Are CAMA land-use plans protecting coastal resources?  
An evaluation of North Carolina’s coastal planning requirement

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ABSTRACT

North Carolina’s Coastal Area Management Act (CAMA) was created in 1974 to “establish a comprehensive plan for the protection, preservation, orderly development, and management of the coastal area”. One of CAMA’s key tools for managing coastal lands is a state-mandated land-use planning process, which tries to incentivize environmental protection through required analyses, planning exercises, and policy creation. The goal of this study was to determine the degree to which the CAMA planning requirement encourages counties to think critically about their environmental resources and plan strategically for future development. This report evaluates the effectiveness of the CAMA planning requirement through two main analyses: a critical review of plan content and quality using case studies from Carteret, Dare, and Gates Counties; and a social survey to assess current opinions and usage of CAMA land-use plans by county officials and planning employees. Plan evaluation results showed that while counties excelled at data assessments of current infrastructure and environmental resources, the application of environmental analyses into responsible development planning fell short. Plan policies were typically weak and unenforceable, and rarely exceeded state and federal standards. Survey results communicated overall satisfaction with the planning requirement, and noted that the process does encourage counties to consider environmental resources but additional protection is still needed. This report concludes that the required environmental inventories and suitability analyses are the most beneficial aspects of the planning process, and encourages the State to dedicate future efforts towards expanding these elements and providing more localized data assistance and guidance.
# TABLE OF CONTENTS

INTRODUCTION ......................................................................................................................... 1

BACKGROUND ............................................................................................................................ 2

CAMA Legislation ......................................................................................................................... 2

  Areas of Environmental Concern (AECs) ................................................................................. 2

  CAMA Land-Use Planning Requirement ............................................................................... 4

CAMA Administration ............................................................................................................... 5

  Coastal Resources Commission ........................................................................................... 6

  Coastal Resources Advisory Council .................................................................................... 6

  Division of Coastal Management ......................................................................................... 6

  The 7B Rules .......................................................................................................................... 7

  The Elements of a CAMA Land-use Plan .............................................................................. 9

  The Plan-Making Process ..................................................................................................... 10

    Public Participation ............................................................................................................ 10

  The 20 CAMA counties ....................................................................................................... 11

PART 1: PLAN EVALUATION .................................................................................................... 15

  Issues common to most CAMA plans .................................................................................. 15

  Land Suitability Analysis ................................................................................................... 19

  Three County Case Studies ................................................................................................ 24

    Methodology ....................................................................................................................... 24

    Spatial Analysis .................................................................................................................. 25

  Carteret County Plan Evaluation ......................................................................................... 26

    Background ........................................................................................................................ 27

    Strengths of the Carteret County plan ............................................................................ 28

    Weaknesses of the Carteret County plan ....................................................................... 29

    Results of Plan-Quality Evaluation Protocol .................................................................. 35

    Results of Spatial Analysis .............................................................................................. 36

  Dare County Plan Evaluation .............................................................................................. 43

    Background ........................................................................................................................ 43

    Strengths of the Dare County Plan ................................................................................. 44

    Weaknesses of the Dare County Plan ............................................................................ 47

    Results of Plan-Quality Evaluation Protocol .................................................................. 48
INTRODUCTION

North Carolina’s Coastal Area Management Act (CAMA) was created to “establish a comprehensive plan for the protection, preservation, orderly development, and management of the coastal area” (State of North Carolina, 1974a). One of CAMA’s key tools for managing coastal lands is a state-mandated land-use planning process which tries to incentivize environmental protection through required analyses and planning exercises. CAMA land-use plans serve as the basis for the issuance of development permits and are crucial for consistency review, meaning any state and federal action must comply with policies laid out in local CAMA plans. This report will discuss the effectiveness of the CAMA land-use planning requirement through two analyses: a critical review of plan content and quality using case studies from Carteret, Dare, and Gates Counties1; and a social survey to assess current opinions and usage of CAMA land-use plans by county officials and planning employees. The goal of this study is to determine the degree to which the CAMA planning requirement encourages counties to think critically about their environmental resources and plan strategically for future development, and to make suggestions that will help the planning process become more effective and efficient.

1 Due to the limited scope of this project, this report will focus on county-level plans and issues. Municipalities also have the option to prepare CAMA land use plans, but they were too numerous to consider here.
BACKGROUND

CAMA Legislation

Enacted in 1974, North Carolina’s Coastal Area Management Act (CAMA) was a response to increasing development pressures and declining environmental quality in North Carolina’s coastal lands and waters. The State realized that “unless these pressures are controlled by coordinated management, the very features which make it economically, esthetically, and ecologically rich will be destroyed” (State of North Carolina, 1974a). CAMA was created with four main goals:

1) preserve the physical, esthetic, cultural, and recreational qualities of North Carolina’s coasts for public use; 2) preserve and enhance water quality; 3) guide growth and development and to minimize damage to the natural environment; and 4) preserve private property rights. As seen from these objectives, CAMA was not intended to be a heavy-headed, top-down environmental preservation act. Legislators believed that a state regulatory program would not incentivize coastal resource protection; they needed incorporate local governments into the process (Division of Coastal Management, 2002). Therefore, CAMA was designed to be a cooperative program of coastal management with divided power between the State and local governments, using two main tools for managing coastal resources: the creation of Areas of Environmental Concern (AECs) and the CAMA land-use planning requirement. They believed that a collaborative management process would be the most effective way to achieve long-term success.

Areas of Environmental Concern (AECs)

The one main regulatory tool created by the CAMA legislation is the power to designate vulnerable coastal lands, called Areas of Environmental Concern (AECs). An AEC is defined as “an area of natural importance: It may be easily destroyed by erosion or flooding; or it may have environmental, social, economic or aesthetic values that make it valuable to our state” (Division of
Coastal Management, 2008b). There are four main types of AECs, including the Estuarine and Ocean System, the Ocean Hazard System, Public Water Supplies, and Natural and Cultural Resource Areas (fig. 1). Due to their sensitive nature, the State has specialized regulatory power over AEC lands which requires a state-granted CAMA permit for almost any development activity. As an easy guide, the State says that any construction, from a dock to a condominium, will likely need a development permit if it is:

- in or on navigable waters within the 20 CAMA counties;
- on a marsh or wetland;
- within 75 feet of the mean high water line along an estuarine shoreline;
- near the ocean beach;
- near an inlet;
- within 30 feet of the normal high water level of areas designated as inland fishing waters by the N.C. Marine Fisheries Commission; or
- near a public water supply. (Division of Coastal Management, 2008b)

CAMA regulation in AECs also includes additional policies such as shoreline development setbacks, limitations on bulkhead construction and sand bag placement, and the dredge-and-fill of wetlands. The actual area covered by AECs may not seem very substantial (some only cover 30-75 feet inland from the shoreline), especially when considering some environmental problems like pollution from storm-water runoff which often originates miles inland from coastal waters. However, the regulatory power the State holds over development in these lands is extensive. CAMA controls the definition of an AEC, the policies and regulations that apply to those lands, and the permitting process. Counties can choose to carryout CAMA permitting as part of their regular administrative duties, but the State sets the decision-making framework. The AEC component, implemented through the CRC, comprises the “stick” portion of the CAMA legislation.
Figure 1. Diagram of potential AECs that may be located in an estuarine setting and their jurisdictions (the left side indicates inland upstream waters and the right side indicates the downstream sound/ocean outflow) (Division of Coastal Management, 2007).

CAMA Land-Use Planning Requirement

The land-use planning requirement is CAMA’s second tool for managing coastal lands. Unlike AECs, the land-use plans were designed to be more cooperative. The State defines the planning elements and analysis that must be in the CAMA plan, the county or municipality writes the plan based on feedback from the public and the State, the county approves the plan locally, and the State gives the plan final approval. Plans are required for all lands contained in the 20 coastal CAMA counties, but the counties are not technically required to create a plan. Counties may defer their responsibility for plan development to the State, but they will be held to the policies the State enacts. These plans
serve as the basis for the issuance of State development permits and for consistency review (all State and Federal actions must be consistent with all policies contained in the local CAMA plan), so it is unlikely that any county would choose to surrender that control to the State. Currently, all 20 coastal counties have a CAMA plan of record. Municipalities may create their own CAMA plans or allow their lands to be included in the county’s plan, but this study did not address municipal plans or issues.

Through the land-use planning process, counties have the flexibility to decide how and where they want their county to grow. County policies must uphold all state and federal guidelines; however, they are free to enact more stringent policies that exceed existing standards. The intent of the CAMA legislation was to give local governments the freedom to identify local issues threatening their coastal resources and establish specific policies to address those problems.

**CAMA Administration**

While the CAMA legislation established the coastal land-use planning requirement and designated AECs, it also created three institutional bodies to oversee the rule-making and administration processes associated with managing North Carolina’s coasts. These administrative bodies are integral to the CAMA land-use planning process and have direct influence over the content and approval of county plans.

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2 In the first planning period (using the initial 1976 planning guidelines), Carteret County deferred plan development to the State. It is the only county to ever have deferred planning power and, after the State created their 1978 county plan, Carteret County reassumed responsibility for its own CAMA plans (Heath and Owens, 1994).

3 As of 1997, 72 municipalities had prepared CAMA plans (Division of Coastal Management, 2002).
Coastal Resources Commission

The Coastal Resources Commission (CRC) is a 15-member citizen committee representing a wide range of coastal interests (State of North Carolina, 1974a). All members are appointed by the governor and serve staggered four-year terms. They represent 12 expertise areas of expertise including forestry, commercial fishing, land development, engineering, agriculture, conservation, marine ecology, and local government. Additionally, there are three at-large members. The CRC is charged with designating AECs, adopting rules and policies for coastal development within the AECs, developing guidelines for the land-use planning requirement, certifying local land-use plans, and granting variances.

Coastal Resources Advisory Council

The Coastal Resources Advisory Council (CRAC) is comprised of 45 members representing state and local government as well as citizen members with expertise in a particular coastal field (State of North Carolina, 1974a). Members include representatives of various state agencies, the four coastal planning districts, the 20 coastal counties, and various CRC appointees from the marine science and human health disciplines. The CRAC is strictly advisory; they provide the CRC with local government perspectives, expert opinions, and technical advice.

Division of Coastal Management

The Division of Coastal Management (DCM) is a state agency housed under the Department of Environment and Natural Resources (DENR) (Division of Coastal Management, 2008). They are charged with providing support for the CRC (both administrative and technical), managing CAMA permitting and enforcement, and providing technical and funding assistance to counties and municipalities as they create and update their CAMA land-use plans. DCM planning staff includes a state planning director, along with four regional planners who provide local assistance for counties and municipalities in their region. Regional planners work directly with each county and
municipality during plan development, and are responsible for approving the plan before it is submitted to the CRC for final certification.

**CAMA Land-Use Planning Process**

Since this report focuses on the effectiveness of the land-use planning requirement, it is important to understand the required plan elements and the planning process.

**The 7B Rules**

As mentioned previously, CAMA requires that a land-use plan must be created for each of the 20 coastal counties. The original congressional legislation does not provide guidance detailing what a plan must contain. This responsibility is given to the CRC, who codify the required content of the plan. These guidelines are called the “7B” rules, and they are part of the North Carolina Administrative Code\(^4\). The CRC has the power to amend the 7B rules without going through the state congressional amendment process. It typically reviews the land-use planning requirements every 10 years.

The 7B rules have changed significantly since their initial adoption in January of 1976 (Heath and Owens, 1994). The first guidelines defined the basic framework, data needs, and public participation required, but left the substantive content up to the discretion of local officials. 19 of the 20 coastal counties\(^5\) and almost 30 municipalities developed plans under the initial guidelines. They were substantially revised in 1979 to include required discussion topics and analyses and a 5-year revision process. These guidelines were updated periodically with minor amendments, but

\(^4\) The name “7B” refers to Subchapter 7B of the North Carolina Administrative Code (NCAC), where the CAMA land use planning requirements are codified. (The CAMA legislation is NCAC Title 15A, Chapter 7.)

\(^5\) Carteret County deferred plan development to the State under the initial guidelines, but has since reassumed local responsibility for its plan.
were not substantially revised until serious concerns about the planning process arose in the late 1990s.

While initially hailed as a legislative model for state-mandated land-use planning, the initial 7B rules did not work as well as intended. Multiple studies concluded that the CAMA plans were not adequately protecting North Carolina’s coastal resources, especially concerning coastal water quality, resilience to catastrophic storms, and preserving the coastal character of the region (Hinkley and Kaiser, 1999; Godschalk, 2000; and Norton, 2001). In response to these concerns, the CRC established a Land Use Plan Review Team in 1999, which submitted its final report in the fall of 2000 (Division of Coastal Management, 2002). The Team recommended taking actions such as improving the quality and implementation of the local land-use plans, increasing the involvement and commitment from local officials and their communities, improving the land suitability analysis, and emphasizing basin-wide planning to address water quality issues (Coastal Resources Commission, 2000). The CRC accepted many of the Team’s suggestions, and overhauled the 7B rules in 2002 (Division of Coastal Management, 2002). A copy of the current 7B rules which details the CAMA land-use planning process can be found in Appendix 1.

No comprehensive evaluation of the new 7B rules has been performed since their adoption in 2002, either by the CRC or an external party. However, this summer (2010), the CRC began its required 10-year review of the land-use planning guidelines. According to John Thayer, DCM Planning & Public Access Manager, the CRC will not be conducting a full-scale, critical review of the planning

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6 The original rules were first adopted in 1976 and subsequently reviewed every 5 years (Division of Coastal Management, 2002).

7 Team members were chosen for their knowledge of the CAMA planning process, their area of expertise and their geographic location. The team included representatives from conservation organizations, municipal and county government, academic community, land use planners, and the CRC, CRAC, and DCM (Division of Coastal Management, 2002).
process but will focus its efforts on specific areas that it feels are lacking, such as adding a sea-level rise component into the required plan elements (personal commun., August 2010).

**The Elements of a CAMA Land-use Plan**

As stated above, the required elements are defined in the 7B rules (appendix 1) (State of North Carolina, 1974b). Counties must prepare a “core” or “advanced core” plan, which must include the elements discussed below. Municipalities have the option of preparing a simplified plan called a “workbook” plan, which will not be discussed here. Table 1 describes the different elements of the plan as required by the State. Topics listed must be addressed, however the county may address other issues or include additional analyses if relevant and applicable to CAMA’s goals.

**Table 1.** Summary of CAMA planning elements (State of North Carolina, 1974b). Areas shaded in gray indicate critical products that will be frequently discussed throughout this report.

