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Assessorato all'Urbanistica

Growth in the Garden Of Venice:
Sustainable Development in Sant'Erasmo

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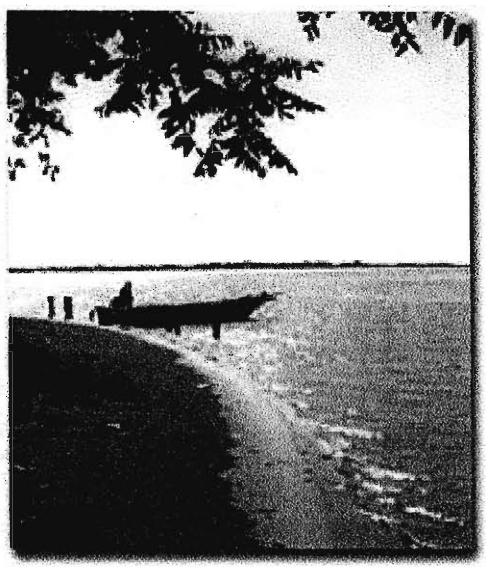

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ABSTRACT

The island of Sant'Erasmo, or "the Garden of Venice," was once the agricultural center of the Venetian lagoon; however, now 1/3 of farmland is abandoned, making it a target for development. To preserve the rural landscape, typologies were defined for the existing buildings for use in future construction. Furthermore, a system was devised to utilize the abandoned farm fields and waterways on the island that will ultimately maintain the historical integrity and ambiance characteristic of the Venetian lagoon.

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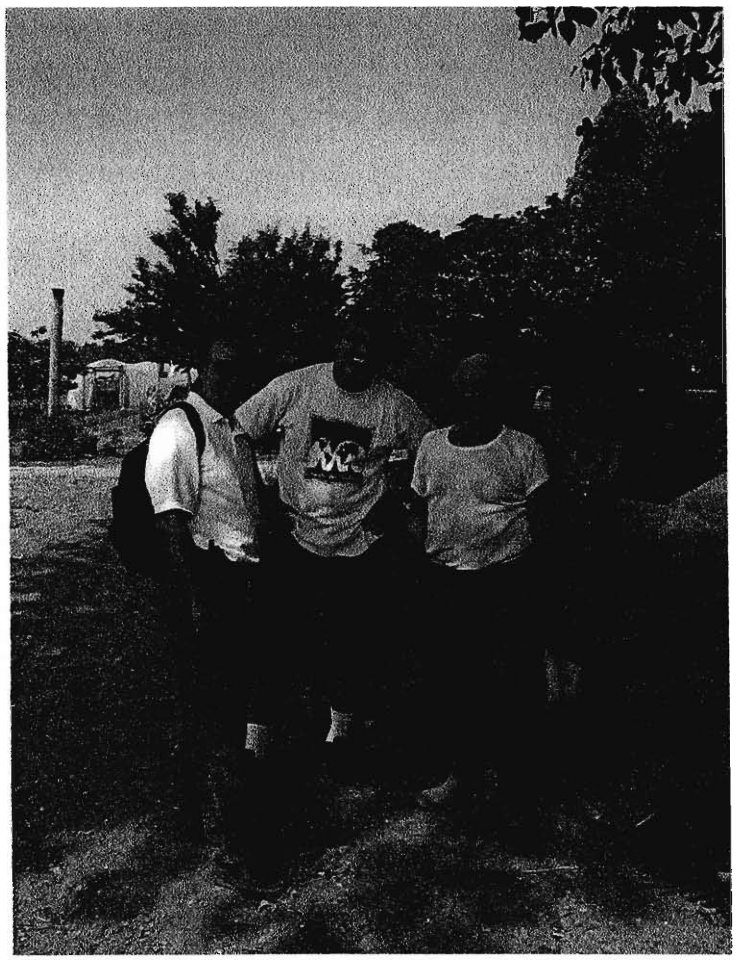

AUTHORSHIP

In the completion of the project, each team member dedicated a significant amount of time and effort into each of the parts on an individual basis as well as a whole. Although this was a team endeavor, each student contributed significantly to specific parts. Laurel and Katrina were the primary data collectors for architecture, while Tom and Dave worked on waterways and agriculture. Tom and Dave were also in charge of the creation of the database and GIS layers, with some help in data entry from Laurel. Katrina and Laurel were the primary paper writers, with significant help from Dave and Tom, especially with the waterways and agriculture sections. The creation of the presentation was split equally between the entire team.

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1 EXECUTIVE SUMMARY

For centuries there has been a struggle between the preservation of the past and the need for advancement. Landscapes around the world are gradually changing as once beautiful structures that are no longer adequate in today's high-paced society are exchanged for modern buildings. Functional bridges are taking the place of older structures in order to accommodate the automobiles that the architects of centuries ago did not anticipate. An explosion of residences needed to accommodate a rising population are taking over what were once rural areas, trees are being cut down to make way for roads, and entire landscapes are slowly vanishing before residents' eyes, transforming the previously untouched countryside.

Few places in the world remain that urbanization has not affected, be it in the built environment or in the mindset of the residents. In many places, the best farmland is used for growing homes, rather than agriculture, as it once was. Agriculture has been decreasing in Italy overall in the last 40 years, with a loss of nearly a quarter of agricultural land since 1961[1]. Much of the land that is at risk for development was formerly used as farmland. There can be economic pressure to sell farm land to developers, which is often difficult to resist for farmers who bring their crops into the cities each day. The varied topographies and textures that farming creates which beautify a region are exchanged in favor of suburban residences. As these important farming regions are lost and the residents move away, the need to maintain open space grows increasingly important. It is this concern that propels the race to control the diminishing of agricultural land accompanying population growth and technological advancement. Controlling change and maintaining a sustainable rate of development is vital in preserving the historical essence of an area, while allowing traditional ways of life, community, and culture to carry down through the generations.

These changes can be controlled through sustainable development which seeks to control growth and change. Sustainable development not only focuses on the environment, but also the economy and the health of society, and the interactions between them. There is a need for balance between the three, as what may be most economically attractive may not be best for the health and environment of a region, and what may be most beneficial to the health or environment may not be economically feasible. Sustainable development is used in many ways. In the built landscape it looks at the density and location of construction, as well as the aesthetic features and maintaining the appearance of an area. Maximizing the use of open space is also an important role in sustainable development. Encouraging methods such as organic farming and minimizing the use of the use of pesticides and chemicals, which have negative impacts on the groundwater and soil condition, can be implemented to benefit the environment. Likewise, waterways can be used in ways that benefit the environment, as well as an alternative economic and transportation source. Limiting fishing or shell fishing, controlling the uses of surrounding areas, restricting point source pollutants, and increasing

[1] FAOSTAT Database

public access and creating low impact tourism all create a balance between the need for economic incentives while protecting the health and environment of a region.

The Venetian lagoon is one such place which has faced heavy development pressure and has lost some of its original atmosphere. As the demand for residential land increases in rural areas, pressure has been placed on the communities of the lagoon to change, and trade their farms for modern housing developments. These areas hold a great potential for other uses besides residences. Presently, there is less emphasis on farming, which is important to, not only the history, but also the future of the islands of Venetian lagoon.

Sant'Erasmo is an island located in the northern part of the lagoon and is the largest island of the area. Until the 1890's, it was a lido, or barrier island, however, jetties made the dune of Sabbioni Tip and eventually formed the island that people know today. For centuries it had been known as "the Garden of Venice," supplying much of the produce sold at the markets. In great contrast to Venice, Sant'Erasmo is a quiet island that houses approximately 800 residents and is infrequently visited by the twelve million tourists that come to the lagoon each year.[2] The island, however, does have many of the same problems as the Venetian lagoon as a whole, such as a decreasing population, which have begun to affect Sant'Erasmo. The population is dwindling, down from 926 residents in 1981 to only 773 in 2001[3]. The younger generations are moving away to work in more lucrative industries and away from the traditional agricultural way of life. The aging and decreasing population creates several other problems, including a lack of farmers to care for the almost 1000 fields on Sant'Erasmo. The pressure to use abandoned fields may be even higher, as the older residents may choose to give up farming and sell their land to developers who would be seeking large parcels of land. If neighboring farmers chose to sell their land together, as one parcel of land, it would be very easy for a developer to build large subdivisions or even commercial units.

Currently, there are many changes happening to the landscape of Sant'Erasmo. Nationally funded work is being undertaken around the perimeter of the island to build a protective flood wall as well as boat marinas. Other work being funded by the regional government to improve waste disposal and sewers, and road and building renovations are being funded by the city.

Despite the numerous improvements and efforts happening, there has not been much published research regarding the architectural preservation or land usage on the island of Sant'Erasmo. Of the research done, the most significant was a master plan of the lagoon which was created in the 1950's and 60's. This plan suggested the best possible use of the land through specified use zoning. The most current version of this plan was compiled in 1997 and is the *Variante Piano Regolatore Generale* or VPRG, compiled in 1997 because alterations have been made to the master plan over the years in order to update it and allow economic and social changes.

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[2] Fabio Carrera
[3] Italian Census Bureau

Expanding on this existing information, the goal of this project was to define typologies of the buildings for suggested changes to zoning guidelines, to plan a land rental system, and to plan a navigable route for small recreational boats. These in turn, will allow Sant'Erasmo to grow and yet maintain the historical essence and aesthetics of the island. Each of these aspects, architecture, agriculture, and aquaculture, required a separate method to gather information to achieve our goals and help prevent future problems that the island will face, such as overdevelopment and field abandonment.

More specifically, to examine and promote the preservation of architectural style on the island, field research was conducted in the form of a photographic survey. Several key elements of each building were photographed, such as windows, doors and chimneys, as well as any unique feature found concerning that structure. This information, gathered in a census approach, was used to determine the typical styles of architecture found on the island. Significant information regarding each building such as the address and use was also recorded. This information was organized in a database along with information from Appendix C of the VPRG provided by *Assessorato all'Urbanistica.* Using the organized information, typologies based on the date of construction and style of the building were defined. The inventory of the buildings is now accessible to planning boards and contractors through *Assessorato all'Urbanistica.* The city's planning boards can use this information to create zoning guidelines by looking at the typologies defined in this project and to manage renovations to existing buildings.

Similar to the inventory of the buildings, the team evaluated how land is used on the island. Again, visual observation was primary method in gathering the bulk of the information regarding use. The condition of the field, including whether the field is purposely fallow, abandoned or active was recorded. Using this information, thematic maps of the fields, as well as their agricultural status, were created. The maps provide information of the types of crops and use of the fields on the island. In addition, the owners of each land plot were also identified on the maps. This information was critical in developing a proposed land rental system where the maximum amount of land could be acquired through negotiations with a minimal number of owners.

Waterways were a final feature examined in the project. Because waterways can play key roles in recreational tourism as well as an alternative economic source, the team looked at ways in which the existing waterways could be reutilized. This was done by identifying the longest continuous navigable route with informational maps provided by *Assessorato all'Urbanistica.* This route was then observed by walking the length of this and mapping out the blockages and other problems associated with water flow, as well as other areas that will need to be altered to allow the passage of small, recreational boats. From the information collected, a proposal was made for a waterway route to be reopened and evaluated for potential recreational or commercial uses.

By analyzing this information gathered from the architecture, agriculture, and waterways, three methods were developed to promote sustainability in each of the three categories. Using the existing information

from the VRPG, the team created an Access database which organized all the information the team collected during our 2 month stay in Venice. To facilitate the introduction of new land use techniques, such as a land rental system, the map layers created pertaining to field status and field ownership were compared in order to find the most attractive plots of land for rental. Finally, through data collection and cost analysis, two recreational waterway routes were created, one ideal which travels the entire length of the island, and another less obtrusive route. Using a combination of the database and the map layers created from existing data and the data we gathered, the team was able to complete three separate yet associated methods to promote sustainability on Sant'Erasmo. Below are the results of our work, along with explanations of what the team found.

The architectural investigation of the island gave important results regarding the style of the various buildings on the island. Of the approximately 243 buildings located on Sant'Erasmo, 222 were photographed, catalogued, and were defined using a typology. It was found that most of the buildings were for residential use. Only two buildings catalogued were for commercial use, six for community use, including the church and two schools, and two historical forts. The remaining catalogued structures, approximately 212, were used for residential purposes. Several overall trends were noted that were prevalent across the island. For example, stucco was the most commonly seen building element on the island, as 85% of the buildings had stucco as the primary exposed material of construction. 200 of the buildings featured the traditional clay shingle roofs found throughout Italy. 64% of these roofs were the *capanna longitudinale* shape, and 14% were the *quattro falde* shape. Most buildings on the island were under three stories. Only 2 of the 222 were 4 stories and 14 were 3 stories tall.

The main classification for building typologies on Sant'Erasmo began by categorizing the buildings by their construction period, either (~1830-1900), 1900-1970 or modern (1970+)
Sant'Erasmo is primarily comprised of two styles of structures. These two are *orticola* and *rurale*, and buildings of these styles were identified with the help of Architects Giorgio Pilla and Alberto Gallo. Most of the buildings on Sant'Erasmo are *orticola* style buildings, as 45% of the buildings were classified as that type. 24% of the buildings catalogued were classified as *rurale* style. Two buildings were classified as *fortezza*, and the remaining buildings were modern buildings that could either not be identified or that did not follow the style of the historic buildings on the island.

Trends in agriculture were also analyzed by the team once all the data was collected. The locations and use of fields were used to create thematic maps that help in looking for patterns that may be used in locating a site for field rental. Although it had been estimated that up to 60% of the fields were abandoned, this was found to be a very high estimate, in fact, of the 2.75 square kilometers on Sant'Erasmo, only approximately .8 square kilometers were abandoned, which is 31% of the island. 45% was used, and the remaining 24% was unusable for productive farming. This is a positive sign for the island, as almost half of the land is currently being used for agriculture, half of which are used for miscellaneous vegetables.

However, great potential still rests in the abandoned fields of Sant'Erasmo. The team hopes its Land Rental System will significantly lower the 31% of abandoned land on the island.

The results of the waterway research that the team completed showed that most, if not all, of the waterways on the island were blocked and not navigable. The work not completed in the field was done using GIS layers. The team analyzed all possibilities of waterway usage and using GIS layers in conjunction with field work, the canals of Sant'Erasmo were examined for the longest possible navigable route through the island. Two routes were found satisfactory, one which traversed the entire island but required that several plots of land needed to be excavated, and one which exited the island and rejoined, which would require less excavation.

Included in the observation and data collection of the waterways on Sant'Erasmo, the team also made note of the fishfarms. The team noted the location of each in order to confirm the accuracy of the GIS Layers. The fishfarms were observed and the condition was analyzed by walking the length of it. Every fishfarm on the island was found to be abandoned. The water was not flowing at all and was naturally obstructed in some locations. The team did find that some potential still lies in the fishfarms of Sant'Erasmo. Through meetings with several Venetian Government Associations, the team learned that the city plans to repair the large fishfarm on the island, which coincidentally is bordered by both our waterway routes.

Based on the information for architecture, it was discovered that much of the buildings on the island were built after the creation of the VPRG, and almost one-third of those buildings were *Moderna Non Intergrata*, or modern buildings that did not fit in with the existing landscape. Many of the existing older buildings had been transformed in some style, either with the addition of small external rooms that could easily be removed, or by entirely modifying the footprint of the building. Based on the information collected suggestions towards the height, shape, building material and building elements used were suggested. It was also noted that many of the incidental use buildings and fences were in poor condition and could be improved with the help of lot improvement program that would help residents of the island improve the look of their property.

A cash-rent farm rental system was devised to help use the abandoned land on the island, with the government acting as an intermediary to ensure that if a land owner wanted to regain their land, it would be possible. This system would target residents of the island who have abandoned land already or are considering giving up farming, as well as citizens of the lagoon who would like to farm, but lack the funds to buy land or are interested in farming as a hobby.

Eco-tourism was found to be a possible reuse for the waterways on Sant'Erasmo, and with the creation of two routes on the island, one that goes through the entire island, requiring more changes to the land, and another that avoids the center section of the island, cutting in and out of the island. While the internal route was more costly, it may prove to be the more successful, as the long term effects of preserving the environment on the island are very valuable.

Overall these three components help to preserve the Sant'Erasmo's rural atmosphere in an important way. The built landscape controls not only the look of the area, but also the land use, and ensuring that the land continue to be used for agriculture helps to prevent development of open space. Bringing people to the island to appreciate its scenery and atmosphere will also increase an interest to the island and ensure that it will be kept as a treasure to the Venetian Lagoon.

2 INTRODUCTION

For centuries there has been a struggle between the preservation of the past and the need for the advancement. In more recent times, it appears that the past is losing ground to the present. In particular, the landscape of regions around the world is disappearing; when a drastic change in the built environment or in the use of land occurs, the region is forever altered. Thus, the safeguarding of the history of a region is best achieved by sustaining the architecture and general landscape. One safeguard of the landscape is sustainable development, which ensures that future generations have the same access to resources as the present. These resources include open space, clean water, clean air, food, and trees as well as non renewable resources, such as oil. It is often applied to urban and rural planning, as a method of protecting against over development. There are few places left that urbanization has not affected, be it in the landscape or in the mindset of the residents. With the world's population growing, urban sprawl is now affecting rural and fringe areas. Places that were small and had deep historical roots are now becoming larger and more urbanized. Controlling change and maintaining a sustainable rate of development and growth is vital in preserving the historical essence of an area.

The Venetian lagoon is a place rich in culture and history. While some islands have faced heavy tourist pressure and lost some of their original ambiance, Sant'Erasmo is one of the few that still maintains strong customs of agriculture. As the demand for residential land increases in rural areas due to urban sprawl, pressure has been placed on this community to change, and trade farmland for modern housing developments and tourist attractions. The abandoned fields hold the potential to be developed for future homes; however, the key to the sustainable development of Sant'Erasmo will be to reutilize this land without compromising the island's original agricultural traits.

While Sant'Erasmo is a relatively large island when compared to others in the Venetian lagoon, it is sparsely inhabited. In 1981 there were 926 residents, but since then the population has dropped to 773[4]. The population is decreasing because the residents are aging and because the younger generations are moving away from Sant'Erasmo. This creates more abandoned fields, which in groups are very attractive as sites for future development. The older farmers are no longer growing crops for the city of Venice, but merely for themselves, resulting in most of their land becoming unused.

There has not been much published research regarding the island of Sant'Erasmo, however, in the 1950's and 60's a master plan of the entire lagoon area was created, including Sant'Erasmo, that described these elements. This plan suggested the best possible use of the land through specified use zoning. The most up to date version of this plan is the *Variante Piano Regolatore Generale* (VPRG), compiled in 1997, because alterations have been made to the master plan over the years in order to update it and allow for economic and social

[4] Italian Census Bureau

changes. Currently, there are many changes happening to the landscape of Sant'Erasmo. Nationally funded work is being undertaken around the perimeter of the island to build a protective flood wall as well as boat marinas. Other work being funded by the regional government to improve waste disposal and sewers, and road and building renovations are being funded by the city.

The goal of this project was to gather and organize information to develop potential guidelines for building, land rental, and recreational waterway use on the island. By controlling the number, size and type of buildings, the open space can be preserved, and placing aesthetic controls will help to preserve the rural architecture found on the island. Encouraging farming not only maintains a greater amount of open space, but also creates an economic incentive for both land owners and farmers to use the land in an environmentally friendly way. A recreational route through the waterways of Sant'Erasmo will not only allow citizens of the island to enjoy the beautiful scenery, but also bring eco-tourism, and create a new form of economic income to the island. This three part solution created a plan for Sant'Erasmo to promote sustainability, maintain its cultural aspects, and protect the island from losing its unique and valued resources.

3 BACKGROUND

Once a thriving agricultural center of the Venetian lagoon, Sant'Erasmo has been providing less and less of the produce found in the Rialto market, served in the famous restaurants along the Grand Canal, and in the meals prepared daily by the average Venetian. The reason for this agricultural loss can best be explained by the gradual, though ever-present transformation happening each day on this quiet island. Residents have moved away, farmers have retired their plows, and sections of valuable farmland have been abandoned. While the island is in need of renewal – for people to be brought back to the island - the agricultural atmosphere needs to be maintained so that future development does not swallow up the characteristic features that make Sant'Erasmo unique. It is because of this that the desire for preservation of the island's atmosphere has been increased.

The following sections provide a brief summary of the themes that the reader should be familiar with to truly appreciate the motive for sustainable development in Sant'Erasmo.

3.1 Transformation of the Rural Landscape

While the earth's population grows at an unprecedented rate of 176 people per minute, the 6 billion people that existed at the end of the 1900's could in fact double by the end of the current century.[6] This, as well as the continuous expansion of industry and business leading to urban growth, has created an alarming loss of open space in many parts of the world. For example, the state of Maine is well known for its rural landscapes and small towns, but as Figure 1 demonstrates, an increasing amount of the state is reaching

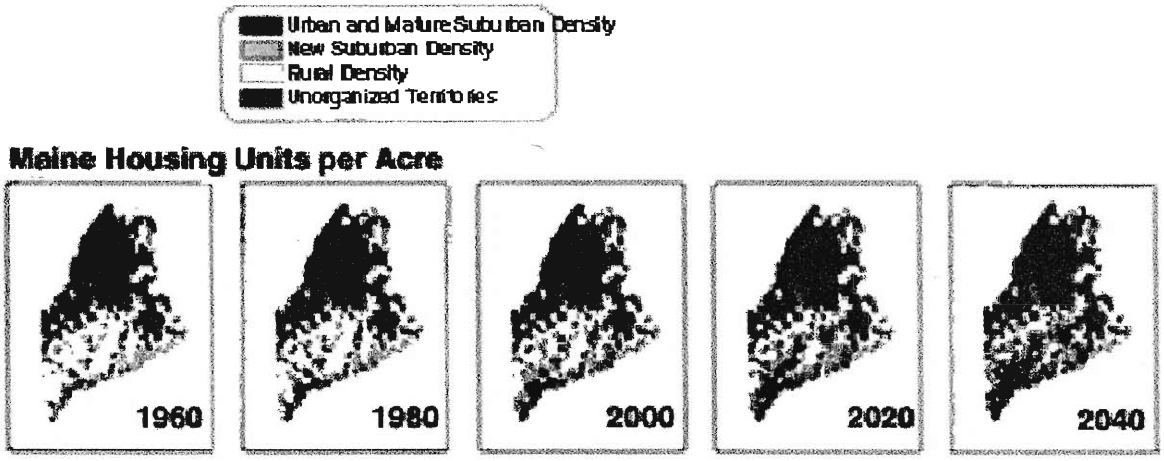

Figure 1: Urban Sprawl in Maine over Time[5]

[5] www.mcht.org/graphics/ campaign/sprawl.gif
[6] Frank, Aliette. (National Geographic News)

suburban and urban density levels, leaving less and less land as rural or open space. This type of drastic change in land use effects the environment, the built landscape, the economy and the residents, and is often a serious problem for small towns that become more populated.

In many areas, the decentralization of cities is causing a rise in population in originally suburban and rural areas[8]. With better transportation routes from rural areas into the city, more and more people choose to live in the suburban or rural areas and commute to work in the city. This has created urban sprawl. As the population in cities is dropping, residents are seeking to live further and further away from the metropolis. As a result, the so-called fringe areas, those furthest from the city and traditionally least effected by change, have become more populated and lost many of the features that made them stand out, such as locally run businesses, non-uniform neighborhoods, as well as their sense of community. The fringe areas are also being moved further and further outwards. Urban sprawl has a number of negative environmental effects including air pollution from automobile exhaust and water pollution from non-point sources due to an increase in impervious surfaces. The neighborhoods are manufactured to place the maximum number of buildings on a property, creating uniform lots and homes, often referred to as "Cookie Cutter" developments, because of their uniformity (see Figure 2). These are often less aesthetically pleasing, and lack privacy as well as human scale.

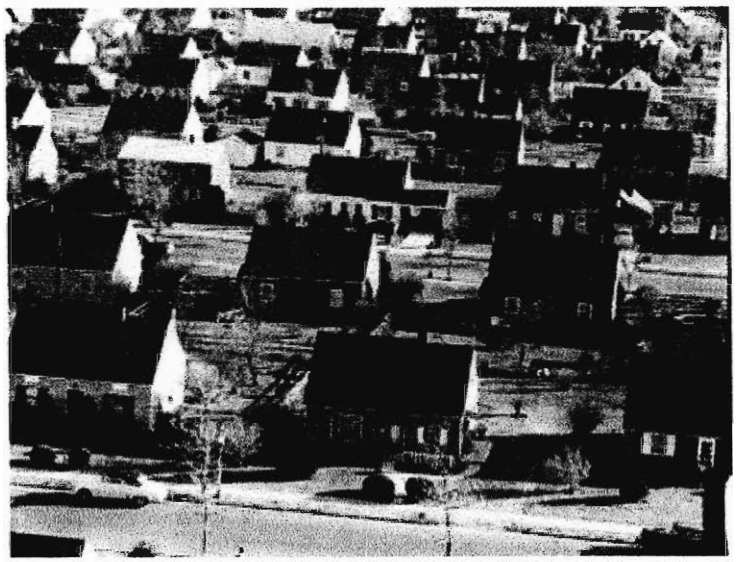

Figure 2: Levittown: An Example of a "Cookie-Cutter" Development[7]

There are two different types of planning for this continuous growth and change. The first of these two is urban planning[9]. This method looks at the projected population increase of an area, and then plans future construction of residential, commercial and industrial zones to accommodate for the expected growth, taking into account jobs, services and transportation. The remaining land within the area, which is often in small, segregated parcels, is left as open space in the form of parks or green spaces. In contrast, the second approach is called rural planning. The primary goal of rural planning is to preserve environmental, agricultural and aesthetic aspects, and often tries to create a controlled change in population growth to accomplish this. As rural landscapes are known for certain key elements, including a great distance between

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[7] www.yesterdaystomorrows.com/newimages/levittown.jpeg
[8] Swanson, 87H
[9] Sargent, 5

buildings, large amounts of open spaces, and certain types of buildings, these areas need special planning to maintain these elements. To do this, the amount of land that can be developed each year may be limited, or zoning may not allow for homes to be spaced closely together due to minimum acreage requirements. A choice of certain land that is not seen as environmentally, agriculturally or aesthetically essential to the plan is used as primary sites for future development. This method seems to be less economically driven, especially in the short term, but can be as financially successful over time. Using the land less intensely preserves its environmental status, and can increase property values over time, making the area more attractive and creating alternative forms of income, such as agriculture and eco-tourism. While these two views may seem contrasting at times, when used in conjunction, they can equate for the total space of a region [10].

