely applies to the satellite-derived data as well. However, Blanton believed that if a study like Petherbridge's were to be made on the houses of elites, they would probably display a more structured use of space, which can be related to this thesis's focus on economic inequality as manifested in domestic housing (1994:98). Blanton's hypothesis makes sense, as elites had more resources to spend constructing their houses and plan for each room's function. Elites utilized various rooms based more on their desires and designated function as a matter of prestige, rather than needs, as they had more time to spare and more rooms due to wealth. The average rural inhabitant on the other hand was using various rooms for similar activities, like cooking in the kitchen or the courtyard, depending on their needs. If we had excavation data for the settlements from the satellite imagery, we would be able to use this to help differentiate between richer and poorer households.

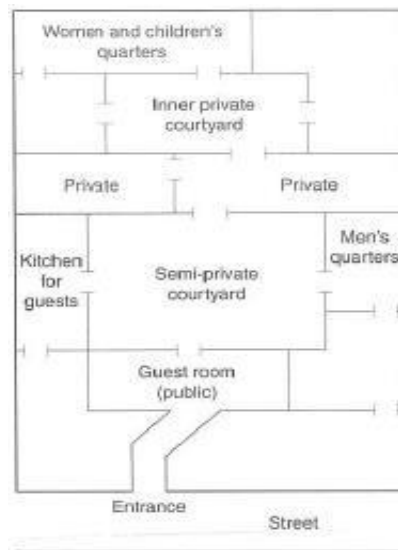


Figure 5: Idealized Layout of a Muslim Courtyard House (Whitcomb 2006)

2. ETHNOARCHAEOLOGY

I will be using the ethnoarchaeological data from Aliabad and Darnaj to demonstrate the ways in which these data are comparable to the satellite-derived data. The ethnoarchaeological data not only corroborates my results on the room and courtyard sizes, but also provides much-needed context to the nature of the settlements under my study in rural southern Iraq.

Darnaj is a Muslim Arab village, with some of its inhabitants likely descending from those we are analyzing in the Early Islamic period, as they are both close to the Euphrates, and border Iraq. They may even come from the same tribes that settled throughout the rural area after the Islamic conquest of Iraq. In regard to Aliabad, while it is also a Muslim village, it is not Arab but rather Kurdish. Additionally, its environment in western Iran is much more mountainous and colder than southern Iraq. While it is in a different environment from Darnaj and the rural settlements I am examining, their architecture seems to be similar. Aliabad and Darnaj are indeed similar villages, as I will demonstrate in this chapter, and although Aliabad is in western Iran, its region was an integral part of the Sasanian empire and strongly connected to southern Iraq, and so it is a great complimentary aspect for this thesis to examine.

2.1. Aliabad

The non-walled small village of Aliabad, (a pseudonym used by the ethnoarchaeologist Carol Kramer), is close to Kangavar in a valley in-between western Iran's Zagros mountains (Kramer 1982:15,85). The predominantly Kurdish Shiite Muslim village that was occupied for at a minimum 100 years is quite small, consisting of 67 houses and 418 people as of the summer of 1975 (Kramer 1982:20-21). Yearly temperatures vary between 4.9 and 37°C, while precipitation occurs infrequently between fall and spring, resulting in little vegetation and people relying on irrigation for agricultural crops (Kramer 1982:15-16). Lastly, the village's typical architecture possesses several characteristics that are demonstrated in the "vernacular architecture of other warm, arid habitats characterized by wide diurnal temperature variations" (Kramer 1982:91), which are like the rural southern Iraqi settlements.

The rooms in Aliabad are split into several categories: kitchens (\bar{x} : 18.0, S.D.: 8.8 m²), living rooms (\bar{x} : 22.4, S.D. 7.9 m²), storerooms (\bar{x} : 21.6, S.D. 13.0 m²), and stables (\bar{x} : 24.00, S.D. 12.0 m²) (Kramer 1982:122). Kramer has stated that the “differences in sizes and numbers of rooms of various types do seem to reflect variation in households’ economic positions” (1982:128). Additionally, courtyards are the “households’ most public areas, and those in which a great diversity of activities occurs” (Kramer 1982:111).

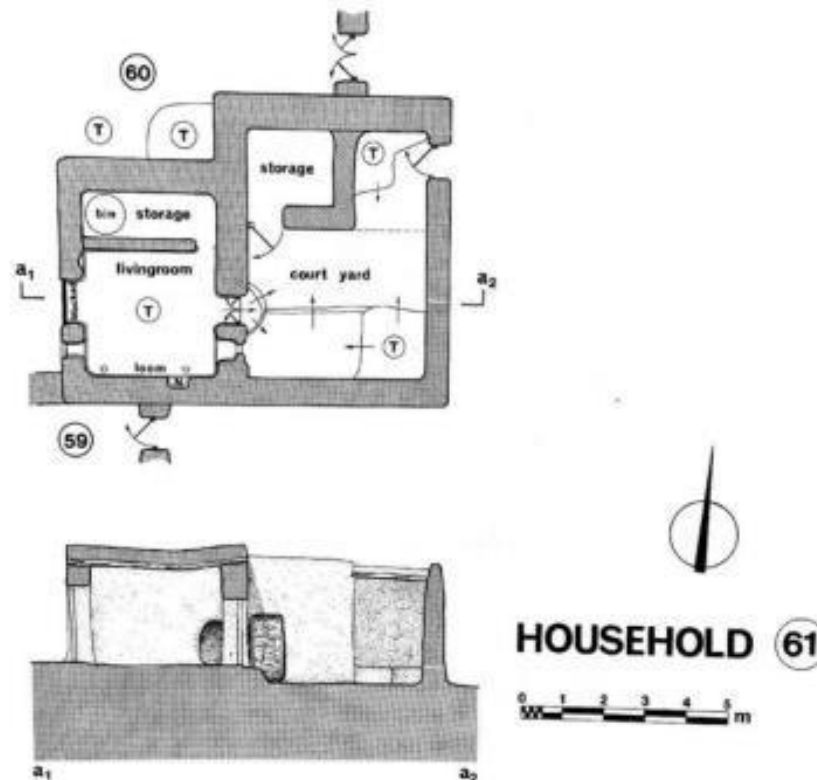


Figure 7: An Example of a Typical House in Aliabad (Kramer 1982:95)

Aliabad overall, while not “characterized by marked socioeconomic complexity or great inequality,” still experiences economic disparity regardless of its relatively small size and “traditional” community (Kramer 1982:80). Moreover, “such variation appears to reflect a “reality of inequality” that coexists with an egalitarian ideology” (Kramer 1982:81). The ethnoarchaeological study of Aliabad by Kramer thus “corroborates the notion that high land prices plus the cultural ideal of a large compound make compound size correlate reasonably well with economic status” (Kamp 2000:89). Total compound area in Aliabad does correspond positively with wealth, with a high-wealth compound correlation. Perhaps more importantly though for this study, the data in Aliabad do in fact support a wealth-courtyard relationship, as demonstrated in Figure 10, specifically showing that larger courtyards are associated with larger houses. The table, organized by house sizes in an ascendant order, reveals a strong positive correlation between houses and courtyards in Aliabad, with the value of R at 0.8693. The calculation proves a trajectory where when houses are larger, so are their courtyards.

Table 1: House-Courtyard Relationship in Aliabad (Single-family Houses)

Area (m ²)		
Household	House	Courtyard
62	42	13
61	58	34
59	72	18
71	78	14
58	84	37
4	89	20
63	96	28
57	101	49
7	112	57
72	115	37
5	120	50
43	125	74
20	141	55
9	141	64
74	142	28
70	147	65
46	152	46
15	155	57
40	159	86
2	170	45
73	176	36
8	182	76
60	194	55
28	212	124
25	217	77
21	226	153

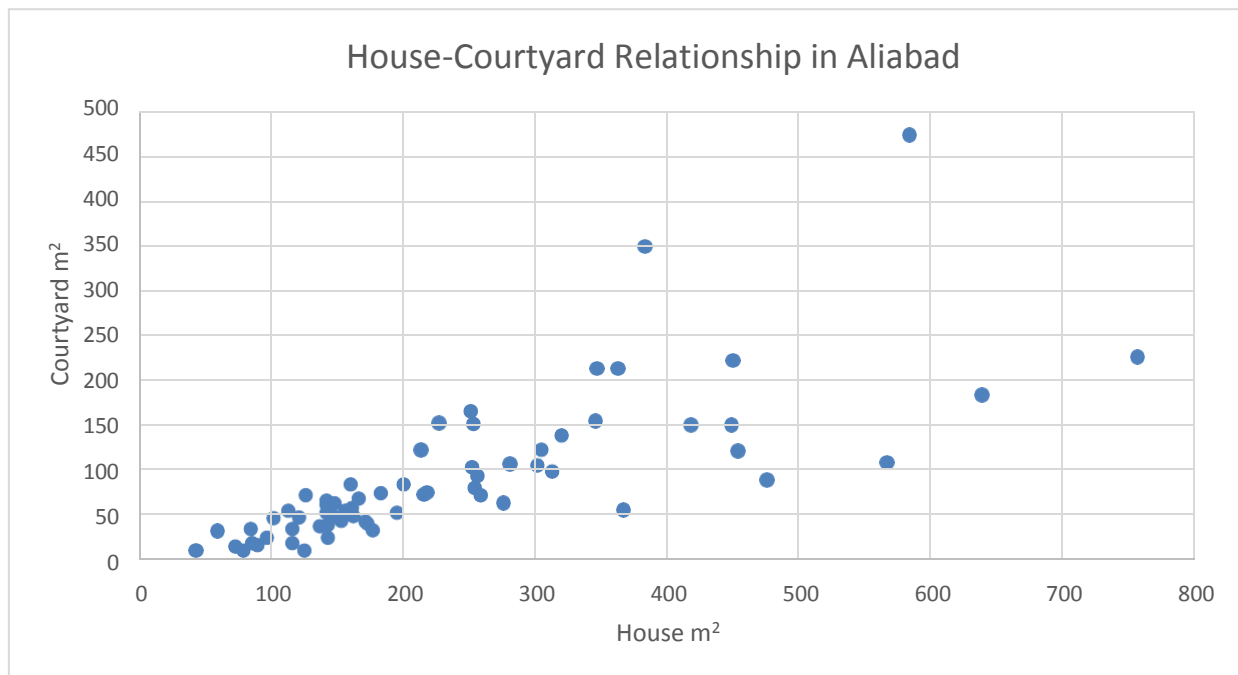
19	250	166
6	251	105
13	252	152
81	255	95
83	258	74
10	301	107
53	312	100
12	346	213
82	362	213
33	382	347
47	417	151
14	448	151
16	566	110
34	583	470

Table 2: House-Courtyard Relationship in Aliabad (Multi-family Houses)

Area (m ²)			
Household	Co-residing Families	House	Courtyard
65/66	2	85	22
49	2	115	22
64	2	124	14
77/78	2	136	40
1	3	141	68
48	2	142	42
67	2	146	51
29/30	2	160	60
18	2	161	51
41/42	2	165	70
68/69	2	172	43

44/45	2	199	86
23	2	215	75
3	2	253	82
37/38	2	275	65
39	2	280	108
26/27	2	304	124
31/32	2	319	139
35/36	3	345	155
54-56	3	366	58
11	2	449	222
17	2	453	122
50-52	3	475	91
75/76	2	638	184
22/24	3	756	226
79/80	2	1358	763

Figure 8: Scatter Plot Demonstrating the House-Courtyard Relationship in Aliabad¹



¹ Excludes the 78/80 household point to increase the scatter plot's clarity.

2.2. Darnaj

The 50 to 300-year-old non-walled village of Darnaj, located on the east bank of the Euphrates River in eastern Syria, is populated by roughly 1500 people (Kamp 1982:19). The village's residents are Muslim Arabs from the Bu Hasan tribe; hence its society is organized by a sheikh-based hierarchal system. Also, 10 percent of the village's inhabitants are nomadic (Kamp 1982:22,24). The settlement is scarcely vegetated due to low annual precipitation of below 250 ml, and experiences cool to cold winters and scorching summers (Kamp 1982:20). Lastly, the village's settlement pattern is dispersed.

Regarding the village's rooms, since land is expensive, only wealthy families can afford to possess larger living spaces (Kamp 1982:91). In Darnaj and other areas throughout the Middle East, it is deemed "necessary for the co-residing conjugal family units of multiple and polygynous families to have individual sitting or goods storage rooms. Since by local economic standards, mudbrick houses are affordable, all households are able to respond to this perceived architectural need" (Kamp 1982:147). Mudbrick architecture is after all inexpensive.



Figure 9: Map Showing the Location of Darnaj, Syria (Kamp 1987:285)

It seems sensible that wealthier inhabitants would possess larger dwellings with more and larger rooms. While this appears to be likely, and Darnaj's wealthier residents did inhabit more land, they did not possess more rooms (Kamp 1982:317). Moreover, "the fact that room area, but not number, relates well to household size may imply that larger households tend to have slightly larger and in a few cases more rooms than smaller households" (Kamp 1982:115).

Rooms at Darnaj consisted of various types: animal/pen rooms, living rooms, sitting rooms, kitchens, guest rooms, goods storage rooms, and hay/grain storage rooms, while room sizes differ within and between single compounds (Kamp 1982:136). Living rooms and guest rooms were the largest in size, with food storage rooms/kitchens possessing a similar size though displaying a “bit more variability as demonstrated both by a higher standard deviation and a wider range of values” (Kamp 1982:136). Animal/pen rooms were extremely variable, very large, and had irregular shapes (Kamp 1982:136). Sitting and goods storage rooms were relatively large at around 20 m². Kitchen and hay/grain storage rooms were relatively small at around 6 to 10 m² (Kamp 1982:253). Animal/pen rooms and hay/grain storage rooms had no windows, and were also the only rooms that did not open onto a central courtyard (Kamp 1982:253,274). This would likely be the case with the satellite-derived sample as well.

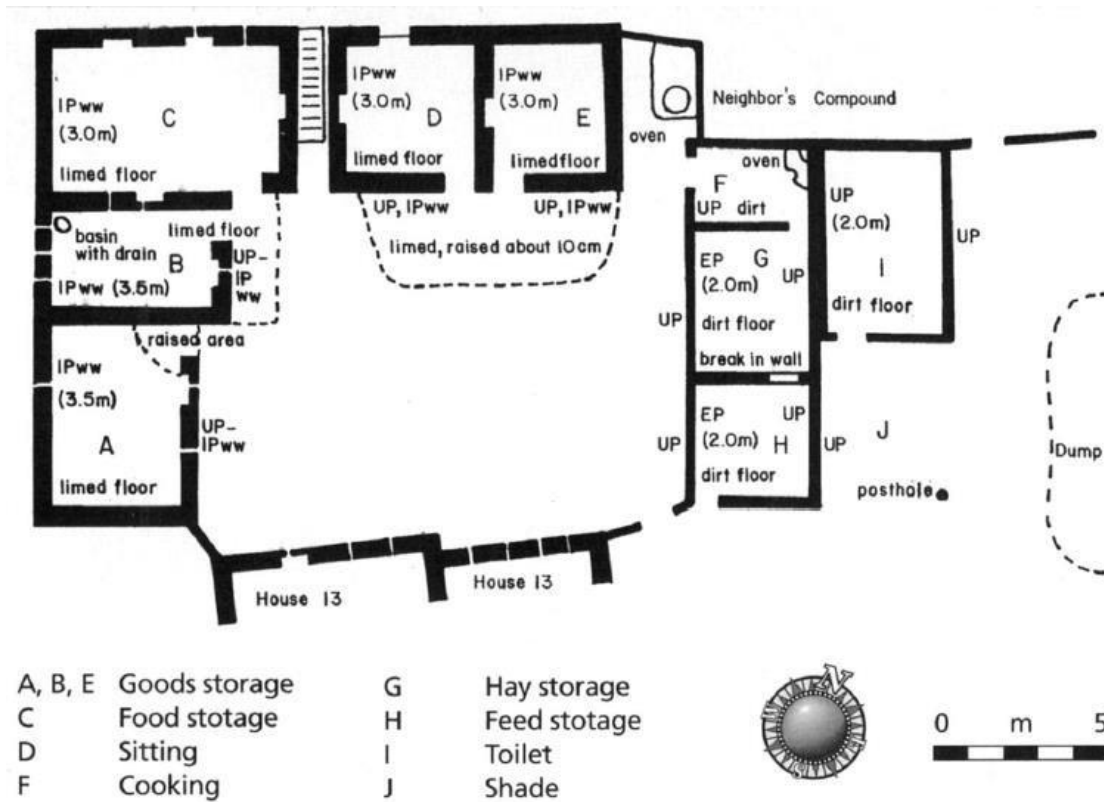


Figure 10: An Example of a Typical House in Darnaj (Kamp 2000:86)

In regard to room-to-room proximity in each house, the “ease of access from one room to another is also affected by room function in a manner that reflects the frontstage-backstage dichotomy. Animal rooms and hay/grain storage rooms usually cluster together in one area of the compound, while rooms designed primarily for occupation by humans form another cluster” (Kamp 1993:35). This is important to note, because I see this pattern of clustering of small rooms usually in the central area of households in the satellite-derived data, which makes sense since they were storage rooms and did not need light, while rooms tend to form in areas surrounding the middle courtyard or storage rooms, as they did need light from windows, doors and courtyards. This applies to settlements from both the Sasanian and Early Islamic periods in the satellite imagery, further demonstrating how effective it is to compare the ethnoarchaeological parallels of Aliabad and Darnaj to the villages of rural southern Iraq.

Darnaj's compounds show considerable variation, with a mean of 495.5 m² and a standard deviation of 260.0 m² (Kamp 1982:88). As seen in the Pearson correlations between wealth and household size and area of courtyard in Figure 10, the courtyard area in Darnaj correlates with total compound area and household size (Kamp 1982:95). It also correlates with household wealth and thus supports a wealth-courtyard relationship as is in Aliabad, which is predicted to be due to expensive land prices (Kamp 1982:95). The solidest correlation however is between wealth and total compound area, which corresponds positively and is similar to Aliabad with its high-wealth compound correlation (Kamp 1982:334). Darnaj's compounds show considerable variation, with a mean of 495.5 m², standard deviation of 260.0 m², and range of sizes from 137 m² to 1500 m².

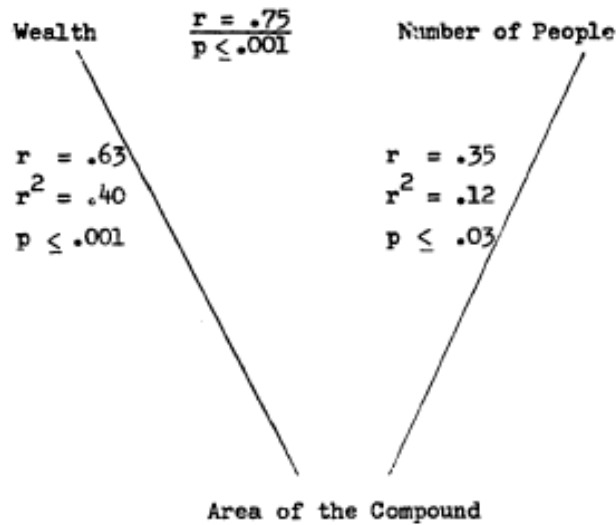


Figure 11: Pearson Correlations between Wealth & Household Size & Area of Courtyard (Kamp 1982:96)

Kathryn Kamp, author of *Architectural Indices of Socio-Economic Variability: An Ethnoarchaeological Case Study from Syria*, states that, “An examination of the different ways that architecture and artifacts are treated suggests that architectural remains will reflect their social context much more accurately than artifacts, and should, thus, be better indicators of household socio-economic characteristics” (Kamp 2000:91). This serves the purpose of this thesis well, since architectural remains shown in the satellite imagery is the only safe way to analyze the rural southern Iraqi settlements.

It is noteworthy that in Darnaj three compounds are far bigger than the others, with two of them the village's wealthiest, while the other is one of the community's five wealthiest members (Kamp 2000:91). Lastly, the number of sitting/goods storage rooms usually account for around a third on average of the total number of rooms (Kamp 1987:284). This is the percentage that needs to be kept in mind when looking at rooms in the following satellite-derived data.

2.3. Comparing Aliabad and Darnaj: Implications for Analysis of Ancient Settlements

The anatomy of these modern-day villages is important, as we can use their comparison to better understand the Sasanian and Early Islamic settlements. Aliabad and Darnaj, like most modern-day rural settlements "lacked evidence of planning", but were also "divided into blocks or quarters, and some may, on superficial inspection, look planned, particularly where there are only two blocks, one on either side of a river or road" (Kramer 1983:349,352). Most of the settlements examined via satellite-derived data lacked symmetry as well, another strong similarity to the ethnographic data. Moreover, neither Aliabad nor Darnaj is a walled village, meaning that there was plenty of land to build on, though the land as we now know was quite expensive (Kramer 1982, Kamp 2000). This was the case with satellite-derived data too. Also, they are both dispersed, as are the sites from the satellite imagery for the most part.

The villagers in Darnaj provide us the definition of wealth, which is holdings in land and animals, and per Kamp and Kramer, is common in the rural Middle East. Moreover, "distributions of compound size in Darnaj and Aliabad have similar shapes, both with several outliers corresponding to the wealthiest individuals. Average compound area is much greater in Darnaj, however, probably reflecting the dispersed layout of the village and hence the relative availability of building land" (Kamp 2000:92). Darnaj's dwelling compounds range from 137m² to 1500m², while Aliabad's are much smaller at 20m² to 400m² (Kamp 1982:88, 2000:92).

Another way Aliabad and Darnaj can be compared is within Blanton's framework of core and periphery communities. The classification system focuses on the economic workings of those communities, with periphery households exporting more labor, producing weaker developed market structures, and smaller less complex "basic" houses than their core counterparts (Blanton 1994:138,154,177). Aliabad and Darnaj share similar characteristics, including the satellite-derived data, as the Sasanian and Early Islamic settlements seem to have had an external economic orientation, as they focused on long-distance trading with commercial transactions being more "spatially diffused" (Blanton 1994:173,178).

According to Blanton's classifications, Periphery One was the "most easily classifiable periphery communities" as opposed to Periphery Two, and Core One, the "obvious rural core villages" as opposed to Core Two, where his Southwest Asian communities had "linkages to urban centers take place via landlords primarily, and through markets only secondarily" (1994:155). Consequently, both Aliabad and Darnaj were periphery two as they were "less clearly classifiable or are found in areas that at the time were undergoing a transition from peripheral status to core status, as core like market systems expanded into previously marginal regions" (Blanton 1994:155). Additionally, both villages primarily exported labor, rather than produce low-order commodities for sale in local markets of the interlocking type (Blanton 1994:157).

Were the following Sasanian and Early Islamic sites in the satellite imagery peripheral villages or core? While I cannot be completely sure until there is excavation data for the settlements, it seems likely that they were peripheral. The Sasanian and Early Islamic settlements share not only similar spatial patterns to those of Aliabad and Darnaj, but also the small less complex basic housing, as seen in the satellite imagery. Their market structures also seem to be not as developed. Overall, Blanton's classification system applies quite well to the ethnoarchaeological and satellite-derived data.

It may also be possible to determine whether government policy and the political situation of the time might shed light on whether these sites definitely shared a peripheral designation with Aliabad and Darnaj, which would provide additional grounds for inference. Only the core communities in Blanton's study displayed a substantial leaning towards an emic concept of shared poverty. Darnaj and Aliabad did not show this strong tendency, maybe indicating they were not *that* equal socio-economically. It is feasible then that the rural Early Islamic settlements from the satellite-derived data also did not show this tendency because they are so similar to Aliabad and Darnaj.

In regard to the Muslim Arab conquerors' settlement patterns, I have suggested before that the political scene at that time would significantly impact the settlement pattern by the conquerors within the villages. This pattern could be perceived through their impact on the economy, (i.e. wealth variation within household differentiation). Thus, the following is critical to take into account:

In peripheries, commercial transactions are more spatially diffuse and more likely to be based on various kinds of external contacts working at a distance, including trade partnerships, connections to government officials, family members residing in distant urban centers, and so on, in addition to the market system per se [also] network ties are much more subject to monopoly control by wealthy and influential periphery households, a situation that could produce and reproduce wealth inequality within communities. (Blanton 1994:178)

The above-mentioned piece from Blanton supports my hypothesis in that just as how urban centers in southern Early Islamic Iraq were affected by rising economic inequality levels, so were their rural counterparts. Aliabad and Darnaj are peripheral, as were the rural settlements I chose also likely to be. Blanton's household comparison models and approaches therefore can be used within this thesis's context. Another relevant excellent part of his work states that:

A comparative political economy of rural-urban linkages is indicated by the introverted, simple houses of the Southwest Asian ... communities, new households are readily established in inexpensive but socially acceptable houses that are built of locally available materials, almost always employing household or local-community labor rather than specialists drawn from outside the community. (Blanton 1994:196)

This is noteworthy, as it shows the ease with which the incoming Muslim Arabs could settle among the existing populace, providing additional motive for their immigration.

In conclusion, the ethnoarchaeological data provides this thesis excellent parallels to be utilized for comparison purposes, specifically with analyzing the satellite-derived data. Aliabad and Darnaj have proven to be quite similar to not only the sites I have chosen in the imagery, but the other sites I chose for the excavation data. Additionally, these modern sites have provided a context for better understanding the Sasanian and Early Islamic settlements from the satellite imagery, with a plethora of information, such as households' layouts, various room functions, the organization of courtyards, and perhaps most importantly, their economies.

3. THE SASANIAN ERA

The Sasanian Empire, lasting from 224 to 651 CE, was the last Persian civilization to rule before the advent of Islam in Iraq, with its strongholds in southern Iraq, southwestern Iran, and its capital Ctesiphon, near modern-day Baghdad. The empire employed a hybrid system of governance, possessing characteristics of both a feudal confederacy, and centralized entity (Lapidus 2014:10). Grand endeavors such as the canalization of southern Iraq demonstrate the degree of centralization of the state (Lapidus 2014:10). Other examples include its hierarchal social class structures and civil administrations, and its state religion, Zoroastrianism, a faith focused on worshipping in fire-temples led by an organized priesthood (Curtis and Stewart 2008:20).