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Key Planning Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Concerns and Aspirations</td>
<td>This section should identify areas and issues of concern, especially those related to growth. This section is typically includes public participation.</td>
<td>Community vision statement.</td>
</tr>
<tr>
<td>Analysis of Existing and Emerging Conditions</td>
<td>Current data and forecasts concerning population, housing, and economy.</td>
<td>Short- and long-term projections about future population and housing needs.</td>
</tr>
<tr>
<td>Natural Systems Analysis</td>
<td>Maps and data analysis concerning soils, water-quality, water-supply, hazards, wetlands, primary nursery areas, natural resources, and AECs.</td>
<td>Map of environmental conditions (defines land into Class I, II, or II based on development limitations).</td>
</tr>
<tr>
<td>Analysis of Community Facilities</td>
<td>Maps and data analysis concerning water supply, wastewater, transportation, and stormwater. Solid waste, health and safety are optional, but often included.</td>
<td>Map of land suitability, usually created using DCM GIS model.</td>
</tr>
<tr>
<td>Land Suitability Analysis</td>
<td>Keeping in mind the previous elements, land is classified by suitability for development.</td>
<td>Map of land suitability, usually created using DCM GIS model.</td>
</tr>
<tr>
<td>Review of Current CAMA Land Use Plan</td>
<td>Review policies and progress of previous CAMA plan.</td>
<td></td>
</tr>
<tr>
<td>Plan for the Future</td>
<td>Identify goals and policies including public access, land-use compatibility, infrastructure carrying capacity, natural hazard areas, water quality, and local areas of concern.</td>
<td>Policies, which should guide future planning and decision-making. Future land use map, identifying future development density limitations.</td>
</tr>
<tr>
<td>Tools for Managing Development</td>
<td>Describes how the county plans to implement the land-use plan within 5 years.</td>
<td>Action plan and schedule.</td>
</tr>
</tbody>
</table>
The Plan-Making Process

The county initiates the plan-making process by notifying the CRC in writing. The county then creates a draft version of its plan, and provides the draft to its regional DCM planner, who returns comments and input. The plan is revised, and once both the county and DCM planner approve, the plan is adopted locally by the county Board of Commissioners. DCM presents the plan to the CRC for certification at the next available CRC meeting. The CRC can approve, conditionally approve, or deny the plan. If denied or conditionally approved, the plan returns to the county or municipality with a list of conditions that must be met. If the CRC has conditionally approved the plan, the DCM Director may approve the plan without returning it to the CRC. If denied, the plan must be revised and returned to the CRC for certification.

Plan updates are not required unless the CRC adopts new or substantially revised 7B rules, after which each plan must be updated within six years to conform to the new rules. However, counties are free to update or amend their plan as frequently as they like. Plan amendments are submitted to DCM and require at least one hearing for public comments. If the revisions are substantial, the CRC must approve the amended plan. If the changes do not cause shifts in policy or alter land suitability, the amendments may be approved directly by the DCM Director.

Public Participation

While there are many opportunities to include the public in the development and approval of a county’s CAMA plan, the legal requirements for public participation are minimal. The 7B rules require only two opportunities for public involvement: 1) in accordance with North Carolina General Statue §113A-110, the county or municipality must have at least one public meeting for

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8 Some or all of the plan development may be outsourced to a planning contractor or consultant.
9 The DCM Director is called the CRC Executive Secretary in the 7B rules.
10 (North Carolina General Assembly, 2009)
community feedback; and 2) the public must be allowed to submit written comments to the CRC
before a plan certification hearing (they must be received at least 15 days before the hearing date).
Many counties ask for additional public participation when creating the “Community Concerns and
Aspirations” section of the plan, particularly during the development of the community vision. Most
participation is obtained in the form of one-time public hearings and written comments, however
some counties have incorporated county-wide surveys and travelling workshops.

The 20 CAMA counties

CAMA legislation and its regulations only apply to North Carolina’s 20 coastal counties and the
municipalities contained therein. Those counties include:

- Beaufort
- Bertie
- Brunswick
- Camden
- Carteret
- Chowan
- Craven
- Currituck
- Dare
- Gates
- Hertford
- Hyde
- New Hanover
- Onslow
- Pamlico
- Pasquotank
- Pender
- Perquimans
- Tyrrell
- Washington

The 20 CAMA counties represent a wide variety of demographic, economic, environmental
situations (tables 2 and 3, fig. 1). Some are very urban, like New Hanover and Onslow, while others,
like Gates and Tyrrell, have only one incorporated town. Some have huge summer populations and
rely heavily on tourism revenues, such as Dare and Brunswick, while others have very little
seasonal fluctuation in their populations, like Camden and Pasquotank. Some counties have large
barrier island systems which are exposed to the open ocean, like Dare and Carteret; others are
located on the sounds and have estuarine shorelines, such as Hyde or Chowan; while others only
connect to the coast through tributary rivers like Gates and Craven. Some struggle with poverty
rates almost double the state average, like Bertie and Tyrrell, while others have per-capita incomes that exceed the state average, like Dare and New Hanover. Some are experiencing significant growth rates in the last decade, like Currituck and Camden, and others have seen a declining population, like Hyde and Washington. It is not hard to imagine, then, that it would be difficult to create a land-use planning requirement that could address such a range of available resources and development interests.

**Figure 2.** Map of the 20 CAMA counties.
Table 2. Population and income statistics for 20 CAMA counties (North Carolina Department of Commerce, 2010). Blue indicates the three counties with highest or best values; red indicates the three counties with the lowest or poorest values. (Highest/lowest in the case of income, population, density, growth rate, and urban population. Best/poorest in the case of poverty rate.){pop, population; pop/sq mi, persons per square mile; %, percent}

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaufort</td>
<td>$37,944</td>
<td>$16,722</td>
<td>19.47%</td>
<td>46,524</td>
<td>56.2</td>
<td>0.40%</td>
<td>44,958</td>
<td>31%</td>
</tr>
<tr>
<td>Bertie</td>
<td>$30,162</td>
<td>$14,096</td>
<td>23.46%</td>
<td>19,217</td>
<td>27.5</td>
<td>-0.30%</td>
<td>19,773</td>
<td>0%</td>
</tr>
<tr>
<td>Brunswick</td>
<td>$41,876</td>
<td>$19,857</td>
<td>12.58%</td>
<td>109,208</td>
<td>127.8</td>
<td>4.40%</td>
<td>73,143</td>
<td>34%</td>
</tr>
<tr>
<td>Camden</td>
<td>$45,496</td>
<td>$18,681</td>
<td>10.06%</td>
<td>10,071</td>
<td>41.8</td>
<td>4.20%</td>
<td>6,885</td>
<td>0%</td>
</tr>
<tr>
<td>Carteret</td>
<td>$45,432</td>
<td>$21,260</td>
<td>10.71%</td>
<td>64,849</td>
<td>124.7</td>
<td>1.00%</td>
<td>59,383</td>
<td>62%</td>
</tr>
<tr>
<td>Chowan</td>
<td>$36,925</td>
<td>$15,027</td>
<td>17.60%</td>
<td>14,927</td>
<td>86.5</td>
<td>0.30%</td>
<td>14,526</td>
<td>37%</td>
</tr>
<tr>
<td>Craven</td>
<td>$42,747</td>
<td>$18,423</td>
<td>13.08%</td>
<td>98,053</td>
<td>138.4</td>
<td>0.80%</td>
<td>91,436</td>
<td>68%</td>
</tr>
<tr>
<td>Currituck</td>
<td>$46,618</td>
<td>$19,908</td>
<td>10.68%</td>
<td>25,305</td>
<td>96.7</td>
<td>3.60%</td>
<td>18,190</td>
<td>0%</td>
</tr>
<tr>
<td>Dare</td>
<td>$49,227</td>
<td>$23,614</td>
<td>8.03%</td>
<td>35,508</td>
<td>92.6</td>
<td>1.90%</td>
<td>29,967</td>
<td>70%</td>
</tr>
<tr>
<td>Gates</td>
<td>$41,874</td>
<td>$15,963</td>
<td>17.03%</td>
<td>12,209</td>
<td>35.8</td>
<td>1.60%</td>
<td>10,516</td>
<td>0%</td>
</tr>
<tr>
<td>Hertford</td>
<td>$31,964</td>
<td>$15,641</td>
<td>18.33%</td>
<td>23,752</td>
<td>67.2</td>
<td>0.50%</td>
<td>22,601</td>
<td>34%</td>
</tr>
<tr>
<td>Hyde</td>
<td>$35,486</td>
<td>$13,164</td>
<td>15.44%</td>
<td>5,518</td>
<td>9</td>
<td>-0.60%</td>
<td>5,826</td>
<td>0%</td>
</tr>
<tr>
<td>New Hanover</td>
<td>$50,931</td>
<td>$23,123</td>
<td>13.05%</td>
<td>196,667</td>
<td>988.6</td>
<td>2.20%</td>
<td>160,307</td>
<td>95%</td>
</tr>
<tr>
<td>Onslow</td>
<td>$36,629</td>
<td>$14,853</td>
<td>12.91%</td>
<td>163,618</td>
<td>213.4</td>
<td>0.90%</td>
<td>150,355</td>
<td>71%</td>
</tr>
<tr>
<td>Pamlico</td>
<td>$42,044</td>
<td>$18,005</td>
<td>15.33%</td>
<td>13,160</td>
<td>39.1</td>
<td>0.20%</td>
<td>12,934</td>
<td>0%</td>
</tr>
<tr>
<td>Pasquotank</td>
<td>$36,613</td>
<td>$14,815</td>
<td>18.40%</td>
<td>41,991</td>
<td>185.1</td>
<td>2.00%</td>
<td>34,897</td>
<td>55%</td>
</tr>
<tr>
<td>Pender</td>
<td>$41,837</td>
<td>$17,882</td>
<td>13.59%</td>
<td>53,508</td>
<td>61.5</td>
<td>2.90%</td>
<td>41,082</td>
<td>8%</td>
</tr>
<tr>
<td>Perquimans</td>
<td>$35,237</td>
<td>$15,728</td>
<td>17.94%</td>
<td>12,842</td>
<td>52</td>
<td>1.30%</td>
<td>11,368</td>
<td>0%</td>
</tr>
<tr>
<td>Tyrrell</td>
<td>$32,100</td>
<td>$13,326</td>
<td>23.32%</td>
<td>4,227</td>
<td>10.8</td>
<td>0.20%</td>
<td>4,149</td>
<td>0%</td>
</tr>
<tr>
<td>Washington</td>
<td>$34,870</td>
<td>$14,994</td>
<td>21.76%</td>
<td>12,954</td>
<td>37.2</td>
<td>-0.60%</td>
<td>13,723</td>
<td>35%</td>
</tr>
<tr>
<td>North Carolina</td>
<td>$46,335</td>
<td>$20,307</td>
<td>12.30%</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Table 3. Year-round and seasonal population statistics for 2000 and 2020. Blue indicates the three counties with highest populations; red indicates the three counties with the lowest populations. (Data collected from county CAMA plans. Hertford and Washington County plans were not available for review; New Hanover’s plan did not contain population statistics.)[-- , not available]

<table>
<thead>
<tr>
<th>County</th>
<th>2000 Year-Round Population</th>
<th>2000 Seasonal Population</th>
<th>Seasonal (seasonal population per 1 year-round resident)</th>
<th>2020 Projected Year-Round Population</th>
<th>2020 Projected Seasonal Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaufort</td>
<td>44,958</td>
<td>4,147</td>
<td>0.09</td>
<td>48,770</td>
<td>5,365</td>
</tr>
<tr>
<td>Bertie</td>
<td>19,757</td>
<td>690</td>
<td>0.03</td>
<td>20,262</td>
<td>720</td>
</tr>
<tr>
<td>Brunswick</td>
<td>73,141</td>
<td>190,480</td>
<td>2.60</td>
<td>127,265</td>
<td>302,618</td>
</tr>
<tr>
<td>Camden</td>
<td>6,885</td>
<td>342</td>
<td>0.05</td>
<td>8,414</td>
<td>369</td>
</tr>
<tr>
<td>Carteret</td>
<td>59,383</td>
<td>112,142</td>
<td>1.89</td>
<td>67,635</td>
<td>138,909</td>
</tr>
<tr>
<td>Chowan</td>
<td>14,150</td>
<td>1,111</td>
<td>0.08</td>
<td>17,364</td>
<td>2,138</td>
</tr>
<tr>
<td>Craven</td>
<td>91,523</td>
<td>2,792</td>
<td>0.03</td>
<td>106,143</td>
<td>--</td>
</tr>
<tr>
<td>Currituck</td>
<td>18,190</td>
<td>70,178</td>
<td>3.86</td>
<td>35,800</td>
<td>99,988</td>
</tr>
<tr>
<td>Dare</td>
<td>29,967</td>
<td>225,094</td>
<td>7.51</td>
<td>43,892</td>
<td>285,230</td>
</tr>
<tr>
<td>Gates</td>
<td>10,516</td>
<td>216</td>
<td>0.02</td>
<td>12,547</td>
<td>--</td>
</tr>
<tr>
<td>Hertford</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyde</td>
<td>5,826</td>
<td>2,129</td>
<td>0.37</td>
<td>5,644</td>
<td>--</td>
</tr>
<tr>
<td>New Hanover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onslow</td>
<td>150,355</td>
<td>17,195</td>
<td>0.11</td>
<td>166,376</td>
<td>--</td>
</tr>
<tr>
<td>Pamlico</td>
<td>12,930</td>
<td>5,940</td>
<td>0.46</td>
<td>14,939</td>
<td>6,750</td>
</tr>
<tr>
<td>Pasquotank</td>
<td>34,897</td>
<td>2,152</td>
<td>0.06</td>
<td>51,611</td>
<td>--</td>
</tr>
<tr>
<td>Pender</td>
<td>41,082</td>
<td>--</td>
<td>--</td>
<td>84,893</td>
<td>5,000</td>
</tr>
<tr>
<td>Perquimans</td>
<td>11,368</td>
<td>1,486</td>
<td>0.13</td>
<td>13,011</td>
<td>--</td>
</tr>
<tr>
<td>Tyrrell</td>
<td>4,149</td>
<td>--</td>
<td>--</td>
<td>4,865</td>
<td>--</td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PART 1: PLAN EVALUATION

While CAMA plans do not contain all the planning elements seen in typical land-use plans, the 7B requirements are inspired by many of the characteristics that make an effective planning tool. According to Berke (2006), the core purposes of a land-use plan are: present a community vision for future development; provide the facts, goals and policies for translating that vision into a physical development pattern; combine long-range considerations into short-term actions; and embody local, regional, and global trends and values. Not only should a plan discuss all these topics, but it also needs to be an effective and purposeful tool for future development. A land-use plan needs a well-articulated vision; identification of threats and opportunities; scientifically valid data and analyses; clearly defined goals; action-oriented and legally defensible policies; implementation schedules and responsible parties; and implementation, enforcement, and monitoring. Only high-quality plans which employ these characteristics will be effective as a guide for future change. This section uses these principles as a guide for evaluating the content and quality of CAMA land-use plans.

Issues common to most CAMA plans

For the purposes of this study, plan evaluation was performed at two scales. While one analysis, discussed later, explored three county plans in depth, there were some interesting observations that could be made during a very simple comparison of all the available county plans11. 18 available CAMA plans created under the 2002 7B rules were considered12. Some of these plans are still in draft form, and have not been approved by their local Board of Commissioners and/or the CRC (table 4). Table 4 also shows the dates of the plans’ year (which often represents the year of the

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11 References for individual county plans are available in the references section. They will not be referenced individually throughout the rest of the report.
12 Hertford and Washington Counties are currently developing plan drafts under the 2002 7B rules. They have not been released to the public, and both counties declined requests for an advance copy.
first complete draft plan or the year of local adoption) and CRC adoption years of plans under both
the old 1976 7B rules and the 2002 revised 7B rules. Plans under the old rules typically took a year
or two to complete, while at least five of the plans have taken over three years to complete (four of
which are still not approved). Possible reasons for the delay may be because the 2002 rules are
more demanding, or there may be a lack of time and resources at the local or State level to prevent
these plans from being adopted quickly. Whatever the reason, one may wonder how long a plan can
be stuck in the approval process before it becomes outdated.

