PHASE II COASTAL GEORGIA OSDS INSPECTION, COMPLIANCE, GEOLOCATION AND ANALYSIS
A GEORGIA EPD 319(H) FUNDED PROJECT

Ray Bodrey

AUTHORS: University of Georgia, Marine Extension Service, 715 Bay Street, Brunswick, Georgia 31520
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Abstract. The population in coastal Georgia is growing at a significant rate. Coastal cities have limited funding and time to upgrade their municipal treatment plant infrastructure to counter the rise in population. Therefore, on-site septic disposal systems (septic tank and drainfield systems) have and will continue to be heavily permitted. It is extremely important to geo-locate these systems to enable better public health planning. These systems have the potential to impair water quality greatly if not maintained, thus causing serious health concerns to both humans and wildlife.

Project partners consisting of the UGA Marine Extension Service, Georgia EPD, Southern Georgia Regional Commission (SGRC) and the Coastal Health District (8 coastal counties) have conducted a survey of geo-locating and inspecting on-site disposal systems in coastal Georgia. The data was then transferred to the WelSTROM (Well and Septic Tank Referencing and Online Mapping) GIS database. The WelSTROM GIS database allows you to browse, query and display private well and septic system locations within the state of Georgia.

Using WelSTROM, environmental health professionals are able to see current well and septic system installations in a spatial context along with other layers of information. The user can easily search and explore the details and performance of nearby systems as well as easily see decision-influencing factors about potential permits. Layers such as wetlands, groundwater recharge areas, property boundaries, rivers, impaired waterways, and protected areas are all on the map database. The project also produced maps, analysis and a pollution susceptibility index for each of the Coastal Health District counties.

Introduction

The population boom in coastal areas is increasing in magnitude. According to the U.S. Census Bureau in 2011, nearly 100 million people live along the U.S. coast on only 18% of the nation's land mass. The population has more than doubled since 1960 when 47 million people inhabited the coast line (Figure 1.1). Coastal populations are projected to steadily increase and coastal Georgia is not immune to this trend, as this area is one of the fastest growing in the state.

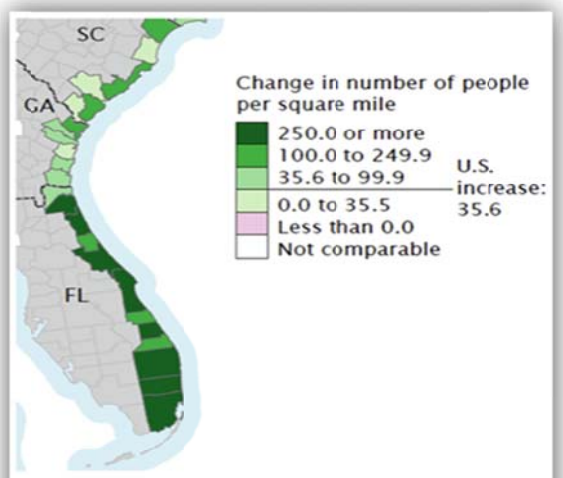

Figure 1.1 Change in population density for coastline counties 1960 to 2008. Courtesy of the U.S. Census Bureau

A major challenge for environmental health organizations is the issue of water pollution. Exponential growth in urban areas is changing the water quality throughout the world. The U.S. is in the forefront of this issue. With growth, comes the need to build. Continuing urban sprawl has put land disturbance issues in the forefront. These issues are brought on by population growth, erosion, sedimentation,

stormwater runoff and onsite-septic disposal system (OSDS) failure.

Most of Georgia's counties have limited public sewage treatment infrastructure and rely heavily on OSDS to handle human sewage production. Figure 1.2 displays the WelSTROM GIS database map of currently mapped OSDS densities in Coastal Georgia. Different colored location points are represented on the map to merely show when the data was collected and the funding source used for the field work.

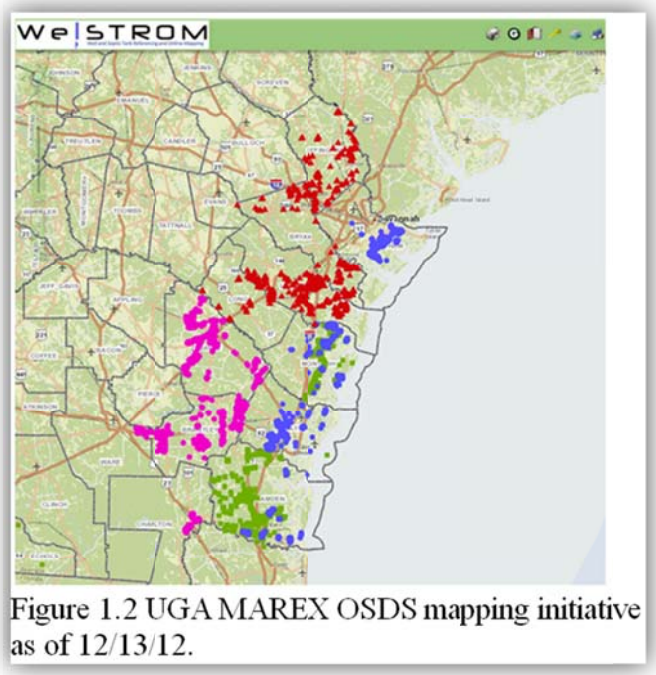

Figure 1.2 UGA MAREX OSDS mapping initiative as of 12/13/12.