Figure 3: Open Space Being Sold In Large Parcels for Development in the United States[11]

3.1.1 Reasons for Controlling Development

While rural areas continue to become more developed, specific economic resources, landscape characteristics, and other important features are lost. One economic activity that is most affected by this is agriculture. The economic pressure to sell farm land to real estate developers is often hard to resist for farmers who transport their goods into the city each day (see Figure 3). In many places the best farmland currently grows homes, rather than crops. The varied topographies and textures that agriculture brings to an area are lost in favor of houses and lawns, and so important aesthetic features are lost. As the landscape becomes more urbanized, area residents are becoming increasingly concerned be it for sociological, environmental, sentimental, political, or fiscal reasons. Maintaining the cultural landscape of an area – keeping the features that make it unique - is crucial in maintaining the character and traditional appearance of a region. Development also effects the environment, as animal and plant life may become displaced from their original habitat, and increases in impermeable surfaces create flooding and run-off problems. Controlling development is also important for the residents of a town, as large increases in population often create economic problems as well as greater pressures on the existing infrastructure which is often pushed to its capacity or beyond when a large influx of people move to an area in a short amount of time.

3.1.2 Agencies for Controlling Development

[10] Sargent, 5
[11] www.iptv.org/mtom/graphics/ features/salesign.jpg

While the concern towards development of rural areas grows each day, government agencies work hard to find innovative ways to control growth in the designated areas. Two such agencies in Venice are the *Assessorato all'Ambiente* (the Planning Department for the city of Venice), and *Assessorato all'Urbanistica* (the Environmental Department for the city of Venice). Other organizations include the *Magistrato alle Acque* and *Consorzio Venezia Nuova.* These agencies are concerned with the updating and interpreting of the zoning laws and regulations that apply in Venice as well as the lagoon. While each building in Venice is assigned a zone and typology based on structure, history, and *ambiti*, or neighborhood and environment, the islands of the lagoon lack this type-based zoning.[12]

Comune di Venezia

Assessorato all'Urbanistica

Magistrate alle Acque

Consorzio Venezia Nuova

Figure 4: Logos of Venetian Organizations Involved With Development

3.2 Sustainable Development

While *Assessorato all'Ambiente* and *Assessorato all'Urbanistica* work hard to preserve the landscape, one of their main objectives is to encourage sustainable development. Sustainable development focuses on the slow, controlled growth of a region, rather than the rapid expansion of it. The difference between these two is that rapid expansion leads to building more, consuming more resources, and polluting more, with little regard for the amount of resources available in the future. Sustainable development not only focuses on the environment, but also the economy and the health of society, and the interactions between them (see Figure 5). An example of the connections between these three is water quality, which while preventive measures may

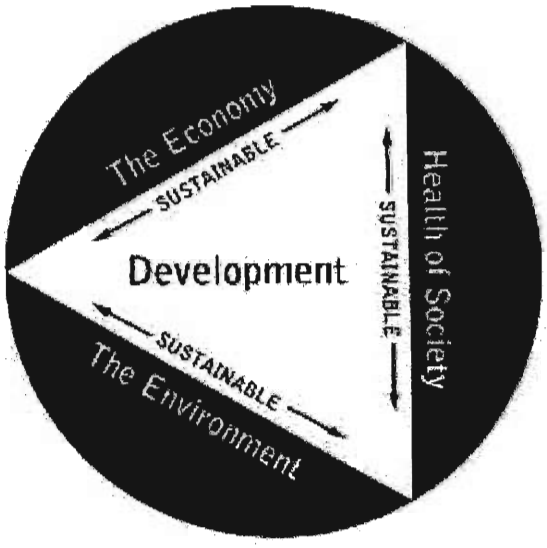

Figure 5: The Three Elements of Sustainable Development[13]

[12] Fletcher, Halloran, Malik, Rohleder, 11

[13] www.gatewest.net/~green/ from/cult.jpg

have an increase in costs for a town, also protect both the natural environment and public health. There is give and take between each of these, as what may be best for the environment may not be best for public health, or what may be desired for health may not be economically feasible. Controlled growth is utilizing the land and resources available; specifically preserving the current status to guarantee that future assets will not be compromised for the present. This means conserving non-renewable resources and promoting renewable resources and industries. This idea brings about a rearrangement of priorities when planning the development.[14] Planners often use a checklist of five priorities when encouraging sustainability: 1- Community Development, 2- Ecological Health, 3- Economical Health, 4- Social Equity, and 5- Connections, trade-offs, and long term effects. With these five factors identified, there are several ways that sustainable development can be applied to a region. [15]

3.2.1 Sustainable Built Landscape

The structural landscape is an important, and often overlooked, factor in the appearance of a region. In many areas the architecture, amount of open space, time of construction and the location of buildings in relation to each other are key characteristics that define the district. When drastic changes are made, such as the construction of very tall modern buildings next to small, simple homes, both appear out of place. Alterations to buildings over time can diminish the historic aspects of local architecture, which may be a key characteristic of that particular area. This is why design controls are often implemented in the construction permits of a developing region. These policies may cover the scale of the structure, mass, bulk, materials used to make the structure, location as well as proportions.[16] Existing buildings may also be subject to design constraints, to prevent the loss of historic areas. The restrictions placed on historic homes vary widely from needing permits for additions and expansions to having to maintain the specific color for the exterior of the building. In some areas changes to historic buildings must be done to restore the structure to its original state. Determining the density of new development can also be controlled, and prevents large amounts of open space from being lost to subdivisions or commercial districts at once. Limiting the number of new buildings that can be constructed over time, and preserving set amounts of open space can help in achieving sustainability regarding open space, which is a very important natural resource.

3.2.2 Sustainable Agricultural Landscape

In the United States alone, the amount of open space that has been lost to development doubled during the 1990's. Between 1982 and 1992, 1.4 million acres per year were converted to development, while

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[14] Harkness, Sarah P
[15] Silberstein, Jane. Maser, Chris, 174
[16] Silberstein, Jane. Maser, Chris, 145

in a span of only 5 years (1992 to 1997) that amount rose to an astronomical 16 million acres.[17] Many regions around the world are facing the same decline of open space and farmland, which affects the agriculture of the area, the economy, the products produced, and ultimately, the sense of community and beauty of the landscape. Italy has lost nearly a quarter of its farmland in the last 40 years, at a fairly constant rate of decline[18] (see Figure 6). With the use of pesticides and fertilizers in agriculture, fewer crops need to be planted to achieve the same amount of produce. These chemicals have negative roles on the environment, however, and can permanently damage the ecosystem surrounding the farm. Sustainable farming tries to minimize the use of chemical pest control so that the land does not become damaged in the future. While sustainable agriculture need not be entirely organic (meaning without the use of chemical fertilizers, herbicides or pesticides), it tries to minimize the negative impacts that using chemicals will have on the environment.

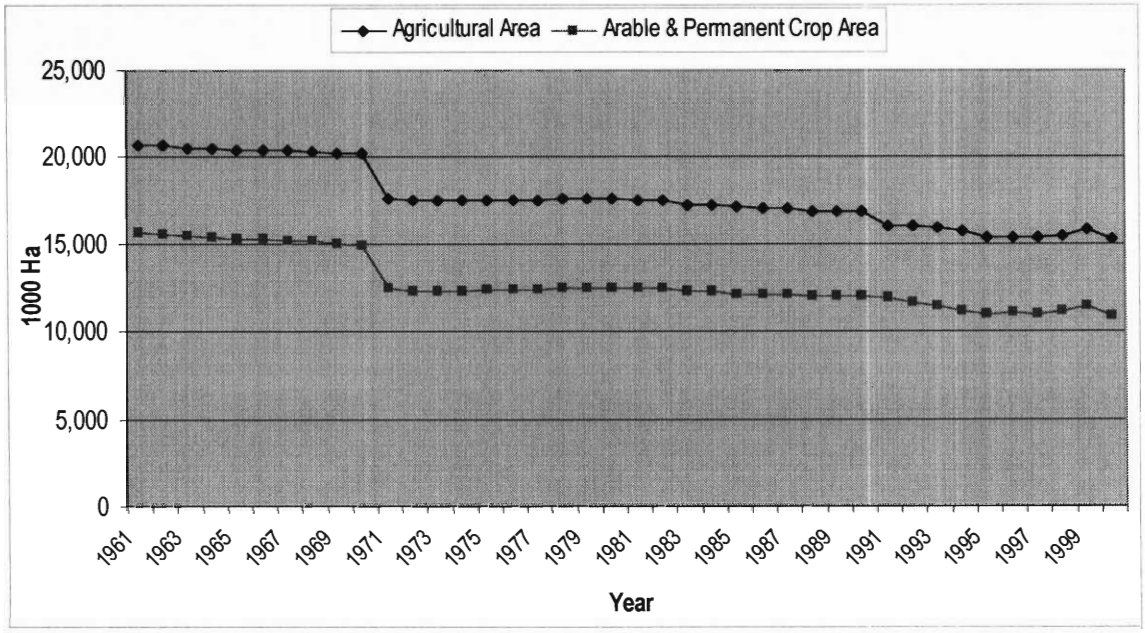

Figure 6: Loss of Farmland in Italy Since 1961[19]

Sustainable farming also encourages the desire to farm – keeping people working the land, however, more and more people are also finding that farming is not a profitable way of life, and no longer farming as the primary means of income. In order to maintain a rural population, adjustments must be made and may include consolidation of fragmented lands, reform in land ownership, conversion of farming from subsistence to commercial types, and development of marketing organizations. [20] These adjustments may require land

[17] Silberstein, Jane. Maser, Chris, 153
[18] FAOSTAT Database
[19] FAOSTAT Database
[20] Friedmann, 34

reform and legislation, expanded research on agriculture, improved informational services, as well as large-scale technical assistance programs.[21]

3.2.3 Sustainable Waterway Use

In addition to agriculture and architecture, waterways are also in danger of negatively changing due to urban development. Waterways play a key role in a community, as they provide recreation, residential appeal, commerce through fishing, as well as an alternative form of inexpensive transportation. These important features are lost when waterways become blocked by developmental changes, such as construction or diversions, or become polluted. Waterways are at risk from contamination from many different sources including agricultural runoff as well as point source effluents. As waterways become progressively polluted and unusable, the concern increases dramatically. While some efforts, such as organic farming and increased environmental laws have helped to reduce pollution of waterways, many are in poor condition. Ways to reverse this decline of functional waterways are often expensive and not feasible to undertake, however, cities and towns often perform procedures to protect and restore waterways. In some urban areas, such as Providence, Rhode Island, the existing waterways that were once diverted underground have been incorporated into the rest of the landscape and become attractive park areas. Other methods of promoting the health of waterways include limits on fishing or shell fishing, controlling the use of surrounding areas, restricting chemical effluents, expanding routes for navigation, and increasing public access to waterways. Alterative uses to waterways, such as eco-tourism, can provide many benefits to a region. Eco-tourism brings people to an area to enjoy the environment, which creates a low impact use for the land, as well as increases public awareness, and encourages the local economy, as tourists often will rent or purchase supplies or visit the local businesses. Eco-tourism can include canoeing, rowing or hiking.

3.2.4 Sustainable Development through Zoning

By examining the three previously mentioned aspects of sustainable development, researchers and government planning organizations can look at incorporating zoning regulations into land planning. Zoning restricts the use of land by defining individual areas into zones based on usage. Areas are divided into zones, those with lower environmental impacts such as residences are allowed in most areas, and those with higher impacts, such as heavy industry have stricter placement regulations. This creates areas with more uniform aesthetics, traffic patterns, environmental quality and property values.[22] While in urban areas, zoning is often used to maintain usage and prevent drastic change, it can be used in suburban and fringe areas to promote sustainability and prevent future development issues.

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[21] Friedmann, 34
[22] Silberstein, Jane. Maser, Chris, 33

3.3 Development in Sant'Erasmo

One such rural area that faces potential developmental pressure is the island of Sant'Erasmo. Sant'Erasmo is located in the north eastern section of the Venetian lagoon approximately 5 Kilometers from Venice (see Figure 7). It is 3.9 Kilometers long, and at the widest point, its 1.2 Kilometers wide.

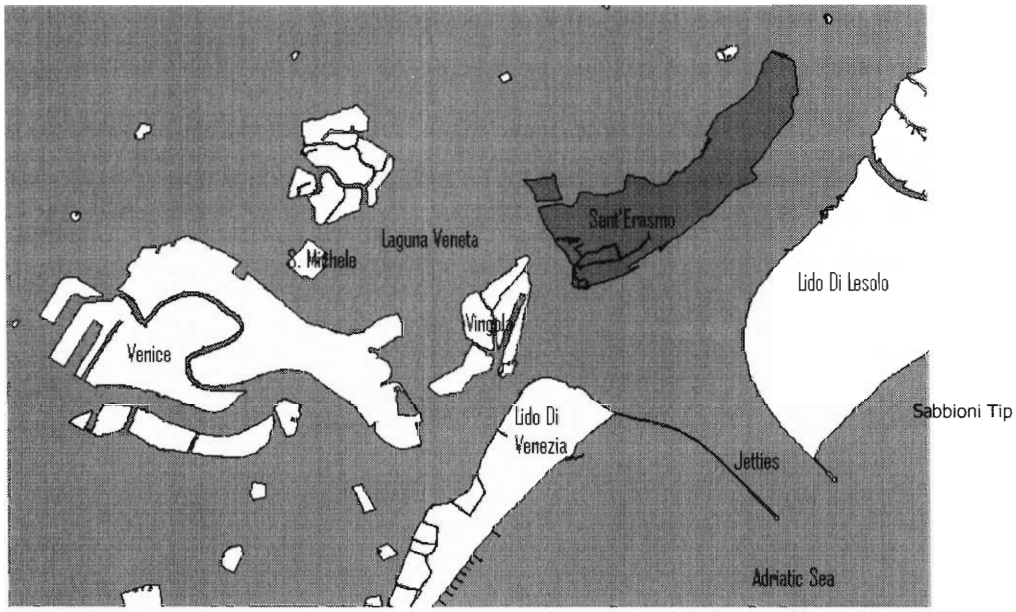

Figure 7: The Venetian Lagoon

3.3.1 History of Sant'Erasmo

Sant'Erasmo is the largest island of the lagoon and until 1890 it was a lido or barrier island. However, jetties made the dune of Sabbioni Tip and eventually formed the island that people know today. To walk around the island, one would travel approximately 9 kilometers. Although Sant'Erasmo remains sparsely populated with less than 800 inhabitants, this region was populated before 1000 AD[24]. Similar to that time, Sant'Erasmo presently is mainly focused on agriculture. For centuries it has been known as "the garden of Venice," providing much of the produce sold at the markets. Besides supplying fruits and vegetables to the rest of the lagoon, Sant'Erasmo has also been an important beach area, one of the first in the area to attract people from all over to sunbathe

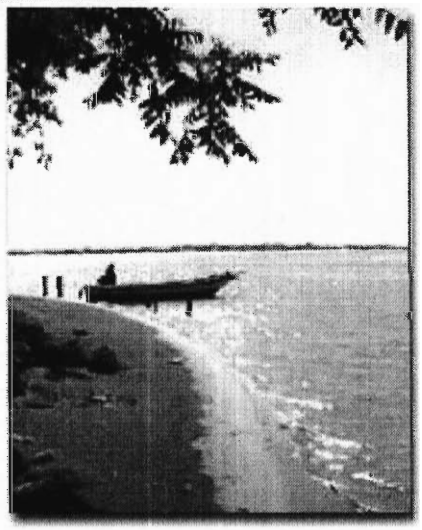

Figure 8: Beach on Sant'Erasmo[23]

[23] www.latoazzurro.it/images/ spiaggia-o.jpg
[24] Arch. Pilla, Giorgio, all'Urbanistica

on its peaceful and scenic sands[25] (see Figure 8). During Roman times, the beach on Sant'Erasmo was a primary location for vacationing.[26] Another role of Sant'Erasmo originally was to provide protection to Venice by guarding the opening to the Venetian lagoon as part of a line of fortifications. Despite the historical significance of this role, the three forts on Sant'Erasmo are currently not used for military protection or tourist attractions. These, along with the existing architecture and land uses that contribute to Sant'Erasmo's rich historical atmosphere, are slowly deteriorating and are subjects of concern for the upcoming development that the region is undergoing.

3.3.2 Current Developments

Because of the decrease of farmers on the island, much of the land is not being used (see Figure 9). There exists a concern that because land is not being utilized, it is going to begin to be built upon and with that comes the loss of open space. While the land should be utilized, the atmosphere of the island should also be preserved and have a slow and controlled rate of growth. That is why there are several changes currently being implemented on Sant'Erasmo.

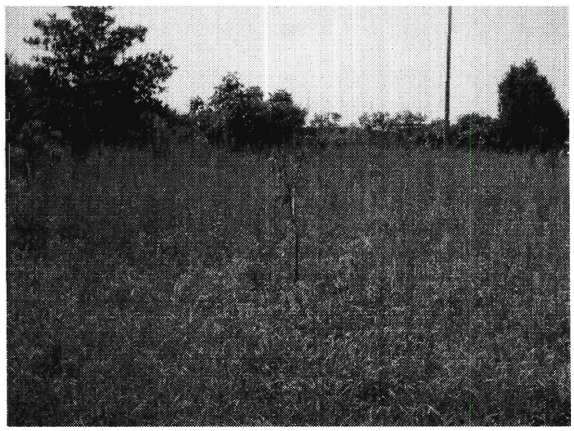

Figure 9: An Abandoned Field on Sant'Erasmo

In the year 2000, a plan for revitalization of Sant'Erasmo was approved. This plan deals with four main issues: 1- To restore the original character of the island, 2- To identify additional income sources for the inhabitants, 3- Ecotourism, and 4- To allow people to rent out part of their houses for low levels of tourism, such as bed and breakfasts or for *Agriturismo*. In order to accomplish these goals, the city needed to find out how to redesign the entire island that is in the midst of becoming abandoned. So far, they have identified areas that need more development as well as areas that should be protected because of their historical or environmental significance. At this time, the city is conducting an ongoing series of public works to make improvements to the island.

The work on the island, begun in June/July of 2001, includes many aspects to restore and revitalize the island. This plan is estimated at over 70 million euros to be completed and should be done in 2005. The cost is shared between the national, regional, and the city government[27]. While the National Government is concerned with building a better perimeter wall and also restoring the forts, the regional government has begun to improve health standard by implementing a better sewer system. The Local Venetian Government

[25] Arch. Pilla, Giorgio, all'Urbanistica
[26] http://www.latoazzurro.it/english/island.htm
[27] Arch. Pilla, Giorgio, all'Urbanistica

has began to improve the roads systems on the island. These are represented in **Figure 10: Current Developments on Sant'Erasmo Figure 10**.

Figure 10: Current Developments on Sant'Erasmo

3.3.2.1 Improving the Land

Figure 11: *Forte Massimillano*

In addition, the buildings on the island are being restored (military forts, etc.) and subdivisions are being constructed, which had been prohibited previously. New building is taking place near the center of the island, sewer systems are in the process of installation, and an area for garbage disposal is being made as well as an area for storage and packaging of the produce going to alternate locations. A seal of quality for the products will be put on this outgoing produce and is being made by the city for farming. Also, the public beach is in the process of being

cleaned for use and the *Forte Massimillano* (see Figure 11) is being restored. The embankment on the outer edge of the island is almost completed

3.3.2.2 *Improving the Waterways*

To improve waterways, several changes are being made. One development being done is the preservation of the important fish farm areas. The largest fish farm will be used by University of Venice for experimental purposes as a research facility. This will be open to the public, and its re-opening will also coincide with the construction of a restaurant and other attractions for residents and tourists. The wall that protects Sant'Erasmo from high water is also being reconstructed (see Figure 12), and includes more boat parking locations. In addition, public waterways are being dredged and a water treatment plant is being made. The levees at the entrances to the canals are being fixed as many have broke since their original construction.

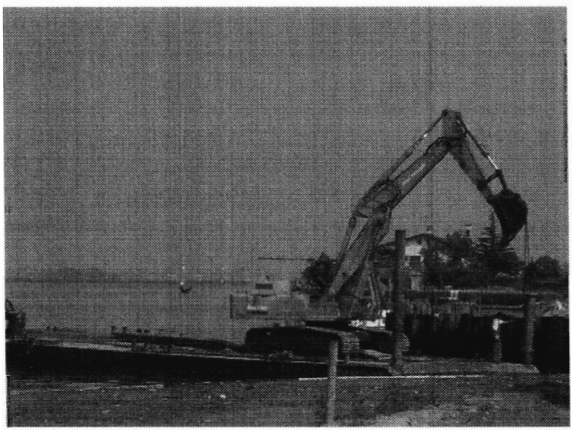

Figure 12: Construction on Waterfront of Sant'Erasmo

3.3.2.3 *Improving Transportation*

To improve transportation around the island, pathways are being constructed for bikes and pedestrians. These are aimed at highlighting the environmental features. Docks, as well as marinas, are being added to allow for easier water access to Sant'Erasmo. Furthermore, the boats will be taking alternate routes. The boat line will now stop at the first stop, but twice as often because a minibus will be traveling the length of the island, although the middle stop will still be used. Roads are currently being redone and traffic laws that were once non-existent have now taken effect. Three parking areas have been made (see Figure 13) as well as a special dock area for the unloading of vehicles. Additionally, the city wants to create a location where the ambulance can transfer sick people from land to boat and also a helicopter landing for major emergencies.

Figure 13: Parking Lot at Capannone Boat Stop

3.4 Identifying What Still Can Be Done

Although, the national, regional, and city governments are completing the plan for improvements on the island, there are still many features of the island that have not been researched. These include developing a typology of the existing buildings, identifying how much of the agricultural land is not being utilized, and examining ways to reopen possible inner waterway routes for recreation and navigation. Each of these plays an important role on the island, and helps to complete the overall goal of a sustainable future for Sant'Erasmo.

3.4.1 Preserving Architecture

Sant'Erasmo is in need of sustainable development in the architectural landscape on the island. There exists a wide variety of buildings from the fortifications mentioned previously to residential homes of various sizes and styles (see Figure 14). While there also is a desire for the construction of new buildings on the island, the existing buildings, which truly represent much of what gives Sant'Erasmo its characteristic atmosphere, should also be preserved. While there is some information regarding the buildings, it is incomplete, and is somewhat out of date and lacks information regarding recent construction. With the expansion of the VPRG to a computerized catalogue that includes the more modern buildings on the island, future construction can be based on that of the past, and exist simultaneously. Likewise, guidelines for existing buildings can prevent drastic changes that would create a loss of the historical rural landscape.