**Table 4.** Schedule of CAMA plan development and CRC adoption under 1976 and 2002 7B rules. (Data
collected from CAMA county plans; Division of Coastal Management, 2010; Division of Coastal
Management, date unknown.)

<table>
<thead>
<tr>
<th>County</th>
<th>Plans developed using 1976 7B Rules</th>
<th>Plans developed using 2002 7B Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plan year</td>
<td>Year adopted by CRC</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Camden</td>
<td>1993</td>
<td>1994</td>
</tr>
<tr>
<td>Gates</td>
<td>1993</td>
<td>1993</td>
</tr>
<tr>
<td>Pasquotank</td>
<td>1996</td>
<td>1996</td>
</tr>
<tr>
<td>Washington</td>
<td>1994</td>
<td>1994</td>
</tr>
</tbody>
</table>
Another quick comparison which can prove enlightening is to review the number of the counties have chosen to enact policies that exceed State standards in AECs. Remember, the State holds additional regulatory power in the AECs, which often includes special development limitations. If a county feels that the State requirements are not strict enough to protect its local resources, it is encouraged to adopt additional policies that exceed the State’s regulations. It is required to disclose these policies in a special section defined in the 7B rules, or clearly state that it defaults to the State regulations in AECs.

After reviewing the plans, only three counties (Carteret, Currituck, and Pamlico) chose to enact additional polices in AECs (table 5). These policies addressed concerns about wetlands, water quality, estuarine shorelines, and development density. The remaining plans defaulted to State AEC regulations. Many plans also clearly stated that they deferred to the State, Federal, National Flood Insurance Program, and Federal Emergency Management Agency standards for most of their regulations.

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13 Bertie and Currituck Counties also enacted additional policies that exceeded State or Federal standards for non-AEC areas; Bertie added a foot to their base flood elevation calculation, and Currituck included additional stormwater and mining regulations. They were the only counties to do so.
Table 5. Overview of county CAMA plans. (Data collected from county CAMA plans. Hertford and Washington Counties did not have plans available for review.) [LID, low-impact development; *, Sustainability in the context of development or environmental issues, not a mention of a sustainable economy; **, Bertie County’s plan is currently in draft form, and does not contain the required section addressing AEC policies.]

<table>
<thead>
<tr>
<th>County</th>
<th>AEC policies exceeding State</th>
<th>Description of AEC policies exceeding State</th>
<th>Does the plan mention...</th>
<th>Length of plan (in pages)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaufort</td>
<td>0</td>
<td></td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Bertie**</td>
<td>0</td>
<td></td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Brunswick</td>
<td>0</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Camden</td>
<td>0</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Carteret</td>
<td>3</td>
<td>Coastal wetland replacement 1:1 for navigational channels; no package treatment plans, septic tanks or wastewater discharge in coastal or freshwater wetlands; no floating structures in public trust waters.</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Chowan</td>
<td>0</td>
<td></td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Craven</td>
<td>0</td>
<td></td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Currituck</td>
<td>1</td>
<td>Increased ocean erodible setback.</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Dare</td>
<td>0</td>
<td></td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Gates</td>
<td>0</td>
<td></td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Hertford</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyde</td>
<td>0</td>
<td></td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>New Hanover</td>
<td>0</td>
<td></td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Onslow</td>
<td>0</td>
<td></td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Pamlico</td>
<td>5</td>
<td>All estuarine shoreline policies: conservation zone, low-density development, cluster development, non-coastal wetland density, marina limitations.</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Pasquotank</td>
<td>0</td>
<td></td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Pender</td>
<td>0</td>
<td></td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Perquimans</td>
<td>0</td>
<td></td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Tyrrell</td>
<td>0</td>
<td></td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Other information included in table 5 is an inventory of the counties which documented their interest in smart growth, low-impact development, sustainable development or environmental sustainability, and sea-level rise. The goal of this exercise was to understand how many counties were interested in alternative planning and development methods, and to ascertain if sea-level rise was becoming a concern\textsuperscript{14}. Smart growth was mentioned in 8 out of 18 plans, low-impact development in 10 plans, and sustainability in 6 plans, which indicates there in substantial interest in incorporating these methodologies into local development. However, like many issues, most policies did not offer specific incentives or require usage of these development tools, only that they will be considered and encouraged where possible. Sea-level rise was mentioned in 10 of the 18 plans reviewed, but almost all policies also noted that while the counties were concerned about the effects of sea-level rise, they were waiting for guidance from the State before incorporating specific actions or regulations.

\textit{Land Suitability Analysis}

The last element that should be discussed in the context of all 20 counties is the development of the land suitability map. This map was briefly mentioned in table 1 as the main product of the required land suitability analysis, and it is a crucial part of every CAMA plan. This analysis is intended to show which lands are the most suitable for development, based on “natural system constraints, compatibility with existing land uses and development patterns, the existing land use and sewer, stormwater management facilities, and transportation systems” (State of North Carolina, 1974b). The 7B rules state that land suitability must consider the plan’s earlier discussions of water quality, the environmental composite map, proximity to existing development and services, and naturally and culturally significant sites. For example, areas inside a storm surge area have a “low suitability”

\textsuperscript{14} While sea level rise was mentioned in the plans reviewed, none of them addressed climate change or adaptation directly.
rating, while areas outside have "high suitability". Parcels within a ½ mile of an existing road have "high suitability", while those further than a mile from an existing road have "low suitability".

This analysis is typically performed using geospatial analysis software (GIS). To assist counties, DCM published the Land Suitability Analysis User Guide in 2005, which provides information about GIS analyses, a sample GIS model, and example criteria based on available state databases. The criteria table example included in the User Guide can be seen in table 6. This model also gives the county the option of weighting the importance of the criteria, allowing them to choose which inputs have more influence during the suitability calculations. While DCM suggests that the example criteria should be useful in creating a useful proxy for land suitability, it also acknowledges that other locally relevant criteria can, and should, be added to the suitability analysis. For instance, Appendix 1 of the User Guide includes other data that was considered, but not included, in the example model. Examples include historic districts, archaeological sites, and inlet hazard areas. Additionally, the 7B rules state that the environmental composite map should be part of this analysis, but the actual map is not utilized in the spatial analysis. Furthermore, while the User Guide also supplies a model for creating the environmental composite map, not all of the inputs mentioned in the 7B rules are included in the model, such as water-quality concerns (shellfish and impaired waters), primary nursery areas, environmentally fragile areas (maritime forests, endangered species habitats), or wellhead protection areas. Subsequently, none of those criteria are included in the land suitability model either.
Table 6. Land suitability criteria table example, as shown in DCM’s Land Suitability Analysis User Guide (Division of Coastal Management, 2005).

<table>
<thead>
<tr>
<th>Layer Name</th>
<th>Criteria and Ranking</th>
<th>Assigned Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Least Suitable</td>
<td>Low Suitability</td>
</tr>
<tr>
<td>Coastal Wetlands</td>
<td>Inside</td>
<td>0</td>
</tr>
<tr>
<td>Exceptional and Substantial Noncoastal Wetlands</td>
<td>Inside</td>
<td>Outside</td>
</tr>
<tr>
<td>Estuarine Waters</td>
<td>Inside</td>
<td>Outside</td>
</tr>
<tr>
<td>Protected Lands</td>
<td>Inside</td>
<td>Outside</td>
</tr>
<tr>
<td>Beneficial Noncoastal Wetlands</td>
<td>Inside</td>
<td>Outside</td>
</tr>
<tr>
<td>Storm Surge Areas</td>
<td>Inside</td>
<td>Outside</td>
</tr>
<tr>
<td>Soils with septic limitations</td>
<td>Severe</td>
<td>Moderate</td>
</tr>
<tr>
<td>Flood Zones</td>
<td>Inside</td>
<td>Outside</td>
</tr>
<tr>
<td>Water Supply Watersheds</td>
<td>Inside</td>
<td>Outside</td>
</tr>
<tr>
<td>Significant Natural Heritage Areas</td>
<td>&lt; 500 ft</td>
<td>&gt;500 ft</td>
</tr>
<tr>
<td>Hazardous Substance Disposal Sites</td>
<td>&lt; 500 ft</td>
<td>&gt;500 ft</td>
</tr>
<tr>
<td>NPDES Sites</td>
<td>&lt; 500 ft</td>
<td>&gt;500 ft</td>
</tr>
<tr>
<td>Wastewater Treatment Plants</td>
<td>&lt; 500 ft</td>
<td>&gt;500 ft</td>
</tr>
<tr>
<td>Municipal Sewer Discharge Points</td>
<td>&lt; 500 ft</td>
<td>&gt;500 ft</td>
</tr>
<tr>
<td>Airports</td>
<td>&lt; 500 ft</td>
<td>&gt;500 ft</td>
</tr>
<tr>
<td>Developed Land</td>
<td>&gt;1 mile</td>
<td>0.5 to 1 mile</td>
</tr>
<tr>
<td>Primary Roads</td>
<td>&gt;1 mile</td>
<td>0.5 to 1 mile</td>
</tr>
<tr>
<td>Water Pipes</td>
<td>&gt;0.5 mile</td>
<td>0.25 to 0.5 mile</td>
</tr>
<tr>
<td>Sewer Pipes</td>
<td>&gt;0.5 mile</td>
<td>0.25 to 0.5 mile</td>
</tr>
</tbody>
</table>

It is the county's responsibility to determine what factors are influencing the local land suitability and adjust the model accordingly. Of the 18 CAMA plans reviewed, most showed only minor deviations from DCM's criteria model, if any. Deviations included adding additional water or wetland classifications or adding a category for culturally important sites. Other counties excluded categories that were not applicable to their county, such as airports or land application sites, or changed the weighting of categories slightly. But overall, most counties followed the criteria model from the User Guide very closely.
The three exceptions are Pamlico County (plan approved 2005) and Bertie County (draft plan), and Dare County (draft plan) which depart drastically from DCM’s model. The Dare County example will be discussed later in the case-study section, but was substantially modified to focus on their local priorities, including an increased priority on wetlands, septic limitations, flood zones and high-quality waters. Dare County also decreased the weightings of the existing infrastructure categories, and added a category concerning scenic and historic sites. In contrast, Pamlico and Bertie County employ a very simplified (and similar) set of criteria inputs (only 8 categories), which focus on existing development, wetlands, soils, and, surprisingly, proximity to waterfront. In these two plans, lands closer to waterfront are designated as “very attractive”, a surprising decision given that waterfront parcels are usually more vulnerable to erosion, flooding, and storm surge. Development on waterfront parcels can also have a deleterious effect on water quality due to stormwater runoff and pollutants due to the conversion from natural vegetation to impervious surface. These two land suitability analyses seem to be heavily biased by market-based development demands instead of environmental, resource-conscious development. However, the CRC certified the Pamlico plan in 2005, so it must not have been too concerned about this analysis. Time will tell if the Bertie land suitability analysis will be approved as well.
Table 7. Summary of land suitability analysis input criteria (data collected from CAMA county land-use plans). [HWQ, high quality waters; ORW, outstanding resource waters; WS, Water Supply waters; (EX),if present, land is automatically categorized as “least suitable”; *, Currituck County divided their county into three separate areas and applied different weights to each; **, Onslow County did weight its criteria. Hertford and Washington Counties did not have plans available for review. Shading indicates counties that did not use the provided criteria model from DCM.]

| County      | Coastal Wetlands | Exceptional and Substantial Non-coastal Wetlands | Estuarine Waters | Protected Lands | Beneficial non-coastal wetlands | Storm Surge Areas | Soil with septic limitations | Flood Zones | HWQ/ORW/WS Waters | Significant Natural Heritage Areas | Hazardous Substance Disposal Sites | NPDES Sites | Wastewater Treatment Plants | Municipal Sewer Discharge Points | Land Application Sites | Airports | Developed Land | Primary Roads | Water Pipes | Sewer Pipes | Substantial non-coastal wetlands | High Quality Waters | Water Quality Classifications | Scenic, historical, cultural sites | Waterfront (closer is “highly suitable”) | Existing Municipality |
|-------------|------------------|-----------------------------------------------|------------------|-----------------|-------------------------------|------------------|-------------------------------|-------------|-------------------|------------------------------------|-----------------------------------|-------------|--------------------------|-----------------------------|------------------------|-----------|---------------|---------------|-------------|-------------|-----------------------------|--------------------------|-------------------------------|-------------------------------|---------------------------|
| Beaufort    | (EX)             | (EX)                                         | (EX)             | 1               | 2                             | 2                | 2                             | 1            | 1                 | 1                                  | 1                                 | 1           | 1                        | 1                           | 1                       | 1         | 1             | 1             | 2           | 3           | 3                           |                         |                               |                               |                          |                         |
| Bertie      |                  |                                              |                  | 3               |                               | 2                |                               | 2            | 2                 | 1                                  |                                   | 1           | 2                        | 3                           |                         |           | 2             | 2             | 1           |            | 1                           |                         |                               |                               |                          |                         |
| Brunswick   | (EX)             |                                              | (EX)             | 2               | 2                             | 2                | 2                             | 1            | 1                 | 1                                  | 1                                 | 1           | 2                        | 3                           | 3                       |           | 1             |                | 2           |            | 1                           |                         |                               |                               |                          |                         |
| Camden      | (EX)             | (EX)                                         | (EX)             | 2               | 2                             | 2                | 2                             | 1            | 1                 | 1                                  | 1                                 | 1           | 2                        | 3                           | 3                       |           |                | 1             | 2           |            | 1                           |                         |                               |                               |                          |                         |
| Carteret    | (EX)             | (EX)                                         | (EX)             | 1               | 1                             | 1                | 1                             | 1            | 1                 | 1                                  | 1                                 | 1           | 3                        | 3                           | 3                       | 3           |                |                | 1           |            | 1                           |                         |                               |                               |                          |                         |
| Chowan      | (EX)             | (EX)                                         | (EX)             | 1               | 2                             | 2                | 1                             | 1            | 1                 | 1                                  | 1                                 | 1           | 2                        | 3                           | 3                       |           |                | 1             | 2           |            | 1                           |                         |                               |                               |                          |                         |
| Craven      | (EX)             | (EX)                                         | (EX)             | 2               | 2                             | 2                | 1                             | 1            | 1                 | 1                                  | 1                                 | 1           | 2                        | 3                           | 3                       |           |                |                | 1           |            | 1                           |                         |                               |                               |                          |                         |
| Currituck*  | (EX)             | (EX)                                         | (EX)             | 1.6             | 1.3                           | 2.3              | 2.3                           | 1            | 3                 | 2                                  |                                   |             | 1.6                      | 2                           | 1.6                     | 1.6         |                | 1.6           | 1.6         |            | 1.6                      |                         |                               |                               |                          |                         |
| Dare        |                  |                                              |                  | 3               | 3                             | 3                |                               | 3            | 3                 | 3                                  |                                   |             | 1                        | 1                           | 1                       | 1           | 1             | 2             | 3           |            | 1                           |                         |                               |                               |                          |                         |
| Gates       |                  |                                              |                  | 3               | 3                             | 3                |                               | 3            | 3                 | 3                                  |                                   |             | 1                        | 1                           | 1                       | 1           | 1             | 2             | 3           |            | 1                           |                         |                               |                               |                          |                         |
| Hyde        | (EX)             | (EX)                                         | (EX)             | 2               | 2                             | 2                | 1                             | 1            | 1                 | 1                                  | 1                                 | 1           | 2                        | 3                           | 3                       |           |                |                | 2           |            | 2                           |                         |                               |                               |                          |                         |
| New Hanover | (EX)             | (EX)                                         | (EX)             | 2               | 2                             | 1                | 3                             | 1            | 2                 | 1                                  | 1                                 | 1           | 2                        | 3                           | 3                       |           |                | 3             | 3           |            | 2                           |                         |                               |                               |                          |                         |
| Onslow**    | (EX)             | (EX)                                         | (EX)             | 1               | 1                             | 1                | 1                             | 1            | 1                 | 1                                  | 1                                 | 1           | 1                        | 1                           |                         |           |                |                | 1           |            | 1                           |                         |                               |                               |                          |                         |
| Pamlico     | (EX)             |                                              |                  | 2               |                               | 3                |                               |              |                   |                                     |                                   |             | 1                        | 3                           | 1                       |           |                | 2             | 2           |            | 2                           |                         |                               |                               |                          |                         |
| Pasquotank  | (EX)             | (EX)                                         | (EX)             | 1               | 2                             | 2                | 2                             | 1            | 1                 | 1                                  | 1                                 | 1           | 2                        | 3                           | 3                       |           |                |                | 2           |            | 2                           |                         |                               |                               |                          |                         |
| Pender      | (EX)             | (EX)                                         | (EX)             | 1               | 2                             | 2                | 2                             | 1            | 1                 | 1                                  | 1                                 | 1           | 1                        | 1                           | 1                       |           |                |                | 2           |            | 2                           |                         |                               |                               |                          |                         |
| Perquimans  | (EX)             | (EX)                                         | (EX)             | 2               | 2                             | 2                | 1                             | 1            | 1                 | 1                                  | 1                                 | 1           | 1                        | 1                           | 1                       |           |                |                | 2           |            | 2                           |                         |                               |                               |                          |                         |
| Tyrrell     | (EX)             | (EX)                                         | (EX)             | 2               | 2                             | 2                | 1                             | 1            | 1                 | 1                                  | 1                                 | 1           | 2                        | 3                           | 3                       |           |                |                | 2           |            | 2                           |                         |                               |                               |                          |                         |
Three County Case Studies