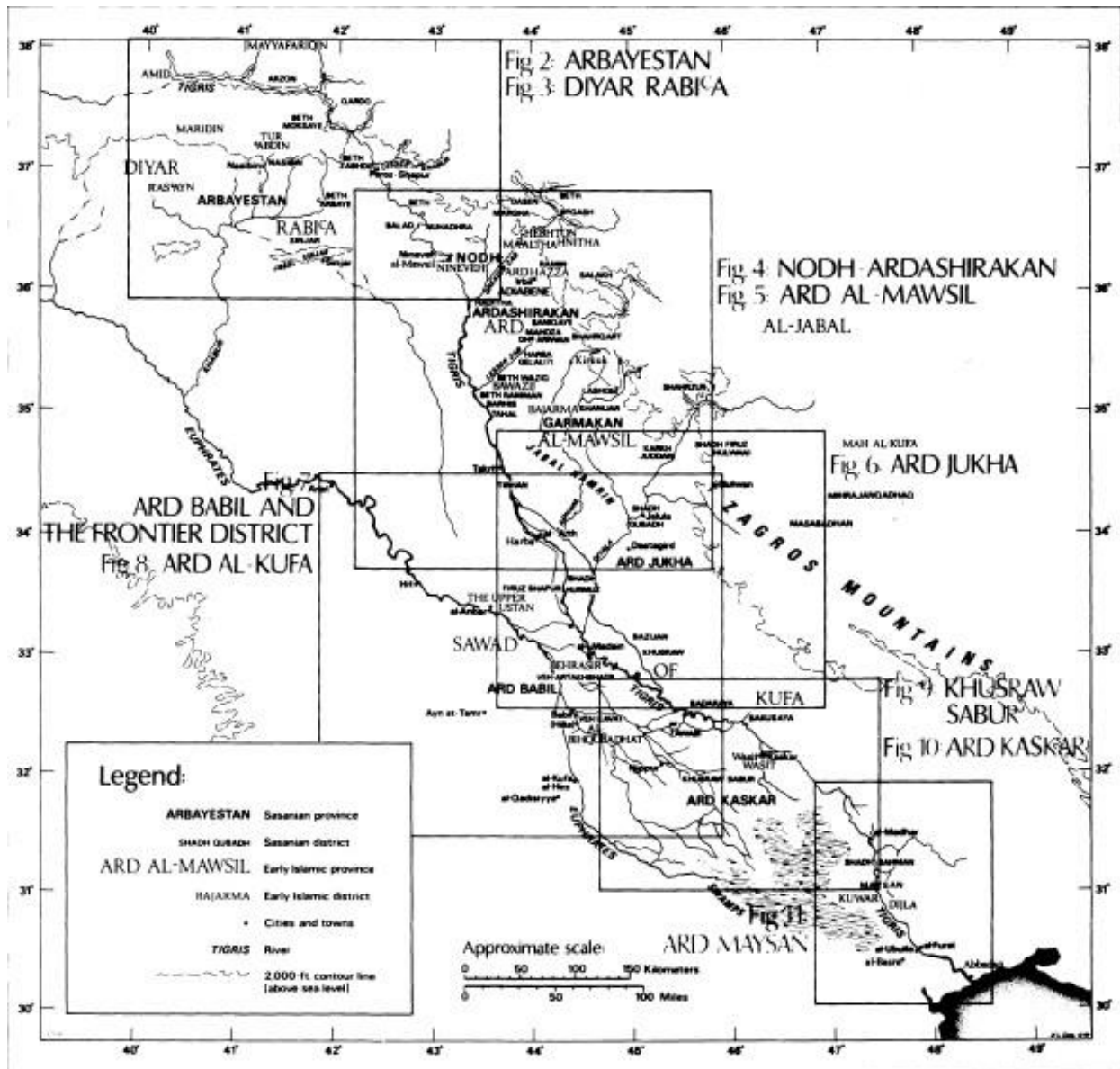


Figure 12: Map of Sasanian Iraq, 224 - 651 CE (Morony 1982:5)

The priesthood was key to the Sasanian kings' grip on power, as the monarchy strongly supported the faith and mainly employed Zoroastrians to aid them in governing the empire (Robertson 2015:151). Additionally, the high priest was a powerful figure at the court of Ctesiphon, with his hierarchal priesthood strongly allied to the centralized government (Robertson 2015:151). This further centralized society by essentially merging the political state and religious establishment to rule at the top through divine kingship (Donner 2010:20). This affected the state's socio-economic structure, as the clergy comprised part of the upper class, strictly separated from the rest of society (Donner 2010:22). Such separation likely manifested itself in settlement patterns in regard to disparate room and courtyard sizes.

On the other hand, an example of the state's confederate traits was that the Sasanian monarch, the so-called "King of Kings," termed *Shahanshah*, ruled simultaneously with aristocratic Parthian clans (Kennedy 2007:99). The clans were feudal lords deriving their nobility from the landownership of whole provinces (Lapidus 2014:10-11). The relationship between these clans and the monarch was strongly attributed to the monarch's reliance on the clans' militarily resources, for the Parthians and their workforce were crucial to the Sasanian army (Curtis and Stewart 2008:56).

Landownership is crucial to the proposed inquiries, for land management strategies would have affected the way the inhabitants settled and built the land, especially rural areas. The Sasanian landowners, the *dihqans*, were from the minority Zoroastrian Persian speaking community (Kennedy 2007:100). Most the population on the other hand were Christian Aramaic speaking peasants who tended the land and lived in serf-like conditions (Kennedy 2007:100). There was a sizeable Jewish population as well. Due to these differences in religion, language, and ethnicity, there were no religious or ethnic bonds that held landowners and commoners together, other than the lord and servant relationship (Daryaee 2012:204-205). This surely influenced the rural settlements' architecture in several ways.

First, higher economic inequality was represented in smaller room sizes among the serf-like masses, with much larger room sizes for their lords. The peasants' homes would likely be in close proximity to the wealthy landowners however, for peasants were to constantly tend to the landowners' estates. Signs to look for would be small, localized churches spread among the peasants, while the Zoroastrian temples would be farther off, but accessible to the elites, which we already know is the case (Kennedy 2007:104). Administrative buildings and their services would likely then be rendered non-existent in rural settlements where peasants lived, but function only in urban settlements close to the elite's more permanent residences.

Second, Sasanians drew much of their power from Iraq, especially the courtiers, landowners, and soldiers, bringing the region to a level of unprecedented development, and a "level of productivity never to be reached again" (Lapidus 2014:10,54). However, this was not the situation toward the end of the Sasanian era, for southern Iraq declined due to a culmination of factors. Other than the mismanagement of resources, the irrigation system was in a state of near collapse, with agricultural disasters, frequent plagues, and recurrent flooding severely damaging the region's capacities and killing sizable portions of the population (Adams 1981:205, Lapidus 2014:54-55). Then again, the fall of a civilization is a natural and inevitable occurrence.

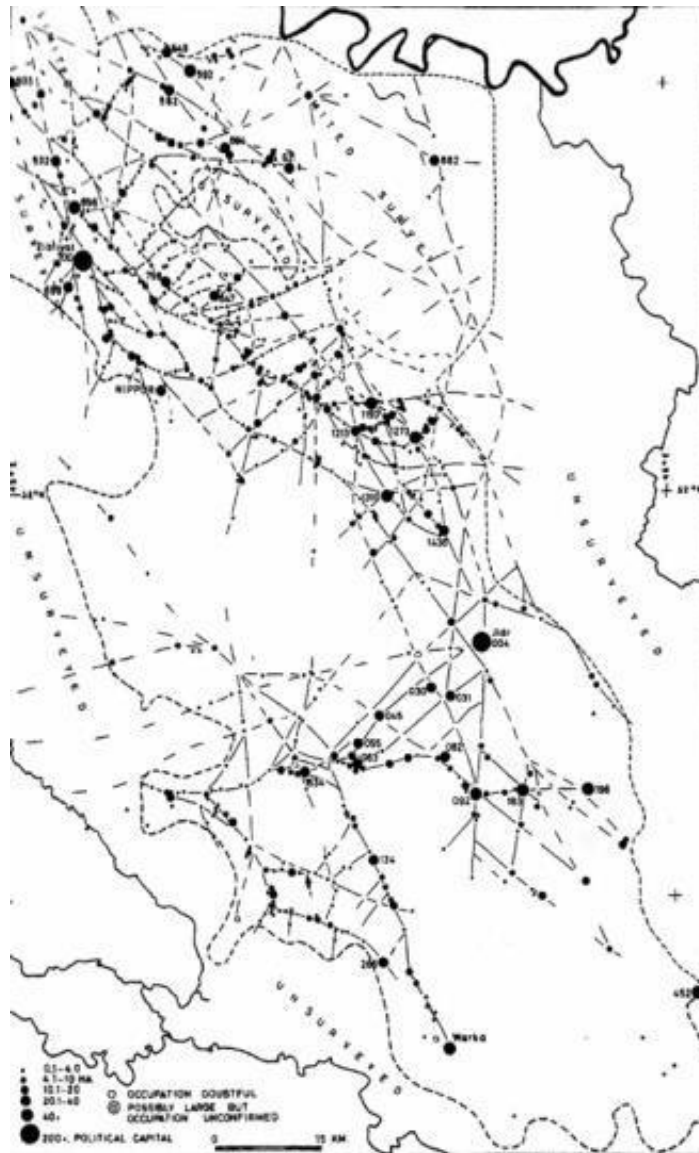


Figure 13: Sasanian Settlement Patterns of the Region Under Analysis (Adams 1981:208)

How did this demise impact the rural economy, and consequently, the economic inequality levels among rural inhabitants? What is more, is how did that economy and the inhabitants fare afterwards during the Early Islamic period? In order to answer these questions, the Sasanian empire needs to be explored, and so I shall provide a concise and relevant analysis of each component of Sasanian Iraq's society, as to better understand the settlements from the satellite-derived data, and the likely reasons for why they possessed the room and courtyard sizes they did at the time.

3.1. Religion

The majority of Sasanian Iraq's population was most likely Christian, specifically adhering to the eastern Syrian Nestorian church (Kennedy 2007:100). Their majority also put them at a position of strength, while their political maneuvers gained them an official policy of toleration in return for taxes (Morony 1984:381). This policy led to a more streamlined process to build churches, and it should be assumed that they were not only located in cities, but rural

areas as well (Morony 1984:381). Regarding Zoroastrianism in the empire, fire-temples seemed to have been placed primarily in distant isolated areas with access to just the minority elite (Kennedy 2007:100). Since the serf-like peasants worked the lands of their elitist Zoroastrian masters, who lived in grand villas and were completely disconnected from the masses, the majority of the population would not have any reason to practice Zoroastrianism.

It is known from the historical sources that the Sasanian population at the time, especially in rural areas, was predominantly Christian, and so it is expected there were churches in those areas. Especially since in such a small city like Hira archaeologists found churches amid houses (Kennedy 2007:104), which partially explains why I also cannot convincingly tell with the satellite imagery which structures may have been churches. Churches can often resemble houses, and when they do not, attempting to distinguish them in the satellite imagery is incredibly difficult. Furthermore, elite village estates were prevalent, so it is plausible that some of the sites being analyzed in this thesis may include these estates.

3.2. Politics

Palaces were seats of immense power in Sasanian Iraq. They were not only administrative centers and governors' residences, but likewise the abodes of ruling aristocracies who were rarely held accountable. The way in which palaces interacted with the public was quite limited, particularly in the countryside. This in turn created a significant disconnect between the populace and ruling class, for generally "other than with regard to rural security and irrigation, the crown's knowledge of and interest in the countryside extended little further than the extraction of the revenue" (Adams 1981:202).

In analyzing relationships of sites, Adams noted that the "proximity to the political center thus was accompanied not merely by a higher degree of settlement nucleation but by marked population agglomeration in the larger urban categories at the expense of smaller urban centers, towns, and villages" (Adams 1981:182). Scant government involvement was certainly detrimental to the countryside, because such an approach would naturally lead to less government investment in infrastructure, and thus deteriorating trade routes and loss of business. Considering this together with the animosity the peasants had toward the *dihqans*, the relationship between rural and urban settlements was probably dismal. Adams's suggested correlation between political centrality and the level of population concentration in sizeable urban centers (1981:182) can be seen in both the centralized and confederate traits of Sasanian political organization. Centralized traits such as the governing institution's concentration of powers in a very top-down society with a highly-populated state is evident. The correlation between political centralization and population concentration can also be seen in its confederate traits with the governing power's coalition structure, (i.e. noble estates, tribal leaders, Zoroastrian priesthood, royal dynasty), and the agricultural canal based economy by tying the countryside with the urban centers to a certain extent.

Lastly, "given the evidence of dense and flourishing settlements under a considerable degree of centralized control, the absence of historical and textual references to the region is curious" (Adams and Nissen 1972:62). The absence of historical references proves quite interesting, because the lack of such known documentation further supports the notion that there

were few institutional structures, (i.e. administrative palaces), in rural settlements. Since there was no mention of these settlements in the extensive known historical record, it is plausible that because of the disconnect between the urban and rural settlements, a system of institutional structures in rural areas was never substantially supported.

3.3. Economics

To better comprehend the Sasanian rural landscape in relation to my question on the satellite-derived data, and the settlement's economic inequality levels, that period's economics must first be explained. This is best commenced by citing an explanation on the basics:

The Sasanian economic landscape divides itself into two parts: on one side the domain directly under royal rule, and on the other the domain of the landowning nobility in which the central power operated only indirectly. It was in the interest of powerful, far-reaching royal control to increase the number of royal cities and their attached rural districts. This had the effect of converting indirectly ruled into directly ruled districts, and only partly taxed districts into fully covered ones. (Altheim 1962:220)

The above-mentioned quote lays out the economic landscape in a rough manner, but it provides us with a basic idea of the main actors and their roles in the Sasanian economy. While it had its issues, as any society would, for a pre-industrial society it was quite productive and generally brought about a time of prosperity for much of its residents. The strong economy was based on a robust and dependable tax base of people who derived profits primarily from agriculture, which was the main cause for its prosperity (Adams 1981:202). The tax-base had thrived during Sasanian times in southern Iraq, especially during its greatest agricultural expansion in the sixth century (Morony 2004:183). This prosperity was especially great within the region of the Sawad. Tax collection had to be fair to be maintained:

One is reminded of the Sasanian political precept that 'the [land] tax (*kharaj*) is the support of the state; nothing increases it like justice and nothing reduces it like oppression.' Enunciated already at the beginning of the dynasty, it was not only verbally reaffirmed by Khusrau I Anosharwan (531-579 CE) but seemingly brought nearer to practical implementation as a policy. On the other hand, there is reference to such a reform only for the Sawad, and it may not have been extended to the realm as a whole. (Adams 1981:201)

This practical implementation consisted of wide reforms of the empire's fiscal base regarding the taxation of all cultivable areas during the rule of Anosharwan. So, unlike before when the empire essentially depended on levying taxes on only urban landholdings which were within the immediate jurisdiction of royal control, it now applied to any other holding too, including those in rural areas (Adams 1981:201). This trajectory indicates not only that rural areas had much to offer economically to the empire as they were a largely untapped resource, but that they were previously perhaps more financially independent, and therefore politically independent from royal rule. Further economic integration created even more prosperous conditions for the Sawad as a result of such taxation reform, but indirectly then affected the realm as a whole, for towards the end of Khusrau Parviz's (590-628 CE) rule there was "an immense extension in both population and cultivated areas as compared with the most prosperous periods of earlier antiquity such as the Third Dynasty of Ur" (Adams 1981:201-202).

The ruling class in the capital always paid some attention to the rural countryside throughout the Sasanian dynasty, as it was likely to have been highly economically integrated

with the empire's cities (Adams 1981:211). This was so as indicated by a significantly sized glass making operation that took place in the countryside, suggesting that even with such long distances and tough terrain between these operational centers and the major population areas, this industry thrived (Adams 1981:211,213). This was only possible with a strong network of roads and economic interconnectedness. These networks then enabled the elites to build huge estates that had diversified production, enabling them to be self-reliant (Morony 2004:169). There seems to be at least a few of these estates present in the satellite imagery, which can be seen in more isolated houses that are relatively and excessively larger than other homes in both the sites they are a part of, and the other sites within the dataset. In late Sasanian Iraq, these estates have been described as the following:

The characteristic unit of landownership was the self-sufficient village estate with its surrounding farmland and servile tenant labor, which operated at the same time as an agricultural, administrative, and tax unit. A composite profile of such an estate is impressive. It could contain grain fields, vineyards, and groves of date-palms, its own mills and buildings, water sources, and cattle as well enjoying control over right-of-way. Such estates had been formed from the middle Sasanian period onward by the purchase of land for tax debts, land grants out of crown property, or the assignment of military fiefs. They were held by a landed aristocracy of absentee landlords who lived in towns, while agents or stewards managed their estates. (Morony 1981:166)

This would partly explain some of the settlement's dispersion patterns. This is quite revealing of the economic disparities within the population between elites and peasants, with the Sasanian sites revealing a lesser amount of these elitist estates proportionally than in the Early Islamic ones, perhaps indicating lesser economic inequality levels in the Sasanian era.

The reforms initiated by Anosharwan however seemed to have had negative consequences in later Sasanian times, as they apparently "rigidified as well as increased the burdens on the agricultural population, imposing fixed demands that in variable natural circumstances could not always be met without extreme hardship" (Adams 1981:213). Therefore:

For all the grandeur of the Sasanian economic achievement, here lay its crucial weakness. Each new expansionary step reduced rural self-sufficiency and tended to place the whole mechanism more and more at the mercy of destabilizing political forces. In the absence of any means of controlling those forces, the possibility of sudden, deep, and tragic oscillations in the supply of the basic necessities of life for great masses of the population loomed ever larger. (Adams 1981:213)

While there was economic decline in the Sasanian empire's last days, as would have occurred in parallel to the state's collapse, it was not representative of the overall Sasanian achievements regarding the prospering economy. Forces outside of the administration's control such as severe floods and reoccurring plagues devastated the agricultural system upon which the economy depended. For example, two devastating plagues occurred in the late Sasanian period before Iraq's conquest, named the "Plague of Shirawayh" in Ctesiphon from 627-628 CE, and the "Plague of Yezdigird" from 634-636 CE, during the rule of the empire's last king (Dols 1974:376).

Excluding then all non-manmade disasters, there is the issue of the Arab Islamic conquest and what role it may have played in the economic state of rural southern Iraq during the post-conquest Early Islamic period. This comparison between the two eras, how the settlements fared afterwards, and what that may mean, will be discussed in the ensuing chapter.

3.4. Excavated Data from Sasanian Sites

It has been suggested that the Sasanians aimed for an urban empire, and they were quite successful at doing so during the late Sasanian period when they had the greatest population density in the world (Daryaee 2008:39-40). Alas, due to archaeologists focusing on palaces and temples, rather than the average home, and Mesopotamia's long history of utilizing baked-brick, which is reused, or mud brick, which washes away with deterioration over time, there is a limited amount of excavation data available on the era's domestic structures in southern Iraq (Farahani 2014:6463, Wright 1969:18). Despite the general lack of ample data, there are a few examples that will suffice for this study. The data set thus consists of a housing complex in Ctesiphon, Hājīābād's manor house in Iran, and an overview of the regional city Hira.

3.4.1. Ctesiphon

The Sasanian empire's capital before its downfall by the Arab Islamic conquest in 636 CE, Ctesiphon was first excavated in 1928 CE by a German archaeological expedition (Reuther 1929:434). The expedition only lasted a couple seasons, with the next excavations taking place in the 1960's when an Italian team investigated the so-called Artisans' Quarter, seen in Figure 14 (Cavalier 1966:63). The city was established by the Sasanian empire's founder Ardashir (224-241 CE), spanning a significant 700 hectares in a strategic geographical area (Riccardi and Mancini 1985:100). It was initially established as a fortified camp on the eastern bank of the Tigris River that later hosted the royal residence (Reuther 1929:436). Ctesiphon was located in central Iraq, approximately 40 km south of modern-day Baghdad as shown below in Figure 13.

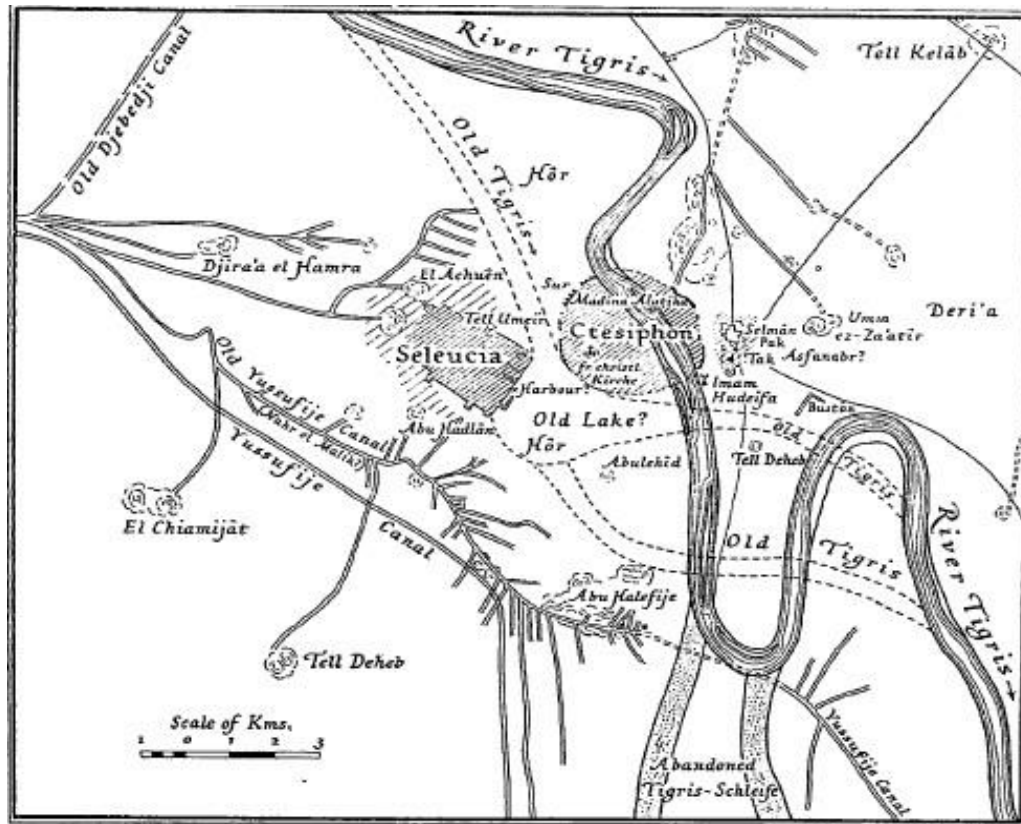


Figure 14: Map of the Sasanian City of Ctesiphon (Reuther 1929:435)

The German excavations, led by Sarre and Herzfeld, were limited and broad in nature as the mission's primary aim was to only carry out a widespread survey of the site (Reuther 1929:440). Accordingly, they did not focus on any specific parts of the site, such as the Taq Kasra palace, rather monumental architecture overall with little mentioning of domestic architecture, unlike their Italian counterparts whose mission was solely aimed at residential structures. These structures were discovered in the Artisans' Quarter, where I was able to attain comprehensive data pertaining to the rooms and courtyards of a housing complex. The layer I am analyzing, seen in Figure 15, was its surface layer, the most recent layer of habitation that was likely to be dated to the middle of the fifth century C.E., approximately two centuries before the Arab Islamic conquest (Cavalier 1966:80). The layer was badly preserved, which according to the excavators was not just due to being affected regularly by flooding, but also because “the standard of workmanship is lower.... indicat[ing] a period of decadence if not of the city, at least of this quarter” (Cavalier 1966:64). This indicates that the complex may be from a lower economic class than its counterparts within both the urban Ctesiphon; and its rural neighbors.

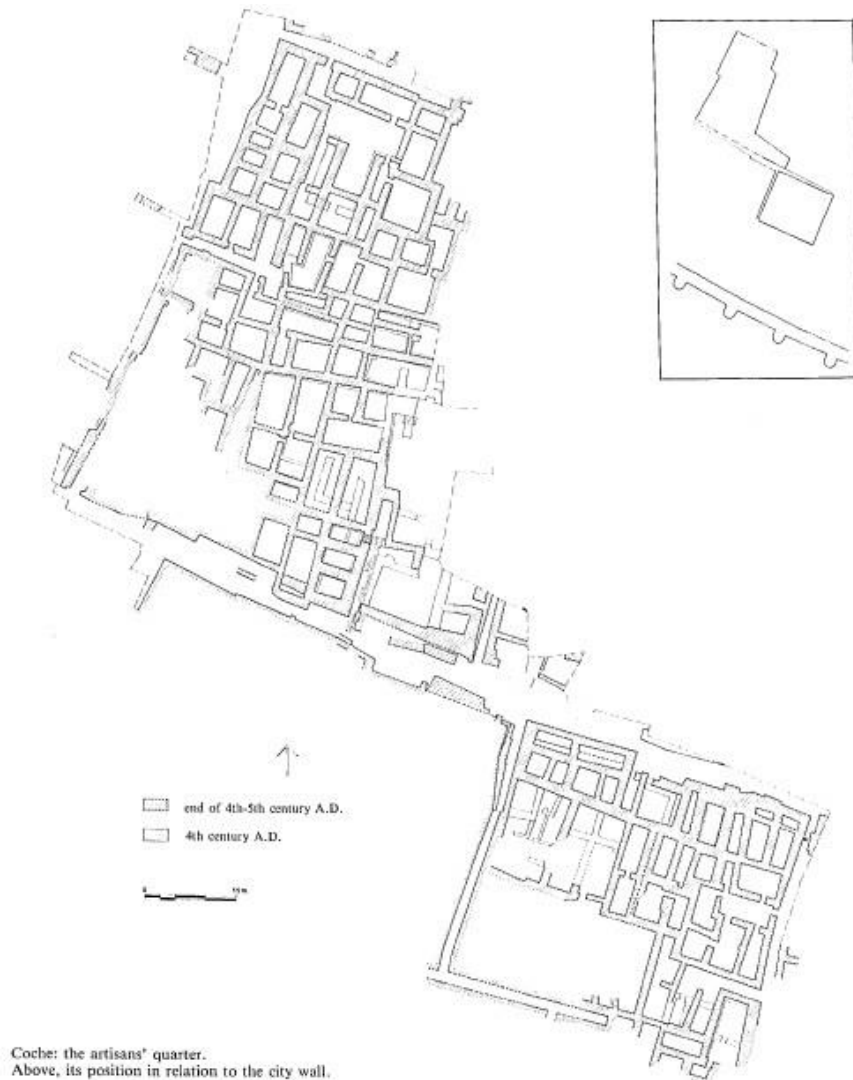


Figure 15: Map of the Artisan Quarter (Riccardi and Mancini 1985:101)

The urban housing complex under analysis was founded on a quadrangular standard, and adapted itself to the round city's circular walls (Cavallero 1966:81). The complex followed the standard Mesopotamian house plan, where a courtyard in the middle had all the rooms open onto it (Riccardi and Mancini 1985:102). The building's plan was well-defined as the doorways existed at the time of excavation, (an example of how significant doorways are for household analysis), though were mostly absent in the rest of the quarter's excavated houses (Riccardi and Mancini 1985:102).

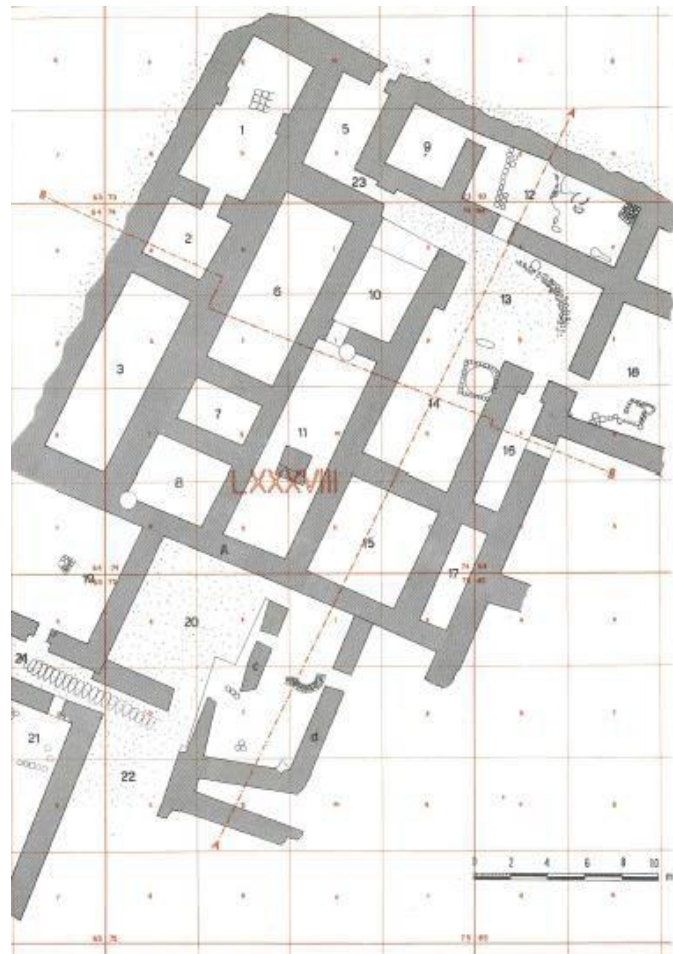


Figure 16: Housing Complex's Surface Layer (Cavallero 1966)

The housing complex consisted of several rooms and courtyards, many of them having had their functions identified. Space 13 was a 'great courtyard,' which had access to rooms 12 and 18, likely storage rooms for they both “present[ed] a series of sunken storage-jars arranged in rows, as if they were intended to store up something or be preserved or sold” (Cavallero 1966:65). Space 14 was a courtyard that was “either totally uncovered or else covered only at the end with light structure. Perhaps this was a simple roofing since inside [they] found some small fireplaces and a cistern excavated by the side of the foundations of the wall” (Cavallero 1966:65). Space 21 was also a courtyard that was probably partially covered by a light roof, and was subdivided by unbaked brick structures, further adding to the site's poor preservation (Cavallero 1966:66).