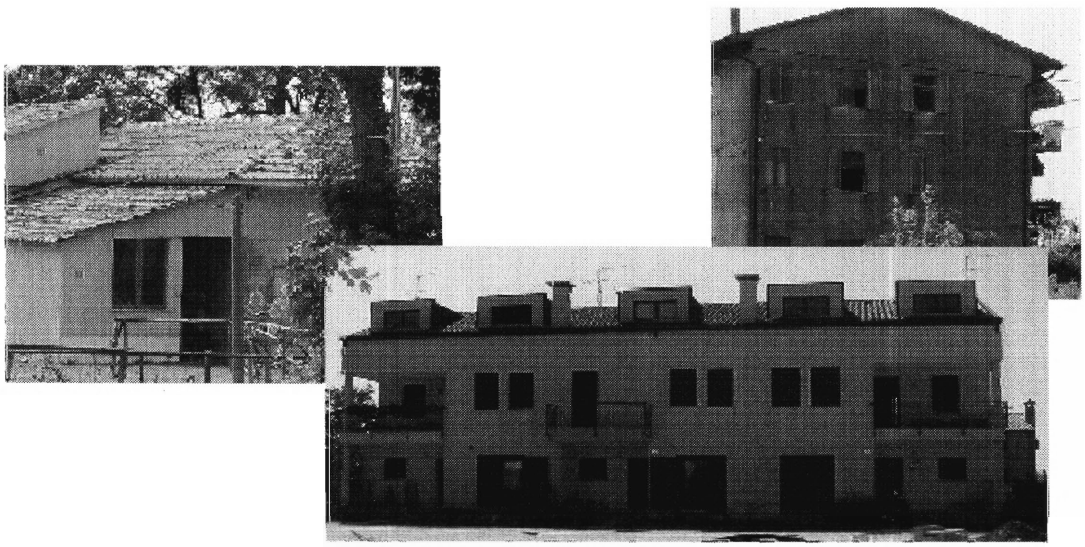

Figure 14: Heterogeneous Building Styles on Sant'Erasmo

3.4.2 Encouraging Agriculture

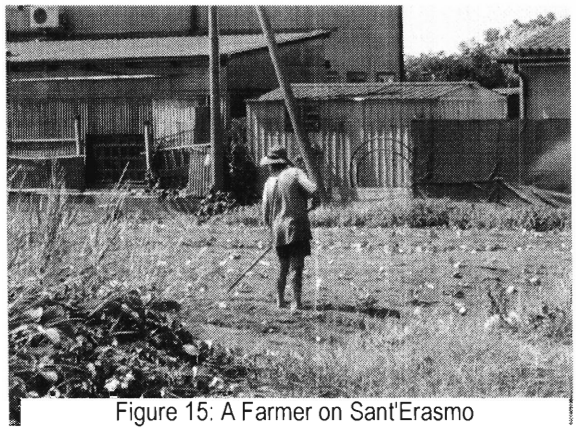
Figure 15: A Farmer on Sant'Erasmo

Sant'Erasmo also has a need for agricultural land utilization. Existing farmland, most of which grows vegetables, such as artichokes, protects the region from developmental pressures associated with urbanization, keeps the historical uses of the lands, as well as maintains the primary economic source for the island. This important land use is at risk with a decreasing and aging population (see Figure 15). Because little information exists on the farms, it is unknown exactly how much of the land is currently used for farming, how much is abandoned, and how much is at risk of becoming developed. The vineyards, vegetable fields and orchards that exist play a vital role in the future of the island, and are vital in preserving the land as open space, and protecting it from development.

3.4.3 Creating Recreation and Aquaculture on Waterways


Figure 16: Aerial View of a Fish Farm on Sant'Erasmo

The last aspect of sustainable development on the island is the waterways of Sant'Erasmo. Years ago, Sant'Erasmo was rich with natural waterways flowing throughout the island as well as fish farms (see Figure 16). These are other important sources of economic, recreational, and agricultural growth. Today, they are no longer navigable, as many of these waterways have blockages that have make them unusable. Many of these obstructions are man made diversions placed there for flood control after the flood of 1966, when the entire island of Sant'Erasmo was submerged under water. All of the fish farms have been abandoned and the waterways are not being utilized to their full potential. To create an alternative economic source as well as improve the natural health of the island, the waterways should be closely examined for their status and future roles as recreational or aquacultural uses. Eco-tourism is one such use that would be ideal for the island, as it not only helps to increase awareness and interest in the natural environment, but can also be beneficial to the island's economy, bringing people to the island and eating at the restaurant or buying things from the store.

3.4.4 Our Mission

This project is designed to assist *Assessorato all'Ambiente* and *Assessorato all'Urbanistica* in the revitalization of Sant'Erasmo. The team carried out an investigation of the typical building architectures in order to define typologies for future construction permits. Furthermore, the students have proposed a system to optimize

the utilization of the farm fields and waterways on the island that will ultimately maintain the historical integrity and ambiance characteristic of the Venetian lagoon.

4 METHODOLOGY

The following methodology is an organized plan that was conducted in June and July of 2003 in order to promote sustainable development for the island of Sant'Erasmo. The team completed an investigation of typical building architecture by taking a photographic inventory of different features of each structure on the island, such as doors, windows, gutters, chimneys, fences, incidental use features, and several others. The collected information was organized into a Microsoft Access Database, and then analyzed to define building typologies. In addition to the structural inventory, information on the fields of Sant'Erasmo was collected. The team noted the use of the fields through a census approach and combined it with the ownership of property on the island to locate specific plots ideal for land rental. The possibilities for reutilizing the existing fishfarms were examined through interviews and field verification. Lastly, a recreational waterway route was planned for the island by locating the longest continuous route. Obstructions were mapped for each particular canal and the current usability, if any was noted for each particular canal.

By conducting this field work, the team's goal is to encourage sustainable development by allowing the gathered information to be available to organizations such as *Magistrato alle acque*, *Assessorato all Ambiente, Consorzio Venezia Nuova* and *Assesorato all'Urbanistica.* These groups are responsible for the implementation of zoning regulations, stipulations on building construction and renovations, and acceptable agricultural, waterway and recreational guidelines for the lagoon. It is these guidelines and regulations that may ultimately make it possible to ensure the preservation of the landscape and traditional way of life in Sant'Erasmo.

4.1 Preservation of the Rural Architecture on Sant'Erasmo

There is a strong desire to maintain the historic atmosphere of Sant'Erasmo through architecture, as the built landscape plays a key role in the look and feel of a region. Recognizing this, the team created an organized strategy which catalogued and classified the existing buildings and suggested guidelines for future construction. These guidelines will make it possible for government organizations to create guidelines for houses, as well as non residential buildings and incidental use structures such as sheds and garages. By recognizing such a variety of structures, the team's plan allows for the preservation and understanding of the variety of architecture on the island. In order to make suggestions concerning what types of structures should be built on the island as well as what should be maintained; a comprehensive analysis of the existing forms of architecture was conducted. To complete this study, there were several components that needed to be evaluated before the final plan could be proposed.

4.1.1 Categorizing Building Types

Before commencing the actual field work, the team differentiated between the various structures on the island to identify which should be photographed and mapped out as opposed to what is not a significant part of our research. Non-significant structures included trailers, campers, non permanent structures such as greenhouses and tents, which are taken down seasonally, because these are not considered permanent features to the built landscape. Buildings can be characterized into several different categories. Described in Figure 17, the structures on Sant'Erasmo were classified by primary use, and first divided into residential and non-residential. A residential structure is a place of residence and can be vacant or occupied, whereas, a non-residential structure includes commercial structures, historical structures, community buildings such as school and churches, and incidental use structures. Because of the size and population of the island, there are only a few non residential buildings found on the island. The incidental use buildings are another subset of non-residential buildings, and will also be divided into their own typology. These include storage sheds and garages.

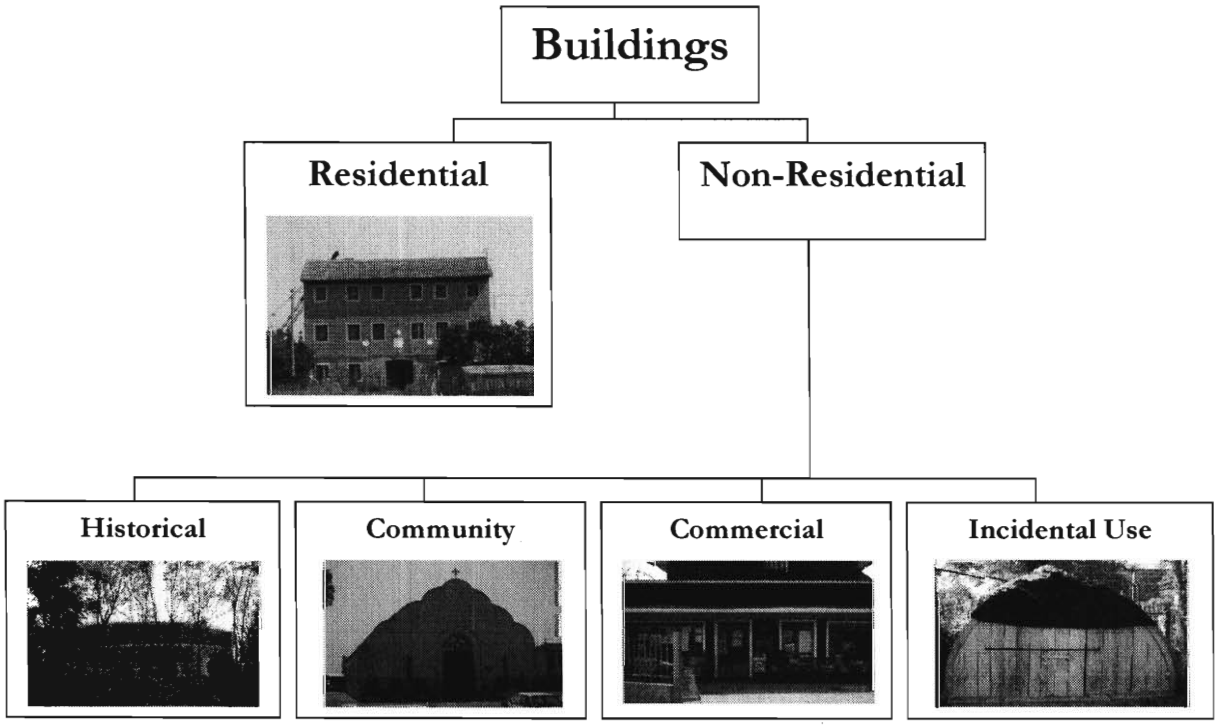

Figure 17: Classification of Buildings by Use

4.1.2 Developing an Efficient Plan

Upon determining the above division to subcategories of structures, a method was devised to complete the field work in an efficient way. Using GIS, the cartography drawings provided to us by

Assessorato all'Urbanistica, as well as aerial photographs, we developed a route (see Figure 18) to navigate the island in a straightforward and organized way. The two major roads running lengthwise along the island were used as guidelines for collecting information. Working from the Capannone boat stop in a Northern direction, the West side of the island was completed. The information for the Eastern shore was also collected working from South to North.

A code was assigned to each building using GIS. The 8 digit code is based on alternating x and y components, unique to each structure. For example, if a structure had an x coordinate as 1357 and a y-coordinate of 2468, then the number of the structure would be 12345678. This building identification system was used because it guarantees that each building will always have its own unique code, even if significant construction takes place on the island. This was accomplished using the SQL tools included in the GIS program used by the team.

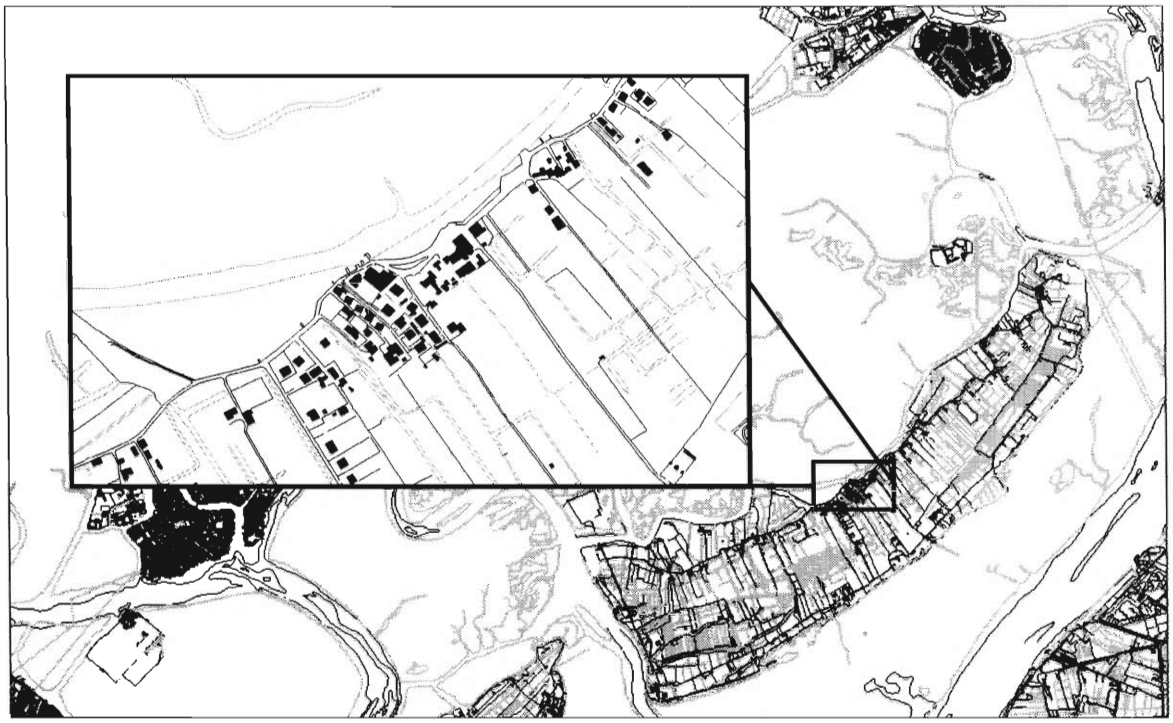

Figure 18: Existing Structures on Sant'Erasmo

Appendix C of *Assessorato all'Urbanistica's Variante Piano Regulatore Generale* (VPRG) provided the group with a catalogue of buildings. It contains pictures, locations, and information on approximately 25% of the buildings on the island. This was very useful in the recognizing which of the buildings had previously been researched, and which buildings were missing as well as other essential pieces of information about each specific structure. This information was valuable in creating the suggestions the team has made. Based on

Appendix C of the VPRG, data collection sheets were made (see Appendix B: Example Field Collection Sheets - Edifici). Microsoft Access worksheets and GIS layers were created using this information which acted as a starting point for defining our typologies.

4.1.3 Photography of Structures

The photographs were collected and organized so that the code associated with a building, the code associated with a photograph, the focus of the photograph, and the direction of the photograph was understood through the file name using Italian descriptions. For example, 12344321_02_F_O_02072003.JPG is a photograph taken of building number 12344321; it is the second picture associated with that house; it is focused on a window (Finestre) on the Western (Ovest) side of the building, taken on July 2, 2003. Table 1 and Table 2 explain the variables used for describing the features and directions respectively.

English	**Italian**	**Code**
Building	*Edificio*	E
Window	*Finestre*	F
Door	*Porta*	P
Gutter	*Grondaia*	G
Chimney	*Camino*	C
Aesthetic Feature	*Caratterstica Estetica*	CE
Incidental Use	*Edificio Secondario*	ES

Table 1: File Name Feature Abbreviations

English	**Italian**	**Code**
North	*Nord*	N
NorthEast	*NordEst*	NE
East	*Est*	E
SouthEast	*SudEst*	SE
South	*Sud*	S
SouthWest	*SudOvest*	SO
West	*Ovest*	O
NorthWest	*NordOvest*	NO

Table 2: File Name Direction Abbreviations

Once the orderly route through the island and final naming convention was planned, each building was located and multiple photographs were taken with a minimum resolution of 1024 x 768 using the following digital cameras: Primarily a Sony Cybershot DSC-P50, but also a Vivitar Vivicam 3715, and Canon Powershot Digital Elph. At each location, each structure was photographed as a person wrote down the picture numbers, which face of the building it was taken of, the feature, as well as other characteristics such as stories, colors material of construction etc. The photographer attempted to take pictures of all four sides of the building when possible to ideally view each side of the building (unless path was obstructed by fences, gates, trees, disgruntled residents, etc.). In addition, close-ups of the chimney, windows, gutters, doors, and other aesthetic features (including gates, signs and other unique features) were photographed (see Figure 19) in order to thoroughly complete our database that has allowed us to portray an accurate representation of the typical structures on the island. Incidental use buildings were also photographed and added to the database. The detail photographs played a key role in defining the typologies of the structures we found.

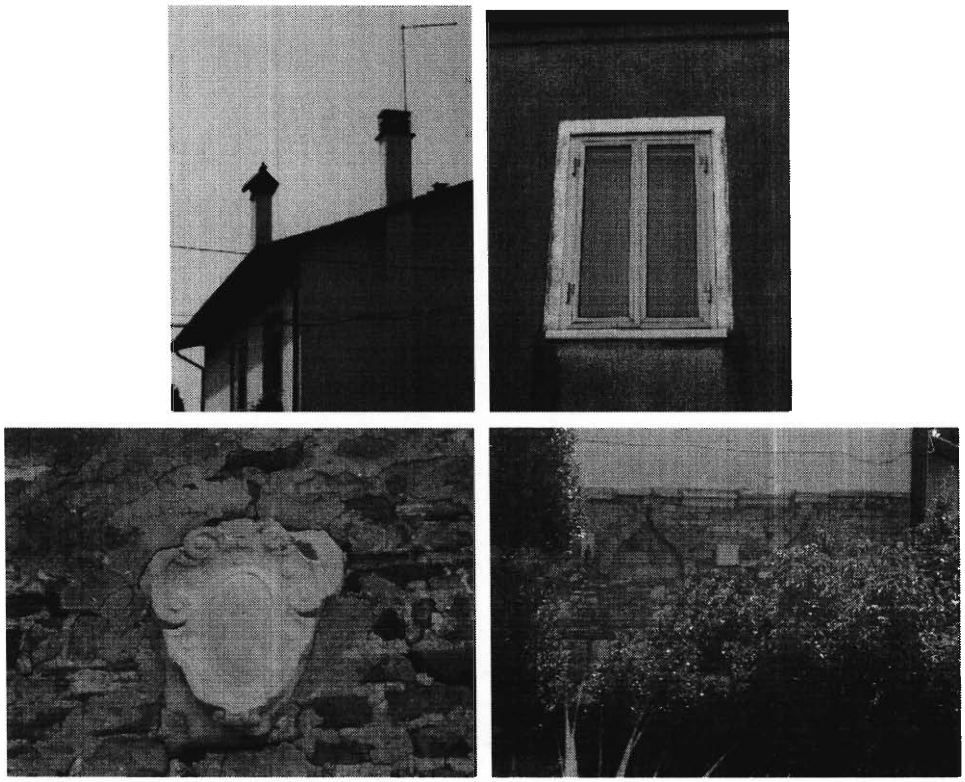

Figure 19: Close-ups of Chimneys, Windows, and Aesthetic Features (Crests, Arches, etc.)

4.1.4 Identification of Typologies

After the completion of the field work, all of the worksheets and photographs in Microsoft Access were organized and a database was created, which organized the information for further analysis of the specific features. With this system, a detailed examination of the houses and other structures on the island was performed. Both the individual elements (doors, windows, chimneys, and fences) and the entire

structures were assigned typologies. The building elements were categorized by appearance and the structures by predefined typologies, date of construction, and modifications made to the original structure.

Primary typologies were defined during interviews with Architects Giorgio Pilla and Alberto Gallo. Fundamentally there are two primary types of historic buildings on the island of Sant'Erasmo: *rurale* and *orticola.* This does not include the forts on the island. Buildings in the *rurale* style are generally very large. They were created to support a large family, sometimes two. The occupants were farmers, so the land surrounding buildings of this type is usually great amounts of farmland. These buildings are accompanied by barns and sheds used to store the equipment and crops of the owner. Traditionally, *rurale* houses are two full stories and a smaller attic with small, square windows for ventilation. These houses are symmetrical and have external chimneys located on the sides or the center of the back. This is important because the chimneys served a purpose being in this style: they created small rooms in which a family could gather around a fire in the winter to keep warm.

Buildings of the *orticola* type are similar to those of the *rurale* type, but they served a slightly different purpose. Generally *orticola* buildings had a dual purpose: to house individuals and provide a place of storage for their tools. These houses are smaller than those of the *rurale* style and usually have a section attached that is used for the storage of farming tools. *Orticola* houses, just like *rurale* houses, have the external chimneys typical of old farm builings.

There was one final classification of primary typologies; this was specific to newer buildings. If a new building fit the style of either a *rurale* or *orticola* house, it was labeled as such. On the other hand if it did not fit either of those styles it was labeled as *Moderna non Integrata.*

After each building was identified as *rurale*, *orticola* or *Moderna non Integrata* it was divided into a time period. House built before or during the 1800s were called *ottocentesca*, those built during the first half of the 1900s were *novecentesca*, and finally modern houses were called *moderna.*

Next, the physical state of the building was taken into consideration. This had two possibilities: transformed (*transformata*) or in its original state (*originaria*). Any building that was in its original state appeared to have purely cosmetic work done, if any. These houses retained the characteristics that made them *rurale* or *orticola.* Transformed houses were any that had an addition such as another story or a new wing. These traits could be noticed when observing if the houses still retained telltale the features of their type, such as two and a half floors, small windows at the top, symmetry about the vertical axis, external chimneys, etc.

The characteristic use of the building was next taken into account. Buildings were put into two groups: mono-functional (*monofunzionale*) and bi-functional (*bifunzionale*). Monofunctional buildings have a single use, generally residential. Buildings of the *rurale* style are mostly monofunctional, as the families would live in the house and store all other equipment in secondary buildings. *Orticola* houses are usually bifunctional, serving to house residents and store their goods and tools. Buildings such as the store in the center of the island are also bi-functional since there is a residence in the upper portion.

Finally, if a transformation had taken place on a structure, the type was noted. The first type was an extension (*aggiunta di corpi esterni*). If a building had a smaller structure connected to it, such as a porch, it was noted here. Smaller structures of this type require no actual physical change to the house, they are merely connected by a few bolts or nails and could be removed with minimal damage to the main body (*corpo*) of the building. Buildings with only extensions are generally considered in original condition. On the other hand, there is a more serious change to the original structure, called a *transformation del corpo originario.* These transformations are more permanent and involve work such as putting a new wing onto the house.

Doors were divided into four major types: Single, Double, Door-and-a-half, and Arched. It was also noted if the door was recessed or not. Only one door was examined for each building, regardless of the number of doors the building had. This door was the primary door, i.e. on the main face of the building.

Windows were classified by several features. The team began by identifying the shape of the window: upright rectangular, sideways rectangular, square, arched, or round (circular). The size was also noted in two simple categories: regular sized (the size of an average window in any house), or small (at most half the size of a regular window, about .5m x .5m). The presence or absence of a border and sill as well as the material of these features was noted. Whenever possible the number of panes in the window was recorded.

Roofs were examined for their shade and material of construction. Roofs were classified as *capanna longitudinale*, which are a two fold roof running the entire length of the building, or *quattro falde. Quattro falde* roofs also run along the length of the building, but at each end is another section of roof, as Figure 20 demonstrates. The material of the roof and roof support system was also noted, along with the presence or absence of *cornicione.*

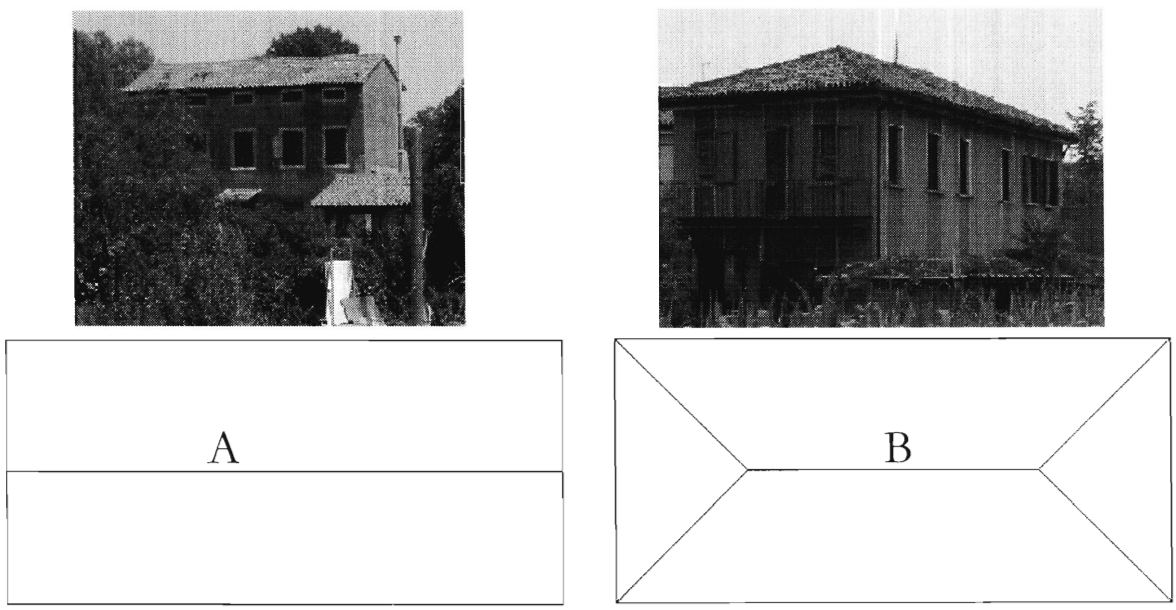

Figure 20: A- *Capanna Longitudinale* Style Roof, B- *Quattro Falde* Style Roof

Chimneys were examined and classified by their shape at the top of the chimney. Ten variations of chimney were found on Sant'Erasmo. Table 3 further explains each type and has examples of each.