While the 7B rules require that all coastal lands must be evaluated and classified based on their development suitability, the real test of the effectiveness of the CAMA land-use planning requirement is to examine the plans themselves. This section will assess three county CAMA land-use plans by comparing their contents to the CAMA planning requirements, evaluating the quality of the plan, discussing the strength of the policies contained therein, and assessing the ability of the document at protecting environmental resources and managing future development.

Methodology

Three counties were selected as case studies based on the variety of demographic, economic, and environmental characteristics they represented:

- **Carteret County** is a complex county made up of barrier islands and a large mainland area with many miles of estuarine shoreline and substantial areas of maritime forest. Its barrier islands face south and are relatively stable. It has a substantial year-round population and supports industry and commercial businesses, while also catering to a large influx of tourists and seasonal residents during the summer.

- **Dare County** is a northeastern county made up predominantly of barrier islands and an estuarine peninsula. Its barrier islands face east and experience significant erosion in many areas. Its seasonal population is over seven times greater than its year-round population, and tourism is its main source of revenue.

- **Gates County** shares its northern border with Virginia. It is very rural, having only one incorporated town, and is connected to the coast through the Chowan River, a major tributary river to the Albemarle Sound. There is very little seasonal variance in its population, as it is not typically seen as a vacation destination.
The plans were read critically and evaluated using a specific set of investigations:

- Each plan was inspected to ensure it complied with all 7B requirements.
- The land suitability analysis was reviewed to see if it deviated from the DCM-provided model. It was compared against previous plan discussions of development concerns to test the consistency of the weighting system.
- The future land use map was evaluated with specific emphasis on a comparison of mapped population capacity to the plan’s population projection analysis.
- An inventory of enforceable language was developed, and each plan’s policy section was searched to determine the frequency of enforceable policies. Policies with specific measurable actions were also identified.
- Plan policies and analyses were compared to the goals set forth in the community vision.
- Plans were reviewed for any enforcement, monitoring, or implementation schedules.
- Plan quality was evaluated using the Plan-Quality Evaluation Protocol designed by Philip Berke\textsuperscript{15} (Berke, Godshalk, and Kaiser, 2006).

While some of these analyses revealed some interesting perspectives on the plans, others did not. The evaluations below will not necessarily report the individual results of each of these investigations, but rather a summary of the strengths and weaknesses these methods revealed.

Spatial Analysis

In addition to a critical plan and policy review, a spatial analysis of the three critical maps (environmental composite map, the land suitability map, and the future land use map) was also performed. The goal of this analysis was to determine the following:

\textsuperscript{15} Philip Berke is a Professor in the Department of City and Regional Planning at the University of North Carolina at Chapel Hill, and the Deputy Director of the Institute for the Environment. He specializes in land use and environmental planning. This protocol comes from the textbook he authored entitled Urban Land Use Planning (2006).
• Does the land suitability map reflect the level of hazards identified in the environmental composite map?

• Does the future land use map identify more suitable lands with fewer hazards for areas of higher development?

The spatial analysis was performed by first digitizing the environmental composite, land suitability, and future land use maps contained in the plan PDFs, using either Illustrator or Photoshop to eliminate unnecessary information to improve the accuracy of subsequent processes. The simplified maps were imported into ESRI ArcMap, were they were georeferenced according to county boundary or road shapefiles (Department of Transportation, 2009). A classification was performed on each map to isolate relevant classification categories. Once the desired categories had been defined, zonal histograms and reclassified maps were created, providing information on relational map categories, which are discussed in the individual county evaluations below. Detailed methodology for the spatial analysis can be found in appendix 4.

It should be noted that this analysis did not evaluate the accurate classification of lands within a single map, only if development-sensitive classes were correctly correlated between maps. In other words, this evaluation does not assess if a parcel of land should be classified as suitable for development, only if its suitability is classified similarly between the three plan maps.

**Carteret County Plan Evaluation**

Carteret County began this plan revision in 2003, soon after the new 7B revisions were released. Planning assistance was provided by an external consultant, Coastal Planning Services, Inc. The plan was submitted for certification at the CRC meeting on June 24, 2009, where it was conditionally approved due to some concerns about the future land use plan raised at the certification hearing (discussed below). There have been no revisions to the public plan drafts.
available on the County or DCM websites since that meeting, but if the County makes the appropriate changes, the DCM Director can approve the plan without another CRC review. As of November 2010, the plan has not been fully approved nor been an agenda item on the Board of Commissioners meetings since being conditionally approved.

**Background**

Carteret County covers 526 square miles of land, and supports approximately 65,000 permanent and 154,000 seasonal residents (Carteret County Economic Development Council, 2009a; 2009b). It is located just west of Cape Lookout and includes many miles of oceanfront and estuarine shoreline. It also contains multiple barrier islands, including the 26-mile Bogue Banks which is almost entirely developed. Residential and commercial properties on Bogue Banks generate over 42 percent of the tax revenue for the County of Carteret while only five percent of the county budget is needed to provide services to the island (Forman, James W. Jr., 2005)\(^{16}\). Of the total property taxes collected, a significant percentage (26–64 percent, depending on the area) is derived from oceanfront property (Forman, James W. Jr., 2005). While all oceanfront municipalities have developed their own CAMA land-use plans\(^{17}\), waterfront development has proved to be very attractive and lucrative. Now that most of the oceanfront parcels have been built out, estuarine shorelines are facing increased development pressure, most of which is occurring on undeveloped County lands. In the Down East community, an area of unincorporated fishing villages, the citizens group Down East Tomorrow has been pushing for stricter development regulations to preserve their cultural and natural resources which are being threatened by development pressures (Pippen, 2006a). While they have been mostly unsuccessful at convincing their local commissioners to act on their requests, the Carteret

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\(^{16}\) These figures include tax revenues and expenditures for all County municipalities, not just lands covered in the Carteret County CAMA land use plan.

\(^{17}\) The only developable oceanfront area that falls under Carteret County’s planning jurisdiction is the unincorporated town of Salter Path. The remaining oceanfront lands are either undevelopable (National Seashore) or under municipal planning jurisdiction. Additionally, three mainland towns (Bogue, Peletier, and Cedar Point) have all given Carteret County CAMA planning jurisdiction.
plan will set the precedent for future development and has the opportunity to be a very important tool for protecting sensitive lands from environmental degradation as waterfront pressure increases on the mainland (Pippen, 2006b).

**Strengths of the Carteret County plan**

Carefully following the 7B rules, Carteret County performed all the required data collection and analysis\(^\text{18}\), including the assessment of current economic conditions, the natural systems analysis, and a historical land-use analysis. The plan includes a community vision and citizen concerns, as well as identifies some existing and emerging concerns such as subdivision growth, declining water quality, a lack of central sewer service and county zoning, and the stress of waterfront development on fragile coastal areas. The plan also contains a detailed discussion of current infrastructure and services, and a thorough identification of environmentally sensitive areas. Additionally, the County is obviously familiar with their infrastructure needs and where expansion will be required in the future. In summary, the Carteret County CAMA land-use plan contains every element required by the 7B rules, and it excels in the sections that required data gathering and analysis of current conditions and inventory.

As required by the 7B rules, any County regulation that exceeds state and federal standards must be identified within the plan. Carteret County is one of three counties whose plan includes policies that exceed state standards, including regulations requiring coastal wetland replacement when wetlands are destroyed during the construction or maintenance of navigational channels; the prohibition of package treatment plans, septic tanks or wastewater discharge in coastal or freshwater wetlands; and a ban on floating structures in public trust waters. While Carteret County should be praised for taking the initiative to enact stricter environmental policies, it should also be

\(^{18}\) Carteret County did outsource some of the CAMA planning work to two consultants, Coastal Planning Services and BLUE: Land, Water, Infrastructure (BLWI).
noted that this plan is a step backward from the previous Carteret County CAMA plan (approved in 1999). The old plan contained six additional policies that exceeded state and federal standards which were eliminated in the 2005 plan. The County removed the policies that prohibited dredging in shellfishing waters, prohibited new drainage ditches, opposed marina construction and expansion in coastal wetlands and primary nursery areas, opposed docks and piers with more than four boat slips in primary nursery areas, required shoreline parking lot setbacks, and limited industrial development to specific land-use categories.

Weaknesses of the Carteret County plan

Unfortunately, the County’s detailed knowledge of their assets and risks does not translate into strategic planning and environmental protection. The County failed to find ways to solve the problems identified in the initial community assessment, including declining water quality (even though this was a top priority of its citizens), a lack of county-wide zoning, vulnerability to hurricanes and storm events, and absent waterfront development management. During the public participation process, County citizens identified water quality and stormwater concerns as two of their top priorities, but the County did not directly address these issues. For example, the plan contains a detailed list of all the impaired waters within the County, however it does not discuss the possible sources of the contamination or what County planning actions could be taken to improve or restore them. The plan identifies the high fecal coliform counts in the White Oak River, but does not investigate the probable relationship to the rampant development that has been happening in lands surrounding the river. The County did not use the information they gathered to think critically about how to solve the problems they are facing, and as a result, the CAMA plan provides very little guidance on how to address these issues in the future.
This lack of emphasis on action was also apparent in the policy section, whose language tended to be weak and unenforceable. The policies used words such as “supports” and “discourages”, instead of stronger words such as “requires” and “prohibits.” For example, one policy reads “To preserve conservation areas and avoid water quality impacts due to development, CC encourages private acquisition of these areas by purchase or gift.” This policy has no substantive action in it; the County doesn’t explicitly say how it will ‘encourage’ private acquisition, even though they could offer tax incentives or utilize urban planning tools like exclusionary zoning and conservation easements. This policy essentially requires no action by the County. The lack of enforceable language in Carteret County’s policies was documented by Maureen Will, the DCM regional planner assigned to the Carteret County CAMA plan. In a memo to Katrina Marshall, a Carteret County planner, during the plan review process, Will writes, “While these statements seem to be guiding actions, they are really not policy and cannot be enforced” (Will, 2007). Yet DCM approved the Carteret County plan for certification in the summer of 2009. If Carteret County refuses to write strong regulations in their CAMA plans, they will have no power to enforce those polices once the plan is approved.

Another substantial problem with Carteret County’s future planning methods can be seen in the land suitability map, a required product in the 7B rules. The land suitability map is based on a spatial analysis of 20 suitability categories which are specified in the State guidelines. Most of the categories are focused on infrastructure connectivity and environmental sensitivity, and each parcel of land is given a rating between “least suitable” and “high suitability”. The average suitability is calculated for each parcel. However, to complicate the calculation, a county can choose to double or triple the weight of a category, giving it more influence in the final calculation. Carteret County chose to deviate from the state-supplied model by reducing the weight of the environmental inputs (storm surge, soil septic limitations, and flood zones) to one while increasing the weight for proximity to existing development to three. These decisions resulted in a parcel’s suitability for development substantially more influenced by its proximity to existing infrastructure than its
environmental risks. As a result, waterfront areas, which were previously developed without consideration of environmental consequences, now appear to be the preferential sites for future development, sanctioned by the CAMA plan. These areas can be seen in the final land suitability map (fig. 3), which shows large tracts of high and medium suitability lands (yellow and orange) along estuarine shorelines. From an environmental perspective, estuarine shorelines would typically be considered sensitive areas where only limited development should be allowed.
The last major issue found in the Carteret County plan concerns the future land use map (fig. 4). This is the keystone analysis of the CAMA plan; it asks the county to take all of the previous analyses and identify the areas where future development will be encouraged and restricted. Each land classification category must be accompanied by a description that includes supported land uses, development intensity, housing density, and infrastructure required to support the planned development. The total amount of development allowed is based on the population growth the county expects, and the 7B rules explicitly state “the amount of land allocated to various uses may not exceed projected needs”. The population statistic cited in the Carteret Plan estimated 218,303 persons, or 4,977 housing units\textsuperscript{19}, will be needed by 2025. However, if the total area of each category is multiplied by its respective housing density\textsuperscript{20} (number of housing units per acre), the map can accommodate 333,413 housing units, or 766,849 persons (table 8). This is more than three times the population expected in 2025, meaning the future land use map is allowing drastic overdevelopment and is in clear violation of the 7B rules.

\textbf{Table 8.} Amount of population accommodated by the Carteret County CAMA land-use plan. The plan estimates the population in 2025 will be 218,303 persons. (Area and projected density values taken directly from table 8.2 in the April 20, 2009, final draft.)

<table>
<thead>
<tr>
<th>Land class</th>
<th>Area (in acres)</th>
<th>Projected density (units per acre)</th>
<th>Household unit totals</th>
<th>Persons per household</th>
<th>Total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>101,285</td>
<td>2.0</td>
<td>202,570</td>
<td>2.3</td>
<td>465,911</td>
</tr>
<tr>
<td>Community</td>
<td>3,420</td>
<td>2.0</td>
<td>6,840</td>
<td>2.3</td>
<td>15,732</td>
</tr>
<tr>
<td>Rural with services</td>
<td>13,032</td>
<td>2.9</td>
<td>37,793</td>
<td>2.3</td>
<td>86,923</td>
</tr>
<tr>
<td>Limited transition</td>
<td>25,620</td>
<td>3.0</td>
<td>76,860</td>
<td>2.3</td>
<td>176,778</td>
</tr>
<tr>
<td>Developed</td>
<td>2,125</td>
<td>4.4</td>
<td>9,350</td>
<td>2.3</td>
<td>21,505</td>
</tr>
<tr>
<td>Totals</td>
<td>145,482</td>
<td></td>
<td>333,413</td>
<td></td>
<td>766,849</td>
</tr>
</tbody>
</table>

\textsuperscript{19} The plan estimated 2.3 persons per household.