Finally, “the same building technique [was] adopted throughout the quarter and does not change with time. Buildings were always in mud brick. Baked bricks were only ever used for small functional structures such as channels, stairs or paved passages and was never used for decorative purposes” (Riccardi and Mancini 1985:102). Regarding the complex's walls, including the walls of the other structures in the quarter, they were constructed of unbaked square bricks that varied from 39 x 9 cm. to 40 x 13 cm., that fluctuated from 36-42 cm. on their sides, with a consistent thickness from 12 to 13 cm (Cavallero 1966:76).

3.4.2. *Hājīābād*

The architectural remains of *Hājīābād* are situated in the modern-day province of Fars in the southern Zagros mountains. It was likely built around 359 CE and is currently surrounded by a dry arid environment with a mean annual temperature of 20°C and infrequent rainfall, and is dependent on agriculture (Azarnoush 1994:237). The building was identified as a sort of provincial manorial center, and therefore termed the “Manor House of *Hājīābād*” (Azarnoush 1994:67). The remains of the manor house, a rectangular shaped building that has been partly uncovered, used to occupy a total of 80 m x 70 m, within the 10.00 m² site (Azarnoush 1994:39). The structure was constructed completely of mud-brick with dimensions of 37 x 37 x 10 cm (Azarnoush 1994:39).

The structure consisted of several sections that served different purposes: (A) official, (B) private, and (C) religious (Azarnoush 1994:41). While each section did serve a different purpose, they were still all a part of the quarters in which the governor resided and used, and so I will be including all rooms and courtyards for analysis. The courtyards and rooms essentially served the same purposes, (work and living), as with other domestic housing at the other settlements that are a part of this study. They host different actions, but have the same functions. *Hājīābād* has two complete residential units excavated, and part of a third. The first consists of one room, a large opening, and a courtyard, the second two rooms and a courtyard, and the third likely is to be made up of one roofed room and a courtyard (Azarnoush 1994:81).

The manor house's plan was quite similar to that of late Sasanian houses, especially their courtyards (Azarnoush 1994:90). The typical plan of a private Sasanian house was much less symmetrical than those of palaces and grand houses like *Hājīābād*'s (Reuther 1938:548). However, their houses were cohesively arranged through the incorporation of an *iwān*, with rooms behind it on a singular axis (Reuther 1938:548) The *iwān*, not to be confused with a courtyard, was a vaulted hall or space, walled on three sides with one end open, while a courtyard was unroofed and walled on four sides. Those from the upper-classes in Sasanian Iraq tended to have both *iwāns* and courtyards in their residences, while only the courtyard was ordinarily utilized by the masses due to the costs of building *iwāns*. The previously examined residential structure in Ctesiphon had a space designated as an *iwān*, although it was smaller than the average one (Cavalier 1966:79). *Hājīābād*'s excavated data on the other hand provides us examples of a typical *iwān*, although not all were roofed in such a manner, for three cases traces or indications of wood usage was found (Azarnoush 1994:55). Moreover, the absence of a domed hall in *Hājīābād*'s complex, makes it even more similar to Ctesiphon's dwellings.

Hājīābād thus proves an apt example for this thesis, especially since it was not as large scale as those dwellings and had a more rural domestic character (Azarnoush 1994:68). It was

unlike southern Mesopotamia however in that the manor house likely utilized vaults, as they usually did in Sasanian Persia due to a lack of local wood (Azarnoush 1994:55), and so they likely did not plant palm tree farms. The Sasanian *iwan* was also always likely to be roofed with parabolic vaults. While “there were varying developments of the *iwan*, the basic principle always remained the same” (Reuther 1938:547). This applied to both manor houses such as Hājīābād’s, and Ctesiphon’s houses too, for Sasanian dwellings always had the *iwan* and courtyard as main features (Reuther 1938:547). The *iwan* however was “one of the most outstanding architectonic forms of the Sasanian period and almost its symbol” (Azarnoush 1994:65).

While possessing a domestic character due to being a residential quarter, the manor house was still likely occupied by the upper class, and thus, “enables us to recognize the general pattern of Sasanian large-scale residential architecture and suggests that the Iranian aristocratic house remained remarkably unmodified for a considerable length of time” (Azarnoush 1994:92). The site’s life was brief, and its occupation was during the end of the fourth century CE, which was a time of political instability and infighting, where the King of Kings and his central government was weakened. Therefore, the site may be a good indicator of domestic architecture experiencing a decentralized society (Azarnoush 1994:238,240).

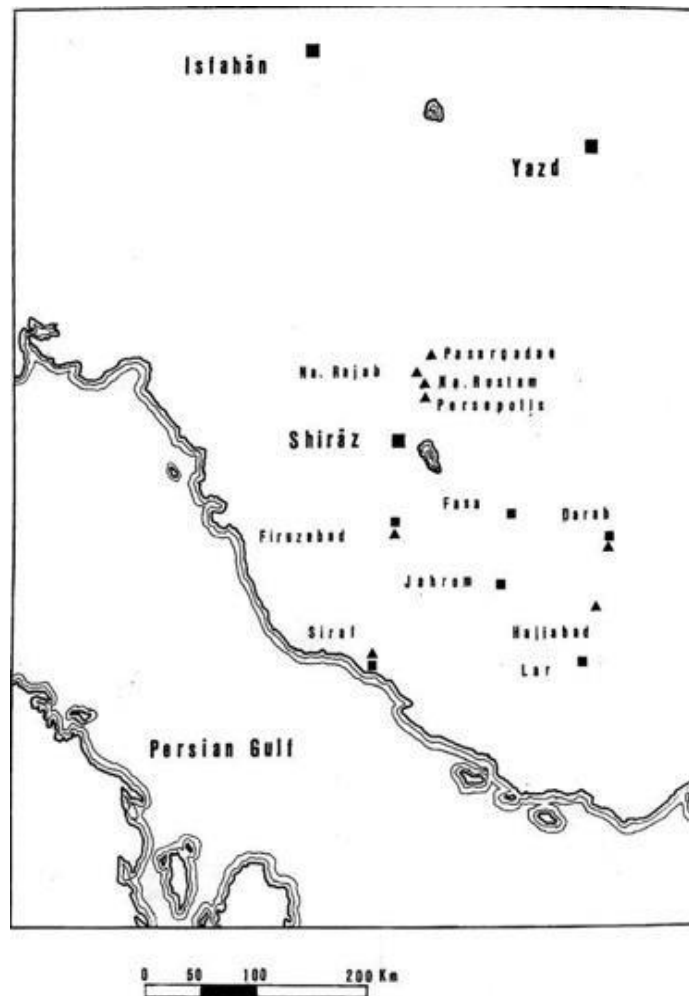


Figure 17: Map Showing the Location of Hājīābād, Iran (Azarnoush 1994:8)

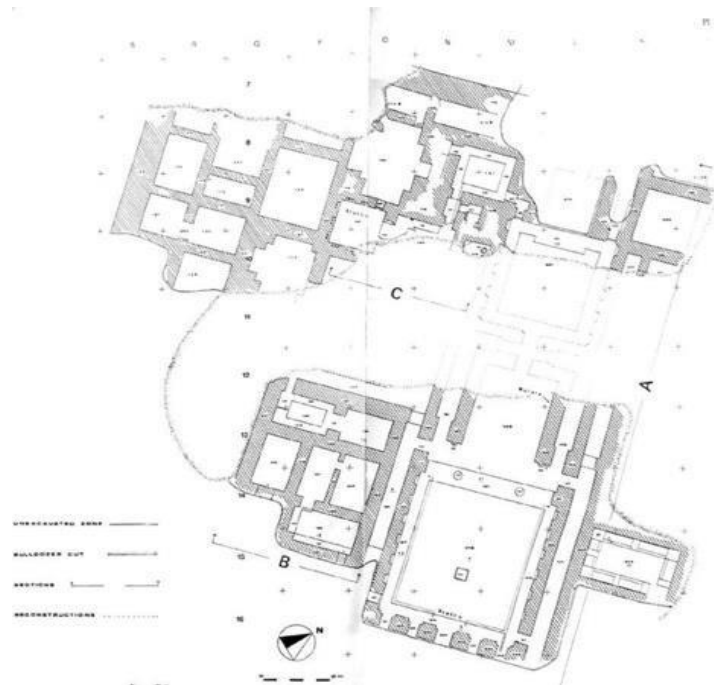


Figure 18: Plan of the “Manor House of Hājīābād” (Azarnoush 1994)

3.4.3. Hira

This was somewhat a small city in southern Iraq, with an approximate population of 30000, mostly Arabs (Kennedy 2007:104). Being a primarily Christian Arab city, of a relatively small size, the town's data is quite useful to this study as it provides various similarities to rural areas. Hira may be the excavated case closest to rural Sasanian southern Iraqi architecture, with excavations of what seemed like a sizable house, serving as an effective example of what domestic buildings would have looked like in that area, but on a grander scale (Rice 1934:51). Since the excavations at Hira were preliminary in nature, few room and courtyard statistics are available, lending Hira more of a contextual and comparative example for the purpose of this thesis.



Figure 19: Map of Hira, Iraq (Rice 1934)

That example was the aforesaid domestic structure, shown in Figure 19, which was a two-leveled structure that had a central court (Rice 1934:51). The building was described as the following: “the principal rooms were on the upper floor-those below, which were never more than cellars, being without doors or windows, had been filled before the last period of occupation.... The building had in fact been restored and reoccupied at three separate occasions, the first of them probably being well within the Sasanian period, through the last was terminated only somewhere about the end of the eighth century” (Rice 1934:52). The structure's outer walls were made of red baked bricks from the Sasanian period that's dimensions were 26 x 26 x 4 cm (Rice 1934:52). The inner walls were from the Early Islamic period, though under “direct Sasanian influence,” and made of mud bricks with 35 x 35 x 7 cm dimensions (Rice 1934:52).

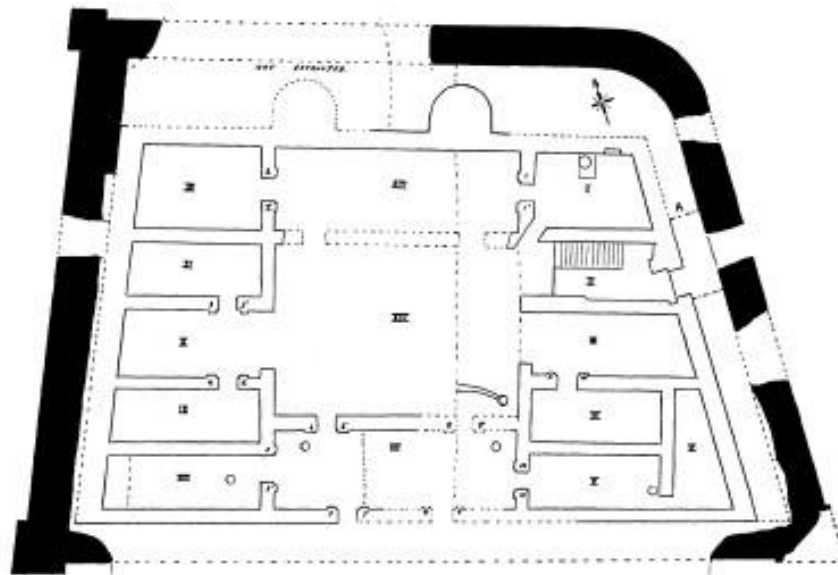


Figure 20: Reconstructed Plan of the Large House in Hira (Rice 1934:53)

Hira had many traits of an archetypal Arab city; it was oasis based, did not have any walls, and consisted of “lightly fortified houses” dispersed throughout a sizable amount of land (Niehoff 2013:117), as revealed in Figure 18. Of the 11 mounds found at the site, nine were partially excavated, with mounds one to four consisting of houses, some deemed significant as they applied both burnt and mud brick in their construction, while others that were made of just mud brick were 'unimportant' (Rice 1934:51-54). This seems similar to both the various Sasanian and Early Islamic settlements from the satellite-derived data.

The city was an excellent example of Arab-Iranian interaction, especially as it reached its climax during the Abbasid era (Niehoff 2013:115), displaying an interaction that may point towards possible immigration by the region’s new conquerors. This is so as the city of Hira, an ethnically and religiously diverse community, was a result of numerous factors such as commercial trade, which then lead to a trade of ideas (Niehoff 2013:116,118). To a certain extent it was also likely due to a state of openness within the residents’ psyche, for without a willingness to integrate with others, they would not have been able to create such a multicultural society. This city on the western frontier of the Sasanian empire then may have likely taken in immigrants from the Muslim Arab conquering communities, as perhaps many other cities and villages did during the Early Islamic period.

Hira was an urban center, but it was a small one, and part of a larger pattern of interaction that developed throughout the region from the pre-Sasanian Achaemenian times until the post-Early Islamic Abbasid period (Niehoff 2013:124). The city therefore offers an excellent conceptual bridge for the purposes of this study, as it is the only site considered in this thesis that had extensive occupation during both the Sasanian and Early Islamic periods. While not enough excavation data is attainable for the ensuing room and courtyard comparison, it is still beneficial to the study. This is exceptionally so regarding the Sasanian period due to its excavation data on that era's architectural remains. It is noteworthy then that although “the arrangement of the rooms around the central court in a series of 'baitis' following the Persian rather than the Syrian system.... Hira was probably important as a center of development for early Islamic architecture” (Rice 1934:52). This was because houses, and even palaces, during the Abbasid period were being built after the style of Hira's houses, creating a new architectural housing style called *Hiriya* (Rice 1934:52).

3.5. Sasanian Settlements Examined via Satellite-Derived Data

The Sasanian sites in question predominantly straddle the borders of the modern-day Iraqi provinces of Wasit and Qadisiya. Wasit is currently primarily desert, while Qadisiya is agricultural. The sites fall in between the Euphrates and Tigris rivers, but are predominantly closer to the Tigris. This area is located in the upper part of southern Iraq, which shares the same method of canal building due to the nature of the rivers and the amount of rainfall. Figure 20 below maps out the settlements in focus, and as one can tell, they are slightly spread out over a line, with the exception of the relatively distant Site 64.

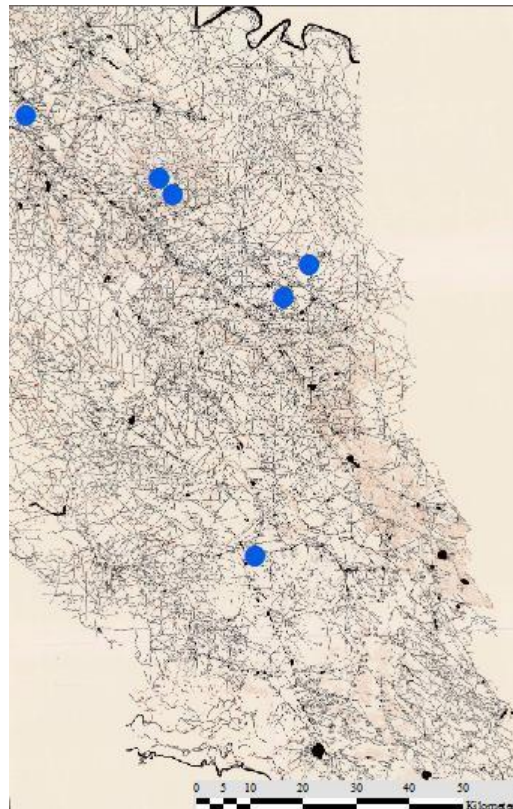


Figure 21: Sasanian Settlements Examined Via Satellite-Derived Data. From North to South: Site 532, Site 825, Site 842, Site 1167, Site 1229, Site 64 (Adams 1981:383)

The typical population center in Sasanian Iraq was a rural town that was constructed mainly of rubble masonry or mud brick, possessed irregular street plans, and was “devoid of any pretensions to civic greatness or self-government” (Kennedy 2007:99). This assertion may be because there have been no excavated or historical data pointing toward the existence of town councils. If that is so, then the following architectural tracing may confirm or invalidate that claim by spotting possible institutional architecture. Moreover, it has been claimed that Sasanian sites generally consisted of a walled city center, that functioned as a focal point for manufacturing and trade, and likely including a fortress as well (Kennedy 2007:99). As with the former assertion, this claim will be analyzed.

Since archaeological excavations have played such a minimal role in interpreting Sasanian society (Farahani 2014:6463), digital technology will be employed to fill some gaps in the record. This will be done by tracing architecture in Sasanian rural settlements in southern Iraq.

Regards the Sasanian rural areas in question, six sites, numbered according to the survey in Adams’s *Heartland of Cities* and *The Uruk Countryside*, will be analyzed:

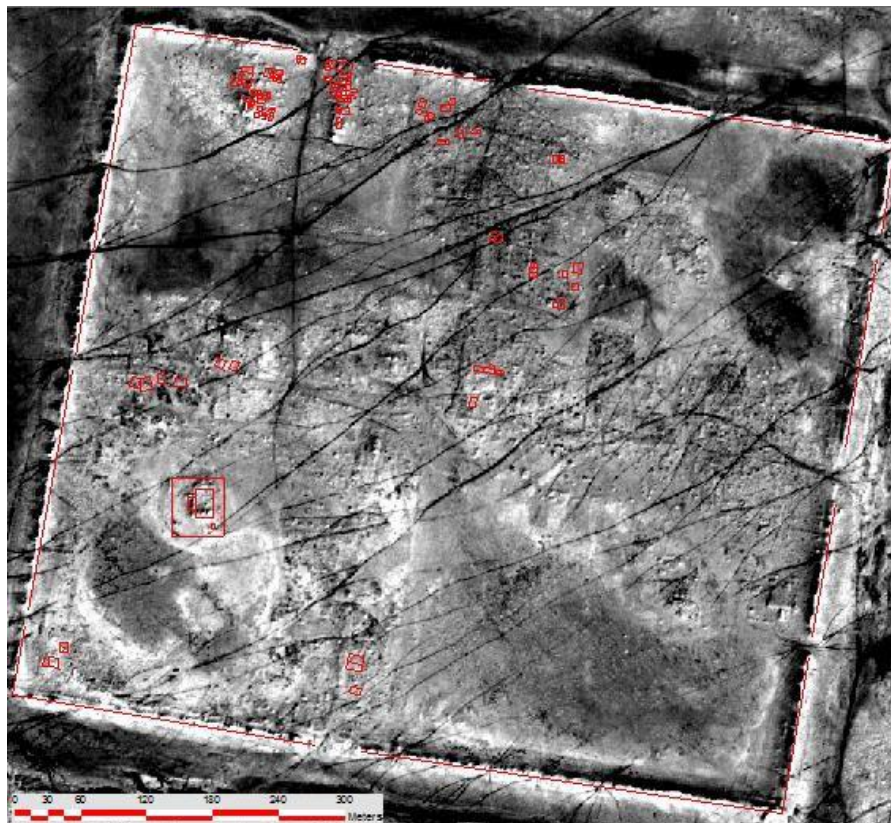


Figure 22: Site 64

3.5.1. Site 64

Some general knowledge on Sasanian sites is that they were generally square shaped and fortified, a result of long wars with the Byzantine Empire. A great example of this is Site 64, also known as Tell al-Dhiba’i’ or Medina. The site provides evidence of planned monumental

construction, which remarkably survived a “millennium and a half of wind and rain erosion,” attesting to its impressive quality (Adams and Nissen 1972:62). In addition, since it was positioned “downstream of the apex of the main canal system as it fans eastward, [it] may have been intended in part to house a protective garrison for a crucial, and vulnerable, point in the irrigation system” (Adams and Nissen 1972:62).

A square, walled town, 700 m along each side, oriented slightly east of north. The wall is composed of large mud bricks; traces along west side, show that it was originally 7 m thick. Its present summit is marked by a regularly spaced series of hillocks rising to 3 m. These may be indications of close-spaced semicircular buttresses, although no conclusive evidence for this could be detected on the surface. There are low places in the outer wall, suggesting gates, in the middle of the north, west, and south sides. Within the enclosure are scattered building remains, but they may at least in some cases be later than its period of primary construction and use, since they do not appear to line up with each other or anything else. Baked fragments (26-28 cm² and 30-31 cm²) outline these fairly sparse remains, but do not appear elsewhere on the surface within the enclosure. Moreover, roughly a third of the area, in the southeast corner, essentially lacks any surface debris at all. Glazed pottery is rare, and all observed classifiable types were Sasanian quality. (Adams and Nissen 1972:222)

Adams’s analysis is mostly correct. However, after tracing the architecture digitally I found gates on the eastern side too, and gates that are located throughout each side, not just in the middle. While Adams’s analysis was accurate in respect to the southern gate, there are three gates on the north, east, and western sides, spread throughout in distance. It is interesting that a fortress town such as Medina has so many gates, yet the significant size of the settlement would require easier access to better facilitate trade with other settlements, and more importantly, more effectively and quickly bring in supplies from various directions if ever under threat. Additionally, the most northwestern part of the site is concentrated with architectural remains that possess quite small sized rooms in comparison to both the rest of Site 64, and the ensuing Early Islamic sites. It seems then that they might actually be barracks, especially since they are located right next to the northwestern gate, conceivably for easy movement. The southeastern part of the site has a large outer courtyard enclosing a room it seems, feasibly the residential quarters of a high commanding officer.

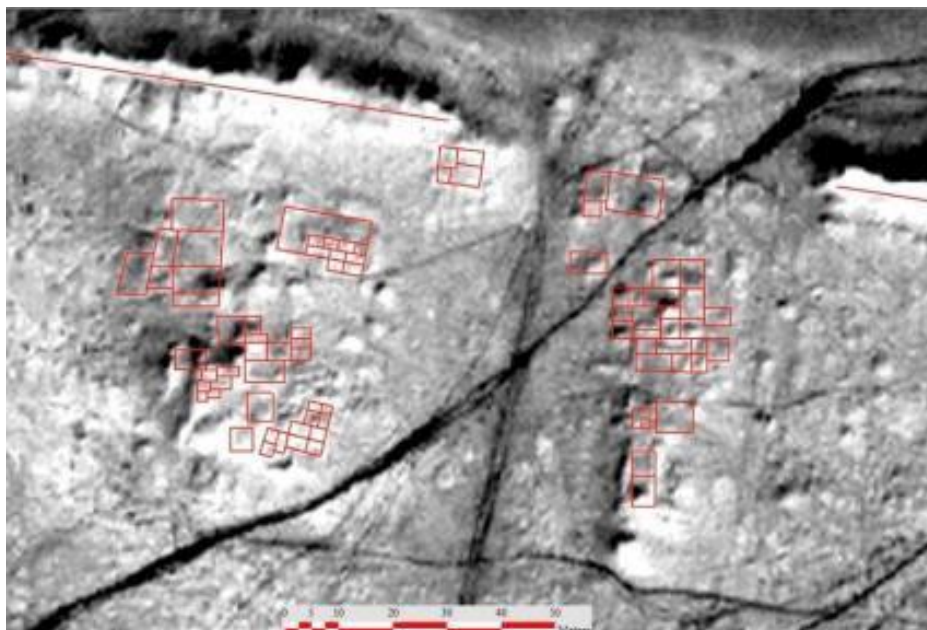


Figure 23: The Northwest Area of Site 64

The site has potential in relaying additional architecture, but these details are obscured by numerous and widespread looting holes, remaining debris littering the site, and generally rough surface area, making it difficult to trace much of the architecture (Adams 1981:233). Additionally, since settlement is scattered across several semidetached mounds, with some corresponding decline in density, its estimated occupational area of 10.00 ha causes a high level of uncertainty (Adams 1981:233). So, while we can estimate total site size to be 43.00 ha via the satellite imagery, it seems that around only 25% of the site was actually occupied, confirming Adams's estimate. However, without higher resolution data, a more extensive survey of the site, and excavations, locating much of the other than already traced dwelling spaces, will be impossible. Lastly, as Adams has noted, much of the architectural remains do not seem to line up, both confirming his theory that significant amounts of the structures are from different periods, and further complicating my analysis to determine Sasanian era rooms and courtyards.

Medina is a great example of centralization, characteristic of Sasanian power and organization, with troops under Persian commanders positioned at similar garrisons in key fortifications. This was part of a defensive pattern, signifying a region planned and part of an “immensely larger imperial unit” (Adams and Nissen 1972:63).

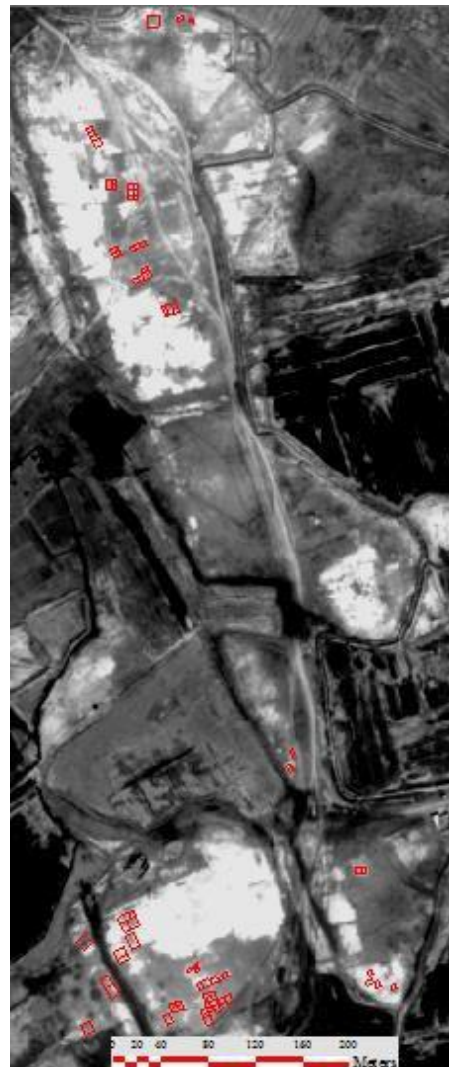


Figure 24: Site 532

3.5.2. Site 532

“At least 1,000 NNW X 250, with numerous semidetached mounds rising 3.5-4.0 and a few smaller, conical mounds to 5 m” (Adams 1981:254). The estimated occupational area of Site 532 is 25.00 ha (Adams 1981:233). Site 532 is one of the few settlements in the data sample that surpasses the 10.00 ha maximum per Adams's criteria for non-urban settlements.