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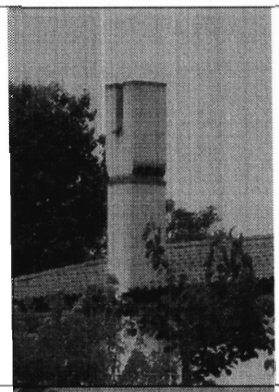
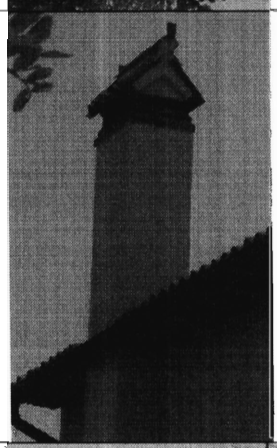
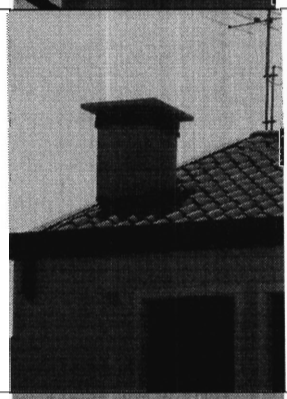
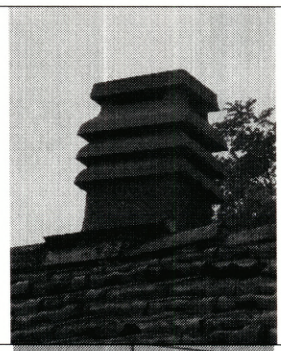
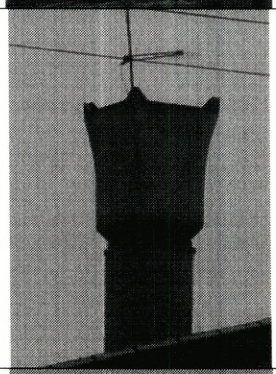
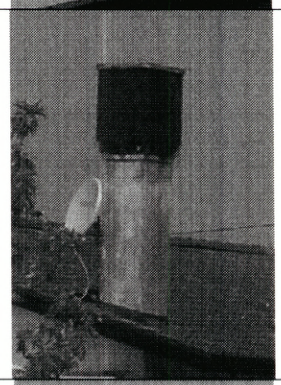
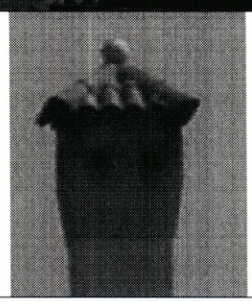
TYPE	DESCRIPTION	EX. PHOTOGRAPH
U-Shape *A "U"*	Chimney has two main divisions from one central point forming a U shaped top.	
Birdhouse *Due Falde*	Chimney has a peaked roof covering the top. The material is often the same as the building's roof. May be very simple or more decorative.	
Flat Topped *Piano*	Chimney features a cover that is flat and level over the top, usually extending further than the width of the chimney stem.	
Cylinder *Cilindro*	Chimney cover has a central peak and slants downward in all directions. May be circular or rectangular.	

Layered *Grigliato*	Chimney appears to be layered, and is comprised of tiers. May have a roof covering the top.	
Crown with Peaks *Corona Con Punte*	Chimney becomes wider than the stem at the top, and is rectangular or square shaped. These have decorative peaks at the corners	
Crown without Peaks *Corona Senza Punte*	Chimney becomes wider than the stem at the top and may be cylindrical, rectangular or square. These lack decorative peaks,	
Slanted *Una Falda*	Chimney features roof similar to the Birdhouse style, but only slanted in one direction. Roof material may be the same as the building's roof.	
Sentry *Quatrro Falde*	Chimney is similar to the Birdhouse style. The difference is that it is slanted in four directions instead of two. This creates a pyramid-like shape	

Compound *Accopppiato*	Chimney shape is a combination of multiple chimney styles (Example picture is of a Birdhouse and Slanted Compound)	

Table 3: Chimney Typology Classification

The overall building types were defined first by period of construction. Then features of the building, such as the width and height ratio, symmetry, number of windows and doors, color, number of stories, roof material as well as the style of the building elements were compared. Those with similar features were categorized based on the photographs taken, as well as with information from the VPRG to define types.

The typologies were identified by noting trends and patterns in the distinct elements of each building. Such trends were easily identified by querying the Microsoft Access database the team created. For example, if the most common type of chimney was sought out, the database produced the number of buildings, and which had that particular type of chimney. By using the age of the buildings and common features found through using the database, the team was able to define a typology to identify the styles of buildings found on the island. Ultimately, this enabled the team to define what typical buildings should look like on the island in order to provide a means of preservation for the atmosphere of Sant'Erasmo.

4.2 Preservation and Revitalization of the Rural Landscape

Just as architecture plays an important role in defining the landscape, so does the use of the land, especially since most of the land on Sant'Erasmo is agricultural. Because of the increasing trend for residents to work in other areas, such as the glass making factories in Murano[28], and the increasing age of residents, fields all over the island are becoming abandoned. Since there exists a large amount of abandoned land, Sant'Erasmo has become a target for development. Therefore, unless something is done to preserve the agricultural way of life, the landscape will be transformed. In order to revitalize the farms on the island, the various fields on Sant'Erasmo were located and classified, and the maps created were examined to identify areas that could be used in a land rental system. Figure 21 shows the location of fields on the island.

[28] Carrera, Fabio

Figure 21: Existing Fields on Sant'Erasmo

4.2.1 Inventory of Land Uses

Like the inventory of structures, information on the fields and farms of Sant'Erasmo was also collected to aid in safeguarding the landscape from being overdeveloped or underused. Before beginning to gather new information, the team went to the island to perform a preliminary assessment in order to find the different categories that the fields should be classified under. It was established that the existing fields can be classified into categories that Figure 22 explains.

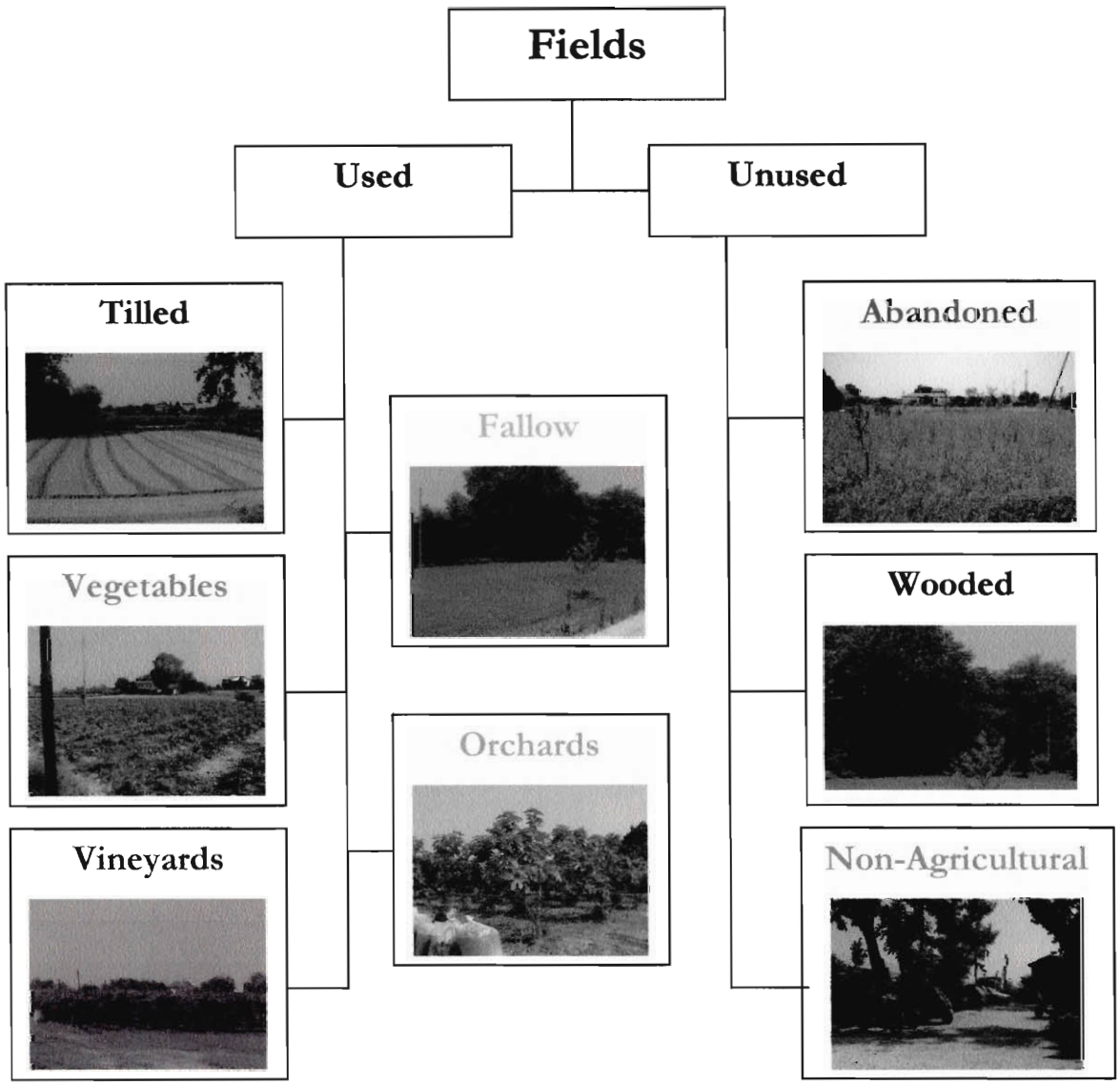


Figure 22: Classification of Fields

As shown, the two main categories of fields are used and unused, meaning they are used agriculturally or not. Used fields can be tilled (*arato,* systematic lines in the earth, only see dirt, ready to be planted soon), ground vegetables are present (*verdure,* corn, tomatoes, peppers, asparagus, etc.), vineyards (*vigneto,* where grapes are grown), orchards (*frutteto,* fruit bearing trees planted in organized rows), and fallow (*incolto,* in between growing season, taking off growing seasons – short grass, sparse weeds, going to seed, revitalizing the soil). Also classified, but not shown in the table above are artichokes (*carciofi,* similar growing characteristics to ground vegetables).

Unused fields are characterized as being abandoned (*abbandonato,* hasn't been used for at least 1 season, tall, obvious weeds, possibly leftover scattered crops), wooded ares (*alberato,* areas too heavily wooded to use agriculturally) or empty (*non-agricolo,* lawns, impermeable surfaces such a parking lots, sidewalks, etc).

Once these categories were identified, the team used GIS to begin looking at the aerial photographs provided to us, in order to ensure that the map layer lines matched the current field perimeters. A number was assigned to each field using GIS tools. The numbers that were assigned are the polar coordinates with alternating x and y components. For example, if a structure had an x coordinate as 1357 and a y-coordinate of 2468, then the number of the field would be 12345678.

Upon determining the location of each land plot data collection began. First, it was established which land plots were fields for farming and which were personal gardens and lawns. We decided that estimated land plot measurements have to be at least ½ of a hectacre (equal to 50 Meters by 50 Meters or approximately 2500 square meters) to be considered a field and anything smaller than this will be considered a personal garden. Also, a personal garden will be comprised of several crops in small plots, whereas a field will have only one or two crops per growing season. After determining this, the team assessed each field as being non agricultural, abandoned, or agriculturally used. If the field was currently in agricultural use, the team identified the basic type of vegetation growing there, whether it was a vineyard, artichoke farm, or other form of vegetation. For the personal gardens, the team identified whether it was in use agriculturally or left unused (yards etc.).

On the island, a combination of GIS and aerial photographs were used in order to identify the location of each field. We also checked the validity of our sources in the field by comparing them to what we found on the island. Finally, we drew the boundaries of each field on a GIS map layer and recorded pertinent information for later use.

4.2.2 Redevelopment of Land Uses

Once all this information had been gathered, it was entered into a GIS map layer. This was useful in determining the percentage of abandoned land on the island, and similar necessary results. The team then proposed a system that could possibly make use of the abandoned and fallow fields on the island by renting them to individuals who may not be able to afford large amounts of land, but have a desire to farm. Comparisons of the field ownership map and the field status map layers were used to find ideal locations of rental sites. This land rental program targets older residents who would not be using this as their sole means of income, but rather as a hobby. Furthermore, the needs of the individual fields, the farmers, and the island were assessed to create an ideal system that was recommended to *Assessorato all'Ambiente* and *Assessorato all'Urbanistica* at the completion of this project.

4.3 Preservation and Reutilization of Waterways on Sant'Erasmo

The network of canals on Sant'Erasmo serves many purposes, including recreation, transportation, but mainly field irrigation. While many of the waterways are unused, creating navigable paths through the center of the island would both increase tourism on Sant'Erasmo, create a second economic source, as well as an alternate means of transportation through the island. In order to accomplish this, the team had to identify the location; status and other information that would allow for a plan of reutilization of the waterways (see Figure 23).

Figure 23: Existing Waterways on Sant'Erasmo

4.3.1 Creating a Recreational Route

One way to reutilize the canals on Sant'Erasmo would be through the reopening of the many abandoned waterways that exist throughout the island. A recreational route would be useful for residents traveling the island as well as becoming a small attraction for tourists to visit Sant'Erasmo. A plan to create a recreational route was created by looking at maps, interviewing officials and residents, and by field verification.

4.3.1.1 Planning the Route

The team used a map provided by *Assessorato all'Urbanistica* and identified the longest waterways running the length of the island. If these canals were not connected, the team drew the shortest land distance needed to connect the waterways so they could become one continuous route. The team decided to plan 2 routes, because a route straight through the heart of the island would require considerable construction and might by too disruptive to the fields and residents. The second route was planned to be as unobtrusive as possible, while remaining within the boundaries of Sant'Erasmo as much as possible. In order to calculate an accurate cost analysis of both waterway routes the team collected information from Architect Alberto Gallo pertaining to the cost of different types of construction associated with waterways and canals.

4.3.1.2 Evaluating the Route

After the detailed routes were planned, the team traveled to the island and identified each individual canal that existed in the plan. Blockages along the routes were noted as well as other obstructions preventing the flow of water and/or passage of a small boat. The areas in between the canals that need to be dug up were recorded as well as the waterways in need of being dredged. Further information was gathered through meetings with *Magistrato alle Acque* and *Consorzio Venezia Nuova* concerning the current status and plans pertaining to the waterway and fishfarm system on the island.

4.3.1.3 Analyzing the Route

At the completion of the waterway canal observation, the gathered information was used to construct several GIS MapLayers. Layers for each individual canal segment, canal segment intersection points and points of construction necessary for our route were created. Further, GIS software was programed to calculate the area of each canal in square meters. AutoCad files provided to us by our sponsor contained depth information for each canal. The depth for each canal was averaged and the data was put into each corresponding GIS layer. Further, the width of each canal was calculated and recorded using GIS. Using this research, the team was able to make suggestions as to which canals should be dredged, widened, filled, or left as is; which blockages should be removed to allow circulation; and which areas should be used for recreation such as canoeing. The dimensions were necessary to create accurate cost estimates.

5 RESULTS

Once the existing information was combined with the new information on buildings, land and waterway use, the team was able to find trends and patterns on the island. Using a combination of GIS, Microsoft Access databases, Microsoft Excel spreadsheets, and other tools the information could be visually represented. Below are the results of our investigation, along with explanations.

5.1 Rural Architecture on Sant'Erasmo

The architectural investigation of the island gave important results regarding the style of the various buildings on the island. Of the approximately 243 buildings located on Sant'Erasmo, 215 were photographed, catalogued, and were defined using a typology. The use, appearance and features of each building was identified and used in creating GIS layers and graphs.

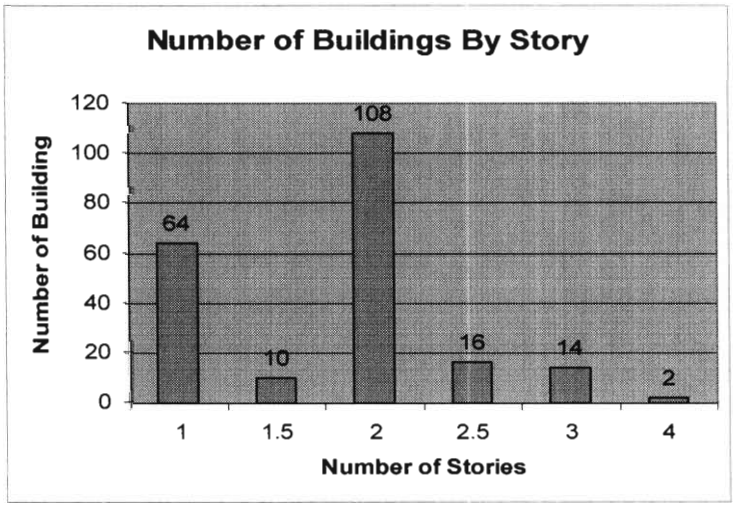


Figure 24: Number of Stories of Buildings on Sant'Erasmo

5.1.1 Building Uses

Most of the buildings were for residential use. Only two buildings catalogued were for commercial use, six for community use, including the church and two schools, and two historical forts. The remaining catalogued structures, approximately 205, were used for residential purposes. Most of the non-residential uses were located towards the center of the island.

5.1.2 Total Structures

Most buildings on the island were under three stories. Only 2 of the 215 were 4 stories, 14 were 3 stories, 16 were 2.5 stories, 108 were 2 stories, 10 were 1.5 stories, and 64 were one story buildings (see Figure 24). Brick with a stucco façade was the most commonly seen

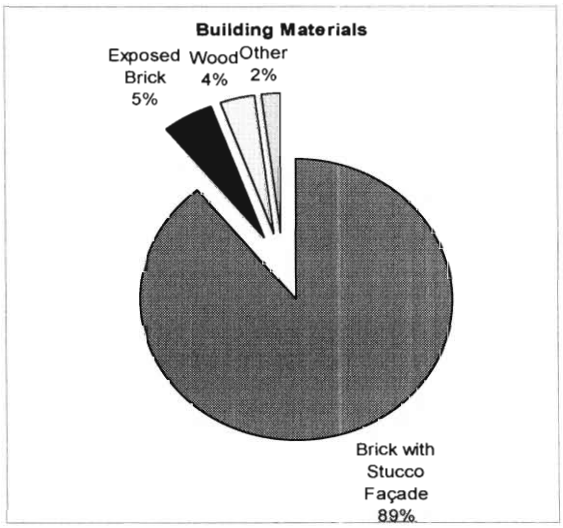


Figure 25: Building Materials on Sant'Erasmo

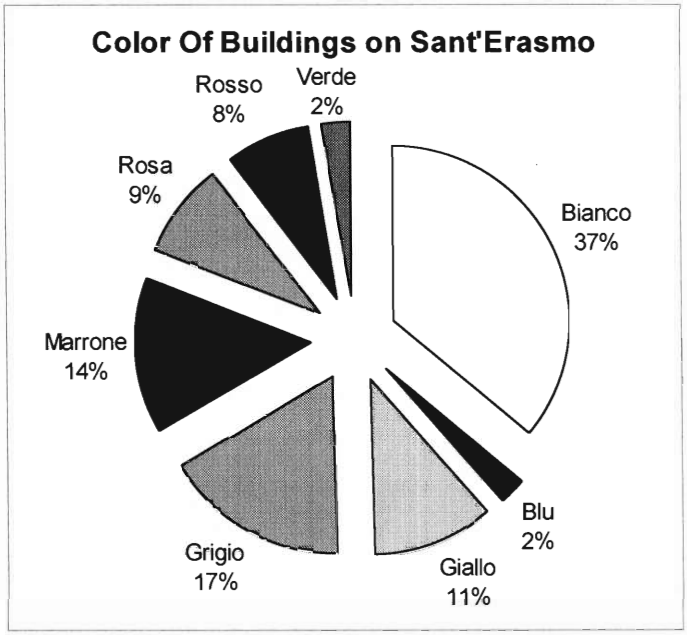


Figure 26: Colors of Buildings on Sant'Erasmo

building element on the island. 89% of the buildings had brick with a stucco façade. 5% were made of exposed brick, and 4% were made of wood. The remaining 2% were other or unidentified materials of construction (see Figure 25). 200 of the buildings featured the traditional clay shingle roofs found throughout Italy. The remaining roofs were of metal or unknown material. 82% of these roofs were the *capanna longitudinale* shape, and 17% were the *quattro falde* shape. Only 1% of the roofs on the island were flat. The proportions of buildings in the island gave a great deal of information about the overall architectural style. 77% of the buildings were wider than they were tall, 15% were square, and 11% were taller than they were wide. The largest majority of the buildings, 37%, were white. 17% were grey and 14% were a shade of brown. Yellow was also common, as 11% were some shade of yellow. 9% of the buildings were pink. Red, green and blue were also found, although less frequently (see Figure 26).

5.1.3 Typologies

Sant'Erasmo was primarily comprised of *orticola* style buildings, 45% of the buildings were classified as the primary typology of *orticola.* 66 of these were modern buildings that were in the same style of *orticola.* 10 of the *orticola* style buildings were from the 1900's prior to 1968, and 19 of the *orticola* style buildings were constructed in the 1800's or before. 29% of the buildings were Moderna non Itegrata style that did not fit into the existing built landscape because of scale, style or other features. 24% of the buildings catalogued were classified as *rurale* style. 19 of those buildings were build in the 1800's or before, 10 were from 1900's prior to 1968, and 17 were modern era buildings fashioned into the same style. The remaining buildings were classified as *fortezza.*

5.1.3.1 Type A – Rurale

Rurale buildings were most frequently found to be wider than tall, and only two of the 45 were square. 40 of these buildings featured the *capanna longitudinale* style roofs. The oldest of these, built before 1900 was defined as A1, *rurale ottocentesca* (see Figure 28). There were 19 buildings found on the island that fit this category, five of which had been transformed. Of those that had been transformed, only two had external chimneys. Four of these had the recessed windows and rectangular or square ventilation windows. All of the buildings that had been transformed still featured the external chimneys, but only one had recessed windows. Of the ten doors examined in this classification, nine of them were recessed. Only one of these buildings was classified as monofunctional. 13 of the *rurale ottocentesca* buildings were two stories.

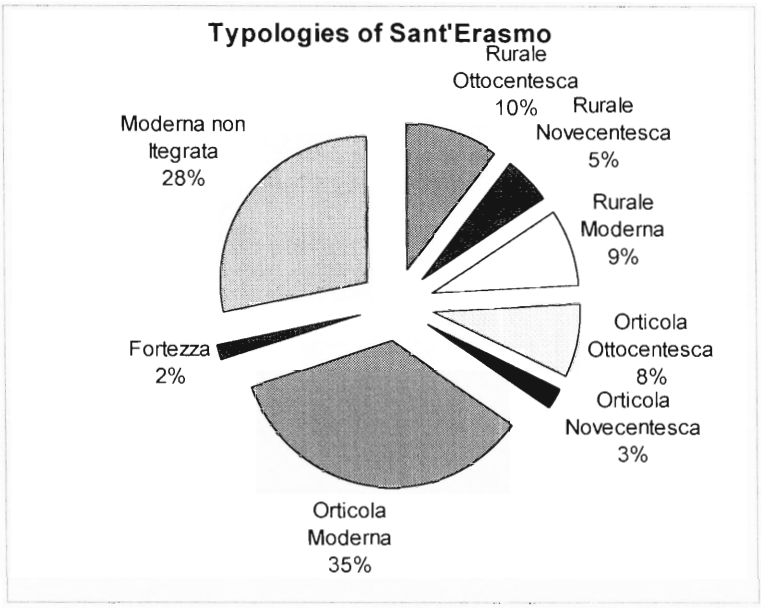


Figure 27: Building Typologies on Sant'Erasmo

Figure 28: A *Rurale Ottocentesca* Style Building

Rurale novecentesca buildings, those constructed between 1900 and 1968, were classified as A2 (see Figure 29). Ten of these were found on Sant'Erasmo. Three of these buildings had decorative *cornicione*, and they all had the *capanna longitudinale* style roof. 70% of these buildings were two stories. Only three were in their original state. Of these three, two had external chimneys, and all had recessed windows, as well as small ventilation windows. Two of the three had symmetry on the front faces. The seven buildings that had been transformed lacked these features. None of them had small windows, and only four

Figure 29: A *Rurale Novecentesca* Style Building

had recessed windows. Only one building had an external chimney. Only two of the *rurale novecentesca* were monofunctional, the remaining eight were bifunctional, for agricultural and residential uses.

Buildings which were in the same style as the existing *rurale* buildings, but constructed after 1968 were classified as B2, or *rurale moderna* (see Figure 30). 17 of these were found on the island. 71% of these buildings were 2 stories. 11 of these buildings had the traditional *capanna longitudinale* style roof, and two had the less traditional *quattro falde* style roof. Of the 11 buildings still in their original condition and six had been transformed. Two of the buildings in their original state had external chimneys, four had recessed windows, one had small windows, and 2 had large square windows. One building that had been transformed had the external chimney. None of the transformed buildings had recessed or small windows. The only *rurale* buildings that were taller than wider were *rurale moderna.*

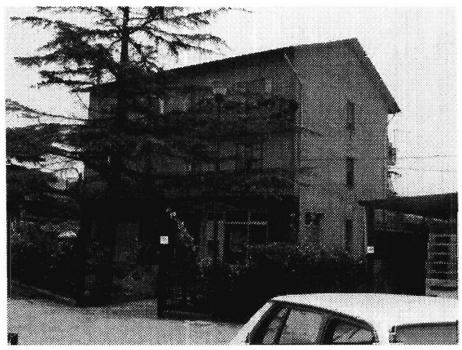


Figure 30: A *Rurale Moderna* Style Building

Figure 31: An *Orticola Ottocentesca* Building

5.1.3.2 Type B - Orticola

Orticola buildings on Sant'Erasmo with most frequently found to be wider than tall, though 12 of the 85 were square. 81% of these had *capanna longintudinale* style roofs. B1 was classified as those which were *ottocentesca*, only four of which where in their original condition (see Figure 31). One of these had the *vallensana* style external chimney room. Three of them featured the recessed windows found on older buildings. Of those that had been transformed, only one building still had the external chimney, one had the recessed windows, and one had the small windows for ventilation. Only one of these were classified as bifunctional, the remaining were monofunctional residential buildings. 75% of these buildings were two stories tall.