\textsuperscript{20} Acres and housing densities are defined in table 8.2 of the Carteret County CAMA plan.
Figure 4. Carteret County future land use map (modified from map in April 20, 2009, final draft).
While this may not be an intentional manipulation of the CAMA land-use planning process by Carteret County to allow unchecked development and limit environmental protection, it is clear that this will likely be the result of the plan if enacted as is. This revised plan was submitted for approval during the June 24, 2009, CRC meeting after DCM deemed it ready. Prior to the meeting, two conservation groups protested the Carteret County plan (the N.C. Coastal Federation via CRC member Melvin Shepard and Carteret County Crossroads via written letter)(Hooper, 2009). Their main complaints focused on the future land use map, the deletion of the six policies that exceeded state and federal standards, a flawed public participation process, and outdated materials and data. While they were not allowed to speak during the meeting, the CRC did take issue with the future land use map. John Thayer and the Carteret County planning staff asserted that the calculations were correct, but had been poorly communicated in the plan, and as a result, seemed to overestimate the amount of development that was being allowed. The CRC voted to conditionally approve the plan, sending it back to Carteret County and the Division of Coastal Management to revise, where it is today. It has not been finalized as of the writing of this report, but it will be up to Jim Gregson, DCM Director, to approve. It will not return to the CRC for public reconsideration.

Results of Plan-Quality Evaluation Protocol

The Carteret County CAMA plan scored 66 out of 120 possible points (table 9; the full protocol can be found in appendix 2a). It excelled in the Issues and Vision Statement, Fact Base, Goal and Policy Framework, Spatial Design and Create Clear View and Understanding of Plans sections with its in-depth data gathering and relevant maps. However, it fell short in the Implementation, Account for Independent Actors in Plan Scope and Participation of Actors sections due to its lack of action- oriented, enforceable policies and vague description of its public participation process.

<table>
<thead>
<tr>
<th></th>
<th>Gates County score</th>
<th>Maximum Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issues and Vision Statement</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Fact Base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description and Analysis of Key Features of Local Planning Jurisdiction</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Techniques Used to Clearly Identify and Explain Facts</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Goal and Policy Framework</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Plan Proposals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spatial Design</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Implementation</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Monitoring&lt;sup&gt;21&lt;/sup&gt;</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Encourage Opportunities to Use Plan</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Create Clear Views and Understanding of Plans</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Account for Independent Actions in Plan Scope</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Participation of Actors</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>66</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

Results of Spatial Analysis

The spatial analysis comparing Carteret County’s environmental composite, land suitability, and future land use maps appears to be generally well correlated. When looking at the environmental composite and the land suitability comparison, most the Class 2 and 3 lands (moderate to severe hazards) are contained in the Least Suitable class, which is ideal. Class 1 lands (those with few limitations) make up the majority of the remaining categories (fig. 5), showing that the Class 1 lands have also been identified as the most suitable lands for development.

<sup>21</sup> It should be mentioned that the CAMA 7B rules do not include any requirement for monitoring the implementation or success of policies. The only monitoring that is required is an assessment of the previous plan’s policies.
Figure 5. Comparison of Environmental Composite Map and Land Suitability Map for Carteret County. This table shows the area (in acres) of each environmental composite class contained in each land suitability classification.

The results from the comparison between the environmental composite map and the future land use map are less straightforward; while the bulk of the Class 2 and 3 lands are isolated to the Rural and Conservation land classes, there are some plans to allow development of some of the moderately to severely hazardous lands in the Limited Transition and Rural with Services categories (fig. 6). While this is not ideal, however, there are plenty of Class 1 lands that have been left to the Rural areas which could be considered first. While this graph does not explain the reasons behind the classification of a parcel or the specific development plans in its future, one
would hope that all Class 1 lands would be utilized for the County’s denser development needs before tapping into vulnerable Class 2 lands.

**Figure 6.** Comparison of Environmental Composite Map and Future Land Use Map for Carteret County. This table shows the area (in acres) of each environmental composite class contained in each future land-use classification.

The comparison between the land suitability and the future land maps is even more unclear. Again we see some Least Suitable lands subject to higher potential development than other Low or Medium Suitability lands (fig. 7). While the overall concentration of these lands is not great when compared to the amount of Least and Low Suitability lands being reserved for the Rural and Conservation classes, it is important to remember that each parcel of hazardous land that is developed puts the coastal environment as risk for habitat degradation and diminished water quality.
Figure 7. Comparison of Land Suitability Map and Future Land Use Map for Carteret County. This table shows the area (in acres) of each land suitability class contained in each future land-use classification.

The spatial comparisons of the three maps reflect these findings. When the future land use map is compared to the environmental composite map, and the most relevant class combinations are displayed, it becomes apparent that areas slated for development, particularly those on or near estuarine waterfronts, contain significant amounts of Class 2 and 3 lands (areas in red and purple, fig. 8). The vulnerable lands at risk for development are located mostly along the western shoreline of Bogue Sound and along portions of Down East and Harker’s Island, which is consistent with the areas currently experiencing market-based development pressures. Additionally, many of the rural areas also contain large tracts of Class 2 and 3 lands, particularly those in the northeast along the Pamlico Sound and in the central portion of the County along Back Sound (areas in orange and green). There are some Class 1 lands that have been reserved for conservation scattered
throughout Down East (areas in blue), but not enough substantial patches to replace the amount of Class 2 and 3 lands at risk.

The visual comparison between the future land use map and the land suitability map shows an even bleaker picture (fig. 9). Many of the lands which will be allowed to be developed under the future land use map are classified as Least Suitable (areas in red), particularly along Bogue and Back Sounds and Harker's Islands. These are clearly the areas most at risk for irresponsible development. This comparison also identifies similar rural development areas which are also categorized as Least Suitable, mostly estuarine shoreline lands in the northeast and central parts of the county (areas in orange). This map indicates even fewer parcels of High or Medium Suitability lands (areas in blue) reserved for conservation, but there numerous tracts of Low Suitability lands available, which should preferentially be developed first\(^{22}\).

\(^{22}\) The large tract of low-suitability rural lands in Down East is actually Open Grounds Farm, which is a large, privately-owned farm. This parcel is unlikely to become available for residential or commercial development.
Figure 8. Map showing relationship between the future land use map and environmental composite map for Carteret County (class 2 and 3 lands are displayed for the land-use categories allowing development; class 1 lands are displayed for the lands reserved for conservation).
Figure 9. Map showing relationship between the future land use map and land suitability map for Carteret County (lower suitability lands are displayed for the land-use categories allowing development; higher suitability lands are displayed for the lands reserved for conservation).
**Dare County Plan Evaluation**

The Dare County CAMA plan was started in 2008. It is currently labeled a “final draft”, but has not yet been approved by the local Board of Commissioners or certified by the CRC. The entire plan was developed by Dare County staff and officials.

**Background**

Dare County consists of a 85-mile barrier island chain (typically divided into the northern and southern islands, and historic Roanoke Island) and a portion of the mainland on the eastern edge of the state. Dare County is known for its popular vacation destination, the Outer Banks. The county’s six municipalities prepare their own CAMA plans, leaving the County oversight over all the unincorporated areas. 80% of the remaining lands are publicly owned (including state parks, historical sites, national wildlife refuge, and national seashore), leaving the last 20% in high demand for development. The seasonal population outnumbers the year-round residents 6.5 to 1 during the peak season, but Dare County experiences an influx of visitors year round. Tourism and its supporting services are the main economic driver, often to the chagrin of residents, as vacation homes and businesses often encroach on older, more traditional neighborhoods. 57% of the residential structures are owned by non-residents, giving rise to a divided public opinion over many issues. Most of the northern islands have already been developed, and additional development is expected on the mainland and on Hatteras Island in the south.

Environmentally, areas of Dare County are extremely prone to shoreline erosion, particularly in the Rodanthe and Buxton areas. Due to the narrow width of many of the islands, transportation routes are limited (consisting of only a single north/south highway in some places) and prone to overwash, which can limit access after storms. Bridge maintenance is also a crucial issue. Most environmentally fragile areas are already public land or managed under state regulations (including CAMA AECs) and local ordinances. Water quality has always been a concern, as valuable
shellfishing waters surround many of the unincorporated communities. Stormwater is a growing issue, and a management plan has been created but not adopted by the Board of Commissioners. Central water is available in most areas, but not all lands have sewer service. Alternative wastewater treatment facilities such as low-pressure and peat systems are becoming popular, as many of the soils have moderate to severe septic limitations.

*Strengths of the Dare County Plan*

As a whole, the Dare County Plan is an impressive document. It is extremely thorough, with specific details and concerns about individual communities in most of the sections. It contains close-up maps for many topics not seen in other plans, such as hurricane storm surge, shellfish waters, nursery areas, water-quality classification, shoreline change, and setback requirements. This plan interesting and accessible to the lay person, yet very comprehensive. The only off-putting aspect is be length of the plan (385 pages; attention to detail breeds substantial plan length); those citizens interested in particular communities will have to hunt for the sections that pertain to them. The plan indicates that each area in the Dare County jurisdiction is fairly unique, and the plan could benefit if some of the information was divided into local-area sections rather than ordered entirely by topic.

Outside of the comprehensiveness of its plan, Dare County also undertook an expanded public participation plan\(^\text{23}\). It included three initial citizen workshops, a community-wide survey delivered online and through the mail to all residents and non-resident owners\(^\text{24}\), numerous travelling planning board workshops separate from their regular meeting schedule, and three policy assessment workshops. The public also has the typical opportunities to provide comments, such as

\[^{23}\] Included in the CAMA plan as Appendix 1, the public participation plan was written at the beginning of the planning process and is written in future tense. In writing this evaluation, I am assuming that all the events proposed did or will occur as planned.

\[^{24}\] The survey received over 2,000 responses, 54% from residents and 43% from non-residents. Results can be found in Appendix 3 of the Dare County 2009 draft plan.
planning board meetings, the Board of Commissioners review and approval meetings, and the future CRC certification meeting. The County seems dedicated to involving their citizens throughout the entire process, not only during the initial visioning and assessment phase but also the policy development and review phase.

Another strength of the Dare County Plan is the land suitability analysis, which is the only successful case of GIS-model customization in the set of CAMA plan reviews. Dare County admits that due to the lack of available developable private land (only 20% of the county), it must consider all private land for development of some kind. But it does want to control that development and ensure that free market forces don’t overpower good decision making. For the land suitability analysis, the County selected only the relevant criteria as inputs, and referred directly to the environmental composite map classes as the areas of highest importance\textsuperscript{25} (table 10). For a county with so little available land but such intense development pressure, this analysis is a good compromise. The County took the initiative to customize this analysis in a way that balanced their economic needs while still putting environmental concerns as a priority, and utilized other plan analyses in a beneficial and integrated manner.

\textsuperscript{25} Class 1 lands contain soils with mild septic limitations, X/AE flood zones, and non-wetland soils. Class 2 lands contain Estuarine Shoreline AEC, Ocean Erodible AEC, High Hazard AEC, Public Water AEC, non-coastal wetlands, soils with moderate to severe septic limitations, VE flood zones, HWQ/ORW water classifications, and the Buxton Woods SED-1 Zoning Area. Class 3 lands contain Coastal Wetlands AEC, Estuarine Wetlands AEC, Public Trust AEC, and Unvegetated Beach AEC.


**Table 10.** Dare County land suitability analysis criteria. (Modified from the Dare County draft plan, page 127.)

<table>
<thead>
<tr>
<th>Attributes of Private Lands</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected (public) lands</td>
<td>Excluded</td>
</tr>
<tr>
<td>Class 1 or 2 lands as identified on environmental composite map</td>
<td>High importance</td>
</tr>
<tr>
<td>Class 3 lands (protected from development by regulatory controls)</td>
<td>High importance</td>
</tr>
<tr>
<td>Water quality classifications</td>
<td>Medium importance</td>
</tr>
<tr>
<td>Proximity to existing development</td>
<td>Low importance</td>
</tr>
<tr>
<td>Compatibility with existing development</td>
<td>Low importance</td>
</tr>
<tr>
<td>Proximity to scenic, historical, or cultural sites</td>
<td>Medium importance</td>
</tr>
<tr>
<td>Availability of central water and/or central wastewater</td>
<td>Low importance</td>
</tr>
<tr>
<td>Access to major highways</td>
<td>Low importance</td>
</tr>
</tbody>
</table>

The other noticeable strength of the Dare County plan is in its policy section. At the beginning of the section, the plan acknowledges the CAMA plan policies “provide direction for local elected officials, advisory boards, citizens, and state and federal agencies on land-use planning matters and other issues of local concern”, and that the policies are “referenced by Dare County in reviewing rezoning proposals, development and re-development applications, and when drafting new ordinances or ordinance amendments.” But it admits some conflict can arise between County ordinances and the CAMA plan, as their ordinances are fluid documents which respond more quickly to local conditions and changing information. Many counties struggle to comprehend the CAMA plan’s place in their set of planning documents, caught between its long-term planning nature and its need for short-term, regulatory-like policies. Dare County seems to have found a useful place for its CAMA plan in its arsenal of planning tools, and its efforts to communicate its local purpose are helpful and appreciated.

As mentioned before, the Dare County plan is very thorough and written in a very practical, meaningful way, and the actual polices it contains are no exception. Each of the six required
management topics is divided into subtopics, which have a substantive narrative that explains the relevant facts and current issue, historical action taken by relevant players, and the current condition. The subtopic narrative is followed by individual policies (which read both like a goal and a guiding principle) and related implementation strategies for each policy, which are the action items. The implementation strategies reference specific documents and relevant players, if applicable, and most include an implementation timeframe. Like the rest of the plan, this level of detail leads to a lengthy policy section, and copies of the polices without the narratives are available in the executive summary. While the policy section is not filled with regulatory-like mandates, its policies are strategic responses to current issues accompanied by fairly specific action items that provide meaningful guidance for implementation.

_Weaknesses of the Dare County Plan_

While there are many positive aspects to the Dare County plan, all is not perfect. As noted earlier, the Dare County plan is extremely detailed and explicit about the data provided and the calculations used, however, its “Development Trends and Future Land Use Projects” section uses an unusual proxy to estimate future development needs – housing permits - but the explanation isn’t quite convincing. The plan purports that the seasonal population estimates, which the State does not provide, are too unreliable to give an accurate prediction of future needs. For Dare County, which accommodates such an enormous seasonal population, this is not a projection they can afford to get wrong. The County believes that building permits give an unbiased gauge on development needs because they do not distinguish between permanent residents, second-home owners, or vacation rentals. While this assumption is sound, using building permits as a proxy for needs also assumes that seasonal growth will continue at the same pace that permanent resident growth will, which may not be the case. Available housing inventory, home sales, and changes in parcel ownership are all additional indicators that could enhance this analysis. It may turn out that building permits are a
good proxy for population, however, the plan does not provide enough convincing evidence that this is the case.