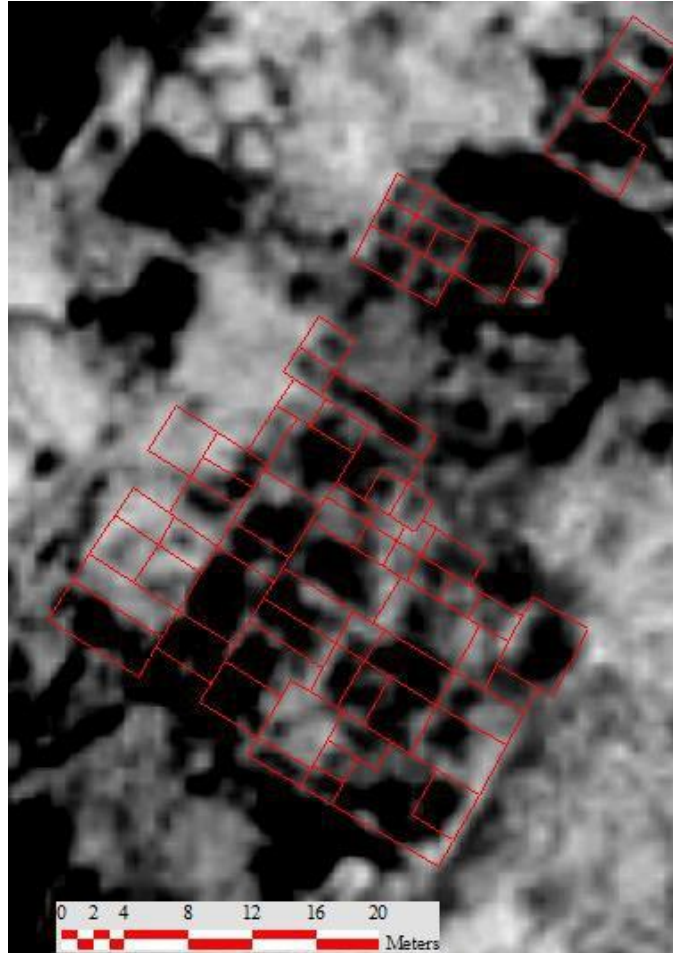


Figure 25: Site 825

3.5.3. Site 825

Adams designates the principal mound as 110.00 meters in diameter, while the adjacent SSW is a second mound measuring 90.00 meters in diameter (Adams 1981:263). Unfortunately, the second SSW mound could not be traced for architecture due to a lack of clarity. The estimated occupational area of Site 825 is 2.00 hectares (Adams 1981:233). The satellite imagery confirms this estimate, with it roughly being two ha. The average for the entire site's room size, based on the mound that was analyzed, is 8.51 m².

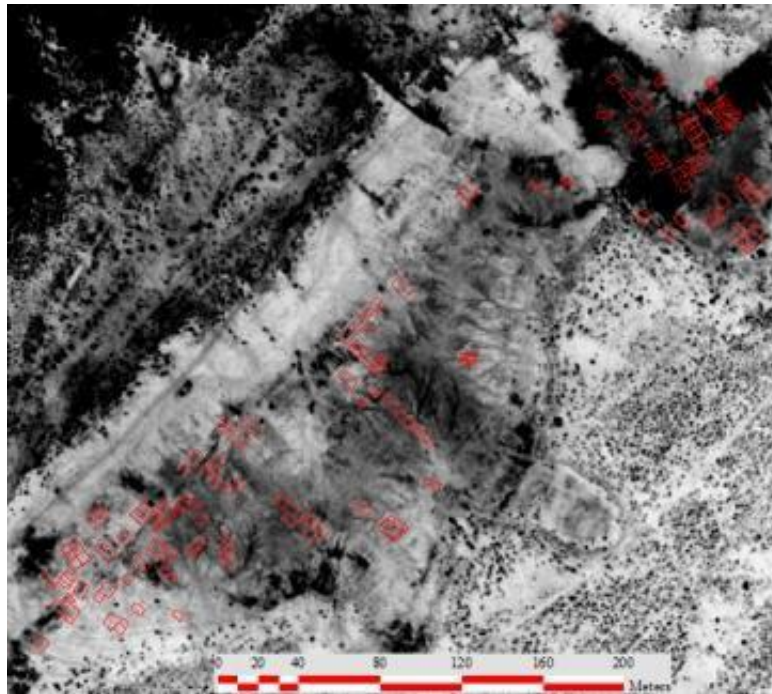


Figure 26: Site 842

3.5.4. Site 842

“750 NW X 200 X 2.8. 200 m SW is a second mound, 280.00 diam., the elevated part of the mound forming a c-shaped ring open to the SW” (Adams 1981:264). The estimated occupational area of Site 842 is 18.90 ha (Adams 1981:233). According to the satellite imagery however, it is roughly 6.50 ha, a striking difference. I am not sure as to why Adams’s estimate is three times the amount of what shows up on the satellite imagery, especially since his estimate was not stated with a high level of uncertainty. While Adams’s estimate is almost twice as much as what is considered urban, the estimated occupational area after utilizing the satellite imagery shows that Site 842 is in fact below his 10.00 ha minimum for urban sites, and is therefore rural.

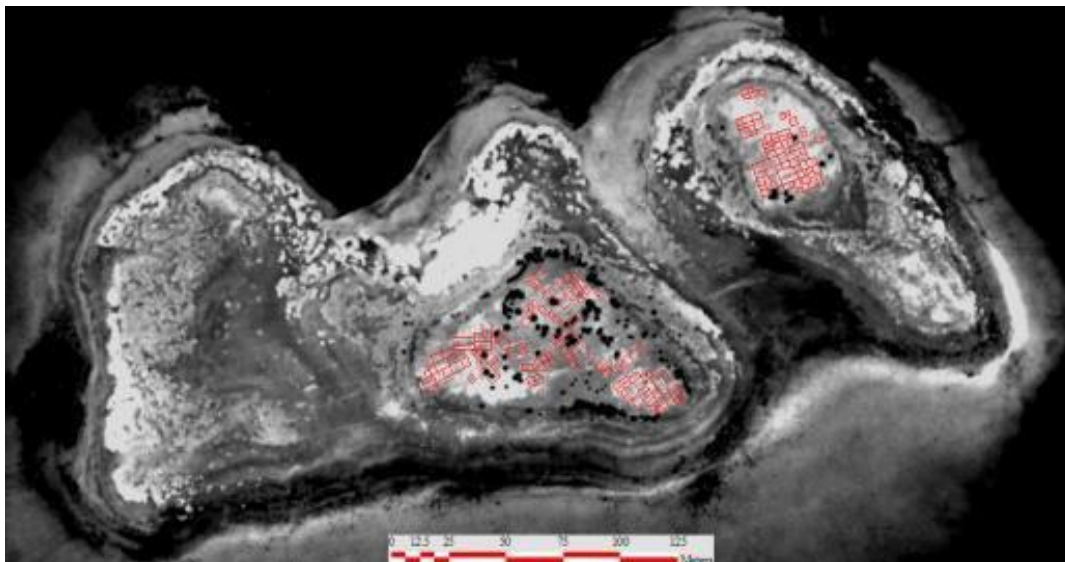


Figure 27: Site 1167

3.5.5. Site 1167

Adams designates the site as 280 NE x 60-80 X 0.6 (Adams 1981:275). The estimated occupational area of Site 1167 is 2.00 ha (Adams 1981:233). The satellite imagery further cements this estimate, as it is also around 2.0 ha.

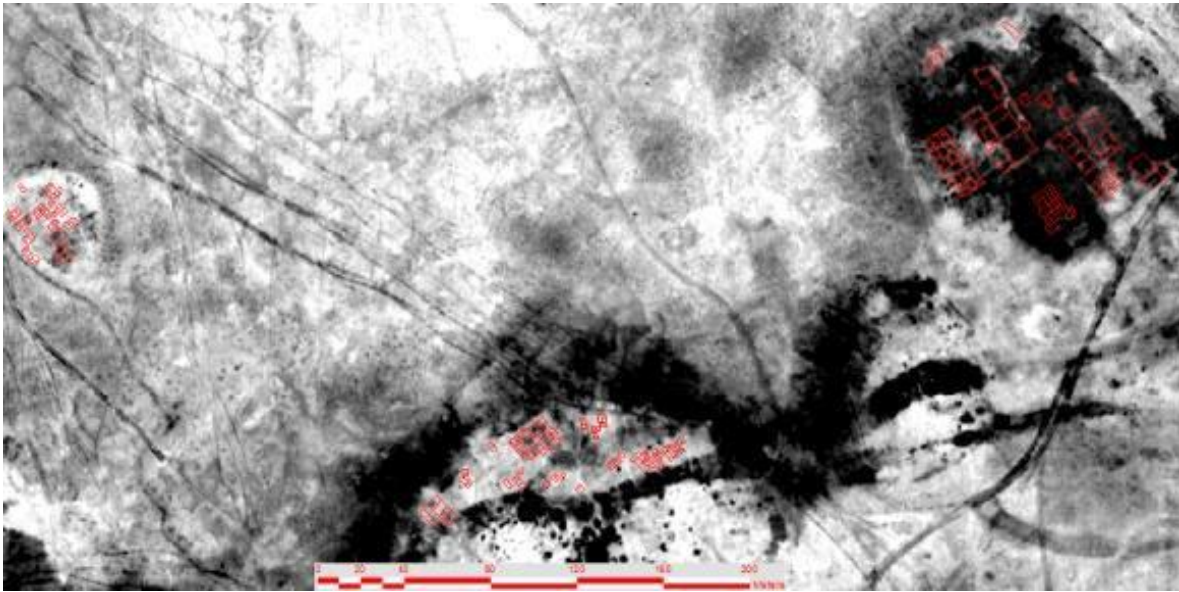


Figure 28: Site 1229

3.5.6. Site 1229

“Eight semidetached mounds in an area 700 NE X 450. The largest and highest, in the SW and SE, rise to 4 and 4.5 m respectively” (Adams 1981:276). The occupational area of Site 1229 is approximately 16.00 ha, an estimate with a high level of uncertainty, due to settlement being scattered across several semidetached mounds, and with corresponding decline in density likely (Adams 1981:233). Although according to the satellite imagery, Site 1229 is approximately 10.00 ha large, 6.00 ha more than Adams’s estimate and thus justifying his high level of uncertainty.

3.6. Results of Satellite Imagery Analysis for Sasanian Sites

The results from the standard deviation and Gini coefficient calculations of rooms and courtyards of the excavated and satellite-derived Sasanian settlements have contributed to further understanding Sasanian occupation in various ways. As seen in Table 3 for example, the satellite-derived data fits within the range of the excavated data, supporting my analysis of architectural traces in the high-resolution imagery. What those ranges reveal to us is first and foremost a confirmation of what we already know about rural southern Iraq during Sasanian times. In relation to the excavation data, a comparison of the housing measurements from Hājīābād to Ctesiphon, within the context of the satellite-derived data, reveals that while rural and domestic in nature, the manor houses’ inhabitants were indeed from an upper economic scale. Its higher standard deviations and Gini coefficients in comparison to the others therefore provides an excellent benchmark. Much more domestic housing data is needed however for a more comprehensive examination of rural southern Iraqi Sasanian occupation.

Table 3: Standard Deviations of Room Sizes between Sasanian Sites

Site	N of Sites	N of Rooms	Median	Low S.D.	High S.D.	Mean S.D.
Ctesiphon	1	14	23.06	-	-	8.74
Hājābād	1	8	13.25	-	-	13.10
Satellite derived sites	6	261	10.98	4.06	15.84	9.81

Table 4: Gini Coefficients of Room Sizes between Sasanian Sites

Site	N of Sites	N of Rooms	Low Gini	High Gini	Mean Gini	Low Room Size	High Room Size	Mean Room Size
Ctesiphon	1	14	-	-	0.22169	9.75	35.00	22.40
Hājābād	1	8	-	-	0.32715	9.24	44.16	20.79
Satellite derived sites	6	261	0.24627	0.33592	0.34792	3.26	75.44	13.50

Table 5: Standard Deviations of Courtyard Sizes between Sasanian Sites

Site	N of Sites	N of Courtyards	Median	Low S.D.	High S.D.	Mean S.D.
Ctesiphon	1	2	32.63	-	-	3.34
Hājābād	1	5	15.91	-	-	31.78
Satellite derived sites	6	33	25.17	3.56	23.10	17.14

Table 6: Gini Coefficients of Courtyard Sizes between Sasanian Sites

Site	N of Sites	N of Courtyards	Low Gini	High Gini	Mean Gini	Low Courtyard Size	High Courtyard Size	Mean Courtyard Size
Ctesiphon	1	2	-	-	0.05172	29.25	36.00	32.63
Hājīābād	1	5	-	-	0.42441	14.04	96.60	34.38
Satellite derived sites	6	33	0.07405	0.24627	0.24927	13.54	84.55	31.38

Meanwhile the excavation data in both the Sasanian and Early Islamic sections of this paper provides us parallels to the satellite-derived data, and therefore can be used to better interpret the imagery. The information we have on certain rooms in the excavation data can be applied to rooms that are of similar sizes, in similar locations, and similarly oriented. The sizes of rooms can help us determine which rooms are what in the imagery as well. While this is all possible, it was still quite difficult, and the excavation data was primarily utilized to provide context to similar dwellings in a similar period. It aims to help myself, and the reader, to better understand and visualize the settlements under analysis in the satellite imagery. It did have a strong impact however on how I determined what were rooms and what were courtyards in the satellite imagery. Subsequently then, along with the ethnoarchaeology data, the excavation data helped me differentiate between these two interconnected yet separate entities and determine which ones were which in the imagery. Finally, once the Early Islamic satellite-derived data has been analyzed in the ensuring chapter, with comparison, we will truly comprehend the Sasanian satellite-derived data at hand.

4. THE EARLY ISLAMIC ERA

The Muslim Arab conquerors of the Hijaz ushered in a new era of rule in southern Iraq. This started as a result of highly coordinated conquests, with a centralized control center in Mecca for all military movements in Iraq, such as those of the general Khalid ibn Al-Walid, and his orders to the veterans from the Yarmouk battle to link up with other forces from southern Iraq at Al-Qadisiya (Donner 1995:353). The conquests were therefore quite centralized, with the future leaders of Iraq mostly stemming from key Hijazi towns such as Mecca (Donner 1995:360). Another example of centralization is seen in its tax arrangements, a trait that extends into the period's administration (Donner 1995:357).

This Early Islamic administration encompassed a series of leaderships, starting with the Patriarchal Caliphate's conquests (632-661 CE) that reached modern-day Tehran, where its preceding settlement was part of the former Sasanian Empire (224-637 CE). The Umayyad Caliphate's conquests (661-750 CE) ensued with Iraq being ruled from the capital Damascus, and finally the Abbasid Caliphate (750-1258 CE), before the establishment of its capital of Samarra in 836 CE. These periods are important to keep in mind when analyzing room and courtyard sizes, for different government rules, due to centralization or lack thereof, meant varying administrative policies were enacted. This in turn had profound effects on economic inequality levels, which were then manifested in the domestic housing.

In respect to relevant historical sources, which will hopefully reveal any significant settlement patterns, government policies, and perhaps the urban landscape, the following excerpt from Fred Donner's *Narratives of Islamic Origins* best summarizes our analytical predicament:

By the canons of modern historical research, however, it is exceedingly difficult to know much about Islamic origins, because the sources for it are highly problematic. Truly documentary sources for Islamic origins – that is, actual physical evidence contemporary with the origins of Islam, whether in the form of inscriptions, coins, archaeological evidence, or original papyrus or parchment – is almost non-existent. (Donner 1998:2)

While his words strike a defeating tone, there is an abundant amount of historical written accounts, but many of them need to be approached with caution, “there are essentially no surviving Arabic sources that deal at first hand with the Mesopotamian alluvium during most of the first century after the conquest. The systematic recordings of traditions befall later, under the influence of partisan political and religious currents that make even references to the seventh century often tendentious and anachronistic” (Adams 1981:204). Regardless, they are not enough on their own to construct a comprehensive account of the past, hence the need for archaeology. With actual excavations lacking, and only the surveys provided by Adams, there is even further need for the satellite-derived data this thesis provides. Moreover, before one can understand the size changes in society's domestic housing from the Sasanian era to Early Islamic era, it is essential to understand the socio-economic dynamics that occurred during those periods.

First, sedentarization was a huge driving force for assimilating the conquering Muslim Arabs into nearby communities (Lapidus 2014:59). Consequently, they likely interacted with the Sasanian countryside economically and politically, even with the establishment of their own cities. Hence, it is plausible that more intense interaction took place, with some Muslim Arabs

settling among the Sasanians towns and villages, changing the very fabric of those settlements. What is more, while many of the urban centers in Sasanian Iraq went through immense devastation by the invading Muslim Arab forces, it is unlikely that such mass levels of destruction occurred in the countryside, and hence less animosity in that respect toward their new rulers (Adams 1981:xv).

Second, according to Ira M. Lapidus, the popular assumption that under the stresses of war, migration, and severe economic changes, the newly conquering Arabs and their fellow Mesopotamian Arabs would be segregated from non-Arabs, with Arabs forming the military elite at the *asmar*, and the non-Arabs simply paying taxes and producing, would be proven to be a flawed idea. Rather both the conquerors and conquered “assimilated to each other on the basis of new communities and new Arab and Islamic identities” (Adams 1981:59). This bold statement requires further investigation, for while it is known that many non-Arabs migrated to the *asmar* over time, it is not known how this assimilation manifested itself in rural areas. Not to mention this assimilation *en masse* would have only occurred with government backing after Iraqi governor Al-Hajjaj ibn Yusuf's reign (694-714 CE), as will be explained later in the chapter.

Nevertheless, Islam brought about a new social order to the Middle East, and indeed Iraq as well. The new social order was neo-tribal, “in principle it was universal and in practice commercial and ‘cited’” (Black 2011:12). Cities were essential to the new order, to strip tribal Bedouin identities and institute Islam as the overarching social order, “settlements obfuscated the distinction between Arabs and non-Arabs. As a capital and commercial center, Basra attracted non-Arab settlers” (Black 2011:12). People of all occupations, both the well-off such as estate managers, landowners, and village chiefs, and those who were not so well off, such as fugitive peasants and migrant laborers, sought a better life from the unforgiving countryside, flooding the *asmar* (Lapidus 2014:59-60). In the Early Islamic period, “a decline had been generally experienced but was by far the most severe in the southern part of the region. Isolated settlements remained there but probably were limited to the crests of old levees in a more and more extensively flooded countryside” (Adams and Nissen 1972:223).

We see examples of assimilation of diverse ethnic groups in cities, for example non-Arabs were starting to compose much of the Early Islamic empire's armed forces, while the settled Muslim Arab Bedouin of the conquests started to ‘demobilize’ and become city dwellers (Lapidus 2014:59). With such a two-way streak of assimilation in the urban settlements, it is conceivable to think that this may have also occurred with their rural counterparts. With so much dynamic interaction occurring between both conquered and conquerors within the confounded living spaces of the *asmar*, surely some chose to settle outside, and even intermarry. These social dynamics played out in complex ways in the newly founded cities of the Early Islamic empire, with Wasit and Kufa serving as apt examples of multi-ethnic interaction.

4.1. Wasit

By around 703 CE, the city of Wasit was established on the western bank of the Tigris River, with the other occupied by the Sasanian settlement of Kaskar (Safar 1945:2). Aramaeans and Persians mostly inhabited the city, whereas Arabs initially only inhabited Wasit because of a government policy that no other ethnic group was to intermix with the new city (Safar 1945:2). This soon changed after the death of the city's founder, Al-Hajjaj, paving the way for inhabitants

from both cities to interfuse over time as, “the two were thus gradually merged by their common interests, both economic and political, into a single community” (Safar 1945:2). The government ban on intermingling between the newcomer Muslim Arabs and the local populations they conquered is interesting, but that policy was soon void due to the death of one person, and the communities were bound to merge because of such vital mutual interests. Certainly, the close proximity aided this merger, including the fact that they were both cities. Yet it is not known whether or not the Muslim Arabs actively started settling the bank across in large numbers, and how they may have affected its domestic architectural landscape. All that has been stated in the historical record is that inhabitants from various Iraqi cities came to settle in Wasit during the Abbasid era (Al-Ma‘adhidi 1978:182). Lastly, it is noteworthy that the city was used as a base by Syrian troops to impose Umayyad rule in the area, possibly adding another dynamic to increasing economic inequality levels among the inhabitants in Wasit's immediate vicinity because of increased oppression (Kennedy 2002:168).

4.2. Kufa

Kufa, the central node of control over the entire Sawad during the Early Islamic period, was a strongly planned city and prime example of high centralization (Bosworth 2007:290). For example, each tribe was assigned a certain street or quarter for their new settlers to reside in Kufa (Donner 1995:357). This high degree of planning surely played a role in the interaction between the different tribes, creating a more differentiated society. This is so because wealth was likely distributed equally within the tribes, and therefore the districts of the city. Each district then roughly possessed the same amount of wealth among its members individually, but some districts were wealthier than others, depending on how many tribal members there were in a district and in the tribe itself. This opens a whole new can of worms, thus further research should be done on the tribes and their financial relations with the state, and with society. Regardless, the city was divided up among tribal lines, immediately shaping its social dynamics.

Another example of the city's centralization was that its “roads radiated out from a central point” that was designated as a civic center, with a mosque the first structure built in the center of a square shaped space (Kennedy 2007:134). The mosque was later moved closer to the governor’s palace, resulting in them sharing a wall (Kennedy 2007:134). Spatial syntax would dictate that this is further evidence of a highly-centralized society, typical of the Early Islamic empire. This all perhaps led to further social differentiation, both in urban and by extension, rural settlements. The motive for this move was not clear though, for the historical record states that it was because of a theft at the governor’s palace, and that with the city’s inhabitants visiting the mosque night and day, it would protect the treasury at the palace (Kennedy 2007:134). This was plausible, but why not just place guards? With increasing socio-economic differentiation, the elite would have more to gain by combining religion and politics, and so motive to join the two institutions seems to outweigh the official reason. This can be said for religious outreach to rural communities through government centers as recently discussed too. Quite similar scenarios, a manifestation of urban politics in rural settlements, and visa-versa, likely occurred as well.

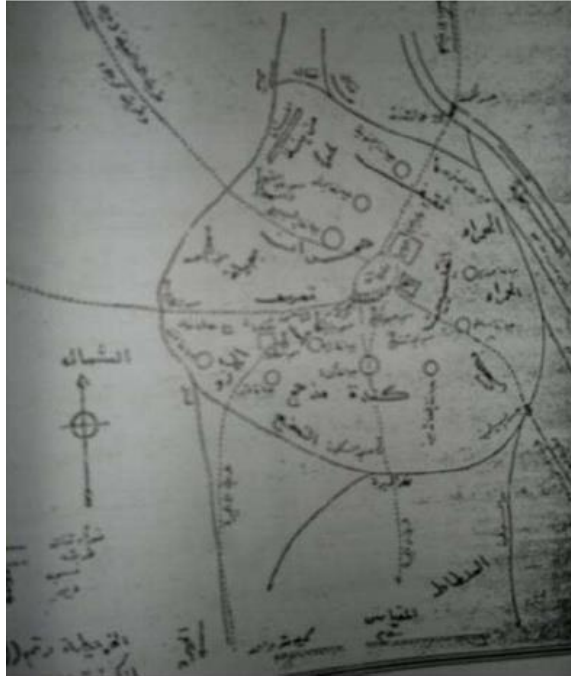


Figure 29: The City of Kufa's Plan (Yassin and Utaberta 2012:55)

While the Sasanians had their fair share of problems during the late Sasanian period, Early Islamic Mesopotamia did not fare any better over most of its existence. The state's affairs seemed to have been in dire straits from the beginning of its rule, with economic problems compounding during the latter half in the pre-Samarra Abbasid period after a lengthy duration of exploiting the Sawad's inhabitants. So, while the Early Islamic period may have gone through similar difficult times as its predecessor, it seems that the inhabitants of the Sawad experienced increasing economic inequality levels, as were their urban counterparts.

Therefore, as in the Sasanian chapter, I will explore Early Islamic Iraq and provide a concise and relevant analysis at each component of its society, as to better understand the settlements from the satellite-derived data, and the likely reasons for why they possessed the room and courtyard sizes they did at the time.

4.3. Religion

While it was much easier indicating whether a specific structure was a mosque in the city because of the available excavated data, it was much more difficult to do so with the rural settlement's satellite imagery. Though it is not completely hopeless since we do know a mosque's standard shape, which usually possesses a *sahn*, a courtyard in Islamic architecture. This may not be so helpful though since the courtyard was, and still is, a standard feature of domestic Mesopotamian architecture, and so these structures may just in fact be homes. Perhaps the orientation of the building may be of help, since it had to be directed toward Mecca (Insoll 1999:35). Or if it is known that the area was home to any churches, synagogues and temples, there are chances they were converted to mosques, which can be identified by any alteration in axis and thus direction of prayers (Insoll 1999:36). Such changes may suggest either mass conversion, Muslim Arab immigration, or both. Pertinent to this inquiry is the idea that newly converted Muslims likely migrated to urban areas due to their rural communities creating hostile environments for them and hampering their freedom to worship (Kennedy 2002:159).

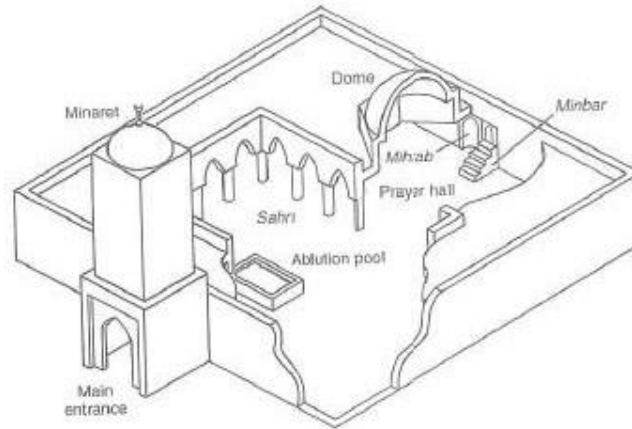


Figure 30: Conventional Plan of a Mosque's Components (Insoll 1999:30)

Mosques are crucial to figuring out whether Muslim Arabs immigrated to the countryside, and after analyzing all the early Islamic sites in the satellite-derived data, I have not been able to discern any mosques with any degree of certainty. As with the Sasanian sites, mosques, like churches, are found among the villages' houses. I find it appropriate to bring in my own experience into this, as the apartment building where I lived for some months in Alexandria, Egypt, had at its corner a small room that was in fact a mosque, that opened onto a courtyard. This mosque was not some small makeshift one, but rather a planned congregational mosque. That room could have been anything, (e.g. store, apartment, etc.), and it was not evident from the outside that it was a mosque. My attempt however has shed some light on the possibility of any existence at all of separate standalone mosques in the countryside. Although mosques were certainly prevalent, they were just as likely to apply the simple room layout than that of a stereotypical mosque. The first mosque, according to various scholars, was the prophet's home, and this is likely the case since in Islamic theology the whole world is considered a suitable ground to perform a prayer, and is thus essentially one grand mosque (Ayyad 2013:283, 299).