Figure 32: An *Orticola Novecentesca* Style Building

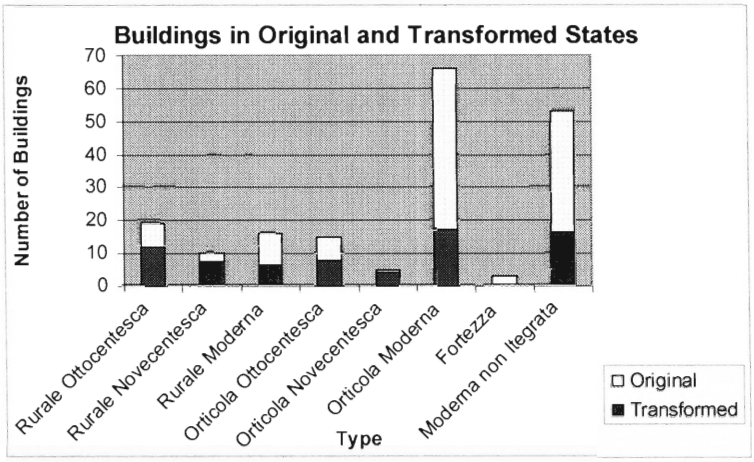


Figure 33: Buildings in Original and Transformed State by Type

Those built between 1900 and 1968 were classified as *orticola novencentesca* and were defined as type B2 (see Figure 32). Only five of these were found on Sant'Erasmo, and only one was in its original state, as can be seen in Figure 33. This building lacked the external chimney, as well as small ventilation windows or recessed windows, and was also taller than wide, making it somewhat different from the typical *orticola* building. The remaining four buildings were wider than tall, and two featured the *capanna longitudinale* roof, and two had the *quattro falde* roof. Three of these buildings were two stories. There was one building that was one story and one that was two and a half.

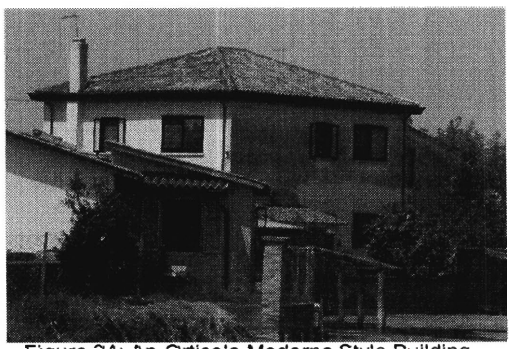


Figure 34: An *Orticola Moderna* Style Building

The final category of *orticola* style buildings was B3, the *orticola moderna* style (see Figure 34). The team found that 66 of the modern buildings were modeled after the existing *orticola* style structures on the island. 48 of these were in their original state, and 17 had been modified. 55 of the *oritcola moderna* featured the *capanna longetudinale* style roof, and only seven had the *quattro falde* style roof. Four of these were bifunctional, the others were monofunctional, mainly for residential use. Of those in their original state, nine buildings had external chimneys, and 13 featured recessed windows. Some also had square windows, but were regularly sized, rather than small, as older buildings were expected to have. Of those that had been transformed, 12 buildings had external chimneys. Four buildings had the recessed windows, but none had the small ventilation windows.

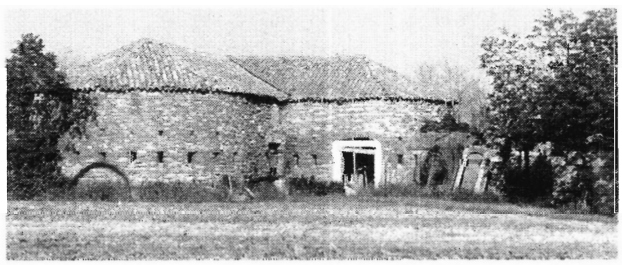


Figure 35: A *Fortezza* Style Building

5.1.3.3 Type C – Fortezza

These buildings are classified as unique structures with historical features. There are

three structures on Sant'Erasmo that are classified as forts (see Figure 35). They are each one story. Two of these were *ottocentesca*, and one is *novecentesca*. They were each monofunctional.

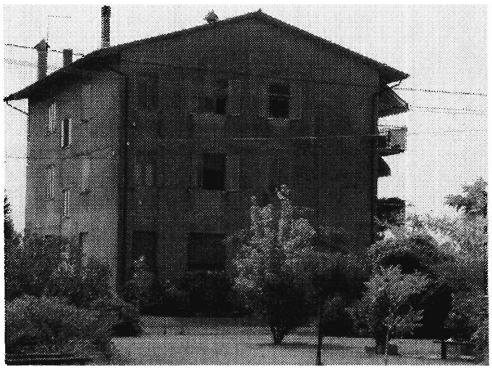


Figure 36: A *Moderna Non Intergrata* Building

5.1.3.4 Type D – Moderna Non Intergrata

The 55 buildings catalogued that were built after 1968 that did not fit in the rest of the built landscape were classified as *Moderna Non Intergrata* (see Figure 36). These most often featured single recessed doors. Most were wider than they were taller, or square in shape. 16 featured the *quattro falde* style roofs, and 28 had the *capanna longitudinale*. 37 of these buildings were in their original state. Of those, five had external chimneys and twelve had recessed windows. There were very few which had small windows for ventilation. The 16 buildings that had been modified had no small windows, only one external chimney, and four buildings had recessed windows. One doorway was arched. The distribution of building height was different than found in other building typologies. This category included the two largest buildings, which were four stories high, as well as having the greatest number of one story buildings, 38%, as shown in Figure 37. This also included several of the non-residential use buildings, because of their scale or other features that made them stand out in the built landscape.

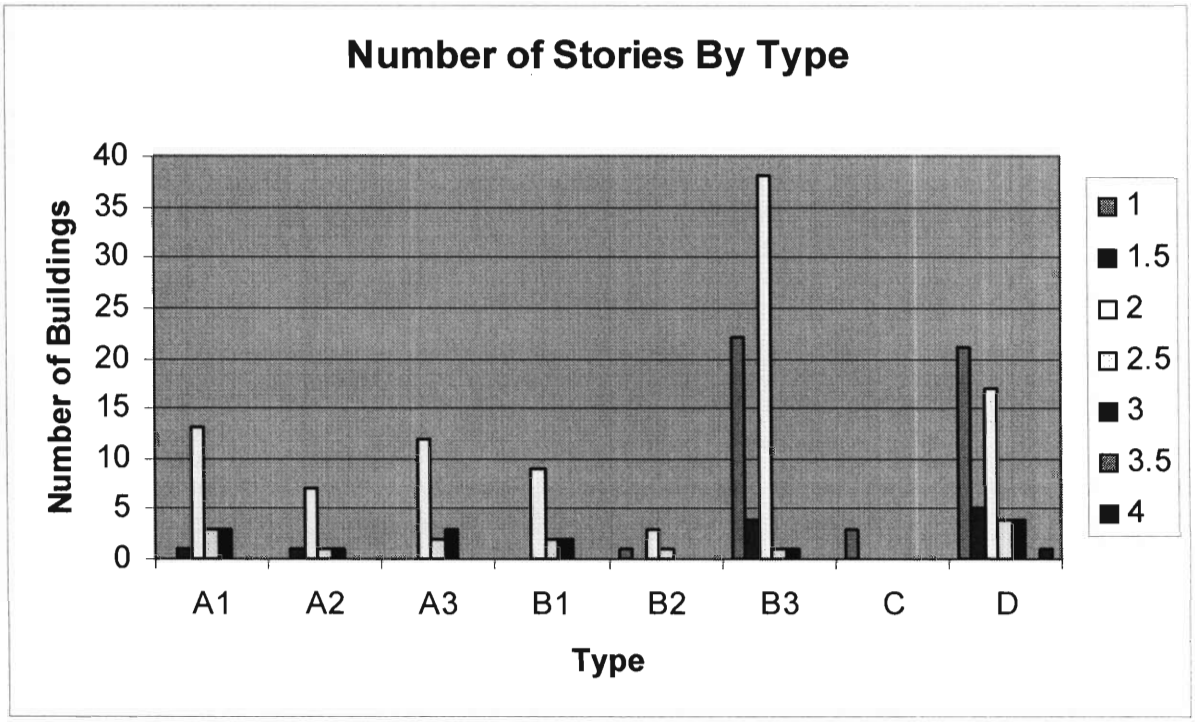


Figure 37: Number of Stories by Type

5.2 Rural Landscape on Sant'Erasmo

The locations and use of fields were used to create thematic maps that help in looking for trends and patterns that may be used in locating a site for field rental. Although it had been estimated that up to 60% of the fields were abandoned, this was found to be a very high estimate, in fact, of the 2.75 square kilometers on Sant'Erasmo, only approximately .8 square kilometers were abandoned. Figure 38 is a map showing the land uses on Sant'Erasmo.

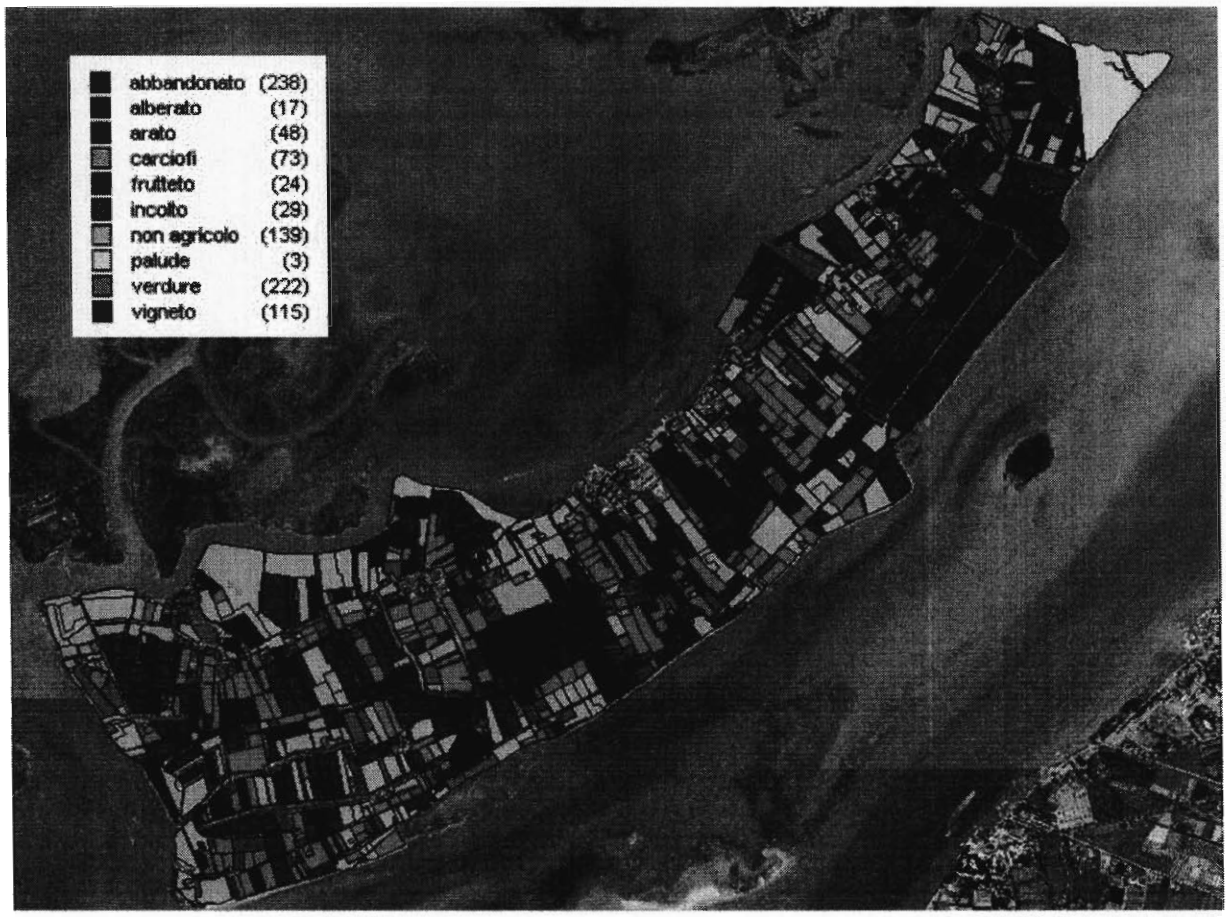


Figure 38: Land Use on Sant'Erasmo

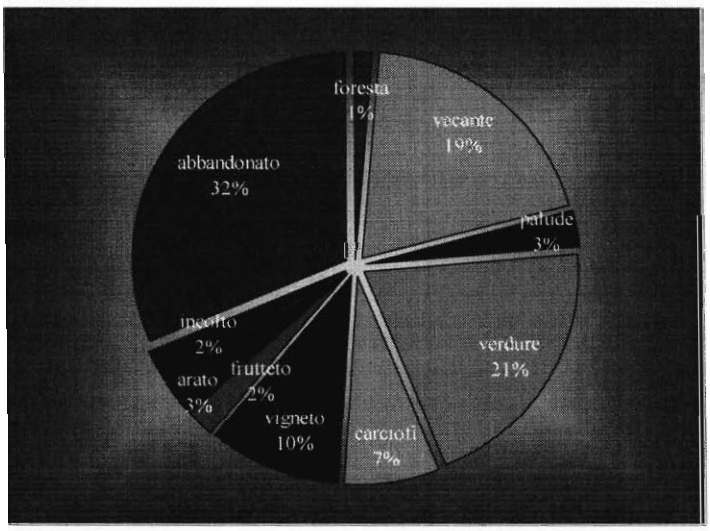


Figure 39: Percentiles of Land Use on Sant'Erasmo by area in m^2

A few large plots of abandoned land were found on the island, mostly near the fishfarms. Most of the farming plots were relatively small, approximately 800-200 square meters. A few field were significantly larger, measuring five and even six thousand square meters. Much of the land was being used for the production of mixed vegetables, as Figure 39 demonstrates.

5.2.1 Field Use

31% of the land on the island was abandoned. 45% was used. 24% was unusable agriculturally (see Figure 40). This is a positive sign for the island, as almost half of the land is currently being used for agriculture. This ratio was much higher than expected. Most of the unused agricultural land was located near the Northern section of the island, near the largest of the fishfarms. Other large portions were located at the Northern tip of the island and along the fishfarms in the interior of the island. Much of non agricultural land was located at the Capannone boat stop and along the Southwestern shore.

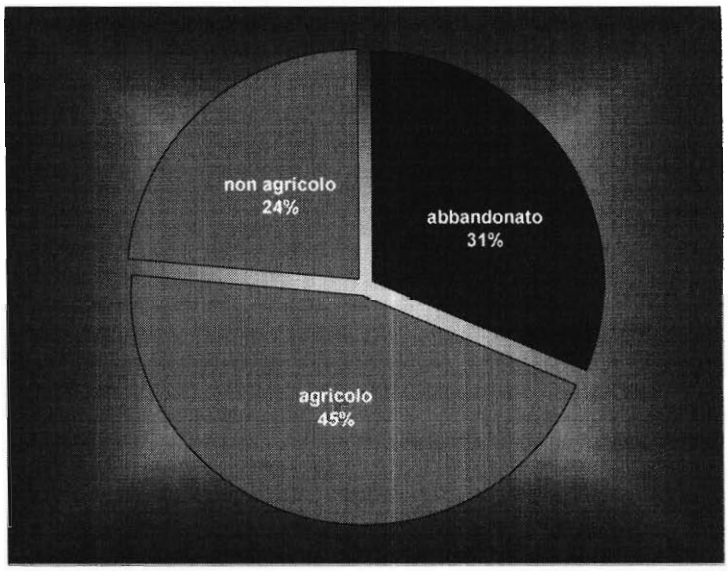


Figure 40: Pie Chart of Used, Unused and Non Agricultural Land on Sant'Erasmo by area in m^2

Figure 41: General Land Use on Sant'Erasmo

5.2.2 Crops

The most commonly found crop growing on Sant'Erasmo was mixed vegetables; approximately 50% of the productive land area was growing ground vegetables other than artichokes. Vineyards accounted for over a quarter of the productive agricultural land. Orchards were the least common form of agriculture, making up only 5% of the active farmland, as Figure 42 shows.

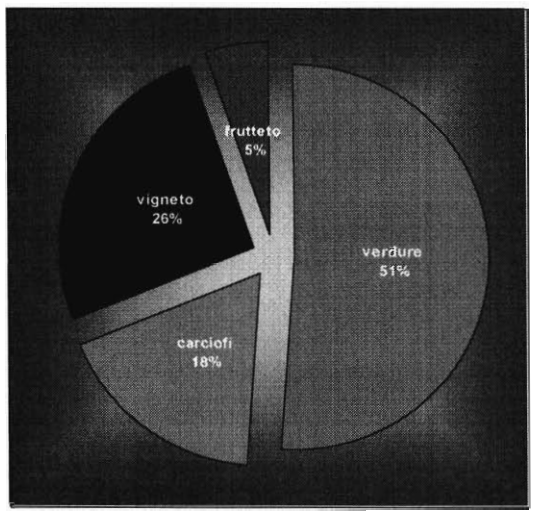


Figure 42: Pie Chart of Crops Growing on Sant'Erasmo

5.3 Waterways on Sant'Erasmo

Much of the work concerning waterways was done using GIS layers. These were verified in the field and then used to find the longest navigable route. Figure 43 and Figure 44 show the two planed waterway routes.

5.3.1 Longest Navigable Route

Figure 43 is a map of the proposed Route A, and Figure 44 is a map of Route B. Route A runs through the length of the entire island, whereas Route B exits the island through the boat parking area near the rowing club. There are two potential reentry points planned. The closest reentry point is ideal, forcing the boater out of the island for the shortest possible distance. Both figures show the land in each respective route that needs to removed to connect the existing canals. Levees and bridges were noted in the field, however, the team was not able to gather enough information concerning the steps need to remedy these problems to make the routes navigable. Since a cost analysis was unavailable, these points were not included on our map layers. All other waterway segments the team found on the island that are not being used for the respective plans are shown in blue. The team estimated that most of the waterways would need some work, be it dredging or widening to make them navigable in accordance with our standard of 3 meters wide and 1.5 meters deep.

Figure 43: Route A – Ideal Planned Waterway Route (shown in green, with land in need of removal in orange).

Figure 44: Route B – Less Obtrusive planned waterway route (shown in pink with land in need of removal in orange

5.3.2 Fishfarms

Included in our observation and data collection of the waterways on Sant'Erasmo, the team also made note of the fishfarms. The team noted the location of each in order to confirm the accuracy of our GIS Layers. We tried to walk as much of the fishfarm as we could and observe the condition of it. Every fishfarm on the island we found to be abandoned. The water was not flowing at all and was naturally obstructed in some spots. It was visually obvious that none of the fishfarms had been cared for in more than a few years. As seen in our Field Use layer (Figure 38) all the land around all the fishfarms were abandoned.

6 ANALYSIS

Using the gathered results the team was able to plan out three main goals for sustainability on the island. The architectural guidelines, land rental system, and recreational waterway route were each planned using the information the team collected, as well as what was provided from various government organizations, such as *Assessorato all'Urbanistica* and *Magistrato alle Acque*. These are each detailed below.

6.1 Preservation of the Rural Architecture on Sant'Erasmo – Zoning Guidelines

Sant'Erasmo is a leading example of rural architecture in Italy. The built landscape of this island is a major part of what makes it a unique place. As buildings age, however, they often change, and as an area grows, new construction can create a change in the architecture so dramatic that the original essence is lost. To prevent this, the team has created suggestions that may prove useful in the future, both for the existing buildings and for new construction.

6.1.1 Additions and Renovations of Existing Buildings

The existing architecture on Sant'Erasmo is an important feature of the island. The history of the area is shown through the features of the buildings. From the *vallensane*, which allowed for cooking in a separate area of the home, to the small windows and windowless faces to prevent heat from escaping from the building, each building gives an idea of how things were when it was first constructed. New renovations to these buildings can often drastically change these elements, and with them, a part of the buildings history is lost. Certain elements of historic buildings are what make them recognizable, and these should be maintained.

6.1.1.1 Size and Shape

Figure 45: Renovations Which Maintained Scale and Shape

Additions should keep existing buildings to three stories or less to fit with the existing buildings, and maintain the original heights found on the island, because most of the buildings are three stories or less. The overall shape, scale and size of the building should be maintained whenever possible. This includes the height, number of floors, and shape of the footprint. Figure 45 is an example of a building with renovations that preserved the scale and shape of the building. Although the colors are different,

and the location of the windows, the rectangular shape of the building has been maintained. The building still maintains its balance with the original footprint, and neither side looks out of place with the surrounding built landscape.

6.1.1.2 Colors

The color of buildings is a major element of the built landscape. While the color of a structure can change with time, certain tones are more characteristic of specific regions. Whenever possible the original color of the building should be maintained, however, buildings with less commonly found colors, such as pink, should have special attention paid to maintaining their original color. When this is not possible, or there is a strong desire from the homeowner to change to color of the building, building tones appropriate to the island should be used. Because over one third of the buildings were white, and many others were shades of grey and brown, these colors should be encouraged.

6.1.1.3 Materials of Construction

Since 89% of the existing buildings on the island are made of brick with a stucco façade, this should be maintained when changes are made to the exterior of the building. The buildings that are made of wooden exteriors should be preserved as such because they are unique. Materials such as aluminum or vinyl siding should be discouraged. Changes to the roofs of the existing buildings should include clay shingles, which are a key element in architecture throughout Italy, since they were found on over 200 of the catalogued buildings.

6.1.1.4 Windows

The traditional windows on Sant'Erasmo are recessed windows with a stone sill. This highlights both the architectural material and time period of construction. In many of the buildings on the island the recessed windows had been replaced with windows that are flush with the building's façade. The small windows used for ventilation in a previous era have been changed in many of the older buildings. Whenever possible, recessed windows should continue to be in use. Those buildings that have already been modified to have the flush windows should be renovated to restore the historical appearance of the island. Stone borders and sills on many of the buildings of the island have been modified over time. These should also be restored when possible.

6.1.1.5 Doors

Recessed doorways were a common feature found on the older buildings of Sant'Erasmo. Some of them also featured the stone borders around the doorways, similar to the windows. This element is another unique to architecture of the region and time period. While it is easy to overlook the location of a door in the doorway, encouraging residents of older home to use recessed doors and not remove stone borders.

6.1.1.6 *Chimneys*

External chimneys were once a key element in buildings on Sant'Erasmo because they were where the cooking was done, to keep the fire away from the rest of the home. While many of these *vallensana* style chimney rooms (see Figure 46) have been integrated into the main body of the building, modified, or entirely removed, they are an important feature in relating the history of the island to its buildings. The existing rooms at the bases of chimneys should not be removed from the building, nor should they be the location for additions to be extended, despite their prime location as a place for additions to be built.

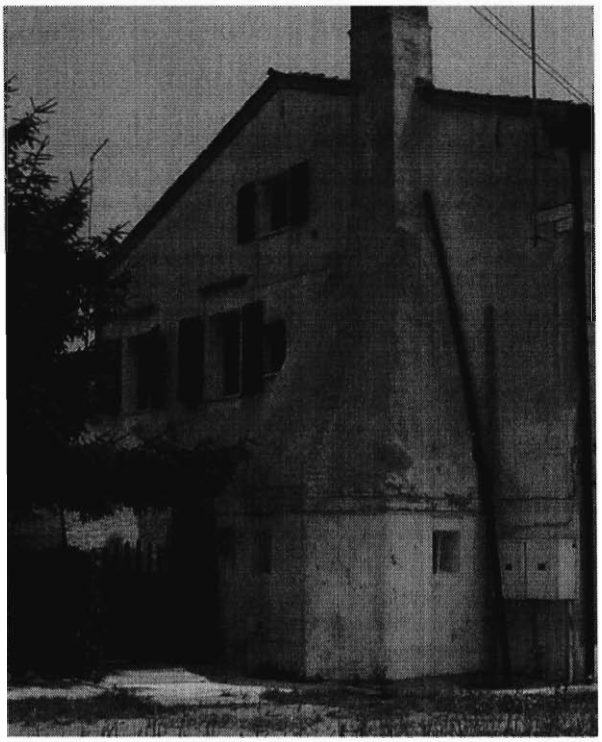


Figure 46: A *Vallensana*, or External Chimney Room

6.1.2 Elements and Features for New Construction

New construction on Sant'Erasmo has the potential to drastically change the built landscape, and remove the historical feel of the island. By creating guidelines for the construction of new buildings, the risk of new buildings ruining the traditional feel of the island is reduced. While new construction should not try to imitate the old in a way that looks foolish or overdone, it is important to keep the rural landscape of Sant'Erasmo somewhat constant, so that the built landscape is not destroyed.