This problem becomes compounded when the plan continues on to the future land use map. There are many land-use categories with similar lot sizes and density, but slightly differing use expectations (residential, institutional, commercial). The plan tries to briefly explain the development assumptions used in each class, but it also includes brief description of specific community scenarios, which just complicates the message. There are tables listing future land use acreage by community and category, by category and percent of total acreage, and by category and projected land needs (which falls short of the acreage need estimates derived from the building permit proxy)^26. Not only is it unclear if the plan provides enough development to meet future needs, but it is uncertain where the development is occurring. There is no discussion of which communities have the highest demand for development, and if there is enough acreage in those areas to meet the demand, or if the County is just estimating the overall demand. Dare County has a unique challenge because it has so little land available for development, and that land is divided into small communities stretched over 85 miles of island. Planning for uncertain future needs under these circumstances may not be possible in the setting of the CAMA requirements, but this attempt at future land-use planning is incomprehensible.

Results of Plan-Quality Evaluation Protocol

The Dare County CAMA plan scored 80 out of 120 possible points (table 11; the full protocol can be found in appendix 2b). It excelled in most sections except the Implementation, Account for

^26 The plan acknowledges that the estimated amount of land is less than the projected need, but it gives no explanation as to why or what the consequences are. Interestingly, in the beginning of the land use planning section, the plan specifically states that the County does not anticipate full build-out in this planning period, but the numbers seem to be telling a different story.
Independent Actors in Plan Scope and Participation of Actors sections due to its lack of action-oriented, enforceable policies and vague description of its public participation process.

Table 11. Results of Plan-Quality Evaluation Protocol for Dare County (Berke, Godshalk, and Kaiser, 2006).

<table>
<thead>
<tr>
<th>Issue and Vision Statement</th>
<th>Gates County Score</th>
<th>Maximum Score</th>
</tr>
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<td>Fact Base</td>
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<td>Description and Analysis of Key Features of Local Planning Jurisdiction</td>
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<td>Techniques Used to Clearly Identify and Explain Facts</td>
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<td>Plan Proposals</td>
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<td>Implementation</td>
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<td>12</td>
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<tr>
<td>Monitoring27</td>
<td>2</td>
<td>8</td>
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<td>Encourage Opportunities to Use Plan</td>
<td>7</td>
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<td>Create Clear Views and Understanding of Plans</td>
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<tr>
<td>Account for Independent Actions in Plan Scope</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Participation of Actors</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>TOTAL</td>
<td><strong>81</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

Results of Spatial Analysis

Dare County is very clear in their plan that, due to the very limited amount of private land available, any parcel not yet developed is considered “suitable”. They do evaluate the suitability of the county lands and attempt to limit future development as best they can, however it is obvious that market pressures are forcing the county to build on vulnerable lands that should not be subject to development.

---

27 It should be mentioned that the CAMA 78 rules do not include any requirement for monitoring the implementation or success of policies. The only monitoring that is required is an assessment of the previous plan’s policies.
The environmental composite and land suitability comparison map are generally well correlated; the bulk of the Class 1 lands (few limitations) are deemed Suitable, and most of the Class 3 lands (severe hazards) are Regulated (meaning there are additional development limitations already in place prior to the CAMA plan) (fig. 10). However, a substantial portion of the moderately hazardous Class 2 lands are in the Suitable classification. While this is expected given Dare County’s current development pressures, it is obviously not ideal for environmental resource protection.

**Figure 10.** Comparison of Environmental Composite Map and Land Suitability Map for Dare County. This table shows the area (in acres) of each environmental composite class contained in each land suitability classification.

The correlation begins to degrade even further between the environmental composite and future land use maps. While plenty of Class 3 lands are found in the Limited Conservation and
Conservation classes\textsuperscript{28}, the greatest amount is found in the Community class, which also makes up the majority of the acreage dedicated for residential and village development (fig. 11). The largest amount of Class 2 lands is also found in the Community development class, which is also unfortunate. Class 1 lands appear to be available in both the Limited Conservation and Conservation classes, but development is likely limited by regulations out of the control of the county. This is unfortunate since building on these lands would likely have fewer environmental repercussions than some of the Class 2 and 3 lands now available for development.

\textbf{Figure 11.} Comparison of Environmental Composite Map and Future Land Use Map for Dare County. This table shows the area (in acres) of each environmental composite class contained in each future land-use classification.

\begin{center}
\includegraphics[width=\textwidth]{future_land_use_map.png}
\end{center}

\textbf{Future Land Use Map classification}

\textsuperscript{28} Conservation class mostly contains lands in AECs, which is subject to state development regulations and permitting. The Limited Conservation class usually includes maritime forests and marshlands, which are also subject to protective local development regulations.
Given the County's inclusive definition of 'suitable' land and the amount of additional regulation on its lands, the comparison between the land suitability and future land use map doesn't provide much new information (fig. 12). The Suitable land (open for free development) is spread out among all the classes, and the Regulated land (subject to non-county regulations) is also common in most classes.

**Figure 12.** Comparison of Land Suitability Map and Future Land Use Map for Dare County. This table shows the area (in acres) of each land suitability class contained in each future land-use classification.
Due to the extremely long but narrow shape of Dare County, the visual comparison of the environmental composite and future land use map is displayed through multiple local area maps instead of showing the county as a whole. As the Dare plan warns, much of the areas targeted for development encompass large tracts of Class 2 and Class 3 lands (areas in red and purple), particularly along the barrier islands (figs. 13A-C). The Martins Point community is the only exception, comprised almost entirely of Class 1 lands. There are some substantial Class 1 lands available within the conservation land-use category in Hatteras, but it is a comparatively small patch.

Due to Dare County's simplification of the land-use suitability classes into “suitable” and “regulated”, the visual map comparisons were unable to communicate any useful information about the relationships between the land-use suitability and the future land use maps. Therefore, they have not been included.

\(^{29}\text{In the case of Dare County, the lands in the Conservation class are federal, state, and local natural and historical areas which are not available for development, similar to other counties' public lands classification. Because of this, the large tracts of Conservation areas between development planning areas are not shown in this analysis.}\)
Figure 13-A. Map showing relationship between the future land use map and environmental composite map for Dare County (class 2 and 3 lands are displayed for the land-use categories allowing development; class 1 lands are displayed for the lands reserved for conservation).
Figure 13-B. Map showing relationship between the future land use map and environmental composite map for Dare County (class 2 and 3 lands are displayed for the land-use categories allowing development; class 1 lands are displayed for the lands reserved for conservation).
Figure 13-C. Map showing relationship between the future land use map and environmental composite map for Dare County (class 2 and 3 lands are displayed for the land-use categories allowing development; class 1 lands are displayed for the lands reserved for conservation).
Gates County Plan Evaluation

Gates County began their CAMA plan update in 2003. They partnered with the consulting company, Community Planning Collaborative, Inc., for the development of their plan. The Gates County plan was certified by the CRC on November 18, 2005.

Background

Gates County is approximately 345 square miles in area, and supports about 10,516 residents as of the 2000 Census. It has only one incorporated town, Gatesville, located in the southern part of the county. Most commercial development outside of Gatesville occurs at the crossroads of state highways, which make up the bulk of maintained roads in Gates County. Residential development occurs along these same highways, posing access and traffic issues. Gates County is currently unzoned (as of the plan’s adoption in 2005), but it is trying to encourage subdivision and cluster development to reduce the number of access points onto state highways. It has also seen an increasing number of mobile homes and spill-over development from Virginia, which shares its northern border. 95% of the land in the County is undeveloped. Gates County values its rural character so much that the county has established a minimum lot size of one acre.

Environmentally, many of the soils in Gates County have severe limitations for septic tanks due to prolonged wetness, slow percolation, and poor filtering capacity (40% of Gates County is swamp or marshland). However, the County does not have a centralized wastewater treatment system, and has no future plans for one, so septic system malfunctions are of great concern. The County does not have any stormwater management infrastructure either, and stormwater pollution and nutrient loading is a growing concern. The west side of the County is bounded by the Chowan River, a major tributary to the Albemarle Sound. The water quality of the Chowan is crucial as it is an important fishing resource and spawning ground, including multiple species of threatened and endangered mussels.
Strengths of the Gates County Plan

Gates County has excelled at gathering data, explaining current and emerging conditions, and inventorying the current services and resources that are in place. The community vision is clear and is echoed through the plan. The plan is written in plain language, and for the most part, is clear and easy to follow. The plan fulfills all the 7B planning requirements.

The Gates County plan's main strength is its thorough exploration of the local issues it felt were not addressed by the other five CAMA-mandated management topics. Gates County chose to include 14 additional management topics: commercial and industrial development, community appearance, Chowan River shoreline, development design standards, federal properties and programs, growth management, intergovernmental relations, public safety, redevelopment, residential development, septic tank use, solid waste management, stormwater management, and transportation. Even though most of these topics were addressed in other fact-base and analysis sections, Gates County believed they warranted special attention in the policy section, where they are given goals, policies and objectives.

Weaknesses of the Gates County Plan

As in other plans, the first major problem came with the land suitability analysis (fig. 14). Like many others, Gates used the state-supplied model without modification, even though previous plan discussions indicated that some adjustments should have been appropriate. For example, the plan repeatedly mentions that much of Gates County is swampy and many of its soils have severe limitations. There is no county sewer service, so land suitability is really dependent on the ability to install a septic system. But in the land suitability analysis, Gates County chose to only rank 'septic limitations' as a "2" instead of a "3", but it left in the 'proximity to sewer' category, which doesn't apply. Additionally, the plan mentions that it wants to encourage subdivisions and concentrated areas of development to maintain the County's rural character and reduce the number of highway
access points, but it left the weighting of the ‘proximity to developed land’ as a “1”, undermining its
desire for clustered development. The reliance on proximity to existing roads is clearly evident in
the resulting map. The land suitability analysis might also have been an opportunity to deal with
issues that stem from the County’s lack of infrastructure or zoning. For example, the county is
concerned with stormwater pollution and nutrient loading to its surface waters. It could have
added a category that discouraged development near impaired waters, primary nursery areas or
shellfish waters. The County clearly states that it made a decision to use the state model as
provided, although it seems like the land suitability map suffers as a result.
Figure 14. Land suitability map from Gates County CAMA plan.
Another problematic analysis was the future land use map, both conceptually and computationally. Conceptually, it appears that the Gates County future land use map represents a projection of where the County expects more development to occur, not necessarily where it wants development to occur. The plan doesn’t detail how certain areas were chosen, but visually all development categories (from Limited Growth to Developed) all occur along existing roads. This may be the influence of the land suitability map, whose Medium to High Compatibility classes appear heavily biased by road location (fig. 14), or it may just be a reflection (and perpetuation) of the current road-based development patterns.

Computationally, the future land use map was very difficult to verify (fig. 15). The definition of the land-use classes was the first problem. Typically, counties identify a maximum density (housing unit/acre) for each classification which can be used to calculate the number of people a certain area will accommodate. However, Gates County defines the Developed class as medium- to high-density, meaning less than one unit per acre. The Growth, Limited Growth, and Community classifications are all defined as low-density, or one unit per acre or more (up to 10 acres). It is entirely unclear, then, how the County was able to calculate the values in Exhibit IX-E, which identifies the estimated population and housing units each class will accommodate. Using the values in Exhibit IX-E to calculate housing density, the number of residential acres was divided by the number of residential units to produce values ranging from 1.25 acres/unit (Existing Developed) to 2.16 acres/unit (Future Limited). Each class’s housing density is different, even when comparing existing and future densities, with no logical pattern, leading to even more confusion about what calculations and assumptions were employed. The process the County used to get these statistics should be described in the plan so it can be evaluated and verified.
Figure 15. Future land use map from Gates County CAMA plan.
Putting housing densities aside, if one assumes the values in Exhibit IX-E are correct, the addition of
the number of people in each class produces a result if 12,254 persons, right in line with the 2020
population estimate. However, if the number of housing units in each class are summed, the result
is 5,917 units, significantly over the 2020 estimate of 4,641 units needed\(^\text{30}\). Using the plan’s average
of 2.69 persons per housing unit, these 2020 units will accommodate 15,917 persons, exceeding the
2020 population estimate of 12,257 by an additional 30%. Obviously, this inconsistency just leads
to more uncertainty about the calculations used to produce the Gates County future land use map.

The final problem of the Gates County plan is its policy section. While the policies seem to be well
reasoned and pertinent, they are actually guiding statements and goals rather than enforceable
policies. The policies constantly refer to products and plans not yet developed. These referential
policies are also repeated verbatim in multiple sections, such as county-wide zoning (repeated in 8
sections), a stormwater management plan (4 sections), revised subdivision ordinance (10 sections),
residential design guidelines and standards (3 sections), a county website (7 sections), and road
standards (5 sections). Gates County is a small community, and likely has limited resources to
develop and implement these products. Unfortunately, the lack of administrative tools prevents the
CAMA plan from having any power to address relevant management issues. Of the 67 listed policies,
only seven had any explicit directives or measurable actions. In essence, this CAMA plan identifies
the administrative and regulatory framework that needs to be implemented instead of providing a
set of enforceable policies for decision-making.

*Results of Plan-Quality Evaluation Protocol*

The Gates County CAMA plan scored 64 out of 120 possible points (table 12; the full protocol can be
found in appendix 2c). It excelled in the *Issues and Vision Statement, Fact Base, Spatial Design* and

\(^{30}\) The 2020 housing unit estimate was calculated using the plan’s estimate of 2000 housing unit estimate plus the
estimated need of 37 housing units per year: \(3,901 + (37 \times 20) = 4,641\)
Create Clear View and Understanding of Plans sections with its in-depth and clearly communicated county vision and data gathering. However, it fell short in the Goal and Policy Framework, Implementation, and Participation of Actors sections due to its lack of action-oriented, enforceable policies and vague description of its public participation process.


<table>
<thead>
<tr>
<th></th>
<th>Gates County score</th>
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<td>Issues and Vision Statement</td>
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<td>Description and Analysis of Key Features of Local Planning Jurisdiction</td>
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<td>Techniques Used to Clearly Identify and Explain Facts</td>
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<td>Spatial Design</td>
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<td>Create Clear Views and Understanding of Plans</td>
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<td>Participation of Actors</td>
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</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>65</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

Results of Spatial Analysis

As mentioned before, Gates is a county of sparse development and marshlands. According to the environmental composite map, there are no Class 1 lands (few limitations); the county consists entirely of Class 2 and 3 lands with moderate to severe limitations. Not surprisingly, the land suitability comparison shows that the Medium and High compatibility classes are mostly made up

\(^{31}\) It should be mentioned that the CAMA 7B rules do not include any requirement for monitoring the implementation or success of policies. The only monitoring that is required is an assessment of the previous plan’s policies.
of Class 2 lands (fig. 16). Class 3 lands make up a significant part of both the Low and Least Compatible classes.

Figure 16. Comparison of Environmental Composite Map and Land Suitability Map for Dare County. This table shows the area (in acres) of each environmental composite class contained in each land suitability classification.

![Bar Chart of Land Suitability Classification](#)

While Gates County has plenty of land suitability challenges, its current low-density and low-pressure development scenario also provides an opportunity to identify those parcels which pose the least environmental risk and guide development toward those areas (fig. 17). In the land suitability and future land use map comparison, we see that the Class 3 lands have been isolated to the Conservation class, leaving the rest of the Class 2 lands available for potential development in the future which is focused on low-density Rural development.
**Figure 17.** Comparison of Environmental Composite Map and Future Land Use Map for Dare County. This table shows the area (in acres) of each environmental composite class contained in each future land-use classification.