4.4. Immigration

In *The Great Arab Conquests* Hugh Kennedy claims that the Muslim Arab conquerors did not seize the properties of villagers, nor did they "even settle among them" (Kennedy 2007:138). While many historians support Kennedy's claim, it lacks not only any archaeological inquiry, but has overlooked key pieces of information in the historical record that aids the idea of the Muslim Arabs settling in areas other than the *asmar* that they built.

For example, Caliph Umar (634-644 CE) issued orders to the Muslim Arab conquerors to not go back to the ways of the Bedouin, or disperse throughout the rural areas and its settlements, but rather build new cities (Kennedy 2007:132). It has been suggested that this may be due to the caliph wanting to maintain their coherence and manage them more efficiently (Kennedy 2007:133). It could also be because that he did not want them to "lose their identity, and perhaps their religion itself" (Kennedy 2002:161). While this order may not have been true, it does seem likely from what we know about Umar and the armies he commanded. Nonetheless that does not mean that all his soldiers listened, and so we do not know to what extent his orders were carried out. Additionally, what about after Umar's reign, what was the policy afterwards? Would it be wise to prematurely state that for the first 200 years of Muslim rule in Iraq, there was no significant movement at all into the countryside?

The harsh countryside pushed people to migrate to cities in search for a better future, so why would Muslim Arabs move to the countryside, especially after founding their own cities? That is reasonable to ask, however there were events occurring then that might prompt us to question whether the Muslim Arabs searched for better opportunities in rural Iraq. Many of them who settled in the *asmar* were not able to gain the economic benefits that their leaders were able to obtain, including booty that was once so plentiful after 642 CE (Morony 1984:261). That, coupled with increasing inflation at the time, led to a decreasing socio-economic status among the *muqatila* (Morony 1984:261). This decrease occurred then within the context of “the existence of privately owned palaces and agricultural estates [that] suggests that the [Muslim] tribal chiefs were enjoying wealth, privileges, and a style of life far removed from that of the mass of their clansmen” (Lapidus 2014:59). This further increased social differentiation and should be visible in levels of higher inequality as represented in room spaces in not only the *asmar*, but the rural settlements as well. Muslim poor in the urban centers of southern Iraq thus “must have grown dramatically in numbers in the early Abbasid period, for several reasons including increased conversion, economic decline in Iraq, and the decline in status of a formerly dominant group, the Arab fighters (*muqatila*)” (Bonner 1996:343). There is reason to believe therefore, that a change in economic inequality levels, in particular an increase, occurred during in both urban, and by extension, rural southern Iraq during the Early Islamic period.

Moreover, while earlier discussed inquiries were reasonable, there are historical records that claim that some did in fact settle outside the *asmar*. For instance, some Muslim Arabs emigrated from the *asmar* during the post-conquest period because of being appointed by military or political officials to centers of administration in various communities (Morony 1984:251). In addition, even with the building of other new cities that were not considered the *asmar*, such as Mosul in the north, these Muslim Arabs were free to move back and forth for personal or governmental reasons (Morony 1984:251). This freedom thus fostered movement to other areas of the newly conquered territory. Nevertheless, settlement throughout the agricultural countryside of Iraq in the seventh century was not widespread, with only some known examples occurring in the Sawad (Morony 1984:252).

It is important to note that when first settling in the *asmar*, the various Muslim Arab tribes each settled in their own quarters, such as in Kufa, and therefore it would be expected of them to do the same if they immigrated to the countryside (Donner 1981:258). This nevertheless begs the question of the plausibility of immigration again, for if settlement was implemented in such a tribal manner, then it makes sense that members of the tribe would not migrate without the others, as to not lose social influence once settling in their new homes. This is backed up by ethnographic works that indicate that “towns' residential wards or quarters are often 'tribal,' 'ethnolinguistic,' or 'religious' in composition or at least in origin, whereas those in villages may more often tend to be 'familial,' with more close kin living near one another, and for longer periods, than is the case in larger settlements, but more data are required to confirm this apparent dissimilarity” (Kramer 1983:352).

Furthermore, it would be highly unlikely that many people moved individually, rather than with fellow tribal members in large numbers. Tribes have always moved and split up though, which can be seen until this day, with my personal tribal origins as an example, that of the Bani Kaab tribe, spread throughout the gulf in Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates after migrating from central Arabia (Casey 2007:32). So, if Muslim Arab tribal

members did migrate, they would have likely done so in significant numbers, (i.e. with their immediate branch), numbering in the hundreds perhaps (Grunebaum 1955:143).

One explanation for why Muslim Arabs may have increased in number in rural settlements has been proposed:

In the [early] Abbasid period, the government hoped to pose as something more than a bitter necessity. Their party was an expression of 'the group of the saved [from damnation]' which according to common belief among Muslims, would appear during the end of time to rally all the believers to true Islamic rule. This role also opened to their subjects the possibility of becoming closely identified with the government by joining. (Mottahedeh 2001:180)

If this were the case would the government not want to establish a rural presence as well, as to gain a stronger base and following? If some of the walled areas available in the satellite imagery could be discerned as administrative buildings, and if it was concluded that there were more administrative buildings in the countryside during the Early Islamic as opposed to Sasanian times, then religious party ideology may have been a driving force for such an occurrence. Unfortunately, that cannot be discerned within this study. Additionally, for the administrative buildings to be built, there had to be a rural Muslim presence, for it was an exclusively Islamic bond. Donner discusses this role of piety and faith in leadership, and their possible effects on social dynamics on the ground, such as settlement patterns among the new immigrant Muslim Arabs because of certain government policies (Donner 1998:103). He also emphasizes in his work on historiographical writings of Early Islam on how piety was initially valued above all, used to, “legitimize claims for leading the community” (Donner 1998:103).

It is interesting however that, “residents of the Muslim town did not develop their own administrative machinery, but that the administrative framework, including the appointment of (at least) the important officials, was imposed by the state, that is, by the personal will of the ruler or his deputy” (Grunebaum 1955:149). This is further exemplified within the existence of governor palaces, but not administrative buildings, for “the absence of the government house from the list of indispensable characteristics of a town would suggest at first blush that the Muslim town is perhaps not to be understood as a body politic at all” (Grunebaum 1955:141-142). If even the major urban centers did not tend to have government houses, why would the government even consider building a network in the more independent rural villages? Moreover, since forced displacement did occur at times in relation to recruiting for newly founded cities in the new Muslim Arab Empire, it is conceivable that it may have occurred as well in relation to migration into the countryside (Grunebaum 1955:154).

The main reason then behind the query of immigration within the context of this thesis, is that it may explain why such a change in inequality levels may have occurred. If the conquerors started settling among the populace, it would have been a strain on resources and therefore drive up inequality levels. It makes sense and is a plausible scenario. It also works the other way around: because the conquest likely drove up inequality levels throughout the realm, perhaps the newcomer conquerors wanted to look for a better more prosperous future in the hinterlands, such as the satellite-derived settlements. There are indications of such movements for economic reasons in the historical record, and looking at the measurements of these sites' courtyards and rooms, and thus Gini coefficients, can help confirm such possible immigration.

4.5. Politics

The Umayyads, under Caliph Muawaiya Abi Sufyan (661-680 CE), worked on reclaiming flooded land in southern Iraq and generated higher revenues for the state, but this work was then overlooked by Al-Hajjaj's regime, resulting in heavy losses (Kennedy 2011:179). The late seventh and early eighth centuries were marked by governor Al-Hajjaj's brutal rule, especially in the south-central part of the Sawad (Adams 1981:215). There is a plethora of information regarding his ruthlessness towards the agricultural producers of the Sawad, which included torturing inhabitants to extract a tax rate of 50 percent, and additional payments such as storage fees, forced gratuities, and paper record fees (Adams 1981:215-216). Subsequently, this brutal rule led to a further downward spiral with the ascendance of the Abbasids:

The causes underlying the decline of agricultural production in the Sawad are to be found within a broad set of relationships between the Abbasid ruling apparatus and the rural population. This sector, primarily the labor force of the agricultural system bore in large measure the indirect effects of Abbasid imperial attitudes and the more direct effects of their administrative policies and political fortunes. When the rural population finally turned against this constellation of pressures, it had only recently fallen victim of a wave of disorder resulting from conflict within the ruling order itself. The destruction to rural life wrought by this conflict was then compounded by the conflict of large segments of the rural population against the ruling order. (Adams 1981:215)

Part of the Early Islamic regime's policy for brutal politics that likely led to increasing levels of inequality was the incorporation of the Zanj into Mesopotamian society. It was not that they themselves produced the higher levels, but that rather their introduction to Mesopotamia, with their even lower socio-economic status than the average peasant of the Sawad, created a more polarized economic scale in the historical and archaeological record. The Zanj were black inhabitants from Africa's west coast who were brought by the Umayyads to work on infrastructure projects in southern Mesopotamia (Kennedy 2011:188). Their socio-economic status must have been quite horrid as can be seen by their rebellions in the Early Islamic period from 689-690 CE and in 694 CE (Kennedy 2011:188).

The preceding Sasanian institutions of Iraq were immediately embraced for the most part by the incoming Muslim Arab conquerors, and continued to be developed by the region's administrators (Morony 1984:18). However, this development seems to soon transform into a drastic realignment regarding fiscal policy, which can be seen in the retraction of southern Iraq's irrigation system in the Early Islamic period in comparison to the late Sasanian's administrative centralization of their canal system (Morony 1994:222). This decline in the agricultural system, seen at its lowest in the Abbasid administration after generations of neglect towards canals, while focusing on building roads, likely indicates a major shift in strategy from an economy based on agriculture to one on commerce (Morony 1994:222).

This shift was manifested with the building of new settlements in Early Islamic Iraq that positioned themselves towards a commerce based economic system (Morony 1994:228). This new positioning has been noticed by Adams in the Diyala region due to the sites' increasingly commercialized economies during the Early Islamic period (Morony 1994:226). These new settlements were built along preceding Sasanian sites whose economies were not so commercialized, creating some much-needed distinction between Sasanian and Early Islamic sites (Morony 1994:227). This is emblematic, and a microcosm of the larger winds of change that swept the region once the new administration came into place. This change was possibly

built on a new worldview, one where “the Abbasids viewed agriculture in the Sawad with a benign indifference so long as revenues flowed into the treasure from other sources sufficient to satisfy their own appetite for extravagance and to support a burgeoning bureaucracy and a demanding military” (Waines 1977:295-296). This worldview is exhibited in the settlements themselves.

Finally, the political scene during the Early Islamic period was an overall disappointing one that led to a decline in the Sawad, that then in turn led to its own demise, as “there is not much doubt that the mismanagement and consequent deterioration of the heartland was one of the decisive, converging forces contributing to the dissolution [of the Abbasid Caliphate] that quickly followed” (Adams 1981:212).

4.6. Settlement

According to Adams, “It is essentially a negative finding, documenting a precipitate retreat from a vast central area of the Sawad that continued for centuries and has reversed itself only in modern times” (Adams 1981:214). Adams’s survey area data suggest that while there was widespread abandonment of settlement overall starting in the late Sasanian period, with a decline in the cumulative occupied area reaching roughly 94 percent by the eleventh century, it is likely that it was a gradual process that lasted till the very end of the Early Islamic period (Adams 1981:218). This gradual process has been only determined by the surface collections though, and so “the sequence of steps by which this abandonment was effected is left somewhat obscure by ambiguities in the dating of Sasanian and Early Islamic surface collections” (Adams 1981:218). However, Adams does state in the end that a general decline was experienced during Early Islamic Iraq, especially in the south (Adams 1981:223). Hence, Adams’s data coincide well with Morony’s statement of non-extensive settlement in the seventh century.

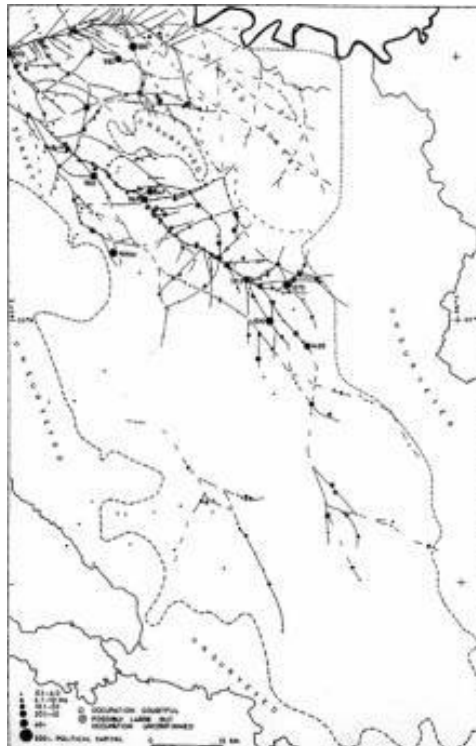


Figure 31: Early Islamic Settlement Patterns of the Region Under Analysis (Adams 1981:220)

The issue of decline in settlement and mass abandonment is crucial to understanding the economy and how it may have affected the peasants' economic inequality levels, as it likely did with their urban counterparts. In comparison to the Early Islamic period, the Sasanian period overall, barring its later years, was booming with settlement and watercourses. Canal growth was key, as it indicates more farming land, hence being recognized as its main producer of wealth by Sasanian rulers (Adams 1981:202). Without the canals, the state cannot have that food supply, that economy, and therefore those population numbers. Since they were all interconnected, their comparison is critical to determining the economy at the time. As we can see, the Sasanian period was better off economically, and since it was based on agricultural rural towns with numerous canals everywhere, due to the ease in creating them from ground level rivers, economic inequality levels were likely to be lower. A comparison of figures 12 and 30 of the settlements from the Sasanian and Early Islamic water courses exhibits the following:

Even steeper decline in aggregate settlement after the Sasanian period, coupled with the northward retreat of the settlement frontier and the absence of substantial additions to the pattern anywhere, makes an Early Islamic date of construction for any significant part of this grid extremely unlikely. The conclusion is inescapable that most of the virtually continuous ancient canal system to be seen in detail on the base map dates to the Sasanian period. (Adams 1981:209)

The decline of the Sawads' settlements may have begun in the late Sasanian period, but intensified during the Early Islamic because of their “subsequent failure to restore and maintain the irrigation system” after a large disruption occurred with the canal system that was affected especially in southern Iraq right before the conquest (Morony 1994:224). The new administration's neglect let the agricultural land turn into swampland after the major flooding of 628 CE (Morony 1994:224). However, this decline was not only due to geographical neglect and events, and the ensuing shift in focus from an agricultural focused economy to a market-based economy, but also because of environmental reasons such as the reoccurrence of the plague.

At least 10 plagues are reported for the Early Islamic period in Iraq. This started with the 639 CE “Plague of Amawas” in Syria that later spread to Iraq (Dols 1974:376). The subsequent plagues of the Early Islamic period seem to have stemmed in Iraq itself, specifically southern Iraq, with one near Kufa in 669 CE, in Kufa in 673 CE, the 688 CE “Violent Plague” and 706 CE “Plague of Maidens” in Basra, the 716 CE “Plague of the Notables” in Iraq, the 719 CE “Plague of 'Adi ibn Artah” in Iraq and especially Basra, another plague in Iraq, particularly Wasit in 735 CE, the 745 CE “Plague of the Crow” and 749 CE “Plague of Salem ibn Qutaybah” in Basra (Dols 1974:378-380). The plagues had a devastating impact on Early Islamic society, with constant recurrences likely hindering population growth (Dols 1974:381).

These plagues must have been quite damaging to the inhabitants' livelihoods, with sources stating that countless inhabitants fled from the plagues that occurred in Basra, and comparing the severest ones to Al-Hajjaj's tyrannical rule (Dols 1974:379-380). It was not just the peasants who suffered, but the elites too. The Umayyad rulers retreated to desert palaces during plague seasons in the summers, and so, “the Umayyad dynasty was literally plagued by this disease” (Dols 1974:380). It is then reasonable to infer that these plagues were one of the factors that led to increasing economic inequality levels in rural areas, and not just the *asmar*, because during such strenuous times the elites tend to extract more wealth for themselves while the poor tend to fare worse.

4.7. Economics

The settlement figures are drastic, revealing to us a “virtual abandonment of an area perhaps as much as 10,000 square kilometers, which for millennia had constituted the vital hearth of a rich and ancient civilizational heritage” (Adams 1981:218). It is not exactly clear why this was the case, but it does mean that state revenues would have been drastically reduced no matter how much the new Muslim administration tried raising taxes (Adams 1981:218). Consequently, starting from the end of the eighth century to the early tenth century, the Sawad had lost around half its imperial revenues (Adams 1981:215). It is during the second half of the Early Islamic era that the region's settlements experienced drastic economic decline.

The Arab Islamic conquest was a turning point, and while it may have not been the main factor for why the economic state was worse in the Early Islamic period than in the Sasanian period, it was most likely the main reason why the economic state was *overall* worse throughout the Early Islamic period than in the Sasanian period. This is so, as the conquest ushered in a new government administration that for the most part, appears to have brought about horrible mismanagement and harmful administrative policies.

In the beginning there seem to have been some actions that would point to the lessening of economic inequality levels in southern Iraq, and they may have had such an effect. One such action was that Umar fixed the state's salaries, suggesting that consumer goods were even attainable for the caliphate's poorest members (Hasanuzzaman 1981:351-353). We are not sure though if it was in fact implemented in the newly conquered province of Iraq, or even the Hejaz itself. If there were concrete efforts to implement it, the first ruler of Iraq was in reality the local governor Al-Hajjaj, not the faraway ruler of the Arab Islamic empire whose reign was fairly short. This supposed welfare state project by Umar likely concentrated on his home province of the Hejaz, and not Iraq, especially since the wealth he utilized stemmed from the empire's expansive conquests which included Iraq (Hasanuzzaman 1981:291-292). Another action was his successor Ali bin Abi Talib's (656-661 CE) relocation of the empire's *Bait al-Mal*, the state's central bank, from Medina to Kufa, an important step and promising sign of carrying on Umar's socialistic policies in the area (Sadr 2016:72). If they were implemented though, they were both short-lived and substituted for a much more capitalistic and unregulated structure with the advent of Muawiya (661-680 CE) (Hasanuzzaman 1981:277).

The arriving Muslim Arabs “radically altered the late Sasanian situation” as they changed both the market's structure and the prices of commodities (Morony 1984:102). While one might assume the Persian Zoroastrian landowning elites of the *dihqans* were simply replaced with new Muslim Arab landlords, something much more menacing occurred. Land was traded from lower-class country-dwellers to arriving petty noblemen, obtained by the new conquering elites in two ways; one, through sale, two, through land grants to the caliph's supporters, such as family and friends (Bavel et al. 2014:267). While sales took place, they not only mostly strengthened the *dihqans*, but seem to have created another elitist superstructure of a handful of big families who gradually rose to consolidate power in the new state, whom then “also acted as tax farmers, government officials, bankers, and merchant-entrepreneurs” (Bavel et al. 2014:267). The mishmash of these occupations and undertakings therefore enabled the new elites to gradually “dominate both commodity and factor markets. The cultivation of market-oriented crops, such as cotton and sugar cane, on the estates of these landowners could easily be complemented by industrial processing or by wholesale trade in these commodities, sometimes combined with tax

farming or high-ranking positions in the state administration” (Bavel et al. 2014:267). This created monopolies, concentrating both power and money in the hands of a few.

It was not just these monopolies that created an ever-powerful and wealthier oligarchy in Early Islamic Iraq, but also the new administration that heavily taxed many agricultural products such as grain, fruits, and palm trees, mostly increasing their prices exponentially (Morony 1984:102). Such taxes to a certain extent would have been passed on to the consumers, who were primarily the peasants themselves, creating a vicious circle. The primary reasoning behind such tax rate increases “appears to have been the need of the new regime to wring as much as possible out of a reduced tax base for the support of the occupying forces” (Morony 1984:102). Examples of negative effects can be seen in Kufa's surrounding agricultural areas, which were reported to have been affected instantly, the same area where the Sasanian and Early Islamic settlements that are under analysis in this study are located (Morony 1984:102). These new elites therefore “availed themselves of the market in order to maximize their revenues and used the non-economic, coercive opportunities offered by and within the market, to the detriment especially of the countryside and, later, also that of the towns” (Bavel et al. 2014:283).

All this was done in the backdrop of the brutality the countryside's rural inhabitants were experiencing. While “bound to the land or in some state of (semi-)dependency,” as were the Sasanian serfs before them, it seems that their situation was much worse (Bavel et al. 2014:271). This is demonstrated during the rule of Al-Hajjaj when people were brought back to the estates by force, and by the numerous legal and theoretical debates on whether they should be in fact termed slaves (Bavel et al. 2014:271). Thus, “the rural economy was highly market-oriented, communal agriculture unimportant, social differentiation pronounced, and corvée labor scarce” (Bavel et al. 2014:271). Monetary gain would be thought as the likely culprit to why such a highly restricted and coercive market of exchange for land, labor, and capital in rural southern Early Islamic Iraq, benefited the elites. There may be a much more nuanced reason behind the situation through:

Elsewhere, the founding of new Arab cities like Basra, Kufa, and Wasit may imply that major emphasis in the Early Islamic period was placed on urban and agricultural development in formerly marginal regions, perhaps because the rights and claims of the indigenous inhabitants there could be more easily ignored or overridden. Within the area of the reconnaissance around Warka, the process of abandonment before the advancing waters of the Great Swamp merely accelerated. In fact, there is so little evidence of an occupation in this region during classical Islamic times that comparison with other regions probably is meaningless. Quite possibly most of its remaining population at the end of the Sassanian period later was drawn off to swell the growth of these new urban centers and their agricultural hinterlands (Adams and Nissen 1972:93).

What if the driving force behind such market ruthlessness stemmed from a lack of concern for conquered inhabitants from the conqueror elites? It is not a revolutionary idea and fits the situation at hand, further explaining why levels of inequality increased with the Islamic conquest.

Within such a context of economic despair, it makes sense then that there was an overall strong disapproval of lavish spending, even when it came to mosques, within the Early Islamic community (Goitein 2009:225). The main reason behind this sentiment was because of “the great suffering inflicted on the middle and lower classes both by forced labor and by the senseless squandering of public funds on costly buildings” (Goitein 2009:225-226). In Islam there is a paradox, as God loves those who smell good and wear nice things, but those who are humble and

non-materialistic too. And so, this leads to the question “was it permissible to hoard riches? Was this not in outright conflict with Allah's command, an injunction to trust in God, repeated so often in the Holy Koran?” (Goitein 2009:226). The answer has been somewhat mixed, with a leaning towards the idea that it was not in conflict, but rather a good thing, so long as he used it for the good of the community (Goitein 2009:227). This of course, is quite dubious as there was not a strong enough system of enforcement, (i.e. regulation), of the wealthy, other than a mandatory 2.5% zakat tax. Apparently, a “survey of representative opinions on the subject from the second to fourth century of Muslim era has shown that early Islam as a whole took a positive, or at least lenient, view of economic activities, luxury and the amassing of capital The attitude of the majority of Muslims is perhaps best expressed in the saying attributed by Shaybani and others to the Prophet Muhammad: 'Poverty is almost likely apostasy'” (Goitein 2009:228).

Subsequently, there is the issue of the bourgeoisie in Early Islamic times, and how they fit into the economic inequality dynamics of that era. I was not able to find much about a bourgeoisie class in Sasanian times in Iraq, so we lack a comparison, but it does seem to be the case that this class was making headway in the Early Islamic period. This was so as it “developed slowly during the first hundred years of the Muslim era, emerged into the full light of history at the end of the second century, became socially 'admitted' during the third and asserted itself as a most powerful socio-economic factor during the fourth. However, it never became an organized body and, as a class, never obtained political power, although many of its members occupied first and second echelon in the state” (Goitein 2009:218). So, while this may be the case, the merchants mostly centered their lives around the main markets, which were the cities of the *asmar*, not the rural villages of southern Iraq. There was more of a chance to move upward, then again this is only a possibility and more research is needed.

This does indeed further complicate the image, adding another factor essentially to the economic image of southern Iraq during the Early Islamic period. But this information is useful as it is another indicator of how the economy was faring and how Iraq's inhabitants may have been able to climb the social ladder. Having that option there in the first place helps lower economic inequality levels, but again, as mentioned, it took them time and it was not until after the Early Islamic period that they found their place. It appears then that in medieval Islamic times, inequality levels may have been decreasing, as the middle class actually came into existence on the political, social, and economic scene. Thus, in the third and fourth centuries of Arab Islamic rule in Iraq, many from the commercial class had reached positions of high standing within society (Goitein 2009:237).

4.8. Excavated Data from Early Islamic Sites

A scenario equivalent to the decline of settlement during the Early Islamic era in southern Iraq, as postulated by Adams, also occurred in Jordan. Following the Sauer-Smith Model, it was hypothesized that “the Conquest was followed by only a few decades of social equilibrium before a combination of economic, political and natural factors lead to the rapid decline of the urban centers east of the Jordan River, most which were abandoned shortly after the establishment of the Abbasid Caliphate and the transfer of the capital to Baghdad” (Walmsley 1992:377). The theory has been adopted by J. Eadie with his survey of Humayma, and can be applied to Tall Jawa and Nahal Mitnan as well (Walmsley 1992:377). The comparable scenarios make sense, as the Islamic conquests occurred in both areas around the same time. The people conquered were from different empires: Byzantines and Sasanians, but they were both from

similar religious, cultural, and geographic backgrounds. This similarity strengthens the thesis's utilization of excavation data from Jordanian sites to be compared to the satellite-derived data.

4.8.1. Tall Jawa

The Early Islamic settlement of Tall Jawa is now a large ruin situated on a natural hill in the Balqa region, 2.2 km northeast of Al-Yadudah, overlooking nearby wadis and farmland. The site's reoccupation during Byzantine times was a transitional period that led to Umayyad control in western Jordan (Daviau 2010:4). The last phase of occupation at the site before it was restructured for habitation during the Early Islamic era, was the final Iron Age II (Daviau 2010:33). The last stage of the settlement's occupation was the eighth century CE in the Early Islamic period (Daviau 2010:468). The site falls exactly in line with the transitional period of the settlements from the satellite-derived data, rather than just the Sasanian civilization. Moreover, the site's Christian Byzantine history and it being a neighbor of Christian Sasanian Iraq, provides another great data sample for this thesis. It is noteworthy that Christian Arabs may have inhabited the site and converted to Islam over time, as shown by the site's "culturally mixed assemblage," providing further data for the thesis's issue of conversion (Daviau 2010:474-475).

The settlement's two-story rectangular shaped building during the Islamic period measured 12.55 x 18.50 m., with a total area of 232.18 m. It had at least 10 rooms, not factoring in the two corridors upstairs, on three sides of a central hall (R607) (Daviau 2010:26). The central hall (R607) was 21.38 m. in size (Daviau 2010:28). The domestic structure was a typical Near Eastern courtyard house like those commonly found in Nabataean, Byzantine, and Early Islamic times, not only in the region but in Mesopotamia as well. Central Hall 607 functioned as the structure's courtyard, yet was not technically constructed as one, probably due to its original function as a church. The courtyard is the biggest single room in Building 600, and all the other rooms, all smaller, were situated against the structure's outer wall (Daviau 2010:28). This is typical in the region according to the excavators, as a courtyard is usually enclosed on three of its sides with smaller sized rooms (Daviau 2010:86). The archaeological record also strongly supports the notion that the courtyard was not roofed (Daviau 2010:86).