OSDS can be a major threat to water quality, especially along coastal areas if not monitored and maintained. A major concern with densely permitted OSDS regions is the strain placed on natural soil remediation process to purify an excessive amount of wastewater before it comes in contact with surface water or groundwater (CSREES, 2004, p. 3). Fecal contamination of Georgia's coastal waters has periodically increased in recent years. From time to time, shellfish harvesting areas in coastal Georgia are closed due to fecal bacteria contamination from nonpoint source pollution (Georgia Department of Natural Resources, 1998, p. 67).

The threat of dysfunctional OSDS makes it very important to periodically inspect and prevent nonpoint source pollution, particularly in the areas of tidal wetlands, a highly productive biological nursery and ecosystem that is the predominant coastal boundary system. A procedure to adequately track and monitor OSDS is a major priority.

Methodology

The location of critical areas of existing OSDS and wells were recorded with a handheld Global Positioning System (GPS) unit to provide the geolocation within the proximity of marshlands or other waters of the state in the coastal region counties of Bryan, Camden, Chatham, Glynn, Effingham, Liberty, Long and McIntosh. Phase I of this project included Bryan, Effingham, Liberty and Long counties while Phase II included Camden, Chatham, Glynn and McIntosh counties. The points gathered were uploaded into the WelSTROM GIS database.

An agreement was forged between the state mandated Garrison Enterprises, Inc. permit database and WelSTROM. Now state health inspectors can edit permit data inside the WelSTROM map by simply logging into the secure portal and clicking on a point. The WelSTROM GIS database can be viewed by anyone, but only health department officials can view and edit permit data (http://www.sgwebmaps.com/welstrom/).

Results

The initiative has produced GIS maps and analysis of the OSDS and wells utilizing the SGRC's georeferenced WelSTROM GIS database which are all web accessible for better public health planning. The database provides a standardized method of recording all current and future OSDS installations for the eight counties of the Coastal Health

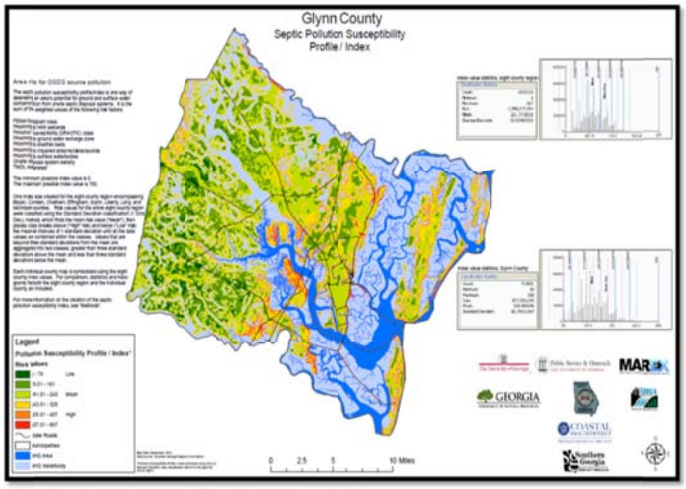

Figure 1.3 Glynn County Pollution Susceptibility Index.

District. A pollution susceptibility index for each of the coastal health district counties was also crated. Above in figure 1.3 is an example of the Glynn County Pollution Susceptibility Index.

Pollution Susceptibility Index

ESRI ArcGIS 10 was used for all GIS processes. ESRI Spatial Analyst extension was used for raster layer creation, reclassification, and addition. Potential OSDS location points from five sources were available to use in the study: "Phase I" GPSed points; "Phase II" GPSed points; Camden County "septic inventory" points geocoded by address or X, Y coordinates; McIntosh County "septic inventory" points geocoded by address or X, Y coordinates; and "Garrison" points geocoded by address or X, Y coordinates, January 2000 to July 11, 2012. A total of 11,744 OSDS points used for the study.

The septic pollution susceptibility profile/index was created by summing the weighted values of the following risk factor layers:

Risk Factor Category Value

FEMA floodplains
In 100 yr. floodplain area 50
In 500 yr. floodplain area 30
Not in floodplain 0

Proximity to Wetlands
0 to 500 ft. from wetlands
100 to 0 ft. from wetlands

Pollution Susceptibility (DRASTIC w/NRCS soil data)
Medium 50
High 100

Groundwater Recharge Areas
Within recharge area 50
Not within recharge area 0

Proximity to Shellfish Beds
0 to 500 ft.
100 to 0 ft.

Proximity to 305(b)/303(d) Impaired Streams/Lakes/Sounds

0 to 1000 ft.
0 to 500 ft.
100 to 0 ft.

Proximity to Surface Water bodies
0 to 500 ft.
100 to 0 ft.

OSDS density

low density to high density 0 to 100

TMDL Impaired Watershed

Within impaired watershed 50
Not within impaired watershed 0

All project maps can be viewed or downloaded from the UGA MAREX Water Quality Program website: http://www.marex.uga.edu/advisory/waterquality.html.

WelSTROM GIS database site: http://www.sgwebmaps.com/welstrom/.

Reference:

CSREES Southern-Regoinal Water Quality Program. (2004). On-site Wastewater Management Systems and Their Environmental Impacts. *University of Georgia Bulletin. 1242-4.*

GA DNR. (1998). Water Quality in Georgia 1996-1997. Georgia Department of Natural Resources/Environmental Protection Division. Atlanta. GA