The comparison between the land suitability and the future land use map shows a similar picture. In the four higher-density classes (Developed, Growth, Transition, and Community), most of the land is classified as High Compatibility (fig. 18). The bulk of the Conservation class is Least Compatible Lands, and the Rural area makes up the rest of the acreage, which is split between all four classes. However, seeing this graph, a question does arise. Given the low development pressure and the extent of ill-suited lands, are all the acres of Low and Least Compatible lands needed for future Rural development? Should Gates County make the decision to most of the Least Compatible lands into the Conservation class to prevent these lands from ever being developed?

**Figure 18.** Comparison of Land Suitability Map and Future Land Use Map for Carteret County. This table shows the area (in acres) of each land suitability class contained in each future land-use classification.
Spatial comparisons of the environmental composite and land suitability maps to the future land use map also reveal some interesting connections (fig. 19). When compared to the environmental composite map, it is clear that most of the future plans for development fall in areas with the fewest hazards for development. The only area of substantial conflict (and opportunity) are the lands surrounding Merchant’s Mill Pond State Park in the center of the county. There is a substantial tract of planned development on Class 3 lands (in red), but there are also significant areas of Class 2 lands which have been designated as Conservation. Due to their proximity to the vulnerable lands, these lands should be considered for development first as they could represent a beneficial development alternative.

When the future land use map is compared to the land suitability map, other patterns emerge (fig. 20). There is substantial development potential that has been planned for many of the “least” and “low” suitability lands, but fortunately, most of the development plans fall under the lower-density
rural land-use category (in orange and green). There are very few lands slated for the higher-density development (in red and purple). However, the suitability conflicts that do appear tend to be located along streams in both the developed and rural lands. Since Gates County is experiencing very few current development pressures, it should steer future development away from county waterways to allow beneficial riparian buffers and wetlands to remain intact.
Figure 19. Map showing relationship between the future land use map and environmental composite map for Gates County (class 3 lands are displayed for the land-use categories allowing development; class 2 lands are displayed for the lands reserved for conservation).
Figure 20. Map showing relationship between the future land use map and land suitability map for Gates County (lower suitability lands are displayed for the land-use categories allowing development; higher suitability lands are displayed for the lands reserved for conservation).
PART 2: SURVEY

While it is important to critically evaluate the quality and effectiveness of the plans that are the result of the CAMA land-use planning requirement, it is also important to understand how these plans function in the real world. Are the beneficial to those who are creating them? Does the process provide valuable information that can be used for other planning purposes? Is plan development a strain on local personnel and resources? The only way to gain insight into these questions is to ask them directly to those doing the planning, so the second part of this study consisted of a web survey delivered to county officials and planning staff in the 20 CAMA counties.

Methodology

The goal of the survey was to investigate the current usage of and opinions about the CAMA land-use requirement. The complete survey instrument is included in Appendix 3, but survey topics included:

- Familiarity and use of the CAMA plan for development and environmental impact decision-making
- Limitations to plan development
- Use of outside consultants for plan development
- Creation of valuable information and planning guidance
- Efficient use of county resources
- Effective protection of environmental resources

The survey included a mix of single-response, multiple-choice, Likert-scale and open-ended questions. Every question was optional, except for the consent to participate. The survey was delivered online using surveymonkey.com, and utilized SSL security to ensure respondent answers were not compromised. The survey was available for two weeks.
Target survey respondents were county commissioners, planning board members, zoning board of adjustment members, county managers, and planning department staff. Contact information was initially identified using each county's public website. For consistency, contact information was not obtained via telephone for any county to prevent biased collection efforts. Budget and time constraints were also an issue. Many unexpected issues prevented communication with all targeted respondents from all counties. Some issues that arose included:

- Many county websites did not identify by name or list email addresses for many of the targeted respondents, particularly Planning Board and Zoning Board of Adjustment members. In these cases, the Clerk to the Board of Commissioners was contacted via email in the hopes of obtaining additional contact information (the Clerk was not invited to participate in the survey).
- Frequently, the county planning director was in charge of Planning Board and Zoning Board of Adjustment contact information. The directors rarely had emails for these members. Due to budget and time constraints, phone or mail survey invitations were not utilized.
- Three counties had a single email address for all their commissioners, so it is difficult to know if each individual commissioner received an invitation.
- At least three counties had commissioners who did not have an email address on file with their county or did not use email at all.
- In cases where email was not available for county officials, clerks, planning directors, and county managers were asked to pass the survey on to the appropriate respondents.
- Tyrrell County's website focused more on tourism issues instead of governmental operations, and did not list any named individuals to contact. Their general email form was used to submit additional requests for information and to send a survey invite, but no one from Tyrrell County participated in the survey. This may have been due to this lack of direct email contact.

A total of 178 email invitations were sent out, but this count also included generic Board of Commissioners addresses and requests to County Clerks and Planning Directors to distribute
invites to county officials and employees who were involved in CAMA planning and permitting. Therefore, it is difficult to know how widely the survey invite was circulated.

Results

The survey was open for 16 days and received 49 responses, a participation rate of 27.5% (based on the initial 178 invitations). The survey was biased by county employees (58.3%) and respondents from Currituck, New Hanover, Onslow, and Pender Counties (together, 51.1%) (fig. 21). 48.9% of the respondents had over five years experience as a county official or employee.

While most respondents said they had read all or most of their county’s CAMA plan, there were nine respondents who are involved with planning activities (including CAMA permitting and variance review and/or approval) who have not read most of their plan (table 13). Fortunately, most respondents who make development or environmental decisions refer to their plan’s policies when making those decisions (fig. 22). The three respondents who reported only “sometimes” using their plan for decision-making noted that the reasons behind their infrequent use of their CAMA plan included deference to another planning document or that the CAMA policies did not apply to the decision at hand.

Table 13. CAMA plan familiarity of respondents who are involved in planning activities for their county.

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>I have read the entire plan. (28 respondents)</th>
<th>I have read most of the plan. (10 respondents)</th>
<th>I have read some of the plan. (8 respondents)</th>
<th>I have not read any of the plan. (1 respondent)</th>
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<td>Approval or review of new development proposals</td>
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Figure 21. Demographics of survey respondents. [Note: three respondents did not identify their county.]
When asked if they were involved in the development of their county's most recent CAMA plan (including draft plans), 42.6% said they were. When asked about resource availability during plan development, most cited that county personnel time and expertise were readily available, while their ability to fund and perform scientific analyses was limited (table 14). Some counties also noted trouble obtaining the information required for the plan analyses, while other counties had easy access to all the necessary data. Many responses noted a lack of ability to fund and perform scientific analyses, which may indicate the area in greatest need of state assistance.

Table 14. Availability of resources during development of CAMA plan. Top three responses are noted in red.

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<th>Limited</th>
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<tr>
<td>Personnel time</td>
<td>95%</td>
<td>31%</td>
</tr>
<tr>
<td>Personnel expertise</td>
<td>84%</td>
<td>31%</td>
</tr>
<tr>
<td>Obtaining source information and data</td>
<td>63%</td>
<td>46%</td>
</tr>
<tr>
<td>Performing scientific analyses</td>
<td>32%</td>
<td>62%</td>
</tr>
<tr>
<td>Financial resources to fund personnel</td>
<td>58%</td>
<td>38%</td>
</tr>
<tr>
<td>Financial resources to fund data or analyses</td>
<td>42%</td>
<td>46%</td>
</tr>
</tbody>
</table>
When asked if they had outsourced any parts of their plan, eight counties said they had outsourced some or all of their plan\textsuperscript{32}, while two counties had only used county staff to develop their plan.

When respondents from these counties were asked to identify why outsourcing was used, the top two reasons were a lack of staff time and expertise (table 15). Strangely, these were also the two resources marked as ‘readily available’ on the previous question (even when only responses from the eight outsourcing counties are evaluated). This incongruency may be due to respondent error or poor survey design, such as unclear wording or a lack of appropriate answer choices. When asked to identify the parts of their plans that had been outsourced, individual responses included data collection and analysis, plan writing, and public participation.

<table>
<thead>
<tr>
<th>Table 15. Reasons for outsourcing the development of some or all of their plan.</th>
</tr>
</thead>
<tbody>
<tr>
<td>County personnel were qualified, but did not have enough available time</td>
</tr>
<tr>
<td>County personnel did not have enough technical expertise</td>
</tr>
<tr>
<td>County did not have necessary information or resources</td>
</tr>
<tr>
<td>Cheaper to outsource</td>
</tr>
<tr>
<td>Quicker to outsource</td>
</tr>
</tbody>
</table>

Two key questions of the survey were Likert-scale matrixes. One question was a set of statements focused on the perceived benefits of the required data analyses and the utility of the plans produced (table 16). In general, most respondents viewed the process favorably, agreeing that CAMA plans are helpful tools which provide valuable information for their county\textsuperscript{33}.

However, the Commissioners and staff groups did not have a majority of their respondents in the

\textbf{Strongly Agree} category for any statement. Group average values for almost all statements between

\textsuperscript{32} Six counties indicated their entire plan was outsourced, and two counties had multiple responses that indicated both “some” and “all” of their plan had been outsourced.

\textsuperscript{33} It should be noted that a maximum of 12 Commissioners and 6 Board members responded to these questions, so each response carries a great deal of weight in the percentage calculations. However, due to frequency of incomplete answers, percentages were the only way to display comparable results.
2.0 (agree) and 1.0 (neutral), with the exception of the statement “The CAMA land-use planning process provides valuable information about my county,” which had values below 2.0 for board members and county staff, indicating a tendency towards Strongly Agree. A few statements did divide some respondent groups, including “My county’s CAMA plan was developed in a timely manner,” (at least 10% of each group strongly disagreed) and “Developing a CAMA plan was an efficient use of our financial resources,” (between 4 to 18% of each group strongly disagreed).

The second set of Likert-scale statements focused more on the CAMA planning process and requirement (table 17). When asked if the plans encouraged environmental protection, the majority of all groups agreed, although the next statement revealed that not everyone thought the plans provided enough protection (over half of the total board and staff members selected Neutral or Disagree). The majority of all groups also agreed that most the required analyses provide valuable information, but are divided on the effectiveness of public involvement during the development of CAMA plans (while the most frequent answer was Agree for all groups, they all had substantial amounts of respondents mark Neutral and Disagree).

The last three statements delivered more divisive answers. No respondent strongly agreed with the statement “The CAMA planning process is straightforward and easy to understand,” and the Commissioners most frequently chose Disagree. A large portion of the Commissioners also disagreed with the statement “The CAMA planning requirement is flexible,” but the most frequent answer from staff members and board members was Neutral and Agree, respectively. The final question asked respondents if CAMA land-use plans should be optional. Over half of the Commissioners and a third of the Board members were in favor of that option, although the groups were fairly divided. The majority of county staff members were not, marking Disagree or Strongly Disagree.
Table 16. Results of Likert-scale question regarding opinions about the CAMA analyses and plans. The highest percentage for each group is displayed in red.

<table>
<thead>
<tr>
<th>Question</th>
<th>Group</th>
<th>Strongly agree (1)</th>
<th>Agree (2)</th>
<th>Neutral (3)</th>
<th>Disagree (4)</th>
<th>Strongly Disagree (5)</th>
<th>I don't know (0)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>The CAMA land-use planning process provides valuable information about my county.</td>
<td>Commissioners</td>
<td>30%</td>
<td>50%</td>
<td>0%</td>
<td>20%</td>
<td>0%</td>
<td>0%</td>
<td>2.10</td>
</tr>
<tr>
<td></td>
<td>Board members</td>
<td>50%</td>
<td>17%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>17%</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td>30%</td>
<td>63%</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1.78</td>
</tr>
<tr>
<td>My county’s CAMA plan was developed in a timely manner.</td>
<td>Commissioners</td>
<td>0%</td>
<td>60%</td>
<td>10%</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>2.50</td>
</tr>
<tr>
<td></td>
<td>Board members</td>
<td>17%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
<td>17%</td>
<td>17%</td>
<td>2.40</td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td>4%</td>
<td>30%</td>
<td>30%</td>
<td>11%</td>
<td>11%</td>
<td>15%</td>
<td>2.95</td>
</tr>
<tr>
<td>Developing a CAMA plan was a worthwhile use of personnel.</td>
<td>Commissioners</td>
<td>9%</td>
<td>64%</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>0%</td>
<td>2.45</td>
</tr>
<tr>
<td></td>
<td>Board members</td>
<td>33%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>17%</td>
<td>17%</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td>19%</td>
<td>48%</td>
<td>22%</td>
<td>0%</td>
<td>4%</td>
<td>7%</td>
<td>2.16</td>
</tr>
<tr>
<td>Developing a CAMA plan was an efficient use of our financial resources.</td>
<td>Commissioners</td>
<td>9%</td>
<td>45%</td>
<td>18%</td>
<td>0%</td>
<td>18%</td>
<td>0%</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td>Board members</td>
<td>17%</td>
<td>33%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>17%</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td>19%</td>
<td>48%</td>
<td>19%</td>
<td>0%</td>
<td>4%</td>
<td>11%</td>
<td>2.13</td>
</tr>
<tr>
<td>My county’s CAMA land-use plan is an effective planning tool.</td>
<td>Commissioners</td>
<td>25%</td>
<td>58%</td>
<td>0%</td>
<td>8%</td>
<td>8%</td>
<td>0%</td>
<td>2.16</td>
</tr>
<tr>
<td></td>
<td>Board members</td>
<td>33%</td>
<td>33%</td>
<td>0%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td>15%</td>
<td>63%</td>
<td>19%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>2.11</td>
</tr>
<tr>
<td>My county’s CAMA plan supplements our other guidance documents and plans in a beneficial way.</td>
<td>Commissioners</td>
<td>18%</td>
<td>55%</td>
<td>0%</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
<td>2.30</td>
</tr>
<tr>
<td></td>
<td>Board members</td>
<td>33%</td>
<td>33%</td>
<td>0%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td>11%</td>
<td>59%</td>
<td>22%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>2.19</td>
</tr>
<tr>
<td>We use information collected during the development of our CAMA plan for other uses.</td>
<td>Commissioners</td>
<td>9%</td>
<td>64%</td>
<td>0%</td>
<td>0%</td>
<td>9%</td>
<td>18%</td>
<td>2.22</td>
</tr>
<tr>
<td></td>
<td>Board members</td>
<td>17%</td>
<td>33%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td>15%</td>
<td>56%</td>
<td>11%</td>
<td>7%</td>
<td>4%</td>
<td>7%</td>
<td>2.24</td>
</tr>
</tbody>
</table>
Table 17. Results of Likert-scale question regarding opinions about the CAMA planning requirement. The highest percentage is displayed in red.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree (1)</th>
<th>Agree (2)</th>
<th>Neutral (3)</th>
<th>Disagree (4)</th>
<th>Strongly Disagree (5)</th>
<th>I don’t know (0)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>The CAMA land-use planning requirement encourages counties to protect coastal resources.</td>
<td>Commissioners 27%</td>
<td>45%</td>
<td>9%</td>
<td>18%</td>
<td>0%</td>
<td>0%</td>
<td>2.18</td>
</tr>
<tr>
<td></td>
<td>Board members 50%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>Staff 22%</td>
<td>74%</td>
<td>0%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>1.85</td>
</tr>
<tr>
<td>The CAMA planning requirement adequately protects environmental resources.</td>
<td>Commissioners 18%</td>
<td>55%</td>
<td>9%</td>
<td>18%</td>
<td>0%</td>
<td>0%</td>
<td>2.27</td>
</tr>
<tr>
<td></td>
<td>Board members 33%</td>
<td>0%</td>
<td>17%</td>
<td>33%</td>
<td>0%</td>
<td>17%</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td>Staff 4%</td>
<td>41%</td>
<td>37%</td>
<td>11%</td>
<td>7%</td>
<td>0%</td>
<td>2.78</td>
</tr>
<tr>
<td>Most of the analysis required for our CAMA plan is beneficial to my county.</td>
<td>Commissioners 9%</td>
<td>45%</td>
<td>18%</td>
<td>18%</td>
<td>9%</td>
<td>0%</td>
<td>2.73</td>
</tr>
<tr>
<td></td>
<td>Board members 33%</td>
<td>33%</td>
<td>0%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Staff 4%</td>
<td>63%</td>
<td>22%</td>
<td>4%</td>
<td>4%</td>
<td>4%</td>
<td>2.38</td>
</tr>
<tr>
<td>The CAMA plan is an effective way to get the public involved with the planning process.</td>
<td>Commissioners 0%</td>
<td>36%</td>
<td>36%</td>
<td>9%</td>
<td>18%</td>
<td>0%</td>
<td>3.09</td>
</tr>
<tr>
<td></td>
<td>Board members 17%</td>
<td>33%</td>
<td>17%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>2.40</td>
</tr>
<tr>
<td></td>
<td>Staff 0%</td>
<td>52%</td>
<td>30%</td>
<td>15%</td>
<td>0%</td>
<td>4%</td>
<td>2.28</td>
</tr>
<tr>
<td>The state and federal consistency requirement is an important aspect of CAMA plans.</td>
<td>Commissioners 0%</td>
<td>42%</td>
<td>42%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>2.64</td>
</tr>
<tr>
<td></td>
<td>Board members 17%</td>
<td>33%</td>
<td>17%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>2.40</td>
</tr>
<tr>
<td></td>
<td>Staff 19%</td>
<td>44%</td>
<td>19%</td>
<td>7%</td>
<td>4%</td>
<td>7%</td>
<td>2.11</td>
</tr>
<tr>
<td>The CAMA planning process is straightforward and easy to understand.</td>
<td>Commissioners 0%</td>
<td>9%</td>
<td>27%</td>
<td>45%</td>
<td>18%</td>
<td>0%</td>
<td>3.73</td>
</tr>
<tr>
<td></td>
<td>Board members 0%</td>
<td>50%</td>
<td>17%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td>Staff 0%</td>
<td>44%</td>
<td>26%</td>
<td>15%</td>
<td>11%</td>
<td>4%</td>
<td>2.92</td>
</tr>
<tr>
<td>The CAMA planning requirement is flexible and allows for my county to incorporate our planning priorities.</td>
<td>Commissioners 0%</td>
<td>36%</td>
<td>18%</td>
<td>36%</td>
<td>9%</td>
<td>0%</td>
<td>3.18</td>
</tr>
<tr>
<td></td>
<td>Board members 17%</td>
<td>50%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>17%</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Staff 4%</td>
<td>30%</td>
<td>33%</td>
<td>19%</td>
<td>4%</td>
<td>7%</td>
<td>2.88</td>
</tr>
<tr>
<td>CAMA land-use plans should be optional (without deferring planning control to the State).</td>
<td>Commissioners 27%</td>
<td>27%</td>
<td>18%</td>
<td>18%</td>
<td>0%</td>
<td>9%</td>
<td>2.30</td>
</tr>
<tr>
<td></td>
<td>Board members 33%</td>
<td>0%</td>
<td>17%</td>
<td>17%</td>
<td>17%</td>
<td>17%</td>
<td>2.80</td>
</tr>
<tr>
<td></td>
<td>Staff 7%</td>
<td>15%</td>
<td>22%</td>
<td>37%</td>
<td>15%</td>
<td>4%</td>
<td>3.38</td>
</tr>
</tbody>
</table>
20 respondents answered the open-ended question asking them to write down the most beneficial aspects of the CAMA land-use planning process (table 18). As seen below, many cited environmental protection as one of the best parts of the planning requirement, as well as the opportunity to get the public involved in local planning and the utility of the CAMA plan as tool to guide development decisions.