Figure 32: Map of Tall Jawa in Jordan (Daviau 2010:11)

4.8.2. Humayma

The site of Humayma was established in the Nabataean period, and consists of a large domestic structure that was used during the Early Islamic period (Oleson and Schick 2013:96). The structure, located on the southeast edge of the settlement, is composed of two parts, designated by the excavators as F102 and B100 (Oleson and Schick 2013:96). The structure was constructed of heavy blocks of sandstone mixed with various types of rubble (Oleson and Schick 2013:93). The core of the building was a Byzantine church with connected rooms to the north and west rebuilt for habitation in the Umayyad period, lasting into the early Abbasid era (Oleson and Schick 2013:96). This re-habitation occurred during a time of an increasing “Islamization of the region,” coupled with a decline in the region’s economy following the Abbasid family’s leave to Iraq (Oleson and Schick 2013:154). These tough economic declines likely made reconstruction challenging, and since it was a time where churches being abandoned was quite frequent, it made sense that the household utilized the church as a domestic structure (Oleson and Schick 2013:155).

The archaeologists who undertook the excavations at Humayma have noted that there were “numerous parallels of design and materials between the renovations of the Early Islamic period at Humayma and those carried out by the Bedouin during the twentieth century” (Oleson and Schick 2013:219). One such parallel is the way the Bedouin roofed the church's apse, just as the Umayyad’s inhabitants did in another part of the settlement (Oleson and Schick 2013:218-219). This provides another excellent example of ethnoarchaeological data that substantiates the likelihood that these same methods were used at the settlements in the satellite-derived data.

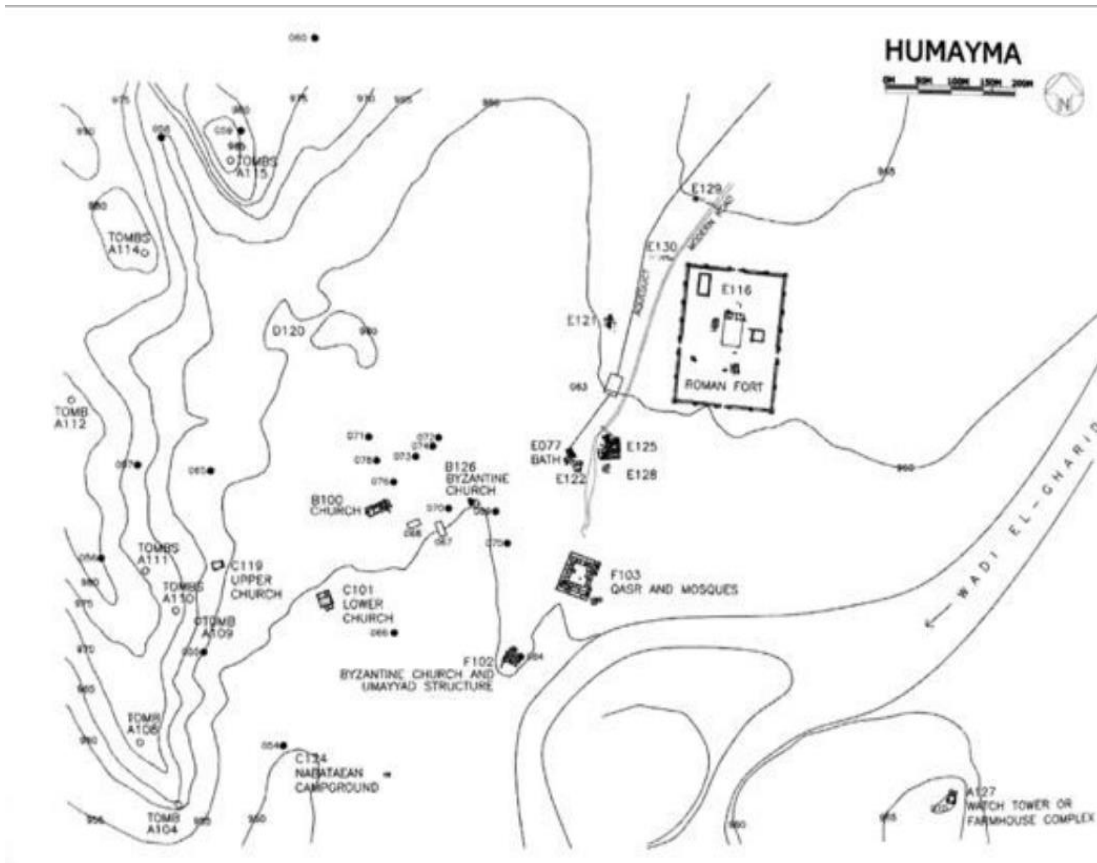


Figure 36: Map of Humayma, Jordan (Oleson and Schick 2013:2)

One part of the residential quarters, B100, reflects the re-use of the church as a habitation, sometime in the later part of the seventh and earlier part of the eighth century CE. This is indicated by partition walls being built, rubbish being leveled off, and so forth (Oleson and Schick 2013:166, 215). New rooms were built during this phase, such as N and F, which faced a large courtyard-like space that was “roofed with transverse arches that probably carried wooden beams, reeds, and a packed mud surface” (Oleson and Schick 2013:216). This area, including perhaps some other rooms, was used for animals and storage, while the small rooms were the likeliest for habitation (Oleson and Schick 2013:216). Furthermore, “the B100 nave provided space for several enclosed courtyards that may have been used to accommodate flocks, tools, or crop processing activities, while Room D north of the F102 church may have been adapted as a partly roofed area for storage of agricultural gear” (Oleson and Schick 2013:554).

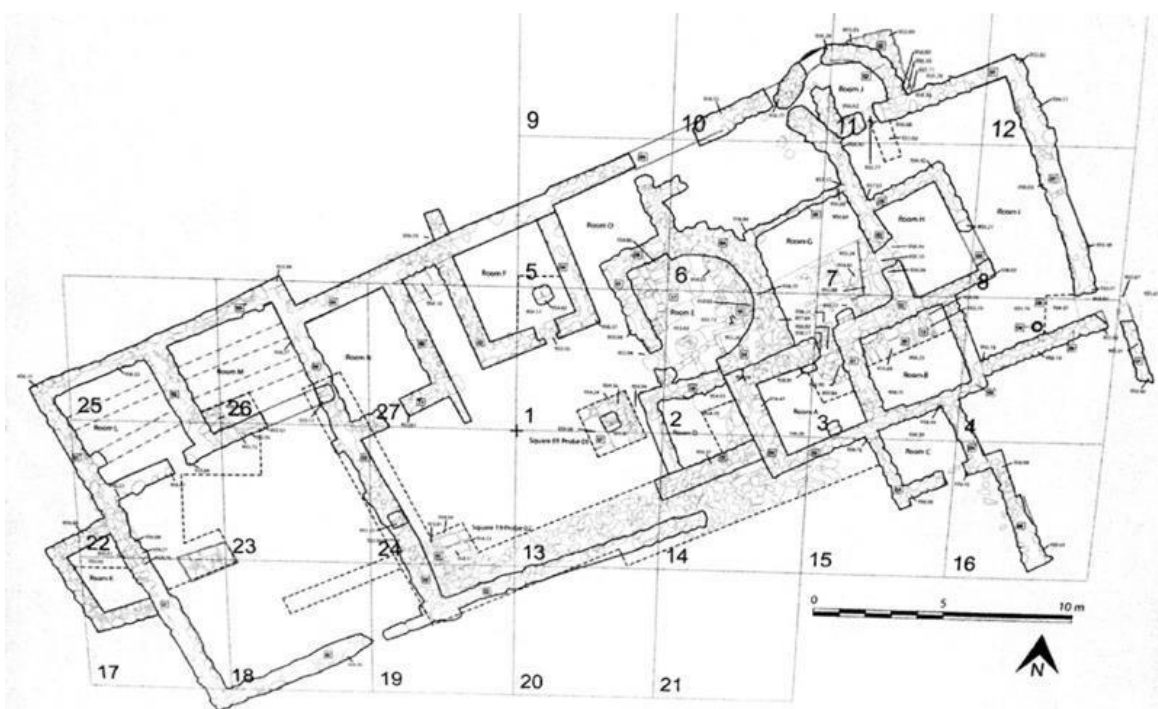


Figure 37: General Plan of Field B100 (Oleson and Schick 2013:164)

Another part of the residential quarter, F102, was built in the mid eighth century CE, and is therefore known as the Abbasid period house (Oleson and Schick 2013:154). The domestic quarters were built into the nave, apse, and Room A (Oleson and Schick 2013:155). Evidence for habitation of the abandoned church and its use as a house during the latter part of the Early Islamic period is seen by its numerous bins and the domestic qualities of the occupation’s debris, not to mention that it was described as a farm house as a result of Humayma’s economy being based on agriculture and pastoralism (Oleson and Schick 2013:159).

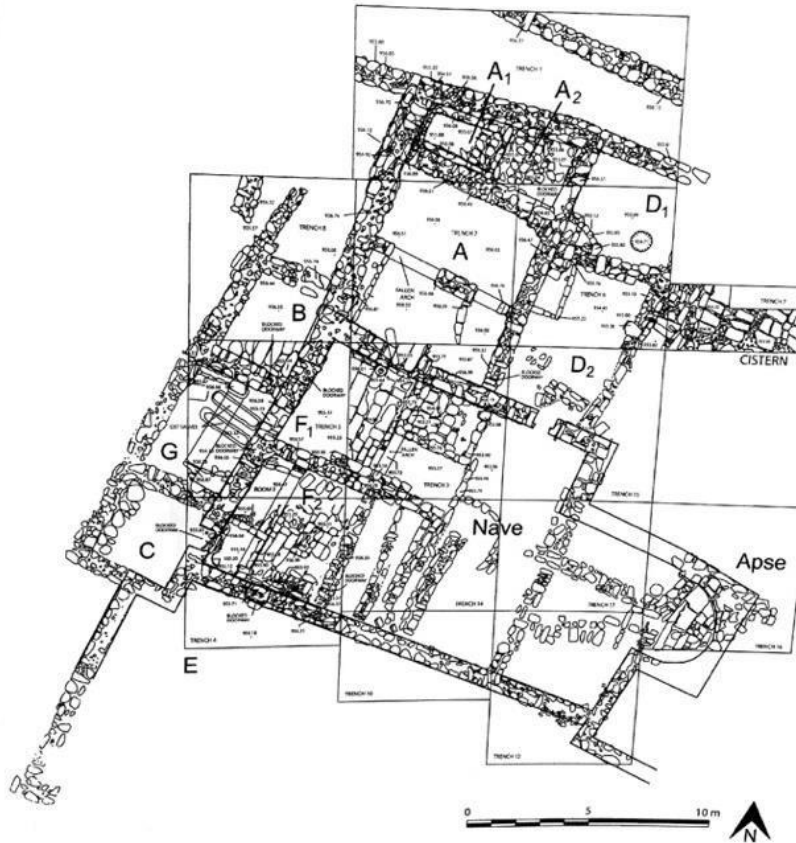


Figure 38: General Plan of Field F102 (Oleson and Schick 2013:95)

4.8.3. Nahal Mitnan

Nahal Mitnan's ruins are situated in Ramat Barnea on the 600-m high arid Eocene plateau (Haiman 1995:1). When excavated, the farmhouse at Nahal Mitnan revealed a complex measuring 15 x 33 m. (Haiman 1995:1). The site dates anywhere between the sixth to the eighth centuries CE, with a possible abandonment sometime after 750 CE because of the political crisis associated with the Abbasid ascent in Baghdad (Haiman 1995:9,11). Rooms at the farmhouse were likely roofed with wood, as a charred beam was discovered in room 193 (Haiman 1995:3). This is interesting in that it differentiates it from other Negev towns which usually built stone roofs, and is thus more like southern Mesopotamian towns with their wooden roofs (Haiman 1995:9). The farmhouse complex consists of three parts, the first comprising of courtyard 101 and room 102, the second comprising of courtyard 101, rooms 103, 105, 105, 106, and the third is made up of courtyard 109, rooms 108 and 110 (Haiman 1995:3). The third unit still has not been fully excavated and so it lacks the dimensions needed for defining their areas.

The farmhouse, one of a series of farmhouses throughout the Negev Highlands, is an interesting example of a state-sponsored initiative by the Umayyads to sedentarize a seminomadic population (Haiman 1995:11). This proves interesting because it aligns well with the idea that the government may have had a heavy hand regarding settlement in such vast rural areas, similarly to my proposed idea of possible Muslim Arab emigration to the countryside in southern Iraq, and thus strengthening this hypothesis. This government sponsored resettlement program into the countryside would have been for Muslim only settlements if it was before Al-

Hajjaj's death, in view of his segregation policy. If it was afterwards, then it would have been to mobilize populations of both Muslims and non-Muslims for strategic socio-political reasons, including a way to relieve the *asmar* from over-populating (Hasanuzzaman 1981:367).

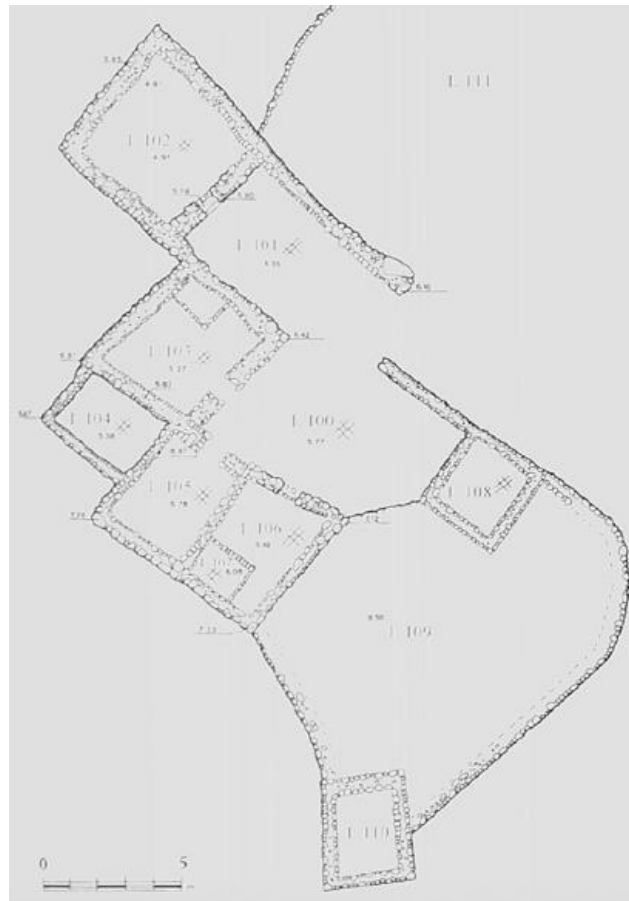


Figure 39: Nahal Mitnan's Farmhouse (Haiman 1995:3)

The basic Early Islamic house design from all these examples would be Tall Jawa (Oleson and Schick 2013:159). This can be seen in Phase III's B100 plan, which looks like the “combined cell blocks and courtyards” of other Early Islamic houses throughout Jordan and Israel, all with similar plans (Oleson and Schick 2013:218). Rooms at both this site and others have shown similarities such as “simple square or rectangular, single story spaces with flat roofs held up by transverse arches” (Oleson and Schick 2013:218). Early Islamic houses possibly looked quite different from modern-day houses because they had to adapt their plans to the pre-existing structures of the communities which they took over (Oleson and Schick 2013:159). This is something to take into consideration, and thus while Humayma is not a site of standard Early Islamic houses, it adds another crucial element to creating a more comprehensive analysis of Early Islamic domestic housing in rural southern Iraq.

It also must be noted that several rooms within the Early Islamic sites of Tall Jawa, Humayma, and Nahal Mitnan were unmeasurable due to incomplete measurements, for excavations were still ongoing or interrupted. These possible rooms and courtyards were therefore not considered. The same applies to the Sasanian excavation data.

4.9. Sasanian Settlements Examined via Satellite-Derived Data

The Early Islamic sites under study are located in the same areas as the Sasanian sites. They are roughly between the cities of Kufa and Wasit, some of the *asmār* that were first founded by the incoming Muslim Arabs. The figure below maps out the settlements, and shows that they are in close proximity, with the exception of Site 890.

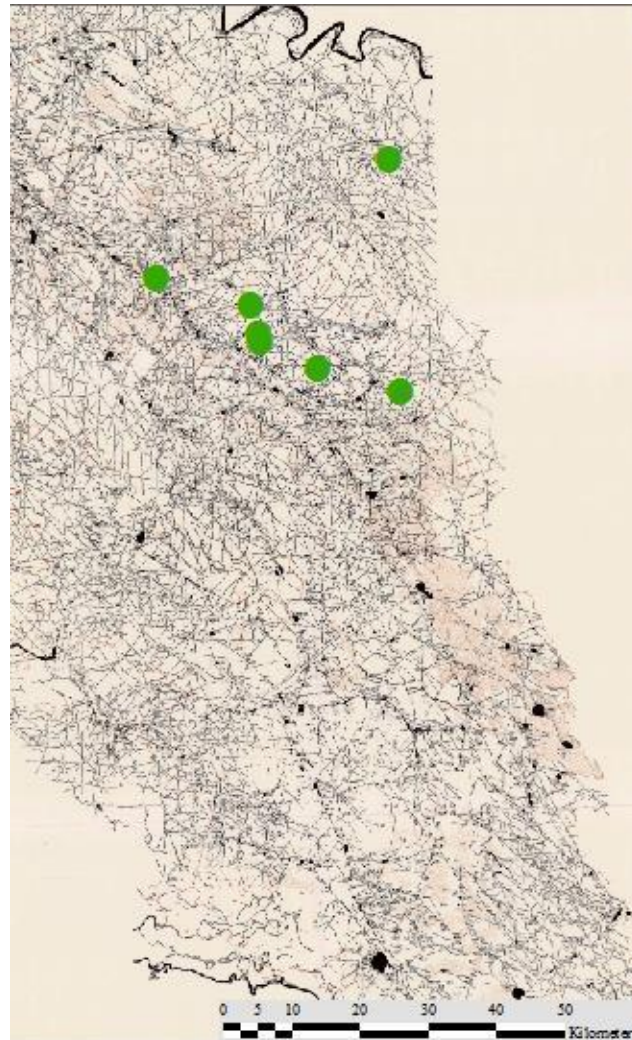


Figure 40: Early Islamic Settlements Examined Via Satellite-Derived Data. From North to South: Site 890, Site 848, Site 1107, Site 1133, Site 1135, Site 1193, Site 1287 (Adams 1981:383)

The Early Islamic period in the Sawad was a significant era for the area, with a quarter of Iraq's population believed to have been living in towns throughout its countryside around 800 CE (Bavel et al. 2014:264). The satellite-imagery below therefore offers great insight into a large portion of Iraq's population during that era. Thence, as with what was sought from the Sasanian imagery, the Early Islamic settlements will hopefully offer the same insights, but this time I have the necessary data to compare the room and courtyard sizes to determine economic inequality levels. The data will then provide a better understanding of the settlements' overall socio-economic dynamics, and economic inequality levels during the two periods.

I will analyze seven rural Early Islamic settlements from the satellite imagery, numbered according to the survey in Adam's *Heartland of Cities*:



Figure 41: Site 848

4.9.1. Site 848

The site has been described as follows:

Tell Abu Dhuwari, 950 NW X 200 X 3.5. Additional smaller mounds, the closest 150 diam., and plain-level debris extend E for a considerable distance. There is extensive surface-level architecture at this site that could be easily mapped from a low-level air photograph. Bricks in the exposed (foundation?) courses are mainly 21 and 23 cm², with a few broken and reused 25 cm bricks used as wall interior fill rather than facing. Adjoining houses with relatively small rooms seem to follow the central axis of the site for its entire NW end, perhaps hinting at a street layout. Rooms and courts are seemingly larger and walls thicker to the SE. Nothing unequivocally Sasanian seen. Early Islamic apparently uniform in distribution over the entire site. (Adams 1981:265)

Site 848 is the one site in this study for which Adams does not provide a specific site size, but rather only a designation within the size 3 category: 20.00 – 40.00 ha (Adams 1981:184, 235). This leaves more room for interpretation of the site's true size. In this case, the satellite imagery provides the only closely estimated measurement, which approximates 20.00 ha. While it is designated as urban by Adams, the settlement's structures seem to be quite dispersed, and hence the site is rural in nature. Moreover, the settlement does not appear to have been all that populated in my traces of the site, (i.e. mostly standalone rooms).

It is noteworthy that Site 848 was the only one of these settlements likely to have been established during Early Islamic times. The others were established either during Sasanian or Parthian times. Site 848 therefore enables us to corroborate or reject certain notions, one being that the more dispersed a site is, the more indicative of it having been settled by nomads, as Kamp notes with Darnaj. It also supports the theory that villages get bigger and internally more densely settled with time, which is seen in both historic and ethnographic evidence (Kramer 1983:353). So, since it was such an early settlement, we find it dispersed. Therefore, the site was either settled by Sasanian Arabs of a faith other than Islam during the Early Islamic period, or the Muslim Arab conquerors themselves.

Since it was likely to have been founded during the Early Islamic period, if a larger quantity of sites established at that time could be analyzed, I would be able to compare it with sites established beforehand to discern any possible differences in the architectural pattern.

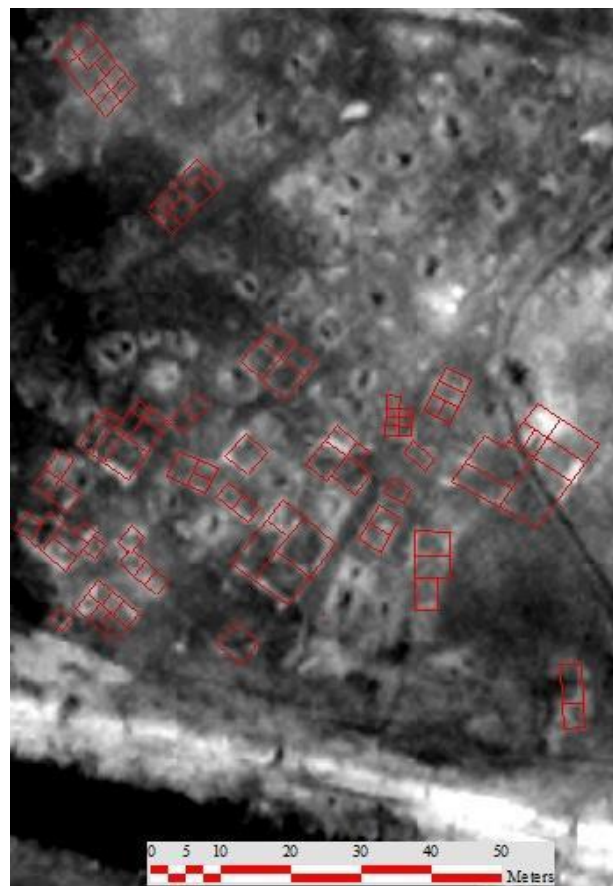


Figure 42: Site 890

4.9.2. Site 890

Tell Mayyid. 150 meters in diameter. The settlement stems from Sasanian times and continued into the Early Islamic period (Adams 1981:265). Adams estimated the site's occupational area at 2.2 ha (Adams 1981:233). The satellite imagery however, shows it to be approximately 1.30 ha. The site seems to be heavily looted, obstructing my tracing, for there were surely more structures. The settlement was likely to have grown organically, as demonstrated by the uncoordinated positioning of the structures.

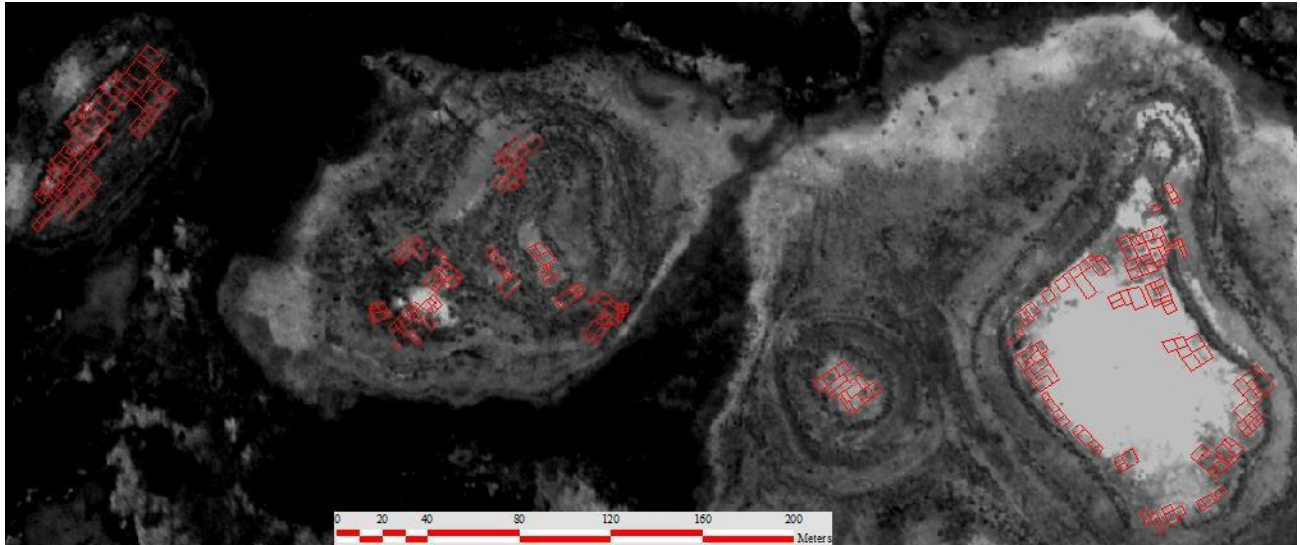


Figure 43: Site 1107

4.9.3. Site 1007

“300 N X 180 X 4.2. Immediately W is a second, 80 diam. [Then] 80 m farther W is a third, 130 diam. X 1” (Adams 1981: 273). The settlement stems from Sasanian times and went through the Early Islamic period (Adams 1981:273). Adams estimated the site’s occupational area at 7.70 ha (Adams 1981:233). In the satellite imagery, it is approximately 7.40 ha in total, but since there are three separate islands, the significant distances in between each should be noted when considering actual settlement.

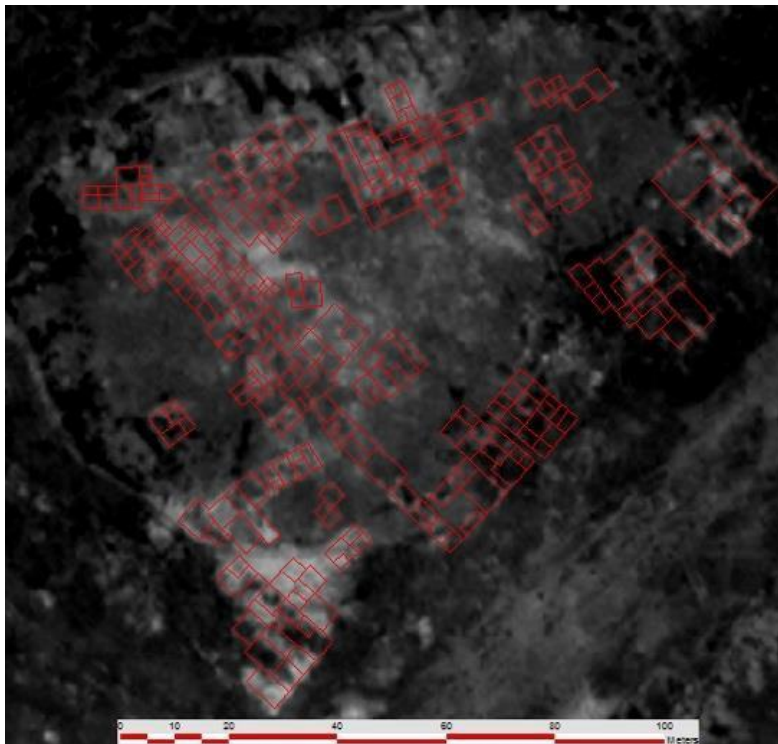


Figure 44: Site 1133

4.9.4. Site 1133

180 meters in diameter (Adams 1981:273). The settlement was a Sasanian settlement and persisted into the Early Islamic period (Adams 1981:273). Adams estimated the site's occupational area at 3.20 ha, though per the satellite imagery, it is approximately 1.60 ha (Adams 1981:233).