6.1.2.1 *Size and Shape*

Based on the information collected, to maintain the scale of the buildings on the island, it is recommended that future construction be limited to three stories or less. This is because so few buildings were greater than three stories, and most were only two stories. A height guideline will prevent modern buildings from dwarfing those already present. Buildings that are too tall compared with the surrounding buildings create an unbalanced landscape. They can also create problems with light reaching the lower areas, and also require a greater footprint, meaning that they would take up a large amount of land, creating more impermeable surfaces and less land for open space.

6.1.2.2 *Colors*

Certain tones and hues are found commonly on the island. While there is a wide variety of colors found, including blues, reds and greens, most buildings were shades of white, grey or brown. Future

construction should encourage the use of these colors, as they are more characteristic of the existing rural style and also reflect the general atmosphere of the island.

6.1.2.3 Materials of Construction

To keep with the most common architectural element of construction on the island, new buildings should be made of brick with a stucco façade. Smaller buildings may be made of wood, but these should be discouraged, as even many of the small buildings on Sant'Erasmo are brick and stucco. The roofs should be comprised of clay shingles whenever possible because they are typical not only of the island, but Italy in general.

6.1.2.4 Windows

Because the traditional windows on Sant'Erasmo are the recessed windows, they should be used in future construction. Although there were many buildings that had windows flush with the building's façade, they are less characteristic of the traditional *rurale* and *orticola* style buildings on Sant'Erasmo. Modern windows with external window panes look very modern, and should be avoided, as to blend in with the existing historic buildings. Because the front faces of traditional buildings on the island have some symmetry in the windows and doors, this should be replicated in modern buildings.

6.1.2.5 Doors

Doorways on Sant'Erasmo vary greatly, especially in modern style buildings. The location of the recessed doorway on the front side of the building is very typical of *rurale* and *orticola* buildings, and should be incorporated into new construction when possible. The addition of a stone border may also help to increase the use of traditional elements into modern construction.

6.1.2.6 Chimneys

External chimneys, coming to a small room at the base of the building, are another traditional element found on the buildings of Sant'Erasmo. Although it may not be possible for all new buildings to imitate this feature, it would be ideal to see external chimneys. Chimney tops should also use one of the existing styles found on the island, rather than a style that is atypical, or used more commonly elsewhere in the world.

6.1.3 Limiting Future Construction

A key point of sustainable development is controlling the growth of a region, and this includes architectural expansion. Limiting the future development of Sant'Erasmo will be what creates a sustainable rate of growth and change on the island. Future construction should be limited in number and location, so that the farm fields are not lost and the rural lifestyle is not lost. Zoning will play a key role in the location

and size of future building. Minimum lot sizes, maximum floor to land ratios, and restricting the uses of buildings will help to limit how the land will be used and how much of the land is used. Construction should be encouraged in the center of town, so that the sides of the island may be used more for agriculture. Having a centralized downtown for the island will be beneficial to residents, and also allow for the maximum amount of large farming fields to stay intact and away from development pressures.

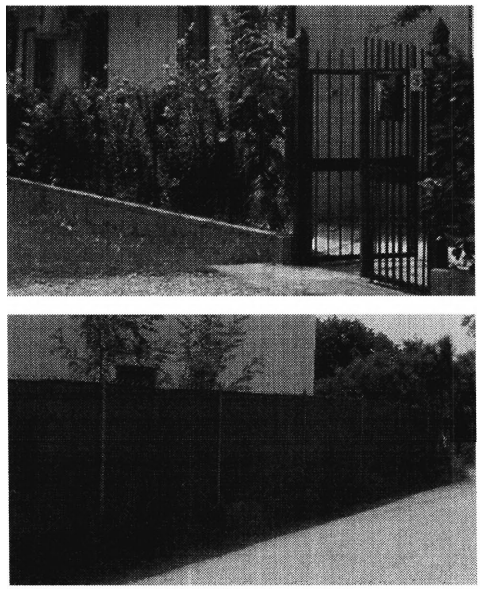


Figure 47: Two Fences on Sant'Erasmo

6.1.4 Lot Improvement Program

The fences, annexes and incidental use buildings on Sant'Erasmo vary greatly in style, shape, material, and condition. While much consideration has been taken in the buildings themselves, these external features are also very important in the aesthetics of the island. Many of the sheds and garages were in disrepair and were randomly placed and constructed. While some of the gates and fences were very ornate and decorative others were simple chain link, which often looked out of place in combination with the buildings in the area (see Figure 47 and Figure 48).

With this in mind, a government program has been proposed to give landowners a portion of the funds they would need to spend to repair or improve existing structures, or to build new ones. A total grant amount of €15,000 would be made available through the Housing Department. This plan was modeled after the City of Sturgis Home Improvement Program Guidelines for 2003, created by the City of Sturgis Community Development Housing Department, of Sturgis, Michigan, in the United States.

Figure 48: A Shed on Sant'Erasmo

6.1.4.1 Program Statement

The purpose of this program is to encourage improvements to sheds, garages and fences on the island of Sant'Erasmo, because the external features associated with rural land greatly affect the surrounding area.

Matching funds of up to €1,000 will be provided to residents of Sant'Erasmo who have owned land for one year or longer, for improvements or construction of fences, gates, sheds or garages to owner occupied lots. This program seeks to make these improvements more feasible to landowners by providing grant funding.

Improvements may include replacing fence posts or missing sections of a fence, as well as fixing roof, door or structural elements of sheds or garages. This program is open to residents regardless of income.

6.1.4.2 Lot Improvement Program Impacts

The goals of this program include:

1. To facilitate lot improvements that will have a positive impact on community standards
2. To encourage lot improvements to fences and incidental use buildings that have deferred maintenance and repairs.
3. To strengthen the aesthetic appearance of lots on Sant'Erasmo and create a sense of pride in the community.

6.1.4.3 Grant Use

The terms and restrictions of this grant include the following:

1. Grants provided by this program are to be used to the external rehabilitation of owner occupied lots.
2. All projects are to be approved by the Project Review Committee, in accordance with the Lot Improvement Program guidelines. Applicants who deviate from the guidelines will be disqualified from receiving grant reimbursement funds, and are ineligible for receiving funds for the next six months.
3. Once the project is completed, the applicant will submit receipts for contractual work, necessary supplies and materials for reimbursement. After confirmation that the project is completed in accordance with the application, the Housing Department will reimburse the approved grant amount. Applicants should allow thirty (30) days for reimbursement.
4. The grant reimbursement will be 50% of the total project cost, totaling no more than €1,000. Applicants are limited to one (1) grant every two (2) fiscal years with no more than three (3) grants within a ten (10) year period.
5. Examples of eligible and ineligible activities:
    a. Eligible improvements include, but are not limited to:

- Exterior painting of sheds or garages
- Roof repairs to sheds or garages
- Structural improvements of sheds or garages
- New fence posts
- Repairs to missing sections of fences
- New gates

b. Ineligible improvements include, but are not limited to:
   - Improvements and/or expenses made prior to grant approval
   - Tree removal or landscaping
   - Tools and equipment (hammers, ladders, etc)
   - Interior improvements to sheds or garages

c. Work performed by the lot owner will not be considered as part of the lot owner's matching contribution, nor will costs be reimbursed for in-kind work.

d. Once a project is approved, applicants will have 150 days to complete the project. If after 150 days the project is not completed, the applicant must file for a 60 day extension or the grant reimbursement will expire. In order to receive the extension, the applicant must demonstrate intent to finish the project to the Project Review Committee or its designee.

6.1.4.4 Program Policy

The following shall also be considered when reviewing and acting on project applications:

1. The Project Review Committee will not use any other criteria to approve or deny an application other than the required criteria outlined in the Lot Improvements Program Guidelines.

6.1.4.5 Program Implementation

The program shall be implemented in accordance with the following sections:

1. Application Process
   a. Applications for the program will be made through, and submitted to the Housing Department.
   b. The application form will contain all items necessary for the Project Review Committee's consideration.
   c. The formal application will be submitted to the Housing Department with proof of residency of the island of Sant'Erasmo, proof of lot ownership and occupancy.
   d. The Project Review Committee will review the application.

e. Upon approval or denial, the Housing Department will notify the applicant.

2. Post Application Process
    a. The Housing Department is responsible for assuring that any work done on a particular project is consistent with the application as approved.
    b. The Project Review Committee must approve all changes to an approved project prior to actual construction.
    c. Deviations from the project that are not approved by the Project Review Committee will disqualify the applicant from receiving the grant reimbursement.
    d. Once the project is completed, the applicant will submit receipts for contractual work, materials and supplies for reimbursement. After confirmation that the project is complete, the Housing Department will reimburse the approved grant amount within 30 days.
    e. Projects that are incomplete will not be eligible for grant funding.
3. Marketing: The Housing Department will conduct a thorough effort to inform and educate lot owners and the community as a whole to the availability and benefits of this program.

6.1.4.6 Project Review Committee

The Project Review Committee will function as follows:

Membership: The Project Review Committee will consist of five (5) members. Three (3) of these members will be appointed by the Housing Department. One (1) will be from the City Planning Organization, and one (1) will be a resident of Sant'Erasmo at large. Each of these members will serve a 3 year term, at which time they will be eligible for a renewal of their position on the Committee.

Duties: The Project Review Committee will review, then approve or deny all application requests for the Lot Improvement Program. The Project Review Committee will not use any other criteria to approve or deny an application other than the required criteria. The Project Review Committee may approve projects contingent upon specific adjustments to the project.

Resources: City staff will provide the Project Review Committee with appropriate information. The Project Review Committee may request specific information and opinions from staff on building and zoning codes, professional design standards, etc.

6.1.4.7 Required Criteria

The following are the required criteria for the approval or denial of an application:

a. Complete Application clearly stating the scope of the proposed project and estimated grant reimbursement amount.
b. Project Assessment Sheet: An assessment of current conditions and the project impacts on the surrounding area.
c. Proof of Sant'Erasmo residency, ownership and occupancy of the lot.
d. External improvement associated with the property as outlined in the Lot Improvement Program Guidelines
e. Conforms to National, Regional and Local building codes and zoning.
f. All modifications, alterations and additions must be designed to reflect the original architecture and land uses, as well as those of the surrounding land uses, concerning architectural style, materials, color, etc.

6.2 Preservation and Revitalization of the Rural Landscape on Sant'Erasmo – Farm Rental Program

Approximately 1/3 of the farmland on Sant'Erasmo was identified as being abandoned. In order to reutilize this land and keep it as open space, a program must be implemented to facilitate the rental of the abandoned properties. The farm rental program will outline the ideal rental locations that have been identified, terms of the leases, conditions, restrictions, land assessment, the government's role, and how the public will be informed of their options. By applying this program to the abandoned farmland of Sant'Erasmo, the fields will ideally be reused so that they will not be targets for future development. This will encourage the preservation of the natural landscape of the island as well as help Sant'Erasmo to hold on to the peaceful atmosphere that is treasured by its residents and visitors.

6.2.1 Leasing Farm Property

Renting farmland is often a concern for landowners. In Italy, the renting of the land can be a complicated process because once rented, it is sometimes difficult to reacquire one's own land. By taking the proper precautions and signing legal documents, the landlord can avoid the hassle of worrying about the loss of his or her land and still reap the economic benefits of owning the property by utilizing it instead of leaving it abandoned.

One such document is a farmland lease. A written lease or contract is an essential business practice when renting out farmland property because it acts as a reference in case details of the agreement are forgotten, in the event of early termination, or other circumstances where the agreement needs to be outlined in a detailed and organized document. It does not transfer the title of ownership or interest asset and protects farmers

from losing their land as well as ensure both parties a secure business investment. A lease will encourage the most beneficial, long-term operation of the property for both the owner and the tenant.[29]

A lease agreement should include the following: the time period of the lease with the beginning and ending dates, names and addresses of the landlord and tenant, a legal description of leased property, the rental amount for the cash lease (including when and how the rent will be paid and the penalties for late payments), who will carry insurance on the property and crop, restrictions, termination guidelines, farming and maintenance operations, how the government is involved, a statement explaining that neither party will obligate the other for debts/liabilities or damages, the nature of landlord participation in management, and lastly, both signatures of the parties involved. [30]

There are several types of leases for the rental of farmland. Some of these include crop-share, custom farming contracts, flexible cash rent, and cash-rent.

Crop-share leasing is the second most commonly used method. In this type of lease, each party involved receives a portion of the crop produced as earnings for their contribution in labor, capital, and land. Usually, crop-share leasing deals with grain crops used to participate in government programs. The landlord's share of the product is weighed by his or her contribution in produced it. In the instance that crops are divided equally, the landlord usually pays fifty percent of the costs of pesticides, seed, fertilizer, and provides the land. In other cases, the landlord may only provide the land and receive one quarter to a third of what is grown.[31]

In a cash-rental method, is considered by many as a generally simple and straight-forward method. In this type of leasing, the tenant pays the landlord per acre used or rather per growing season. Provisions in the lease usually state the terms of agreement, in other words, the landowner may place restrictions on the use of land or fields for certain crops. Also, the lease may have an agreement that has a measured degree of productivity that has to be maintained. [32]

Flexible cash leasing is another form of leasing farmland. This is a hybrid of cash-leasing and in this type of lease, the tenant has to pay a proportion of the price and/or yield level. One method of flexing a lease. The most common way is called flexing gross or net revenue so that the risks associated with cash-rent leasing are shared amongst the tenant and the landlord. If an excess of revenue is received than the established base level, the tenant and the landowner split this. If there is a revenue made that was less than the established base level, the tenant and the landowner will split the loss. Despite this uncertainty about whether or not the actual amount made will meet the baseline, here is often a guaranteed amount of revenue that the landowner will receive. Other types of flexing leases deal with flexing price, yield, or both. Using

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[29] http://pearl.agcomm.okstate.edu/agecon/farm/f-214.pdf
[30] http://www.ianr.unl.edu/pubs/farmmgt/nf453.htm
[31] G426 Farm Lease Agreement
[32] http://muextension.missouri.edu/explore/agguides/agecon/g00426.htm

this method, the tenant and the landowner, need to take into consideration current value, depreciation, interest, taxes, inflation, repairs, insurance, and maintenance. [33]

Choosing the proper lease depends on the location, type of crop, farmer, and the community.

6.2.2 Cash-Rental Leasing in Sant'Erasmo

The cash-rent lease method is the most compatible for the island of Sant'Erasmo, because small commercial farming is the most desirable for the island. Encouraging agriculture at a greater level than the current method of sustenance farming will ensure that most of the land will remain farmland. It will also maximize open space, as well as create an economic incentive for tenants to continue to farm and possibly eventually buy land or rent more land, if they are able.

There are many advantages for this type of leasing because it is very straight-forward with relatively few chances for misunderstanding. The owner is relieved of making operating decisions from day to day, has little financial risk and the tenant has a large amount of freedom in planning and developing the farmland and also has fewer records to keep (see Table 4). [34]

Advantages for the Owner	Advantages for the Tenant
More stable income as price and yield risk are eliminated. Income can be scheduled for any time of the year.	Total managerial freedom, lessening the chances of disagreements with the land owner
Requires less managerial participation, thus reducing the worry of production and marketing decisions and the possibility of disagreements with the tenant.	Receives all of the benefits of productive growing years and superior management
Eliminates or greatly reduces financial expenditures	Eliminates time and effort associated with the dividing of crops and input purchases and records kept relating to that

Table 4: Benefits of Cash-Rent Leasing

[33] http://muextension.missouri.edu/explore/agguides/agecon/g00426.htm
[34] http://pearl.agcomm.okstate.edu/agecon/farm/f-214.pdf

6.2.2.1 General terms

The general terms of a lease agreement outline the basic elements of the lease including the duration of the lease, changes made, right of entry of the land owner, what is done in the event of the death either party, sub-leasing, and any additional agreements made that are included in the lease.

6.2.2.1.1 Time period covered

The duration of the lease usually depends on the land owner, however, in this program of cash-rental leasing, each contract will be effective for three years. This is to promote long-term land usage by the tenant, instead of by growing seasons, which may leave that particular field abandoned for several months before attaining a new tenant. After the first three year period, the tenant may choose to continue leasing the land from the landowner or to terminate the lease. If he or she chooses to continue leasing the property, they may do so for another three years, but at the end of that leasing period (6 years total) the landlord may decide not to lease to the tenant again. The lease will continue from beyond the six year period as long as the landlord wishes, however, if the he or she wishes to terminate the lease, it must be after the three year term is complete. This allows the landowner the ability to reclaim his land and to minimize the risk of losing it, which is a concern for area farmers. It also allows the tenant to receive the benefits from his or her investment. For instance, artichoke farming, which is the main crop grown on Sant'Erasmo, generally takes at least 2 years before receiving a lucrative crop. Therefore, leases beyond that two year period will be a sufficient amount of time to be a worthwhile investment.

6.2.2.1.2 Review of lease

30 days before the end of the first three year period, the tenant must decide whether or not they will continue leasing the land from the farmer. If he or she wishes to continue the lease, they will have to notify the farmer at this time at the end of each three year period. However, after six years, the landlord may terminate the lease on any three year period after that. For instance, the lease may be terminated on the 6th, 9th, 12th, and so on years after that. In any case, 30 days before the date of the 3 year terms, the landlord or tenant must state their leasing intentions.

6.2.2.1.3 Alterations and Amendments

In order to keep organized records of any changes made to the lease, a signed copy of the alteration or amendment is recommended. This will ensure that both the tenant and the landlord understand and agree to the change made. In this specified lease, if either party wishes to alter a particular section of the lease, they must come to a mutual agreement on the change made.

6.2.2.1.4 No Partnership

Because some farmers may be hesitant about making permanent commitments, a statement is included in the lease stating that the lease does not imply a partnership relation, and simply is a separate business arrangement where there is no sharing of crops, funds made from the crops grown, or any other product of the land. The tenant has full managerial decision-making within the limitations of the lease.

6.2.2.1.5 Right of Entry

Another important aspect of the lease is making clear the right for the landlord to enter the property. Under this contract, we have stated that the landlord, as well as those who work for him, reserves the right to go onto his land in certain circumstances. These include to make repairs of, improvements to, and inspections of his property, to do tilling, seeding, fertilizing, and other seasonal work after the notice of termination of the lease has been given, and lastly to consult with the tenant. Although under these circumstances, the landlord may enter the property, he or she may not interfere with the regular operation of the tenant or alter the crops that the tenant has planted. By reviewing the landlord's right of entry, future problems and misunderstandings will be alleviated, allowing the landlord to go onto his or her own land without jeopardizing the business relationship with the tenant, and also protects the tenants investment.

6.2.2.1.6 Sub-leasing

Under some leasing programs, tenants are allowed to sub-lease for a growing season or allow another farmer to use the land for a period of time. The tenant receives payment for the land from that specific farmer in exchange for the use of the land. Under this land rental program, sub-leasing will not be allowed. This will prevent liability issues by keeping the landowner informed about what is occurring on his property and who the client is. Under subleasing, the landlord does not always receive documentation for the sub-letters, which can lead to legal problems.

6.2.2.1.7 Binding on Heirs

In the instance that the tenant or landlord in unable to complete his legal obligations in accordance with the lease, it becomes the responsibility of their successors to complete the remainder of the contract. The purpose is to protect the investments of each party.

6.2.2.1.8 Land Use

This is one of the most important sections of a lease for the landlord. It outlines how his or her land will be used, ranging from the specific crops grown in acreage to pesticide restrictions. By identifying these

categories, the landlord can still have indirect control of the property without having to manage day to day activities.

6.2.2.1.9 General Provisions

It is important for the landowner to keep records of what is growing on his or her land from year to year in order to maintain the quality of the soil as well as keep future tenants informed about which crop would grow successfully in accordance with crop rotation. This part of the lease contains detailed information of what the tenant intends to plant on the land and approximately how many acres of each crop will be planted. Other possible information addressed in this section of the lease that may be important to the landlord would be the use of the structures or equipment on the land such as sheds, grain bins, or greenhouses.

6.2.2.1.10 Restrictions

The use of pesticides and chemicals is a concern for landowners because they can permanently affect the quality of the land. Pesticide and chemicals can also pose a health hazard for the individuals living on or close to the property. Records containing what chemicals were previously used on the land inform the new tenant of how their crops may or may not be affected, their own health risks, or other events that could take place due to what has been put into the soil or surrounding irrigational run-off canals. This section of the lease allows the landlord to further outline which chemicals and pesticides he or she will permit on the property. In accordance with Italian law, this program will not allow any harmful chemicals or pesticides to be used on the land.

6.2.2.1.11 Government Programs

The participation of government programs will be discussed at the beginning of, or renewal of each annual lease period. The involvement must be fully outlined and signed by both parties. These government programs, which may include farming grants, may be beneficial as tax write-offs.

6.2.2.1.12 Payment

In this program, the cost of each plot will be judged using a percentage of the land value as assessed by a professional appraiser. This will be made by multiplying the estimated current market value for the land as detailed by the appraiser by a projected rate of return. In certain parts of the world, such as the state of Iowa in the United States, the cost for farmland rental is between six to eight percent of the current land value. This shall be the basis of property percentage rates in Sant'Erasmo, however, this may adjusted from year to year.

The payment of rent will be due on the day that the lease was signed for the following month. For instance, if the lease began on June 1st, the rent for that month will have to be paid, as well as for July. Then on July 1st, the rent for August will be due. This will continue on the same date of the month for the year that the contract exists. Having monthly payments, as opposed to paying the full amount ahead of time, allows the tenant to have a payment plan as he receives the capital for selling his products.

6.2.2.2 Operation and Maintenance

The owner is responsible for providing the tenant with a proper environment for farming. He is responsible for testing and maintaining the fertility of the soil and pH levels and the removal of noxious weeds. The landlord also holds the right to make and use improvements and receive monetary compensation for said improvements. The tenant will be provided with a statement of current environmental status of the property and it is the landlord's responsibility to minimize activities that may lead to contamination. Areas not rented for cropland such a garden plots, grain bins, buildings, trees, and pasture are important aspects to include in the lease agreement between the tenant and landlord.

In this particular program, the tenant will agree to provide proper maintenance on the land and equipment during the lease period. Normal wear on the property will be understood by the landowner and accepted. The tenant may not plow over pasture or meadowland, cut down live trees, or plant trees or grasses without the consent of the land owner. The tenant also will not be allowed to violate any part of the owner's insurance policy such as the housing of tractors, trucks, or any type of automobile in a barn or shed. The tenant will be responsible for notifying the landlord about noxious weeds so that they can be taken care of. The landlord will have fifteen days to do so. The tenant may not add permanent structures or elements to the land such a buildings, electrical wiring, plumbing, or heating without the consent of the landlord. Soil erosion will be controlled, ditches will remain open, and the surrounding waterways will be preserved by refraining from any practice that would damage them. If the tenant does damage the property of the landlord, proper compensation will have to be paid to the landlord to account for the harm to the land. This will not include normal wear and tear on the property as mentioned previously. Costs of operation will be paid and also a given amount by the landlord will not be exceeded on making improvements to the land without written permission.

The landlord will also be responsible for making agreements that will be beneficial to the tenant. It is the priority of the landlord to replace any building or part of the farmland used by the tenant for operation that is damaged by natural disaster or anything that the tenant has no control over. This will be covered in the landowner's insurance plan for his or her property. All materials for normal maintenance and repair must be supplied by the landowner to ensure the proper upkeep of the property. If the tenant cannot do a designated task to maintain the land, the land owner must provide proper skilled labor to accomplish the task. The landowner must reimburse the tenant within one month of the maintenance or repair not to exceed

a given amount agreed in writing by the landlord unless specified. The landlord must agree to let the tenant make minor improvements to the land of a non-permanent nature which do not alter the appearance or condition of the land that the farmer will have to provide capital at a later time to repair. The tenant may also remove such improvements at any time during the lease or within one week of the termination of the lease. The tenant will not receive any type of compensation for the improvements if not previously agreed upon by both parties in writing. Both parties must agree to not hold the other accountable for debts or liabilities incurred or for damages made by the other.

6.2.2.3 Termination

Termination of the lease will not be allowed unless certain conditions permit. These conditions include death or incapacitation of the landlord or tenant. In any other case, neither party will not be allowed out of the lease, unless an agreement is reached by both parties. In the case of the death of the land, the heir to the property, as outlined in the landlords will, shall complete the term of the lease with the tenant. In the case of the death of the tenant, the landlord will be compensated for the remainder of the term of the lease first, by the tenants existing crops and lastly, by the insurance provided by the government intermediary.

6.2.2.4 Arbitration of Differences

Any differences between the landlord and the tenant as to their rights or responsibilities according to this lease that are not settled by discussion will be submitted to an arbitration committee composed of government appointed officials (see preservation of Garden of Venice Committee below). Both parties will accept whatever decision is made, which will be governed by a majority vote from the committee.

6.2.3 Role of the Government

The Venetian government will be responsible for overseeing the Sant'Erasmo farming program. The City of Venice will appoint an official to chair a committee on Sant'Erasmo that deals with the preservation of the farmland and rural landscape. The government will also fund this committee and provide capital for grants associated with the farming incentives program detailed below.