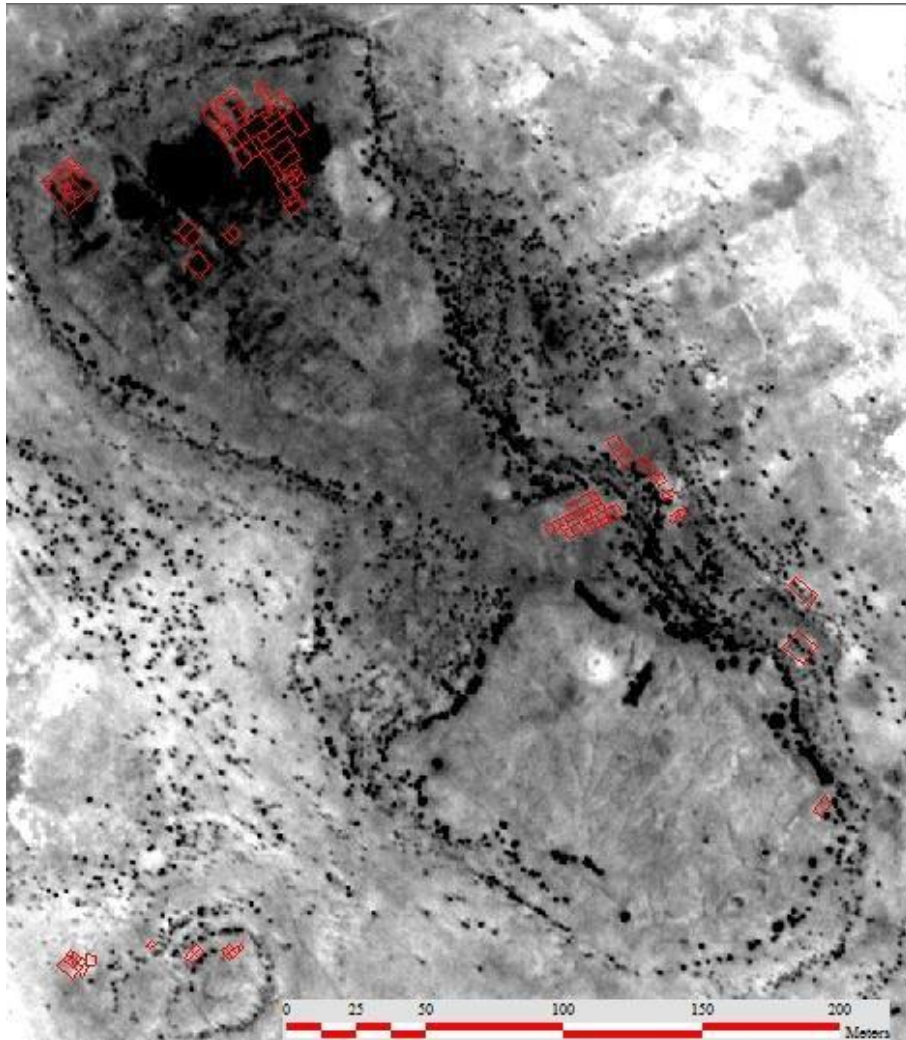


Figure 45: Site 1135

4.9.5. Site 1135

Tell Rubahiyat al-Torra. The principal summit is 5 m high. Adams noted that there was likely to be an underlying small Uruk site, perhaps indicating a lengthy period of continuous habitation, and at least the general desire by people to settle at this primarily Parthian-Sasanian-Early Islamic site (Adams 1981:273). Adams estimated the site's occupational area at 13.30 ha (Adams 1981:233). The satellite imagery however, suggests that it is approximately 7.60 ha in total; supporting Adams's own statement on possible site size inaccuracy.

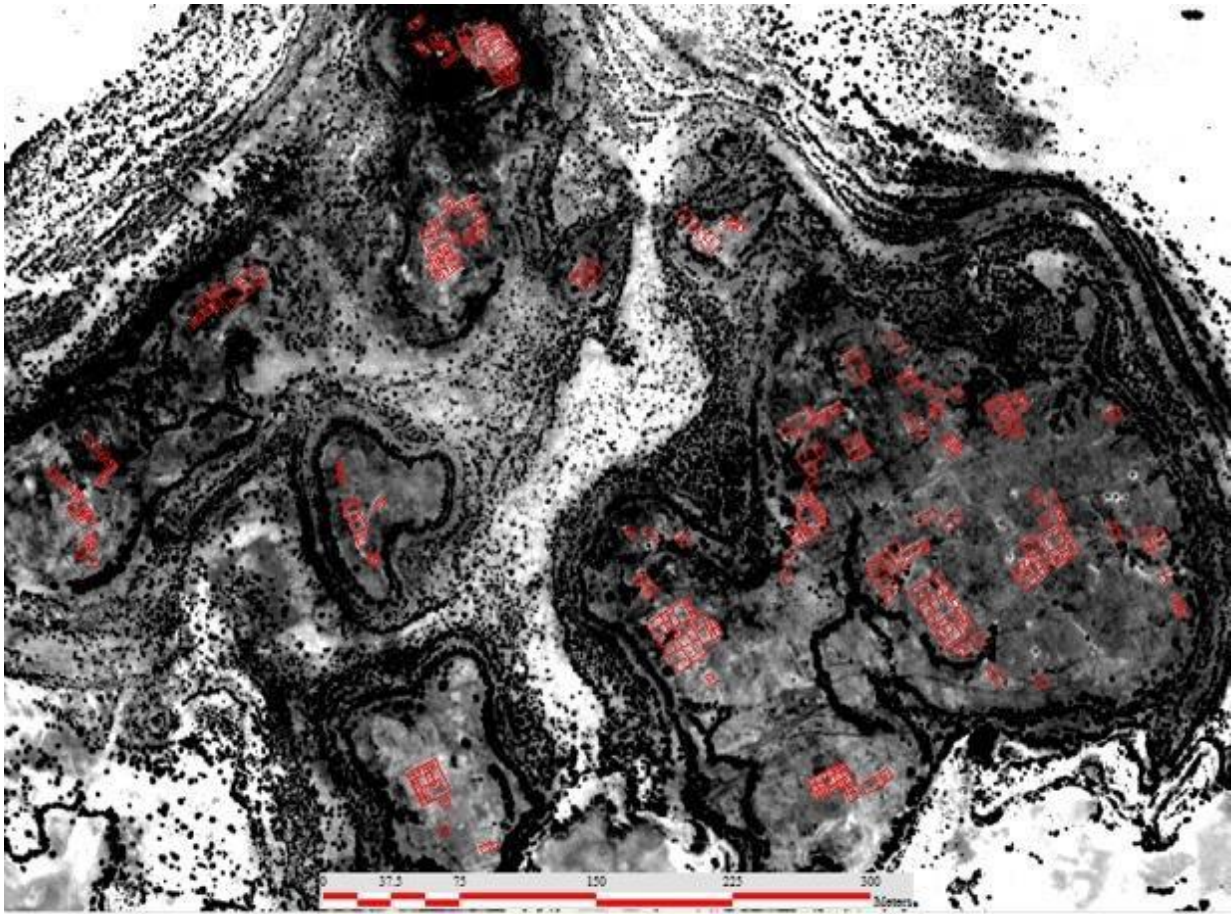


Figure 46: Site 1193

4.9.6. Site 1193

The site has been described as follows:

Tell Mirza. 750 E X 600 X 6.5. Parts of the site are only a little above plain level, but surface debris is dense and continuous. At plain level, moreover, debris also extends 200 m SE of site and for varying but generally shorter distances in other directions. Bricks on site preponderantly 33-36 cm², but also 27-30 cm². 50 m E, across an old canal bed is a second mound that is surely a continuation of the same site, 120 diam., and from here indistinct small mounds and hummocks of debris tail off SSE along a levee. An isolated small tower, now in ruins, stands 150 m NW of this second mound. Sasanian-possible (or at any rate, limited) Early Islamic. (Adams 1981:276)

Adams estimated the site's occupational area at 50.00 ha (Adams 1981:233). In the satellite imagery, it was approximately 18 ha in total, with such a large difference a result of Adams not visiting this specific site during the survey and is only known from the Directorate General of Antiquities files (Adams 1981:236). While the 18.00 ha certainly classifies Tell Mirza as urban by Adams's standards, density must be considered when designating a site as urban or non-urban. Since the various clusters are much more spread out, the site may have been a collection of smaller sites within a short distance of each other, rather than one large site. Likewise, the multiple clusters might suggest that this site was originally a marsh settlement.



Figure 47: Site 1287

4.9.7. Site 1287

260 meters in diameter. 140 meters NW is a second, 160 meters in diameter (Adams 1981:279). The settlement stems from Sasanian times and went through the Early Islamic period (Adams 1981:279). Adams estimated the site's occupational area at 9.30 ha (Adams 1981:233). In the satellite imagery, the site is approximately 20.00 ha in total. However, after considering density and the widely-dispersed settlement across the site, the occupied territory is roughly almost 7.00 ha. Furthermore, Adams only saw two mounds, but after utilizing GIS and satellite imagery, it seems that there are in fact three mounds.

4.10. Results of Satellite Imagery Analysis for Early Islamic Sites

The picture is mixed. While there were still rising economic gaps between the classes, it has been reported that there was still economic growth, demonstrated in the “rough calculations based on early Abbasid revenue lists [which] suggest that the alluvial of southern Iraq generated four times as much tax revenue as the next richest area of the Islamic world, Egypt, and five times as much as all of Syria and Palestine combined” (Kennedy 2011:178). Also, there were certain positive aspects of the Early Islamic administration, such as an economic boom in a neighborly region, (i.e. the Persian Gulf), during that period, leading to growth in southern Iraq through trade (Kennet 2007). The state's gross income did in fact increase exponentially, but so did the economic inequality levels. This was so as more wealth was being concentrated in the hands of a few. It was like the modern-day United States, because though the nation's Gross

Domestic Product (GDP) is constantly growing, it is the rich who are getting richer and the poor getting poorer (Piketty et al. 2016). The state's overall finances are increasing, but so is the distance between the rich and poor. This phenomenon is playing out in the housing sectors of San Francisco and New York City, with the rise of less affordable housing, and the average house becoming larger and more luxurious with richer tenants in the city centers, (i.e. Manhattan), while the poor move into further neighboring districts, (i.e. The Bronx) (Esri Story Maps 2017).

Table 7: Standard Deviations of Room Sizes between Early Islamic Sites

Site	N of Sites	N of Rooms	Median	Low S.D.	High S.D.	Mean S.D.
Tall Jawa	1	13	15.20	-	-	6.47
Humayma	1	16	13.42	-	-	13.56
Nahal Mitnan	1	5	15.75	-	-	3.44
Satellite derived sites	7	249	11.18	5.68	28.22	6.23

Table 8: Gini Coefficients of Room Sizes between Early Islamic Sites

Site	N of Sites	N of Rooms	Low Gini	High Gini	Mean Gini	Low Room Size	High Room Size	Mean Room Size
Tall Jawa	1	13	-	-	0.24198	2.03	29.34	14.53
Humayma	1	16	-	-	0.34537	3.94	57.00	18.28
Nahal Mitnan	1	5	-	-	0.13333	7.5	15.75	13.05
Satellite derived sites	7	249	0.19323	0.28848	0.27018	2.44	33.60	12.37

Table 9: Standard Deviations of Courtyard Sizes between Early Islamic Sites

Site	N of Sites	N of Courtyards	Median	Low S.D.	High S.D.	Mean S.D.
Tall Jawa	1	1	N/A	-	-	0
Humayma	1	3	184.38	-	-	49.83
Nahal Mitnan	1	2	31.13	-	-	10.13
Satellite derived sites	7	52	29.11	3.68	7.28	21.93

Table 10: Gini Coefficients of Courtyard Sizes between Early Islamic Sites

Site	N of Sites	N of Courtyards	Low Gini	High Gini	Mean Gini	Low Courtyard Size	High Courtyard Size	Mean Courtyard Size
Tall Jawa	1	1	-	-	N/A	21.38	21.38	21.38
Humayma	1	3	-	-	0.15784	79.49	186	149.96
Nahal Mitnan	1	2	-	-	0.16265	21.00	41.25	31.13
Satellite derived sites	7	52	0.1277	0.35019	0.31757	10.51	101.60	35.69

This phenomenon is not new as shown with the satellite-derived data. It makes sense in the case of Early Islamic southern Iraq as well, especially its rural areas. As rural America is experiencing more and more economic despair (USDA 2016), so were the villages of the Sawad during this time. After looking at the Early Islamic satellite-derived data and comparing it to the Sasanian satellite-derived data, an immediate increase in standard deviations and Gini coefficients is noticed, laying out a pattern of high variability of room and courtyard sizes. Outcome A is the result and the higher economic inequality levels that followed the Arab Islamic conquest will be further analyzed in the concluding chapter.

5. CONCLUSION

In the beginning of the thesis I had proposed three possible outcomes to the study of the settlements' rooms and courtyards found in the satellite imagery of southern Iraq, from the Sasanian period to the Early Islamic period. Of those three possibilities, Outcome A, where a pattern of high variability of room and courtyard sizes is significantly greater in the Early Islamic settlements than in the Sasanian settlements, as seen in higher standard deviations and high Gini coefficients, would indicate more economic inequality ensued after the conquest. Consequently, Outcome A is my conclusion after analyzing the data by comparing each era's room and courtyard sizes in the rural sites, as the numbers show a pattern of high variability between the two eras. This pattern is best shown in both higher standard deviations and Gini coefficients, indicating that more economic inequality ensued after the Arab Islamic conquest. The reasons for such results likely stem in the post-conquest administration of the Early Islamic period, consisting of the various leaderships of the Rashidun Caliphates, the Umayyads, and the Abbasids. Therefore, specific actions within the context of different policies overall by the new governing order, seem to have driven up economic inequality to the levels we see in the data.

Just as the urban Early Islamic world of southern Iraq experienced higher economic inequality levels, so did its rural counterparts. Consequently, this outcome was hypothesized based on two main sources of information, historical sources on urban settlements, and Adams's surveys on rural settlements. Both bodies of data strongly suggest that the new Muslim Arab rulers were extracting more resources from the rural hinterlands than their Sasanian predecessors. This policy of resource exploitation was based on a change in attitude, and thus policy, by the new administrators. It was one that ultimately had dire consequences for the area's rural inhabitants, as opposed to the fairer state of economic equality under Sasanian policies. The results of these policies are manifested in variability and economic differentiation patterns in the data, and thanks to the context provided with the ethnographies and excavation data, we can make sense of it all.

First, let us look at the concluding numbers from the information gathered and analyzed in the following tables:

Table 11: Standard Deviations and Gini Coefficients of Room Sizes between Sites from Different Eras²

Date	Site	N of Sites	N of Rooms	Median	Mean Room Size	Mean S.D.	Mean Gini Coefficient
Sasanian	Hājīrābād	1	8	13.25	20.79	13.01	0.32715
Sasanian	Ctesiphon	1	14	23.06	22.40	8.74	0.22169

² When comparing rooms from both the Sasanian and Early Islamic, I considered that a portion of them, roughly one third, were storage rooms. Thus, these rooms likely did not need any light and hence their positions in the imagery in relation to the courtyards and outside for the windows and doors.

Sasanian	Satellite derived	6	261	10.98	13.50	9.81	0.34792
Early Islamic	Tall Jawa	1	13	15.20	14.53	6.47	0.24198
Early Islamic	Humayma	1	16	13.42	18.28	13.56	0.34537
Early Islamic	Nahal Mitnan	1	5	15.75	13.05	3.44	0.13333
Early Islamic	Satellite derived sites	7	249	11.18	12.37	6.23	0.27018
Modern	Aliabad	1	334	-	21.50	10.43	0.4890

Table 12: Standard Deviations and Gini Coefficients of Courtyard Sizes between Sites from Different Eras

Date	Site	N of Sites	N of Courtyards	Median	Mean Courtyard Size	Mean S.D.	Mean Gini Coefficient
Sasanian	Hājīābād	1	5	15.91	34.38	31.78	0.42441
Sasanian	Ctesiphon	1	2	32.63	32.63	3.34	0.05172
Sasanian	Satellite derived	6	33	25.17	31.38	17.14	0.24927
Early Islamic	Tall Jawa	1	1	N/A	21.38	0	N/A
Early Islamic	Humayma	1	3	184.38	149.96	49.83	0.15784
Early Islamic	Nahal Mitnan	1	2	31.13	31.13	10.13	0.16265
Early Islamic	Satellite derived sites	7	52	29.11	35.69	31.78	0.31757
Modern	Aliabad	1	67	74.00	103.30	17.14	-

The fundamental correlation between courtyard and house sizes has been proven thanks to the ethnographic sample from Aliabad, for “since courtyard area is simply total compound area minus the area devoted to rooms, the courtyard area-household wealth relationship will parallel the total compound area household wealth relationships” (Kramer 1982:319-320). This enables myself to effectively compare the results in the tables above, and explain why economic

inequality increased in post-conquest southern Iraq. As one can see, there are some striking similarities between the various sites, lending credence to this comparative sample.

First, I would like to review the effective excavation data sample the rural settlements of Early Islamic Jordan has provided us for comparison to those of southern Iraq. The sample was quite effective because of the similar geography, environment, and not to mention that the transitions, are quite similar, with an Arab Islamic force conquering a mostly Jewish, Christian, and Polytheist Arab community ruled under two opposing yet somewhat similar empires: Byzantines and Sasanians. Perhaps most importantly, the Jordanian sample further fits well architecturally due to inheriting architectural forms and patterns because of the Umayyads having both ruled Iraq and Jordan simultaneously. This means whatever the Umayyads adopted from the Sasanians in southern Iraq, had been implemented to a certain extent in Jordan as well (Almagro 1992:356). For example, a two-side-room pattern that is typical of Persian palaces that dominate Jordan's desert palaces, is seen in the Jordanian capital Amman (Almagro 1992:353).

In particular, Humayma's standard deviation and average courtyard/room size may be so high due to being originally constructed as a church and not as a house. The growing abandonment of churches indicates an abundant supply of churches to occupy, with a supposedly low demand. Otherwise why would anyone want to live in an abandoned church? Besides, it does not seem likely these were elites by any means. The artifact record does not indicate an elite status nor has the site been described as a large domestic structure by the project's archaeologists. Tall Jawa and Nahal Mitnan, on the other hand, are excellent examples of rural housing with the standard house size of that period.

Moving onto the satellite-derived data, I would like to point out that the Sasanian data overall seems to have had more rooms than those I included in the sample, but that I was not able to confidently identify them from the architectural traces. This is best shown in a site like Site 64, which surely had much more to offer, but I was not able to identify the number of rooms, while other sites with architectural traces were generally clear enough to discern. In the Early Islamic satellite-derived data, it is likely that around a couple dozen rooms could not have their areas measured with confidence. Now while the Early Islamic data sample has one more site to analyze, it is possible that while considering issues of image clarity, there was simply a larger population during Sasanian times, and thus more rooms. It has been noted that the Sasanian era had already experienced massive depopulation, so that would have meant this trend continued into the Early Islamic, but perhaps for different reasons, (i.e. Islamic conquest).

Room sizes in the excavated data from Hājīābād are noticeably bigger than in the satellite data, and the courtyards are almost twice as large. This makes sense, since the excavation data was very likely to reflect upper class inhabitants, whereas rural Sasanian Iraq likely consisted of people much less well off. Perhaps the excavation data provides an elitist benchmark to a degree, enabling us to learn how large the wealthy *dihqans'* country estates may have been in rural southern Iraq.

The Early Islamic equivalent of an elitist benchmark therefore is Humayma, seen in its high standard deviation of almost 13.56 m² regarding rooms and 49.83 m² regarding courtyards, almost twice the amount of Early Islamic settlements in the satellite-derived data. Meanwhile the average Early Islamic house then would be the house at Tall Jawa, which turns out to be quite similar to houses detected in the satellite imagery. If the rooms decreased in size by half, it

would not have made any sense for the incoming Muslim Arabs to settle among them. Not to mention the rural countryside seems to have been in an even worse condition. If anything, it is because of this economic decline, and considering the socio-political context, oppression from the newly Muslim Arab conquerors, that drove economic inequality levels up and hence the majority likely stayed in the *asmar*. Nahal Mitnan's room and courtyard sizes meanwhile were half of those in the satellite-derived data concerning standard deviation, but that is probably due to possessing so little data, and hence not enough for a comprehensive comparison.

Coming back to the ethnographic data, Aliabad's standard deviation of courtyards was very high compared to both the excavation and satellite-derived data, providing us a benchmark of a village that is more stratified than any of the others. This proves then that the Sasanian and Early Islamic settlements in rural southern Iraq were more egalitarian than the Aliabad sample. However, the Sasanian satellite-derived data does paint a slightly more egalitarian picture than that of the Early Islamic. This drop in economic equality was surely noticed and felt in the average inhabitant's domestic housing, and so that leads us to the main comparison between the Sasanian and Early Islamic satellite settlements themselves.

The results of that comparison lead us to scenario A's outcome: "If a pattern of high variability of room and courtyard sizes appears between the Early Islamic settlements, in comparison to that of the Sasanian, as seen in higher standard deviations, that would indicate more economic inequality ensued after the conquest." The standard deviations of the Sasanian settlements are 9.81 m² for rooms and 17.4m² for courtyards, compared with the Early Islamic era's 6.23 m² for rooms and 21.93 m² for courtyards. From 17.4 m² to 21.93 m² is almost a 20 percent increase in standard deviation for courtyards, and therefore larger housing patterns, while rooms even decrease in mean size, albeit slightly, going from 13.50 m² in the Sasanian to 12.37 m² in the Early Islamic. Courtyard mean sizes also increase from 31.38 m² to 35.69 m², showing that people were starting to have slightly smaller rooms, and perhaps more people were sharing courtyards with others, a sign of possible difficult economic times among the populace as space became a more valuable commodity.

5.1. Economic Inequality

One of the most significant changes that occurred in southern Iraq after the Arab Islamic conquest was in taxation. An example of the exploitation of the countryside's resources by the new urban minded rulers can be seen in the following:

In the countryside, the use of credit instruments was often linked to fiscality and may have produced forms of dependency. At the local (village) level, the link between credit and fiscality was evident in the practice of *qabāla*, in which a rich man or village notable advanced the tax payment to the tax officer for the local community, in order to be reimbursed later by the community, with compensation. This practice could result in abuses, and already in the late eighth century it was condemned by Muslim jurist Abū Yūsuf, in part because he feared that, under this system, the state would receive less than in case of direct collection. (Bavel et al. 2014:279)

This new procedure was not present before and this heavily increased abuse, for Abu Yusuf was indeed correct in his analysis. Further details of what happened after the Muslim Arabs came into power and their hurtful new policies regarding taxation have been discussed throughout this paper, but what promoted such a different approach? It appears that a major reason as to why the implementation of such hurtful policies occurred was due to the way the

new Muslim Arab conquerors viewed the world and their newfound rule of Iraq, which can be conveyed in following manner:

The Abbasids were the inheritors rather than the creators of the vast irrigation system which supported human life and cultivation in Iraq. For the Sasanians, the core of empire has been a network of artificial canals connecting town and country; for the Abbasids, the empire was a network of highroads linking the metropolis with urban markets throughout their domains. Thus, orders of priority were different. (Adams 1981:215)

Ctesiphon was the only significant Sasanian urban center that lasted into the Early Islamic period. However, it was short-lived and soon withered away. It is likely a great example of the devastating economic impact the Arab Islamic conquest had on the area's inhabitants, unfortunately there is not enough excavation data on residential structures to make a comprehensive conclusion. Another example is that specific inhabitants known as *People of the Book*, (i.e. Jews and Christians), were forced to pay a special poll tax (Kennedy 2002:158). The Early Islamic government's main income was public taxation, as how it was with their predecessors, nevertheless, "development of taxation systems in the early Islamic period is complex and controversial" (Kennedy 2002:158).

Another matter of importance is that, "the evidence for a very substantial decline in land use in the central Euphrates floodplain appears to lend additional support to reports of a level of Sasanian state income considerably higher than could be attained afterward. If this central area were fully representative, in fact, a serious decline in income would have been inevitable no matter how repressively the Muslims raised the rates" (Adams 1981:218). This may in fact also explain the higher economic inequality level, due to a general decrease in incomes, and thus the satellite imagery and its higher variability patterns as indicated by both lower room mean and standard deviations, and higher courtyard mean and standard deviations in the Early Islamic, than in the Sasanian period. This pattern further confirms Adams's hypothesis. Moreover, he supposes that with future surveys, we would be able to see that this decline is in fact quite modest for the first few centuries after the conquest, a deduction that validates the modest results I have procured from the imagery (Adams 1981:218).

It seems that the new Muslim Arab rulers were more interested in using up the resources the villages had to offer than in investing and growing them as the Sasanians did within their more rural economic system. The city was superior to the village in minds of the merchant city-dwelling Arabs. This was seen even in the choices of locations for the establishment of the *asmar*, "the founding of new Arab cities like Basra, Kufa, and Wasit may imply that major emphasis in the Early Islamic period was placed on urban and agricultural development in formerly marginal regions, perhaps because the rights and claims of the indigenous inhabitants there could be more easily ignored or overridden" (Adams and Nissen 1972:93).

5.2. Muslim Arab Immigration

Yet we ask ourselves, why would these Arab Muslim conquerors settle in the countryside, when many left the Arabian Peninsula for a more prosperous future, one that would have included an urban lifestyle? But not necessarily, for they were leaving desert rural areas, in search for a better future, and that future may have been the relatively lush countryside of southern Iraq at the time (Aldous 2013:473). While they would leave from one rural area to an

urban one, it does not mean they would not also leave to another rural area, as long as it was more beneficial, especially if the urban was not all that it was cut out to be. For example, it is known that numerous immigrants to cities tended to get sick quite often, and many would contract fatal illnesses. Many ruling elites contracted the plague during the summer, which is why many constructed their 'desert castles' far away from cities to go wait it out in the desert (Dols 1974:380). This temporary movement was practiced by others as well like the military, with whole military regiments relocating to the desert until the epidemics subsided (Dols 1974:380). Thus, one could predict that many from the lower class as well would emigrate out of the cities too into the countryside for those very reasons after experiencing so many plagues on a yearly basis.

Regarding governmental interference, as mentioned in Nahal Mitnan, there was a state-sponsored strategy in sedentarizing the population in rural areas, which was in line with the government's policy of establishing or reoccupying frontier forts, such as Site 64, as part of a policy to control nomadic and semi-nomadic groups (Donner 1981:264-267). It seems the state's strategy was two-fold, on both the militarily and civilian fronts.

Aliabad and Darnaj are similar to some of the sites in the satellite-derived data, especially the Early Islamic, in regard to displaying dispersed settlement patterns. This is so as "such a dispersed settlement pattern tends to be characteristic of recently settled nomads," which makes sense and supports the idea that Muslim Arabs immigrated into the countryside, and perhaps best seen in Site 848 (Kamp 2000:83). This site is also notorious for its single room dwellings, which may support the idea that they were of the lower classes of Muslim Arabs coming to the countryside to look for a better life. For example, in Palestine and in Syria in the 1930s the poorest lived in one room dwellings, a fact that has been used to substantiate the idea that total room number relates to household wealth (Kamp 1982:132). Several other sites seen in the imagery seem to display numerous one room dwellings, but as Darnaj has shown, this does not mean that the quantity of rooms necessarily reflect household wealth (Kamp 1982:132). Though it was not necessarily the case, this is still plausible when considering the socio-political context of the times. So, if this was the case, then much smaller rooms and slightly larger courtyards may be a result of rising economic inequality, fueled by a subtle wave of Muslim Arab immigrants.

5.3. Settlement

After discerning the architecture of each era's settlements, it seems that both the Sasanian and Early Islamic samples possess a key similarity regarding how the inhabitants dispersed within the settlements. They both tended to leave significant distances among themselves and settle in clusters. I have determined this based on my observation, or lack thereof, any surface traces between said clusters. The reasoning for these distances and a "cluster settlement model," which has not been addressed by the academic literature, seems to be because of the inhabitants' psychological and economic interaction with their environment. They may have settled in such a way to maximize open space, a reason for why they or their ancestors settled the countryside in the first place, or possibly because the environment they lived in has always taught them wide open-spaces between neighbors is the norm. Alternatively, this cluster model may have also existed because these sites were in the marshes at the time and there was water between them. Regardless, this topic requires further research and is beyond the paper's scope.

While both samples share a similar distribution pattern within their settlements, the density within those clusters seem to differ. The Sasanian sample appears to be denser than its Early Islamic counterpart, and thus probably hosted larger populations, going in line with Adams's theory of mass depopulation during the sixth and seventh centuries. This happened during the Islamic conquests of the region, and so perhaps that was one of the driving factors. While I was not able to trace both samples' architecture in their entirety, one can still attain a good idea on how dense the settlements were based on the remaining surface traces. Some examples are Sasanian Sites 64 and 532, while settlements from the Early Islamic era, except for Site 1107, mostly appear to be slightly less dense. It remains to be seen if this has any significance.

Another main issue of settlement key to economic inequality in rural southern Iraq is the effect the Muslim Arab conquest had on settlement numbers in the area. It has been proposed that the conquest resulted in the abandonment of 68 percent of villages which were present in the previous Sasanian era, and is demonstrated in Figure 48 below (Gibson 1972:52). Though as Gibson notes, "no similar disruption was caused by any previous invasion of the area," and that perhaps this exception was instead because of "the massive flooding of both the Tigris and Euphrates during the late Sassanian period, in the time of Khusrau II" (Gibson 1972:52-53).

Period	No. of Sites	Sites Founded		Abandoned in a Given Period		Surviving into Following Period	
			Per Cent		Per Cent		Per Cent
Ubaid	4	4	100	2	50	2	50
Proto.	15	13	86	5	33	10	66
ED I	21	11	52	1	6	20	94
ED III	30	11	36	17	56	14	46
Akk.	17	4	23	2	12	15	88
Ur III/L-L.	20	5	25	5	25	16	80
OB	20	3	15	7	35	13	65
Kass.	23	10	43	10	43	13	57
NB	29	16	55	9	31	20	70
Ach./Sel.	50	30	60	18	36	32	64
Parth.	53	30	38	23	43	30	57
Sassan.	68	38	53	44	68	22	32
E. Isl.	66	44	67	38	58	28	42
Samarr.	37	9	24	12	32	25	70
L. Abb.	58	31	54	37	65	20	35
Ilkhan.	20	0	0	2	10	18	90
Post-Ilkhan.	30	12	40	30	100		

Figure 48: Sites Organized by Historical Era (Gibson 1972:49)

5.4. Change

As Morony has stated in *Continuity and Change in the Administrative Geography of Late Sasanian and Early Islamic al-Iraq*, there was significant differentiation by social status between the Sasanian and Early Islamic eras because of 'institutional continuity.' However nothing specific was mentioned in relation to the sites in question because of a lack of focus on rural southern Iraq. What aided this social differentiation? Evidently it was that, "cadres of

administrators [were] under an increasingly centralized direction. Providing the improved coordination needed for widely extended empires, they also made possible unprecedented destructive and despotic exercises of state power” (Kamp 1982:174). Hence, centralization had a direct impact on economic differentiation.

The cities seem to indicate a high level of centralization, and thus, assumedly social differentiation, though that is still unclear. It is not certain whether the same scenario manifested itself in rural areas, since excavation data is crucial to figuring out the towns’ spatial syntax regarding possible institutional buildings such as houses of worship and palaces. The historical record, (i.e. centralization, depopulation, etc.), meanwhile points to a higher level of economic inequality in both urban and rural settlements, seen in the satellite-derived data.

I hoped that by carrying out the statistical analysis on room and courtyard sizes of both the Sasanian and Early Islamic sites, patterns of economic inequality would appear, with the combination of room sizes and courtyards and the variability patterns as demonstrated in standard deviations, representing economic differentiation. The Early Islamic period is considered a more centralized empire in comparison to the Sasanian’s confederate traits, maybe explaining the numbers, with increasing economic differentiation manifesting itself in these sites, highly centralized societies would produce such an architectural pattern.

While the Sasanian and Early Islamic systems in southern Iraq were still quite similar in that both were mostly centralized – a strong sign of continuity that affected rural settlements – I do not see this continuity in the urban arena. This is so because while in the *asmār* we see a mosque and palace right next to each other, this is not the case with the Sasanians. Their rulers removed themselves religiously, socially, and economically from the masses, which can be seen with spatial syntax to a certain extent, and the way they imposed their faith, or rather did not. For example, no Zoroastrian fire temples have been found adjacent to any administrative palaces, but instead they were inclined to be distant from each other; a decentralized trait, another example of the Sasanian centralized-confederate hybrid regime. The Early Islamic system of governance on the other hand changed these multiple foci natured Sasanian sites, (i.e. separate religious and secular spheres), to a single intertwined religious and political center.

An interesting find during my research was that the settlements of the Sasanians and Middle Islamic period shared some traits which differed from those dating to the Early Islamic era. The Sasanians were, “united by a shared eclectic culture, combining Greek philosophy and medicine, Byzantine architecture, Indian tales, and sports and games such as chess, polo, and hunting. This hybrid culture would flourish again in the ‘Abbasid age” (Lapidus 2014:10). It is quite intriguing that this shared ‘eclectic’ culture bypassed the Early Islamic period. Why was that the case? Was there some sort of reversion during Early Islamic times, and why did this occur? This relates to the city of Hira, which is the utter manifestation of Arab Persian interaction, a city that offers much in learning the sphere of Iranian-Arab transculturation (Niehoff 2013:116). This learning is performed within a process that is "significant from a wider historical perspective, because it might have prepared the path for later developments in Islamic times, when the apogee of Arab-Iranian interaction is supposed to have taken place, i.e., in Abbasid Iraq" (Niehoff 2013:116).

5.5. Religious Conversion

Interaction can then lead to conversion, a definite change among the populace that may have affected the architecture I revealed in the study. For instance, we do see some conversion among some of the Christian Arab tribes along the frontier with Arabia, especially early on in rural areas (Lapidus 2014:61). Though it was not until later that the inhabitants in general started converting, likely when they realized the socio-economic benefits that came with being Muslim. The Muslim Arab elites were against the masses converting so as to maintain their tax base, (i.e. subjugated non-Muslim population), and thus protect their special advantages (Lapidus 2014:61). Therefore, the possibility that mass conversion took place in the countryside in the short time frame of the Early Islamic period in southern Iraq seems low, as there is no evidence of mosques in the satellite-derived data. The Muslims had built their cities and missionary work was unusual.

There is still a chance for at least some waves of conversion to have taken place though, for there was pressure to convert, and a loss of Zoroastrianism's status after attacks on its members' wealth (Daryaee 2013:97). While that was not the dominant religion among rural southern Iraqi inhabitants, it still had some followers. The same could have also applied to Christians and Jews, although they likely experienced much less pressure due to being *People of the Book* and possessed a special status among Muslims. Even polytheists were likely to have been less pressured, for most were Arabs, hence having ethnic ties to the Muslim conquerors. Meanwhile Zoroastrians were usually Persians, long-time enemies of many Arabs. It has also been shown that the eighth and ninth centuries witnessed rapid conversion taking place among the Zoroastrian community in Iran, a possible scenario for the Zoroastrians of southern Iraq (Daryaee 2013:94).

While we do not know how much conversion to Islam affected the Sasanian settlements, we do know that an overall negative socio-economic change occurred, and that it may have played a role. Why exactly this may have been is unclear, but the primary reason was likely the repressive fiscal policies of the new rulers that favored Muslim Arab urbanites over the majority Sasanian Arabs and Persian rural dwellers, increasing inequality. This obviously led to significant changes in the day-to-day lives of the average inhabitant, but not all changed.

5.6. Continuity

Continuity has been hypothesized to have at least prevailed in the countryside for it was, "an important force behind the developing economy of the early Islamic period" (Simpson 2014:22). This would have strengthened Outcome B, as continuity would have been the dominant factor in economic policy post-conquest southern Iraq. Yet that was not the case, as economic policy changed thanks to political change.

The structure and function of domestic architecture seems to have stayed the same in Sasanian and Early Islamic sites. In the early Muslim community, as has been shown in early Islamic Iraq, "a rural setting, a multi-living arrangement is conducive to interdependence, with families functioning cooperatively in terms of land ownership, division of labor and the sharing of work animals" (Ahn 2010:107). Regarding the basic architectural structure, "the similarity of the ancient houses at Ur and the traditional Baghdad houses in present-day Iraq has been noted

by Woolley and Schoenauer. The enclosed courtyard house is a product of cultural polygenesis dating to the Bronze Age, and it has persisted...in the form of the classical atrium and pastas house to be adopted by Muslims” (Ahn 2010:105). The courtyard is a structure that has passed on from one civilization to the next, and it seems that it is more than just a feature that has continued from the Sasanian to the Early Islamic.

It is notable that some sites, such as Site 64, were relatively more significant in size, and therefore "recalls the functions of Arab qal'as” (Adams and Nissen 1972:62). Perhaps the Early Islamic qal'as were just continuances and essentially a borrowed idea from their former Sasanian counterparts, especially since the invading Arab nomads were not known for building such fortifications. Another example of a continuance was in institutional architecture is the main architectural component in Kufa's palace, a three-aisled hall that has a domed room immediately behind it, a regular feature found in many Sasanian palaces (Creswell 1989:15). All of this, including the excavation and satellite-derived data, indicates that many changes were still likely to be introduced gradually, especially during the first two centuries, which happens to be the Early Islamic period in its entirety (Adams 1981:234).

5.7. Concluding Remarks

This study has provided additional evidence to the notion that few Muslim Arabs likely emigrated from the *asmar* to more rural areas, and that conversion was probably just a gradual process. But, it does aid in differentiating between a Sasanian and an Early Islamic site, as shown in room and courtyard sizes, in economic inequality. The seemingly higher levels of centralization, harsh government policies, and a bloody Arab Islamic conquest of the region, including other mentioned factors, likely led to the increase in economic inequality that we see in the imagery. These conclusions however ought to be taken provisionally until they are substantiated by a larger body of evidence. While I do provide a statistical sample, comparable excavation data, and historical sources, my analysis is limited until actual full-scale excavations can take place at the Sasanian and Early Islamic settlements presented in the satellite imagery.

The thesis touched upon, albeit indirectly, the somewhat tumultuous dichotomy between history and archaeology. They have always been presented as two peas in pod, however not enough historians utilize archaeological findings and analysis by archaeologists in their research, and not enough archaeologists take advantage of both historical texts and their analysis by historians. There is reason to believe that if both disciplines worked closer together, we would be able to create a more comprehensive image of the past. I utilized both historical sources, (i.e. Umar's decrees), and the analyses of historians, (i.e. Bonner's work). Morony, an author cited extensively throughout this paper, gets at the heart of it within the context of Early Islamic Iraq:

In general, historians and archaeologists tend to have a symbiotic relationship; historians look to archaeologists for validation while archaeologists look to historians for proof texts. The disjunction between historical and archaeological information need not be viewed as contradictory but could be seen as an advantage, each illuminating different aspects of life in a complementary way. Demographic change needs to be viewed in broader terms than mere population shifts; the effects of migration need to be balanced against the effects of possible changes in birth and mortality rates. Regional and sub-regional differences during the seventh and eight centuries might be seen in terms of the chronological overlapping of different material cultures, specifically in terms of more and less commercialized economies. (Morony 1994:229)

In conclusion, the domestic architecture, traced with only satellite imagery using GIS, comes with a warning that this does not provide an adequate basis for thorough conclusions on domestic structures in Sasanian and Early Islamic southern Iraq, but rather aids in the formation of a platform for future studies. More is needed in terms of archaeological survey, and especially excavation data. It was hoped that this thesis would shed some much-needed light on the transition between the two-era's architecture in rural settlements, as to help us further determine what constitutes a Sasanian, and more significantly for this study, an Early Islamic site. That was achieved, to a certain extent.

The Early Islamic period unfortunately has not had enough archaeological dedication that focuses on that era's domestic rural areas in southern Iraq. The minute quantity of research, coupled with Iraq's recent political history, may result in society never piecing together large parts of their past. Such threats include earlier looting trends that were focused on more recent periods of Iraq's history, such as the Early Islamic period (Stone 2015:180). Although it is no longer the case that the looting focuses on Iraq's Islamic era, possibly because of the greater importance of Islam in modern-day Iraq (Stone 2015:180). The decline in this trend however may just be because so many Early Islamic sites have already been plundered. With Iraq's archaeological heritage under so many threats, from collateral damage due to the Gulf Wars to the so-called Islamic State of Iraq and the Levant's vicious attacks on cultural sites, there is little left of the Early Islamic past, and it is now more imperative than ever before to contribute to this crucial field (Curry 2015). I hope that this thesis offers a contribution to this field, hopefully the first of many.

List of References

Adams, Robert McCormick

1970 Tell Abu Sarifa: A Sassanian - Islamic Ceramic Sequence from South Central Iraq. *Ars Orientalis* 8:87-119.

1981 *Heartland of Cities: Surveys of Ancient Settlement and Land Use on the Central Floodplain of the Euphrates*. Chicago: University of Chicago Press.

Adams, Robert McCormick and Hans J. Nissen

1972 *The Uruk Countryside: The Natural Setting of Urban Societies*. Chicago: University of Chicago Press.

Ahn, Sandra

2010 *The Domestic Architecture of Jordan-Palestine in the Early Islamic Period: An Archaeological Approach*. Master's thesis, Department of Arab and Islamic Civilizations, American University in Cairo.

Aldous, Gregory

2013 *The Islamic City Critique: Revising the Narrative*. *Journal of the Economic and Social History of the Orient* 56(3):471-93.

Allawi, Ibrahim

1988 *Some Evolutionary and Cosmological Aspects to Early Islamic Town Planning*. In *Theories and Principles of Design in the Architecture of Islamic Societies*. Sevchenko, Margaret Bentley, ed. Pp. 57-72. Cambridge, Massachusetts: Aga Khan Program for Islamic Architecture.

Al-Ma'adhidi, Abdul-Qadir S.

1978 *Khitet Madeenat Wasit fe Alasr Al-Abbasi [The Planning of the City of Wasit in the Abbasid Period]*. *Sumer: Journal of Archaeology and History in the Arab Homeland* 34:181-197.

Almagro, Antonio

1992 *Studies in the History and Archaeology of Jordan*, vol. 4: *Building Patterns in Umayyad Architecture*, 351-56. Amman: Department of Antiquities.

Altheim, Franz

1962 *Das alte Iran [Ancient Iran]*. In *Propylaen Weltgeschichte [Propylae World History]*, Robert McCormick Adams, trans. 2:135-235. Berlin: Propylaen Verlag.

Ayyad, Essam S.

2013 *The 'House of the Prophet' or the 'Mosque of the Prophet'?* *Journal of Islamic Studies* 24(3):273-334.

Azarnoush, Massoud

1994 *The Sasanian Manor House at Hājīābād, Iran*. Firenze: Le Lettere.

- Bavel, Bas Van, with Michele Campopiano and Jessica Dijkman
 2014 Factor Markets in Early Islamic Iraq, c. 600-1100 AD. *Journal of the Economic and Social History of the Orient* 57(2):262-289.
- Black, Antony
 2011 *The History of Islamic Political Thought: From the Prophet to the Present*. Edinburgh: Edinburgh University Press.
- Blanton, Richard E.
 1994 *Houses and Households: A Comparative Study*. New York: Plenum Press.
- Bonner, Michael
 1996 Definitions of Poverty and the Rise of the Muslim Urban Poor. *Journal of the Royal Asiatic Society* 6(3):335–344.
- Casey, Michael S.
 2007 *The History of Kuwait*. Westport: Greenwood Publishing Group.
- Cavalier, Mariangiola
 1966 The Excavations at Choche (The Presumed Ctesiphon). *Mesopotamia: Rivista Di Archeologia* [Review of Archaeology]. G. Giappichelli, ed. Pp. 63–81. Torino: University of Torino.
- Curry, Andrew
 2015 Here Are the Ancient Sites ISIS Has Damaged and Destroyed. *National Geographic*, September 1: <http://news.nationalgeographic.com/2015/09/150901-isis-destruction-looting-ancient-sites-iraq-syria-archaeology/>, accessed January 8, 2016.
- Curtis, Vesta S., and Sarah Stewart
 2008 *The Sasanian Era*. London: I.B. Tauris.
- Creswell, K.A.C.
 1989 *A Short Account of Early Muslim Architecture*. Aldershot: Scholar Press.
- Daryaee, Touraj
 2008 *Sasanian Persia: The Rise and Fall of an Empire*. London: I.B. Tauris.
 2012 The Sasanian Empire (224-651 CE). In *The Oxford Handbook of Iranian History*. Touraj
- Daryaee, ed. Pp. 187-207. Oxford: Oxford University Press.
 2013 Marriage, Property and Conversion among the Zoroastrians: From Late Sasanian to Islamic Iran. *Journal of Persianate Studies* 6:91-100.
- Daviau, P.M. Michèle
 2010 *Excavations at Tall Jawa, Jordan, vol. 4: The Early Islamic House. Culture and History of the Ancient Near East*. Leiden: Brill.
- Dols, Michael W.
 1974 Plague in Early Islamic History. *Journal of the American Oriental Society* 94(3):371.

Donner, Fred McGraw

1981 *The Early Islamic Conquests*. Princeton, NJ: Princeton University Press.

1995 *The Byzantine and Early Islamic Near East, vol. 3: Centralized Authority and Military Autonomy in the Early Islamic Conquests*. Averil Cameron, ed. Princeton: Darwin Press.

1998 *Narratives of Islamic Origins: The Beginnings of Islamic Historical Writing*. Princeton: Darwin Press.

2010 *Muhammad and the Believers: At the Origins of Islam*. Cambridge, Massachusetts and London: The First Belknap Press of Harvard University Press.

Edwards, Brian

2006 *Courtyard Housing: Past, Present, and Future*. Abingdon: Taylor & Francis.

Esri Story Maps

2017 *Wealth Divides: Exploring the Stark Dividing Lines Between Rich and Poor in American Cities*. March 8:

<https://www.arcgis.com/home/item.html?id=af93202557af445d8a0cfba1d0bcbb87>,
accessed March 30, 2017.

Farahani, Alan

2014 *Encyclopedia of Global Archaeology, vol. 10: Archaeology of the Sasanian Empire*. New York City: Springer.

Goitein, Shelomo Dov

2009 *Studies and Islamic History and Institutions, vol. 5: The Rise of the Middle-Eastern Bourgeoisie in Early Islamic Times*. Brill Classics in Islam. Leiden: Brill.

Haiman, Mordechai

1995 *An Early Islamic Period Farm at Nahal Mitnan in the Negev Highlands*. 'Atiqot 26:1-13.

Hasanuzzaman, S.M.

1981 *The Economic Functions of the Early Islamic State*. Karachi: International Islamic Publishers.

Insoll, Timothy

1999 *The Archaeology of Islam*. Oxford: Blackwell.

Kamp, Kathryn Ann

1982 *Architectural Indices of Socio-economic Variability: An Ethnoarchaeological Case Study from Syria*. Ph.D. dissertation, Department of Anthropology, The University of Arizona.

1987 *Affluence and Image: Ethnoarchaeology in a Syrian Village*. *Journal of Field Archaeology* 14(3):283.

1993 *Towards an Archaeology of Architecture: Clues from a Modern Syrian Village*. *Journal of Anthropological Research* 49(4):293-317.

2000 *From Village to Tell: Household Ethnoarchaeology in Syria*. *Near Eastern Archaeology* 63(2):84-93.

Kennet, Derek

2007 *The Decline of Eastern Arabia in the Sasanian period*. *Arabian Archaeology and Epigraphy* 18(1):86-122.

- Kennedy, Hugh
2002 *Military Pay and the Economy of the Islamic State*. *Historical Research* 75(188):155-169.
Oxford: Blackwell Publishers Ltd.
- 2007 *The Great Arab Conquests: How the Spread of Islam Changed the World We Live In*.
London: Weidenfeld & Nicolson.
- 2011 *The Feeding of the Five Hundred Thousand: Cities and Agriculture in Early Islamic Mesopotamia*. *Iraq* 73:177-199.
- Kramer, Carol
1982 *Village Ethnoarchaeology: Rural Iran in Archaeological Perspective*. New York: Academic Press.
- 1983 *Spatial Organization in Contemporary Southwest Asian Villages and Archeological Sampling*. In *The Hilly Flanks and Beyond: Essays on the Prehistory of Southwestern Asia*, Robert J. Braidwood, ed. Pp. 347-68. Chicago: Oriental Institute of the University of Chicago.
- Kröger, Jens
2011 *Ctesiphon*. *Encyclopaedia Iranica*. November 2:
<http://www.iranicaonline.org/articles/ctesiphon>, accessed January 8, 2016.
- Lapidus, Ira M.
2014 *A History of Islamic Societies*. New York: Cambridge University Press.
- McGuire, Gibson
1972 *City and Area of Kish*. Miami: Field Research Projects.
- Morony, Michael G.
1982 *Continuity and Change in the Administrative Geography of Late Sasanian and Early Islamic al-Iraq*. *British Institute of Persian Studies* 20:1-49.
- 1984 *Iraq after the Muslim Conquest*. New Jersey: Princeton University Press.
- 1994 *The Byzantine and Early Islamic Near East, vol. 2: Land Use and Settlement Patterns in Late Sasanian and Early Islamic Iraq*. G.R.D. King and Averil Cameron, eds. Princeton: Darwin Press.
- 2004 *Economic Boundaries? Late Antiquity and Early Islam*. *Journal of the Economic and Social History of the Orient* 47(2):166-194.
- Mottahedeh, Roy
2001 *Loyalty and Leadership in an Early Islamic Society*. London: I.B. Tauris.
- Mustafa, Muhammad 'Ali
1963 *Preliminary Report on the Excavations in Kufa during the Third Season*. Christel Kessler, trans. *Sumer* 19:36-65.
- Northedge, Alastair
2005 *The Historical Topography of Samarra*. London: British School of Archaeology.

- Oleson, John Peter., and Robert Schick
 2013 Humayma Excavation Project, 2: Nabatean Campground and Necropolis, Byzantine Churches, and Early Islamic Domestic Structures. Boston: American Schools of Oriental Research.
- Oscar, Reuther
 1929 The German Excavations at Ctesiphon. *Antiquity* 3(12):434-451.
 1938 Sasanian Architecture: A History. In *A Survey of Persian art from Prehistoric Times to the Present*. Arthur Upham Pope, ed. Pp. 493-578. London and New York: Oxford University Press.
- Petersen, Andrew
 2005 What is 'Islamic' Archaeology? *Antiquity* 79:100-106.
- Petherbridge, Guy T.
 1978 The House and Society. In *Architecture of the Islamic World: Its History and Social Meaning*. George Michell, ed. Pp. 199-201. London: Thames and Hudson Ltd.
- Piketty, Thomas, with Emmanuel Saez and Gabriel Zucman
 2016 Economic Growth in the United States: A Tale of Two Countries. Washington Center for Equitable Growth. December 6: <http://equitablegrowth.org/research-analysis/economic-growth-in-the-united-states-a-tale-of-two-countries/>
- Rice, Talbot D.
 1934 The Oxford Excavations at Hira. *Ars Islamica* 1(1):51-73.
- Robertson, John
 2015 *Iraq: A History*. London: Oneworld Publications.
- Sadr, Seyed Kazem
 2016 *The Economic System of the Early Islamic Period: Institutions and Policies*. New York: Springer.
- Safar, Fuad
 1945 *Wasit: The Sixth Season's Excavations*. Cairo: The French Institute of Oriental Archaeology.
- Simpson, St John
 2014 Merv, an Archaeological Case-Study From the Northeastern Frontier of the Sasanian Empire. *Journal of Ancient History* 2(2):1-28.
- Stone, Elizabeth C.
 2015 An Update on the Looting of Archaeological Sites in Iraq. *Near Eastern Archaeology* 78:178-186.
 N.d. *The Trajectory of Social Inequality in Ancient Mesopotamia*. Unpublished MS.

- Stone, Elizabeth C., with Paul E. Zimansky and Piotr Steinkeller.
2004 *The Anatomy of a Mesopotamian City: Survey and Soundings at Mashkan-shapir*. Winona Lake, IN: Eisenbrauns.
- Toral-Niehoff, Isabel
2013 Late Antique Iran and the Arabs: The Case of Al-Hira. *Journal of Persianate Studies* 6:115-26.
- United States Department of Agriculture (USDA)
2016 *Rural America At a Glance: 2015 Edition*. Page 1.
https://www.ers.usda.gov/webdocs/publications/44015/55581_eib145.pdf?v=42397,
accessed June 30, 2016.
- Venice Ricciardi, R., and M.M. Negro Ponzi Mancini
1985 *The Land between two rivers: twenty years of Italian archaeology in the Middle East: the treasures of Mesopotamia*:100-110.
- Von Grunebaum, G.E.
1955 *Islam: Essays in the Nature and Growth of a Cultural Tradition*, vol. 5: *The Structure of the Muslim Town*. Menasha, WI: George Banta Publishing Company.
- Waines, David
1977 The Third Century Internal Crisis of the Abbasids. *Journal of the Economic and Social History of the Orient* 20(3):282-306.
- Walmsley, Alan
1992 *Studies in the History and Archaeology of Jordan*, vol. 4: *Fihl (Pella) and the Cities of North Jordan during the Umayyad and Abbasid Periods*. Amman: Department of Antiquities.
- Whitcomb, Donald
1992 *The Byzantine and Early Islamic Near East*, vol. 2: *The Misr of Ayla: Settlement at al-'Aqaba in the Early Islamic Period*. Princeton, NJ: Darwin Press.
2006 *Archaeology of Islamic Cities, 2004-2005*. Annual Report, 14-17, Donald Whitcomb. Chicago: Oriental Institute of the University of Chicago.
- Wright, Henry T.
1969 *The Administration of Rural Production in an Early Mesopotamia Town*. Ann Arbor: University of Michigan.
- Yassin, Ali, and Nangkula Utaberta
2012 *Architecture in the Islamic Civilization*. *Journal of Islamic Architecture* 2:52-60.