6.2.4 Preservation of the Garden of Venice Committee

The official appointed by the City of Venice will chair the Garden of Venice Preservation Committee and will be responsible for appointing members within the town to be on the committee which will have the following duties: keeping track of all signed and notarized leases for the three year periods, advertising of the available property, taking applications from owners willing to rent their land or farmers wanting to rent land, resolving disputes within the leases, and doing an tri-annual assessment of all farm fields on the island in concordance with the map layer that this project has produced.

6.2.5 Farming Incentives Program

In order to make a plan like this successful, there must be a program of benefits that will make utilizing land attractive to the citizens of Sant'Erasmo. Every three years, the Preservation Committee will note the abandoned land on the island. If the committee finds any large plots of the land that are being unused, they will contact that owner and attempt to convince the owner that renting his or her land is beneficial. The committee will explain the rewards of renting land, such a tax write-offs. Also, the committee will set up the advertising for the rental of land and providing grant money to prepare the land for rental so that the landowner will not have to find someone themselves to rent the property and they will receive money to put the land into production.

6.2.6 Locations of Ideal Rental Land

As shown in Figure 47 below, certain areas of the abandoned land identified previously have the same owner. By locating these ideal large parcels of abandoned land that are owned by one person, the Committee can contact this person and discuss the advantages of reutilizing their property. It is important to find these large land parcels to put them back into production before developers can make them an offer to buy the land. This will help maintain the rural landscape that is characteristic to Sant'Erasmo by not allowing the land to be built upon and instead, keep the traditional farming alive.

Figure 49: Targeted Abandoned Fields for Land Rental System

6.3 Preservation and Reutilization of Waterways on Sant'Erasmo – Recreational Boat Route

6.3.1 Cost Analysis

The team collected data pertaining to the blockages and overall condition of the canals on Sant'Erasmo. Using GIS layers to confirm the locations of the waterways the team created two waterway routes based on what appeared to be the least disruptive to the fields on the island. In order to realize the feasibility of these routes the team completed a cost analysis for each route.

Before crunching numbers the team had to decide exactly what needed to be done to complete these waterways routes. The team first looked at the waterway segments and intersections. Almost every waterway had to be widened and deepened. We decided that a canal should be 3 meters wide and have a depth 1.5 meters above mean sea level. In order to determine the work needed to be done the team had to consult our map layers given to us by our sponsors. The average depth of each canal segment and intersection was determined from the depths listed on the AutoCad layer. Further, the width was determined by measuring the each segments width in several places and then taking the average. The segments measurements were based on a GIS layer. Finally, several section of land needed to be dug out. The team once again consulted both our GIS layers for dimensions and AutoCad layers for height (from mean sea level) to determine the volume of land needed to be dug.

While this work is being done, the preservation of Sant'Erasmo is a constant concern. Drudging usually creates wakes that can erode the sides of canals. While this is not of much concern since the canals will be widened anyways, the canal water being soaked into the fields is of much greater concern. To prevent the runoff water in the canals from contaminating the fields the team decide to have barrier walls put up in every location that was having work done. The team also wanted the dug and drudged material removed from the island instead of having it left along the canals or in a designated place on the island in order to prevent contamination of the fields. The costs of both the barriers and material removal were also considered in our cost estimate.

The team created a cost analysis including for each waterway route. Listed in the tables below are the amount material needing to be dug, drudged or removed the price per cubic meter and the cost for each individual item.

	Amount	Price (in euros)	Cost
Segment Dredging	47360.45 m^3	50,87	2409273.452
Intersection Dredging	5277.69 m^3	50,87	268481.368
Connection Digging	6530.12 m^3	92,96	607053.0154
Transportation	59168.26 m^3	30,99	1833446.873
Barrier Creation	1778.78 m	24,27	43170.9906
Canal Widening	14.17 m	92,96	1,317.27
TOTAL			**5,161,425.70 euro**

Table 5: Cost Estimate Breakdown for Plan A

	Amount	Price (in euros)	Cost
Segment Dredging	36063.25 m^3	50,87	1834573.591
Intersection Dredging	4839.16 m^3	50,87	246172.9084
Connection Digging	4459.52 m^3	92,96	414565.8982
Transportation	45361.93 m^3	30,99	1405630.125
Barrier Creation	1865.59	24,27	45277.8693
Canal Widening	0 m	92,96	0
TOTAL			**3,946,220.392 euro**

Table 6: Cost Estimate Breakdown for Plan B

As seen in Table 5 and Table 6 above, while both waterways will necessitate considerable funding route B will require significantly less. This route is also less obtrusive to the residents of the island as it does not cut through the middle of the island and as a result requires less work on the canals. A large part of the cost reduction comes from the fact that only 12 land connections were need as opposed to the 24 needed for plan A. While this does make plan B seem more logical as it is cheaper and less obtrusive, it is not necessarily better. Plan A is the best ideal canal for the island because it does not require the boater to travel into the lagoon allowing him or her to enjoy the island completely. The cost analysis is merely an estimate. It will change as work is already being done on some canals. Also the team was not able to consider the costs to raise or rebuild bridges that are too low to allow boat passage at high tide.

6.3.2 Plan for Largest Fishfarm

Through our interviews with our sponsors the team discovered that the largest fishfarm on the Sant'Erasmo, which is currently abandoned, will be reopened and used for research by the Venetian

University. It is planned to have the fishfarm functioning again, and at the same time make it accessible to the University of Venice to use as an instructional lab. The team has decided that this may be used to our advantage in attempting to create a waterway route through Sant'Erasmo. Both our planned waterway routes pass through one of the outer canals that make up the large fishfarm. If work is already planned for this fishfarm it may cut the cost of our routes because the canals will already be widened and dredged. Also, while construction is taking place at the fishfarm it will be easier simply keep working on the other canals on the island than to have to start a fresh operation. This may help to convince government officials to complete our proposed recreational waterway routes.

7 CONCLUSIONS

Sant'Erasmo has been a nurturing "mother" to Venice for centuries; providing protection at one time from the harms outside of the lagoon as a lido with her fortifications, nourishment for its people through the rich vegetables grown on her farm fields, and most of all, and more recently, a peaceful escape from the twelve million tourists, crowded alleys, and noisy canals that Venetian residents have watched progress each year. Sant'Erasmo is now a fading secret told by the older generations as the place that they went to the beach as a child or perhaps, as the safe and friendly home where they raised their children. Currently, residents there have slowly been moving away, farmers have permanently retired their plows, developers are targeting the abandoned fields that are adding up each year, and landscape is on the verge of a great change. This change will possibly revitalize the population, but at the same time, replace the landscape that the few inhabitants and visitors have grown to love.

The purpose of this project was to help safeguard the peaceful landscape of Sant'Erasmo as well as protect the quality and way of life of its current residents as well as future ones. To begin the quest for preservation, the team first completed an inventory of the existing structures on the island, which led to the creation of an architectural database that organized past data from the *VPRG* as well as the approximate added 75% of the structures on the island that were missing from that catalogue. This database then aided in establishing common typologies found on the island for use in future renovation and building construction. This database will serve as a tool for updating future structures of the island, act as a comparison to the structures found on Sant'Erasmo in years to come, and provide information that will ideally aid in sustaining the appearance of the built landscape on the island.

In addition, an evaluation of field use was completed which detailed whether or not a field was being used or was abandoned, as well as the agricultural use. Each field on the island was placed in a GIS map layer for analysis as well as updating in the future. In doing so, large parcels of land were identified that were considered ideal land for rental and a proposal for a farmland rental plan of cash-rental leasing was created. This plan will ideally be implemented by the suggested committee in order to promote sustainable development for the natural landscape of the island by utilizing the land efficiently so that it does not go to waste or be built upon. Maintaining the open space of Sant'Erasmo is essential in preserving the look of the island as well as allowing the resources found there to be available to future Venetians.

Lastly, ways to utilize the waterways were investigated in order to create an alternative economic source on the island through ecotourism. Two possible recreational waterway routes were identified and evaluated for feasibility. It was concluded that while one is more expensive and ideal because it is a direct route through the island, the second would be more feasible due to capital investments needed to begin a project such as digging up the blocked off canals and other construction work. By creating this recreational

waterway route, the natural landscape will be preserved because if unused, developers could possibly fill these waterways in and build upon the rich fertile land. Not only is it important to use the natural landscape for the purpose of preserving it, but with this recreational route, it will be also providing an alternative income to Sant'Erasmo through attracting people to kayak or canoe there.

In investigating these three components; architecture, agriculture, and waterways, the team was able to provide tools and suggest methods that will be helpful in the future to discourage uncontrolled growth. These suggestions will allow the landscape to change gradually while keeping more attention on preservation and utilization of the land rather than development. Whether it is the charming residents, quaint cottages, or kilometers of peaceful countryside that create a welcoming atmosphere on this island, one thing can be certain: that Sant'Erasmo is meant to be treasured and appreciated, but especially preserved for the future generations who have yet to discover the beauty and splendor of the Garden of Venice.

8 RECOMMENDATIONS

The value of this project will be influenced by the future use of the information gathered and the tools for data collection that we have made available. Due to time constraints, weather or seasonal limitations, or other factors that may have governed what was completed, there are suggestions for the continuing of the project as well as recommendations as to how our completed data should be used and evaluated.

8.1 Preservation of the Built Landscape

The building catalogue of Sant'Erasmo will play a great role in the future of the built landscape. Now that each of the buildings has been photographed, there is a testimony to the state of preservation of the island. Existing buildings can be compared to their previous status when maintenance or improvements are made, upon based on the catalogue. Future buildings can be compared to the existing buildings on the islands and modeled after those already on the island based on scale, shape, color, and building elements.

Future expansion of the catalogue should include photographic documentation during winter months, as vegetation was the most common problem in taking clear pictures of building faces. It would also be ideal for the photographer(s) to be able to communicate with residents so as to learn more about the history of their buildings, which can be added to the database. Having photographers that can fluently speak Italian may also be helpful in alleviating the fears of the residents whose houses are being photographed. Keeping the database current is essential to preserving the built landscape on the island, which in turn, is important for maintaining communal pride in built landscape.

As the database is continually updated over the years, it will become increasingly important to check for any variations in building styles. New typologies or modifications to the current typologies that will undoubtedly arise should be taken note of in the database. This way it can be decided by Venetian architects whether or not these new typologies are suitable for the island of Sant'Erasmo. It is also feasible to expand the database to the island of Vignole. Although data was not collect for that island during our project, the same VPRG appendix that contained information on Sant'Erasmo also contained information on Vignole. Both islands have the same general building types and typologies so adding Vignole to the database would simply be a matter of data collection and entry.

8.2 Preservation of the Rural Landscape

Although the land use GIS map layer constructed by the project team will allow a new understanding of farming on the island of Sant'Erasmo, there is still much to be done. Continuations of the project as well as recommendations for future use of the products of this will be necessary to carry on the quest for the ongoing process of landscape preservation.

8.2.1 Suggestions for the Preservation of the Garden of Venice Committee

The key to the farming proposal that is suggested in this project will rely primarily on the Preservation of the Garden of Venice Committee. It will be beneficial to utilize our information to compare and track future land uses. By updating the field status layer, the committee can thereby locate the plots of land which have been abandoned the longest and find ways to make renting that land desirable to the owner of the property. Reevaluating the GIS map layer every three years will allow the committee to keep track of abandoned land which can then be with interested farmers through the application process which has been outlined. Interviews with the farmers will also be helpful in determining concerns about renting, how to alleviate those concerns, and their opinions on the future of rental on the island.

8.2.2 Future Research

In addition to work that the project team did, there are certain pieces of information that would have proved helpful but were beyond the limits of the two month project duration. The first is to perform data collection over time. A two month period is a short amount of time when compared to the entire growing season of crops on the island. To gain a better understanding of land use, a year long evaluation would demonstrate a more thorough analysis and help determine leasing procedures such as duration of the lease (due to the time it takes for crops to generate) as well as what the percentages are for particular crops grown. In this case, artichokes were the primary crop grown, but in earlier months, another crop may have been. To have a complete analysis and data set, it would be in the best interest of future researchers to evaluate the land use over an extended period of time. Another beneficial undertaking would be to become familiar with the crops grown such as the amount of time it takes for certain crops to grow and also to identify which particular crops are being grown when doing the visual inventory. Having a better understanding of the best crops to grow on the island will be helpful when advertising to potential tenant farmers.

8.3 Utilization of the Waterways

The recreational waterway route suggested will provide valuable information about how to create an alternative source of income through ecotourism. Although the areas needing to be worked on and navigable areas are outlined on the waterway route, there still could be much more done in this section of our project to put our proposal into action or further the research that we have completed.

By using the GIS layers the team created in conjunction with the information on depths provided by *all'Urbanistica* a more detailed map of the waterways in Sant'Erasmo can be created. The team accomplished this for a small section of the island the waterways affected by the two recreational routes. This could be continued for the entire island, which would facilitate the extraction of information regarding which canals need to be dredged or widened and cost estimates such as the team created for this project as well as other useful information. In addition to this, an investigation of waterway contamination could be done with a

chemical. These projects could link the abandoned farmland section and waterways section together to get a detailed look at the interactions of these and make it possible for farmland next to the waterways to be reutilized. This further research would continue our efforts in the search for sustainable development in the Garden of Venice.

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http://www.agr.gov.sk.ca/DOCS/Econ_Farm_Man/Business/flxls2.asp?firstPick=Economics%20and%20Farm%20Management&secondPick=Business%20Arrangements&pick=&child=1 November 1995.

Frank, Alliette. "Conservationalists Focus on Population Growth." National Geographic News. 17 April 2001. http://news.nationalgeographic.com/news/2001/04/0417_wlpopulation.html Accessed on 18 March 2003.

Friedmann, John. Regional Development Policy: A Case Study of Venezuela. Cambridge, MA and London, England: The M.I.T. Press, 1966.

Horst, Leslie. Harkness, Sarah P. Ed. Sustainable Design: For Two Maine Islands. Boston: Boston Architectural Center, 1985.

New England Land-Link: Application for Farmers Looking for Land.
http://www.smallfarm.org/nell/lookerform.html. Accessed on 11 June 2003.

New England Land-Link: Application for Owners Looking to Rent Land. http://www.smallfarm.org/nell/ownerform.html. Accessed on 11 June 2003.

Palaces of Venice, WPI IQP, Aldebaran Kari Fletcher, Andrew George Halloran, Reem Mushtaq Malik, and Kevin H Rohleder. July 2002.

Pilla, Giorgio. Personal Interview. 4,5 June 2003, 17,18,22 July 2003

Sant'Erasmo: The Green Island of Venice. http://www.latoazzurro.it/english/island.htm Accessed 27 February 2003.

Sargent, Frederic O. Rural Environmental Planning. University of Vermont, 1976.

Silberstein, Jane. Maser, Chris. Land-Use Planning for Sustainable Development. London: Lewis Publishers, 2000.

Swanson, Bert E. Cohen, Richard A. Swanson, Edith P. Small Towns and Small Town Owners: A Framework for Survival and Growth. London: Sage Publications, 1979.

10 APPENDICES

10.1 Appendix A: Annotated Bibliography

Brower, David J. Managing Development in Small Towns. Washington, D.C: The American Planning Association,1984.

This book discusses the land acquisition that could possibly take place when a region is being developed (what we are trying to control), developmental regulation techniques of agricultural zones, as well as several other potentially useful topics in developing non urban areas.

Daly, Herman E. Beyond Growth. Boston, MA: Becon Press, 1996

Some topics in this book may be a little too broad to be applied to Sant'Erasmo and Vignole; *Beyond Growth* is more concerned with sustainable development on a large scale, but the some of the basic information will be very relevant.

Friedmann, John. Regional Development Policy: A Case Study of Venezuela. Cambridge, MA and London, England: The M.I.T. Press, 1966.

Although this publication did have useful general information on basic regional development processes with a specific case study, it will not be very useful for the project on Sant'Erasmo because it describes redevelopment more in terms of economic development, than in historical preservation. However, it did describe the planning and analysis of a successful project.

Giaoutzi, Maria. Nijkamp, Peter. Decision Support Models for Regional Sustainable Development. England: Avebury Ashgate Publishing, 1993.

This book is on applications of geographic information systems and evaluation models for the Greek Sporades Islands. This will be very useful because it discusses not only sustainability in development of a group of islands that are in the same basic area of the world that Sant'Erasmo is, but it also goes into great detail on the research and methodology of this specific case study. It identifies the problems that the islands face, what needs to be done, and how the research team implements these

methods. It does have some information that is not as useful such as tourism multipliers and economic evaluations, but overall, the book has useful information on fishing, landscape, and planning, as well as charts, that will be helpful in our investigation.

Horst, Leslie. Harkness, Sarah P. Ed. Sustainable Design: For Two Maine Islands. Boston: Boston Architectural Center, 1985.

Not only is this book an excellent source, but it shows the process and planning done by a research team made up of environmental engineers, architects, physicists, biologists, and others on the two Maine islands of Vinalhaven and Peaks. It introduces sustainability and the significance of historical, cultural, and biological aspects of environments. There are useful mapping methods the team used during the examination of these two islands. Furthermore, recommendations were made which will be useful to the Sant'Erasmo Project in regards to set up and utilization of our techniques.

Lynch, Kevin. Managing a Sense of Region. Cambridge, MA and London, England: The M.I.T. Press, 1976.

Although this publication is aimed more towards urban planning, it discusses several important aspects of how human reactions should influence developmental planning. Also, it stresses the importance of smells, sounds, and the feeling of a particular environment in the development of the land. In addition, there is a helpful section on conserving local history, which may prove useful in maintaining the building architecture on Sant'Erasmo.

M. C. Treu, M. Magoni, F. Steiner and D. Palazzo, *Sustainable landscape planning for Cremona, Italy*, Landscape and Urban Planning, Volume 47, Issues 1-2, 20 February 2000, Pages 79-98. (http://www.sciencedirect.com/science/article/B6V91-3YDGK3N-7/2/6067e35d28960bf5c87a5c73745494d7)

This gives some great information on the history of urban planning in Italy, and discusses some important laws that may prove important. The book describes the importance of good planning and what factors should be considered. This article also lays out the goals of planning in Italy, and gives a lot of information about a much grander plan, but with similar goals of preserving the essence of an area.

Maine State Planning Office. Comprehensive Planning: A Manual For Maine's Communities.

This was very useful in explaining methods of land planning as well as creating policies for controlling growth of small towns. It discussed sustainable development and applying it to regions within Maine, which are very like Sant'Erasmo in regards to farming and agriculture. It also had a detailed guide in what to include in a comprehensive plan for land use when completing one for rural communities such as what sorts of maps to include, zoning, and other important features.

National Parks Service. http://www.cr.nps.gov/habshaer/habs/ (Nov. 2002)

This website may be a useful source for our project. It covers Historic American Buildings, links to documentation components, standards and guidelines, and contact information for the head executives of the organization. If the website does not prove valuable in our research, the contact information will be.

Northern Maine Development Corporation. A Comprehensive Plan for New Sweden, Maine. May 2003

New Sweden, Maine is like Sant'Erasmo; a small farming community of approximately 700 to 800 people that is going through a population decline as well as farming being a opportunity of the past. This guide from the Northern Maine Development Corporation served in planning our sections on land use, how to reutilize some of the land, gave us important information about zoning, and also showed strategies of doing an analysis of sustainable development in a town such as this.

Organic Farming in the Venetian Lagoon, WPI IQP, Marco Andreoni, Orhan Arsel, and Samir Sood. July 1990.

This source offers valuable information on organic farming into the Veneto region, using the island of Sant'Erasmo. It presents background on organic farming in general and on the agriculture of the Veneto region. It contains interviews and goes into the history of the present social and economic profile of Sant'Erasmo and its agricultural aspects.

Palaces of Venice, WPI IQP, Aldebaran Kari Fletcher, Andrew George Halloran, Reem Mushtaq Malik, and Kevin H Rohleder. July 2002.

This source describes the data basing of the palaces of Venice. It is useful because it describes the agencies which deal with maintaining historical integrity that have to be contacted when making a modification of a palace. This may be beneficial in knowing who our project team is going to have

to deal with when giving recommendations for future construction permits as well as see some of the criteria that is presently enforced for the palaces.

Peck, Sheila. Planning for Biodiversity: Issues and Examples. Washington, D.C: Island Press, 1998.

This book discusses the long and short term changes of developing an area, how communities and landscapes change, specific case studies, models for reserve design, as well as monitoring and adaptive management. Although this book mentions wildlife and fish conservation, which could possibly help with our waterways segment of the project and understanding the affects of land development on them, this has to do mostly with ecosystems and animals, rather than preservation of an island's architecture, history, and landscape in general.
Also, it mentions specific people to contact for more information of preservation of the environment. However, these names were people in the United States and were employed by the National Forestry Service and other companies that would not be very useful in the project.

Portalie Lunette: Venice's Artistic Entrances, WPI IQP, Erica Lisa Bartos, Rebecca Lee Croteau, DJ Lemmo, and Katrina L Solamon. July 2002.

This source is a useful way to see how other students catalogued the different doorway art in hopes of historical preservation. Although this is a different project, the methodology of photo documentation and cataloguing techniques may prove to be helpful in our project, especially since the main goals for the projects are very similar.

Redevelopment and Historic Preservation in Boston, WPI IQP, Corey Matthew Brodeur, Adam Jeffrey Hathaway, Michael Stephen Newcomb, and James Michael White. July 2002.

The basic idea of this project was to develop a property information database and GIS map layers for the Boston Landmarks Commission and the Boston Redevelopment Authority. This will prove useful because the goal of this project was to preserve the historic sites while allowing room for growth, which follows the aim of the Sant'Erasmo project. The data collection methodology as well as the cataloguing methods may prove beneficial to our project team when examining the buildings on the islands and finding ways to distinguish them.

Safeguarding the Churches of Venice Italy, WPI IQP, Brian Christopher Donnelly, Brynn Gemma Hart, Matthew Justin Pilotte, and Thomas Christopher, Scherpa. July 1999.

This project's goal was to contribute to the preservation of the churches of Venice by developing a catalogue. This source will prove useful in the examination of the cataloguing methods of the churches as well as developing a methodology of procedures to undertake while in Sant'Erasmo.

Sargent, Frederic O. Rural Environmental Planning. University of Vermont, 1976.

This source is a specific case study in the development of rural Vermont towns and describes the methods for protection of the environment. Although this text may be useful in identifying important aspects that will need to be investigated in the Sant'Erasmo and Vignole, it does not describe architecture or maintaining historical features of a specific area. Much of this has to do with the economy and specific Vermont facets.

Schaenman, Philip S. Muller, Thomas. Measuring Impacts of Land Development: An Initial Approach. Washington, D.C: The Urban Institute, 1974.

By measuring the impacts of a particular area with the great detail this book exhibits, we may be able to evaluate the procedures of our data collection better as well as assess the outcomes of each part of the project we undertake. Putting implications in perspective, this text identifies the people, environmental issues, and groups that will possibly be affected by the undertaking of a land development plan. It elaborates on the presentation of data, the analysis of data collection approaches, the economy, over-crowdedness, and the environment (water pollution, air quality, etc.).

Schaenman, Philip S. Using an Impact Measurement System to Evaluate Land Development. Washington, D.C: The Urban Institute, 1974.

This is a continuation of the previous book mentioned. It is an analysis of the procedures of data collection and recommendations, outlines advantages and disadvantages of using a system of measures for evaluating proposed land development, suggested measures for evaluation. It also identifies specific land development projects that have been made and has samples of the reports produced by the researchers.

Silberstein, Jane. Maser, Chris. Land-Use Planning for Sustainable Development. London: Lewis Publishers, 2000.

The author of this text reviews the foundations of land use practices today while discussing historical, economic, ecological, and societal perspectives. According to the author, "this is the first book to incorporate land-use planning with sustainability." While its main arguments are in discussing America's land-practices, this will prove helpful in the recognition of constraints, maintaining the agricultural crops and forestry, and stages in developing a comprehensive plan for sustainability.

Swanson, Bert E. Cohen, Richard A. Swanson, Edith P. Small Towns and Small Town Owners: A Framework for Survival and Growth. London: Sage Publications, 1979.

This book establishes the concern for small communities and has a relatively small, but helpful section in developmental considerations and community analysis. The remainder of the text discusses the social aspects of small communities (values of small towns, etc.) and reasons why the controlling of development is a goal of many regions around the world.

Alexander, Christopher. Ishikawa, Sara. Silverstein, Murray. A Pattern Language: Towns, Buildings, Construction. New York: Oxford University Press, 1977.

This source discusses many aspects of architecture and land development, identifying water access, construction designs and aspects of several rooms within a structure, columns, roofs, and other architectural designs. This book will be moderately useful in aiding in the classification of building designs.

Warner, Raynor M. Groff, Sibyl McCormac. Warner, Ranne P. New Profits from Old Buildings: Private Enterprises Approaches to Making Preservation Pay. New York: McGraw-Hill Book Company, 1978.

This book outlines the importance of historical preservation in buildings and how this could be profitable for the economy and private businesses. It discusses the benefits and problems of preservation and lists innumerable examples of real-life edifices all over the world that have been restored, ultimately for the revitalization of the communities where they exist. This will make the project team more aware of the obstacles involved in preservation as well as specific advantages associated with the maintenance of historical buildings and landmarks.

Salmon-Safe, Inc. *Salmon-Safe Farm Management Certification Program* http://www.salmonsafe.org/salmonsafe.pdf. 2002.

The entire Salmon-Safe website has valuable information on ecologically safe farming practices and the effect agriculture and aquaculture have on fish. This particular article goes into great detail on field assessments of farming operations.

Waterhouse, James. Water Engineering for Agriculture. London: Batsford Academic and Educational Ltd, 1982.

This source addresses the water requirements for several agricultural operations and water quality considerations. It covers aspects of legal, management, and financial significance, changes in ecology with development, and methods in data collection and manipulation. Although these areas may be helpful to the island project, much of this book has to do with hydraulics and other irrelevant features of water study.

Burns, John A. Recording Historic Structures. Washington, D.C: The American Institute of Architects Press, 1989.

This is an extremely helpful source. It gives an overview of what architectural documentation is, planning surveys, historical information and the methodology of research. Principals of architectural photography (which will be carried out in Sant'Erasmo and Vignole), case studies, and an introduction to measured drawings are discussed as well. The vast majority of the information in this book is relevant to the project on the two islands.

Williams Jr., Norman. Kellogg, Edmund H. Gilbert, Frank B. Readings in Historic Preservation: Why? What? How? New Brunswick, NJ: Rutgers University, Center for Urban Policy Research, 1983.

This book describes the preservation of European monuments, and landmarks and gives a general introduction to what historical preservation is (benefits, reconstruction, etc.). The book also describes the restoration of Florence, Italy and possible threats to specific locations, what to preserve, and criteria on conformity with architectural styles (which the project is strongly based on with the making of the model for future construction permits). It also discusses the restoration of buildings in Venice and UNESCO, as well as preservation through area planning, and the possible effects of historic preservation to the economy.

Shahab, Fazal. *The need for preserving farmland: A case study from a predominantly agrarian economy (India)*, Landscape and Urban Planning, Volume 55, Issue 1, 15 June 2001, Pages 1-13. http://www.sciencedirect.com/science/article/B6V91-4378T98-1/2/689540c2554b8eb9d8521648fff33fe2)

This article brought to some of the reasons for preserving farmland and the difficulties in doing so, by a case study in India over a 10-year period. An increasing population in an urban area will cause an outward expansion, and can mean the loss of farmland. Often farms and buildings compete for the same land qualities. This is somewhat useful for understanding the process of farmland restoration and preservation.

Sant'Erasmo: The Green Island of Venice. http://www.latoazzurro.it/english/island.htm

This was helpful in completing the background. It gave valuable information on the forming of Sant'Erasmo and the previous and current uses.

Farm Lease Agreement. http://muextension.missouri.edu/explore/agguides/agecon/g00426.htm April 15, 1999.

This was very helpful because it outlined the important features that a lease should include. It was useful in developing the lease as well as the type of lease that was chosen.

Cash Farm Lease with Flexible Provisions. http://www.public.iastate.edu/~mwps_dis/mwps_web/pdf_files/ncr_76.pdf 1997.

This served as a guideline for the lease we produced for Sant'Erasmo and the Cash-Leasing farmland rental that was proposed. It identified the key features to include in the lease, samples of payment, termination, etc.

Flexible Cash Lease Agreement. http://www.agr.gov.sk.ca/DOCS/Econ_Farm_Man/Business/flxls2.asp?firstPick=Economics%20and%20Farm%20Management&secondPick=Business%20Arrangements&pick=&child=1 November 1995.

Like the previous cash farm lease, this too played an important role in constructing our lease by serving as a model.

http://www.smallfarm.org/nell/lookerform.html

This is an example application for a farmer that is looking to rent land. It served as a model for the application that we made by identifying important aspects to include in order for the application to be useful in matching farm plots to interested farmers.

http://www.smallfarm.org/nell/ownerform.html

This is an example application for an owner that is looking to rent out land. It served as a model for the application that we made and included important features, similar to the previous application that was used for matching farmers to farm plots. With this specific application, it gave the features that would allow more organization in the land rental matching by including how long they are looking to rent their land for and other important elements like that.

10.2 Appendix B: Example Field Collection Sheets - Edifici

Structure Number: _____

Date: _____

Photographer: _____

Camera: _____

Recorder: _____

Feature	Picture #(s)	Face (if Applicable)
Face		North
Face		West
Face		South
Face		East
Chimney(s)		
Window(s)		
Gutter		
Door(s)		
Aesthetics		
Incidental Uses		

Color: _____

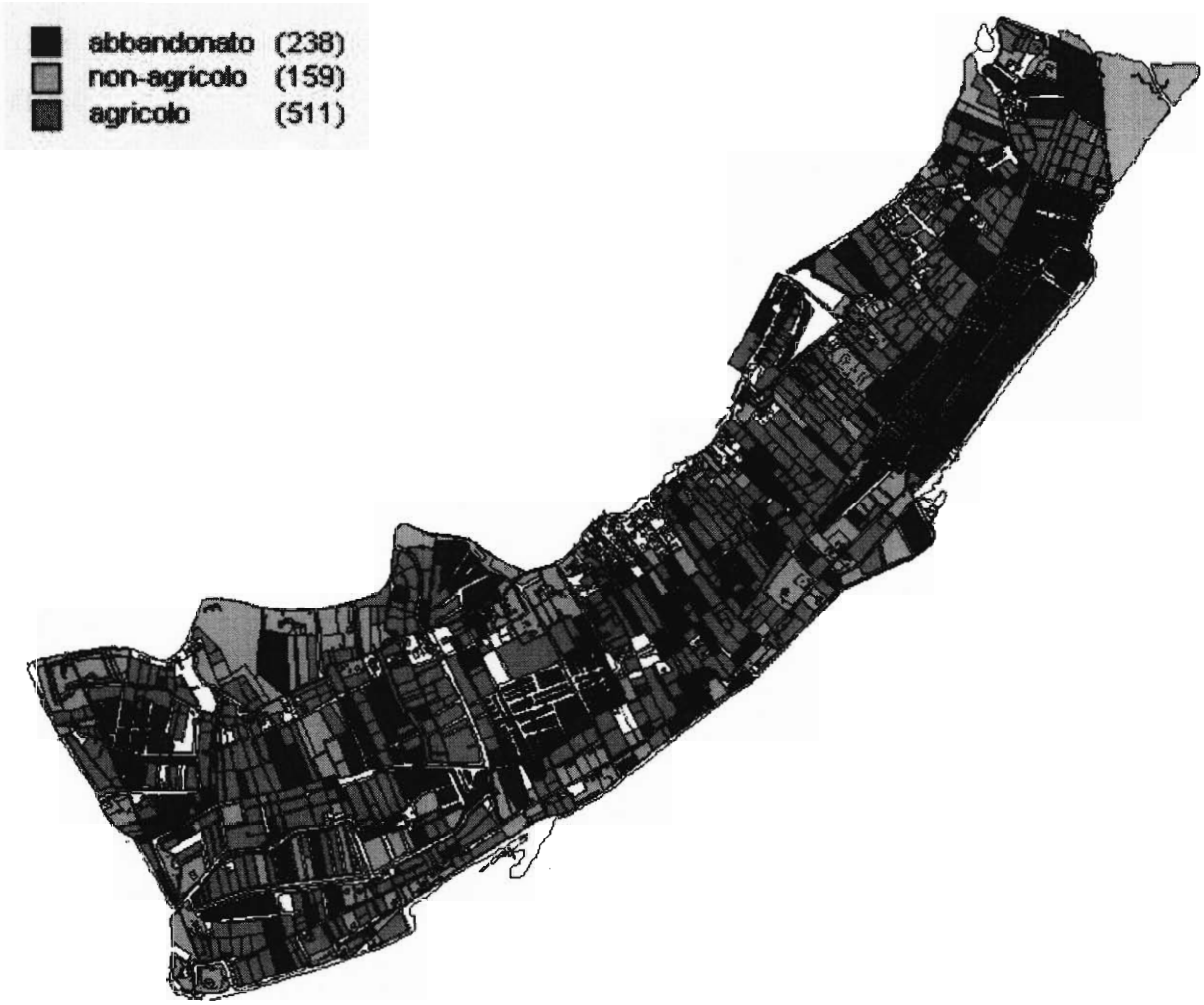
Material: _____

Address: _____

Notes:

10.3 Appendix C: GIS Map Layers and Thematic Maps

This is a Map Layer showing the farm field boundaries on the island. It was used to construct the thematic maps shown below which outline the status of the field and a breakdown of that status into more specific usage.



This is a thematic map showing the general field usage on the island. It includes the abandoned land in red, the land that was used for agriculture in green, and empty lots or forested area shown in gray.

This thematic Map shows the breakdown of field usage. It detailed what was grown in a particular area such a vineyard and identifies whether or not a field was abandoned.

This is a Map Layer showing the existing waterways on the island. It was used in the creation of the proposed routes.

This is a Map showing the proposed route A. It was made using the original waterways Map Layer.

This is a Map Layer showing the proposed route B. It was made using the original waterways Map Layer.

10.4 Appendix D: Cash-Farm Leasing Application

Sant'Erasmo Cash Farm Lease

With Flexible Provisions Drafted July 2003

This guideline for a Cash-rental agreement for the farmland of Sant'Erasmo was drafted by students from the Worcester Polytechnic Institute in conjunction with the completion of an Interactive Qualifying Project on Field-Use and Sustainability of the island. It is modeled after Iowa State University (United States of America) Midwest Plan Service Form for the rental of farmland and is not to be mistaken for a legalized document. Instead, it shall be used as a suggestion for the most beneficial, lucrative, and hassle-free future leasing of property in Sant'Erasmo under the Preservation of the Garden of Venice Committee Members.

This lease entered into the _____ day of _____, 20___, between

_____, landlord of _____

address

_____

hereafter known as "the landlord," and

_____, tenant of _____

address

_____

hereafter known as "the tenant."

I. Property Description

The landlord hereby leases to the tenant, to occupy and use for agriculture and related purposes, the following described property:

_____

_____

consisting of approximately _____ acres in the island of Sant'Erasmo with all improvements thereon except as follows:

_____

_____

II. General Terms of Lease

a. Time Period Covered. The provisions of this agreement shall be in effect for 3 Years, commencing on the _____ day of _____, 20____. This lease will continue for that three years and at the 3rd year, the tenant has the option of continuing for three more years. At the 6th year, though, the landlord has the option of not continuing to lease his or her land to the tenant. If he or she does choose to lease the land out, he or she may do so until notice of termination from the tenant. In order for the lease to be renewed after the three year period, it must be reviewed 30 days prior to the termination of the lease.

b. Review of Lease. A written request is required for general review of the lease or for consideration of proposed changes by either party, at least 15 days prior to the final date for giving notice to terminate the lease as specified in II-A.

c. Alterations and Amendments. Alterations and Amendments to this lease shall be in writing and shall be signed by both the landlord and tenant

d. No partnership intended. It is particularly understood and agreed that this lease shall not be deemed to be, nor intended to give rise to, a partnership relation.

e. Transfer of Property. If the landlord should sell or otherwise transfer title to the farm, such action will be done subject to the provisions of this lease.

f. **Right of Entry.** The landlord, as well as agents and employees of the landlord, reserve the right to enter the farm at any reasonable time to (a) consult with the tenant; (b) make repairs, improvements, and inspections; and (c) (after termination of the lease is given) do tilling, seeding, fertilizing, and any other customary seasonal work, none of which is to interfere with the tenant in carrying out regular operations.

g. Subleasing. The landlord does not want to convey to the tenant the right to lease or sublet any part of the farm or to assign the lease to any person or persons whomsoever.

h. Binding on Heirs. The provisions of this lease shall be binding upon the heirs, executors, administrators, and successors of both landlord and tenant in like manner as upon the original parties, except as provided by mutual written agreement.

i. Additional Agreements:

_____

_____

_____

_____

III. Land Use

a. General Provisions. The land described in section I will be used in approximately the following manner. If it is impractical in any time period to follow such a land-use plan, appropriate adjustments will be made by mutual written agreement between the parties.

i. Cropland

Type of Crop: _____ _____ Acres

_____ _____ Acres

_____ _____ Acres

ii. Other (Pasture, Use of Sheds, etc) _____

_____

_____

b. Restrictions.

Use of Chemicals and Pesticides:

_____

_____

_____

_____

Other Restrictions:_____

_____

_____

_____

c. Government Programs. The extent of participation in government programs will be discussed and decided on an annual basis. The course of action agreed upon should be placed in writing and be signed by both parties. A copy of the course of action so agreed upon shall be made available to each party.

IV. Amount and Payment of Rent

The annual cash rent shall be paid according to an profession appraiser's value estimate of the land. 6% of that estimate will be the yearly rental of the property and paid in a monthly payment plan. It will be paid as follows:

$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)
$_____ on or before _____ day of _____ (month)

Rental Adjustments. Additional rental payment agreements: _____

_____

_____

_____

V. Operation and Maintenance.

In order to operate this farm efficiently and to maintain it in a high state of productivity, the parties agree as follows:

a. The Tenant Agrees:

i. General Maintenance. To provide the labor necessary to maintain the farm and its improvements during the rental period in as good condition as it was at the beginning.

Normal wear and depreciation and damage from causes beyond the tenant's control are excepted.

ii. **Land Use.** Not to (a) Plow pasture or meadowland. (b) cut live trees. (c) pasture new seedlings of legumes and grasses in the year they are seeded without consent of the landlord.

iii. **Insurance.** Not to house automobiles, trucks, or tractors in barns, or otherwise violate restrictions in the landlord's insurance policies without written consent from the landlord. Restrictions to be observed are as follows: _____

_____

_____

_____

iv. **Noxious Weeds.** To use diligence to prevent noxious weeds from going to seed on the farm. Treatment of the noxious weed infestation and cost thereof shall be handled by the landlord if notified by the tenant with at least 15 days notice.

v. **Addition of Improvements.** Not to (a) erect or permit to be erected on the farm any nonremovable structure or building, (b) incur any expense to the landlord for such purposes, or (c) add electrical wiring, plumbing, or heating to any building without written of the landlord.

vi. **Conservation.** Control soil erosion according to an approved conservation plan; keep in good repair all of the terraces, open ditches, inlets and outlets of tile drains; preserve all established watercourses or ditches including grassed waterways; and refrain from any operation or practice that will injure such structures.

vii. **Damage.** When leaving the farm, to pay the landlord reasonable compensation for any damages to the farm for which the tenant is responsible. Any decrease in value due to ordinary wear and depreciation or damages outside the control of the tenant are excepted.

viii. **Costs of Operation.** To pay all costs of operation except those specifically referred to in Sections V-A-4 and V-B.

ix. **Repairs.** Not to buy materials for maintenance and repairs in an amount in excess of $_____ within a single year without written consent of the landlord.

b. **The Landlord Agrees:**

i. **Loss Replacement.** To replace or repair as promptly as possible the dwelling of any other building or equipment regularly used by the tenant that may be destroyed or damaged by fire, flood, or other cause beyond the control of the tenant or to make rental adjustments in lieu of replacements.

ii. **Materials for Repair.** To furnish all material needed for normal maintenance and repairs.

iii. **Skilled Labor.** To furnish any skilled labor tasks that the tenant is unable to perform satisfactorily. Additional agreements regarding materials and labor are:

_____

_____

_____

iv. **Reimbursement.** To pay for materials purchased by the tenant for purposes of repair and maintenance in an amount not to exceed $_____ in any one year, except otherwise agreed upon. Reimbursement shall only be made within _____ days after the tenant submits the bill.

v. **Removable Improvements.** Let the tenant make minor improvements of a temporary or removable nature, which do not mar the condition or appearance of the farm, at the tenant's expense. The landlord further agrees to let the tenant remove such improvements even though they are legally fixtures at any time this lease is in effect or

within _____ days thereafter, provided the tenant leaves in good condition that part of the farm from which such improvements are removed. The tenant shall have no right to compensation for improvements that are not removed except as mutually agreed.

vi. **Compensation for Crop Expenses.** To reimburse the tenant at the termination of this lease for field work done and for other crop costs incurred for crops to be harvested during the following year. Unless otherwise agreed, current custom rates for the operations involved will be used as a basis of settlement.

c. **Both Agree:**

i. **Not to Obligate Other Party.** Neither party hereto shall pledge the credit of the other party hereto for any purpose whatsoever without the consent of the other party. Neither party shall be responsible for debts or liabilities incurred, or for damages caused by the other party.

ii. **Capital Improvements.** Costs of establishing hay or pasture seedings, new conservation structures, improvements (except as provided in section V-B-5), or of applying lime and other long-lived fertilizers shall be divided between landlord and tenant as follows:

Type of Improvement	Date of Completion	Cost

The tenant will be reimbursed by the landlord wither when the improvement is completed and proof of purchases has been given to the owner.

VI. Arbitration of Differences

Any differences between the parties as to their several rights or obligations under this lease that are not settled by mutual agreement after thorough discussion, shall be submitted for arbitration to the Preservation of the Garden of Venice Committee. The committee's decision shall be accepted by both parties.

Executed in duplicate on the date first above written:

_____ _____

tenant landlord

Country of Italy, island of Sant'Erasmo, Venetian Lagoon, on this day of _____, A.D. 20___, before me the undersigned, a Notary Public in said country, personally appeared _____, _____, and _____ to me known to be the identical personas named in and who executed the foregoing instrument, and acknowledged that they executed the same as their voluntary act and deed.

_____

Notary Public

10.5 Appendix E: Cash-Lease Farmland Rental Renewal Form

Sant'Erasmo Cash Farm Lease

With Flexible Provisions (Renewal Form) Drafted July 2003

This guideline for the renewal of a Cash-rental agreement for the farmland of Sant'Erasmo was drafted by students from the Worcester Polytechnic Institute in conjunction with the completion of an Interactive Qualifying Project on Field-Use and Sustainability of the island. It is modeled after Saskatchewan, Canada's Flexible Cash Lease Renewal Form for the rental of farmland for Agriculture, Food, and Rural Revitalization and is not to be mistaken for a legalized document. Instead, it shall be used as a suggestion for the most beneficial, lucrative, and hassle-free future leasing of property in Sant'Erasmo under the Preservation of the Garden of Venice Committee Members.

We, _____ of _____ and
(Landlord's Name) (Address)

_____ of _____
(Tenant's Name) (Address)

being parties to a cash land lease agreement for the term of _____ year from _____ day

of _____, 20____ to the _____ day of _____, 20_____
(Month) (Month)

on the following plot of land: _____

_____

do hereby extend the term of the said agreement for 3 Years from _____ day

of _____, 20____ to the _____ day of _____, 20_____.
(Month) (Month)

according to the terms and conditions outlined in the previous document unless specified differently, that is to say:

_____

I, _____, _____, do hereby accept this lease of the above described land, to be held by me as tenant, and subject to the conditions, restrictions, and covenants set forth.

In Witness Whereof the parties have set their hands and seals this _____ day of _____, 20___.

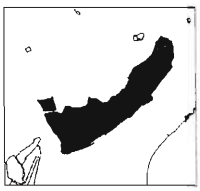
Signed, Sealed, and Delivered in the Presence of:

As to the Execution by the Landlord	(Signature of Landlord)

And in the Presence of:

As to the Execution by the tenant	(Signature of Tenant)

10.6 Appendix F: Application Form for Owner of Farm Rental Land



Sant'Erasmo Cash Land Lease Program

APPLICATION FOR FARMLAND OWNERS/MANAGERS

This guideline for the application to lease land through a Cash-rental agreement for the farmland of Sant'Erasmo was drafted by students from the Worcester Polytechnic Institute in conjunction with the completion of an Interactive Qualifying Project on Field-Use and Sustainability of the island. It is modeled after the New England (United States of America) LandLink Application Form and is not to be mistaken for a legalized document. Instead, it shall be used as a suggestion for the most beneficial, lucrative, and hassle-free future leasing of property in Sant'Erasmo under the Preservation of the Garden of Venice Committee Members.

Please contact us with any questions you may have about this application.
phone: (Phone Number of Head of Preservation of the Garden of Venice Committee)
email: (E-mail of Head of Preservation of the Garden of Venice Committee)

Legal Property Owner : _____

Contact Person (if different): _____

Address: _____

_____

Phone/Fax: _____ **Date:** _____

Email: _____

May we list your farm, without contact information, on the our database? ____ **yes** ____ **no**

1. Property location:

2. Describe property location (center of town, residential area, non-populated area, near tourist attraction, etc):

3. The property is composed of: _____ total acres.

4. Housing is available on the property: ____ no ____ yes; Please describe:

If no housing is available, please check appropriate box(es):

___Farmers can build permanent housing ___Farmers can place temporary housing, e.g., trailer

___Housing is available off the farm ___Other _____

5. Please give a brief description of the farm: facilities, resources, current uses, and potential uses.

6. Tenure interests (check all that apply):

____ Immediate Sale: Seeking farmer prepared to purchase this property.

____ Willing to consider owner financing.

____ Eventual Sale: Rental, lease, or farm manager arrangement that will lead to the eventual transfer of this property.

____ Rent: Short term arrangement (1-5 years).

____ Lease: Longer term arrangement (6-99 years).

____ Farm Manager: Long term management of farm operation. May include active involvement of owners.

____ Work-in: Gradual transfer of assets and management responsibilities following a successfully developed work relationship.

7. Would you be interested in negotiating your arrangement with beginning farmers? ___ yes ___ no

8. Is your property currently enrolled in a program which has purchased the development rights? ___ yes ___ no

9. If for sale: a) Please approximate the current value of the property described above. (optional)

b)Are you willing to explore creative ways to make your property more affordable (e.g. easements, gradual transfer, involvement of land trusts & other community partners, multiple farm operators)?

I/We understand that the Preservation of the Garden Venice Committee is limited to providing information. It cannot guarantee a successful farmland-farmer match and is released from responsibility for any loss, damage or injury that may occur as a result of inquiries or interview related to this search.

I/We understand that this application will be active for one year following the date of receipt, after which we will be invited to renew.

Applicant's signature: _____

Please return this questionnaire to:
(address of Preservation of Garden of Venice Committee)

10.7 Appendix G: Application for Farmer Seeking Farm Land

Sant'Erasmo Cash Land Lease Program

APPLICATION FOR FARMERS LOOKING FOR LAND

This guideline for the application to lease land through a Cash-rental agreement for the farmland of Sant'Erasmo was drafted by students from the Worcester Polytechnic Institute in conjunction with the completion of an Interactive Qualifying Project on Field-Use and Sustainability of the island. It is modeled after the New England (United States of America) LandLink Application Form and is not to be mistaken for a legalized document. Instead, it shall be used as a suggestion for the most beneficial, lucrative, and hassle-free future leasing of property in Sant'Erasmo under the Preservation of the Garden of Venice Committee Members.

Please contact us with any questions you may have about this application.
phone: (Phone Number of Head of Preservation of the Garden of Venice Committee)
email: (E-mail of Head of Preservation of the Garden of Venice Committee)

Name/Contact Person: _____

Address: _____

_____

Phone/Fax: _____ **Date:** _____

Email: _____

Please write listing # of Land Plots Interested in from database (Need to be created by Preservation of the Garden of Venice Committee using the numbering system created by the Project Group-using the corresponding Map Layer of Polar Coordinate System):_____

3. Please provide your preferred acreage range in your ideal farm property:

_____ total acres.

4. Do you require housing on the property? ___no ___yes; Please describe:

Please check appropriate box(es) if you would consider other housing options:

___Willing to build permanent housing ___Willing to place temporary housing, e.g., trailer
___Willing to find housing off the farm ___ Other _____

5. Please give a brief description of the farm you would like to find/develop.
Include facilities, resources, current uses, and potential uses, etc. Feel free to write on the back of this page.

6. Tenure interests (check all that apply):

_____ Immediate Sale: Prepared to purchase a property.
_____ Eventual Sale: Rental, lease, or farm manager arrangement that will lead to the eventual transfer of the property.
_____ Rent: Short term arrangement (1-5 years).
_____ Lease: Longer term arrangement (6-99 years).
_____ Farm Manager: Long term management of farm operation. May include active involvement of owners.
_____ Work-in: Gradual transfer of assets and/or business management responsibilities following a successfully developed work relationship.

Please CHECK ALL THAT APPLY for the next three questions:

7. Please rate your level of farming experience for the farm enterprise you would like to find or begin:
___ Have more than 3 years of experience
___ Have less than 3 years of experience
___ Have no experience.
___ I would like to explore a working/mentoring relationship with the current farm owner.

8. Considering the financing of your farm/farm business:
___ Have finances in order to purchase a farm.
___ Have some finances and/or would like to learn about alternative tenure and financing models.
___ Interested in more information about non-ownership tenure options.

9. Please estimate your time-frame to begin the farm transfer process:

___ Want to start as soon as possible.

___ Will be ready in 3 to 12 months.

___ Still forming a farm vision (12+months)

____ I am interested in being an active member of the Preservation of the Garden of Venice Committee.

I understand that this form will be active for one year following the date of application, after which I will be invited to renew.

Applicant's signature: _____ Date: _____

Please return this questionnaire to:

(address of Preservation of Garden of Venice Committee)