**Table 18.** Results of open-ended questions asking for the most beneficial aspects of CAMA planning process.

<table>
<thead>
<tr>
<th>Most beneficial</th>
<th>Number of comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental protection</td>
<td>6</td>
</tr>
<tr>
<td>Public involvement</td>
<td>4</td>
</tr>
<tr>
<td>Strategic development planning tool</td>
<td>4</td>
</tr>
<tr>
<td>Data analyses</td>
<td>3</td>
</tr>
<tr>
<td>Formalized guidelines and policies</td>
<td>2</td>
</tr>
<tr>
<td>Comprehensive guide</td>
<td>2</td>
</tr>
<tr>
<td>Focus on long-term planning</td>
<td>2</td>
</tr>
<tr>
<td>Plans are required to be updated</td>
<td>1</td>
</tr>
</tbody>
</table>

17 respondents supplied an answer to the open-ended question asking for the least beneficial aspect of the planning process (table 19). They cited the rigidity of the planning requirement, expressing their desire to incorporate locally relevant issues. Respondents also complained that the CAMA plan was caught between a traditional land-use plan and zoning ordinance, and the mix of policy and regulation made it hard to define as either a guidance document or an enforceable rulemaking document.
Table 19. Results of open-ended questions asking for the least beneficial aspects of CAMA planning process.

<table>
<thead>
<tr>
<th>Least beneficial</th>
<th>Number of comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigidity of required planning elements</td>
<td>3</td>
</tr>
<tr>
<td>Strange mix of a land-use plan and a zoning ordinance</td>
<td>3</td>
</tr>
<tr>
<td>Undue burden on coastal counties</td>
<td>2</td>
</tr>
<tr>
<td>Inconsistency of requirement interpretation at state approval level</td>
<td>2</td>
</tr>
<tr>
<td>State review/approval takes too long</td>
<td>2</td>
</tr>
<tr>
<td>Too little public participation</td>
<td>2</td>
</tr>
<tr>
<td>Too obscure for public to understand</td>
<td>2</td>
</tr>
<tr>
<td>Takes too long to produce</td>
<td>1</td>
</tr>
<tr>
<td>Does not represent local community</td>
<td>1</td>
</tr>
<tr>
<td>Demanding data analyses</td>
<td>1</td>
</tr>
<tr>
<td>Plans just uphold state and federal minimum standards</td>
<td>1</td>
</tr>
<tr>
<td>Future land use map</td>
<td>1</td>
</tr>
</tbody>
</table>

The final open-ended question in the survey asked respondents to provide suggestions on how to improve the planning process. Some of the 19 comments received described proposed solutions while others solely identified problems. The comments have been grouped and summarized below:

- CAMA plans should be more integrated with other planning tools, like hazard mitigation plans, comprehensive plans, and zoning ordinances.
- Plans need to be more flexible to account for local priorities.
- Make the CAMA plan a true land-use planning process, not a plan based on rigid elements and criteria that must be followed. Allow for non-environmental planning topics to be incorporated into the document.
- The public participation process needs to be improved. The public is heavily engaged in the initial visioning and planning process, but is no longer involved by the end. There should be designated funding for public involvement throughout the entire process.
- Division of Coastal Management staff should update counties periodically to present summary information on emerging issues, ideally during public Commissioners meetings so coastal issues stay in the public eye and local decisions are given more validity.
• Plans should be reviewed and approved more quickly at the state level.

• Once the community has approved the plan, it should not require additional state approval.

• CAMA plan policies are not enforced.

• Most plans default to state and federal guidelines anyway; there’s no need for a formal plan.

• It is unfair to require that only coastal counties have to producing land-use plans. All 100 counties should have to do this.

To summarize, respondents generally look favorably on the CAMA land-use plans, and view the development process as a worthwhile use of personnel and financial resources. Public participation and data access/analysis appear to be the issues that counties struggle with, although many counties outsource some or all of their plan, indicating that additional plan elements may also be a challenge. Most believe that the planning process does encourage counties to consider their environmental resources, but a substantial number also think that additional protection is necessary. There is common concern for the timeliness of plan review and approval, especially at the state level; a few comments cite state review times of over a year. Responses also indicate the need for a more flexible process which can be customized for local community concerns, as well as increased integration with other county planning documents and tools. Finally, the State needs to clarify the role of the CAMA plan as a guidance document or regulatory ordinance.
CONCLUSIONS AND RECOMMENDATIONS

While CAMA’s approach to environmental protection through strategic land-use planning is a sound concept, poor-quality plans can downplay county efforts and the environmental repercussions of irresponsible development can be severe. If the county or municipality is not mindful of which lands they allow to be developed, or if vague policies prevent plan guidelines from being implemented, valuable habitat can be degraded or destroyed. Protecting environmental resources benefits everyone; citizens can enjoy clean air and pollution-free water, fishermen can harvest healthy fish year-round; tourists can appreciate the natural beauty of sparkling beaches and inland waters; and communities will continue to support local businesses and economies. Unfortunately, the CAMA-created system of AECs covers only a small portion of coastal lands, and the State protection afforded to the AECs cannot be relied upon to adequately protect all of North Carolina’s coastal resources. Environmentally responsible land-use planning is critical to fully achieve the State’s preservation goals.

The CAMA land-use planning requirement mandates a detailed set of data analyses in the hopes of encouraging coastal counties to evaluate locally sensitive areas and limit development based on environmental suitability. Unfortunately, it is clear from this study that the process is not incentivizing many counties to embrace local environmental protection initiatives as the State intended. As this study reveals, there are substantial problems with the CAMA planning requirement at many scales, from conception to implementation and analysis to policy. But not all the blame falls on the State’s requirements; local circumstances also limit the effectiveness and control a county can bring to bear. This section identifies some of the issues discovered during this analysis that are preventing CAMA plans from serving as effective planning documents and protecting coastal resources, and makes recommendations about how the process and resulting plans could be improved.
The CAMA plan identity crisis. As mentioned in the survey and evidenced in the plan evaluations, CAMA plans are a hybrid of a high-level planning document and a zoning ordinance. Similar to a land-use or comprehensive plan, the CAMA plan requires a visioning process, identification of threats and opportunities, goal-setting, and issue analysis. But like a zoning ordinance, it also desires substantial policy development including the creation of measureable, enforceable regulations. Additionally, the requirements are very specific in the topics the plan must address, and typical planning elements like social services, community character, and economic development are only discussed in relation to environmental consequences. Some counties already invest in other planning tools like comprehensive plans, hazard mitigation plans, and subdivision ordinances. These documents likely contain analyses and polices that could influence or inform topics contained in the CAMA plan, but there is little guidance or incentive to integrate all these tools into a cohesive planning strategy. This confusing mix of planning likely frustrates many counties who don't want to duplicate their efforts between multiple planning documents. This approach also discourages the creation of regulatory policies if the bulk of the county's ordinances are contained in another document.

Recommendation: The state needs to re-evaluate its goals for the planning process and adjust the planning requirements accordingly. It should give counties the option of incorporating other planning elements into the plan, so they can use it as a fully functioning comprehensive/land-use plan. If regulatory policies are the State's real focus, it should require or incentivize counties to develop enforceable policies.

Making the transition from analysis to policy. As seen in the Carteret, Gates and Dare County case studies, the 7B rules can require the county or municipality to perform the analyses, but they cannot require them to think critically and plan strategically while keeping environmental protection in mind. Many counties choose not to enact policies that exceed state and federal
standards, and their plans fall short of creating specific, enforceable policies and actions to fulfill their community goals. Even some of the more guided analyses, like the land suitability map, still allow the county or municipality the option of favoring development over environmental protection. Specific goals, like the creation of a future land use map to show the development limits of available land, can be misinterpreted to allow much more development that needed or misused to show expected development instead of strategically guiding it. Unless the county or municipality already values its environmental resources, the current system is unlikely to ensure that all coastal resources will be adequately protected.

Recommendation: Much of the previous recommendation applies here. Additionally, more oversight and enforcement of these goals during state review of the plan would ensure that counties are not over-valuing economic goals at the cost of environmental resources.

Locally relevant plans. Through the evaluation of the three case-study plans, it was very apparent that each county has a very different set of limitations, planning priorities, and local resources that affect their CAMA plan and their ability to guide future development in responsible ways. Dare County’s developed areas are spatially limited and spread out over many miles, making community involvement and conservation efforts very difficult. Gates County’s lands are predominantly marshlands and it faces very little development pressure, but it has limited resources and tools for strategic planning. Carteret County is experiencing strong estuarine development pressures while trying to preserve traditional fishing villages and work around large municipalities. CAMA plans must allow for counties the flexibility to include issues that are affecting development decisions or eliminate issues that don’t apply.

Recommendation: Allow for more flexibility in the CAMA planning elements. Provide assistance to make environmental analyses more locally specific. Encourage the use of local area planning: both
Currituck and Hyde Counties divided their planning areas into localized areas with specific issues and needs, and then performed different planning scenarios for each area. This might also inspire more community involvement, as citizens are more likely to participate in policy discussions that pertain directly to them.

**The trouble with maps.** The environmental composite, land suitability, and future land use map are three of the most power tools in the CAMA plan, in both the strength of the analysis and the ease of reader comprehension. Unfortunately, there doesn’t seem to be a successful method of integration or review of these analyses. The problems arise in many forms: inappropriate weighting of inputs, including irrelevant or excluding crucial data, an over-reliance on existing development or transportation routes, guiding development toward sensitive areas before less-vulnerable areas are first built-out, deferring to the state-provided model settings, or miscalculations and unexplained methodology. Counties also seem to lack the initiative or will to customize these evaluations for locally important issues and data. Additionally, the results may not correlate with or be used in other key analyses. These three analyses are important, but their development and use must be carefully monitored.

Another problem with these maps, particularly the future land use map, is one of scale. Many counties caveat their maps with a disclaimer stating the classification is not done on a parcel scale, so decisions regarding specific plot suitability and limitations may differ from the future land use map. While it is understandable that a certain parcel may have characteristics that differ from the surrounding area, this also diminishes the power of the future land use map as a decision-making tool. If every parcel can be allowed a different development density during an individual analysis, then the cumulative result may not match the future land use map at all. There needs to be more clarification about the goals of the future land use map and how much enforcement should be behind it.
Recommendation: The state needs to provide more guidance and encourage local customization, including specialized assistance with locally relevant data sets to allow for more robust analyses. Ideally, these discussions would take place early in the plan development process so to save time and effort for both the county and state, but at the very least, the State should review these analyses more closely during plan review to ensure they contain all pertinent information, are not heavily weighting existing development or infrastructure over environmental limitations, and consistently support the other analyses and results in the plan.

Engaging the public throughout the entire process. While the plan approval process does provide for some public participation, it is important to realize that there are many stakeholders who are affected by the outcomes of CAMA land-use plans. Developers, real estate agents, and construction businesses will not want to see profitable lands become unavailable for development. Town councils and county commissions will not want to alienate powerful business and citizen groups. Waterfront homeowners will not want limitations placed on uses of their property or the future value of their property diminished in case they want to sell. Inland homeowners will not want to pay higher property taxes to fund local infrastructure because development has been limited or redirected, leading to fewer residents to share the tax burden. Fishermen won’t be able to earn a living if the fish they catch are full of pollutants or unable to survive due to poor water quality, but they also need continued waterfront access to bring in their catch. Conservation groups will want the most protection possible for valuable coastal environments. Tourists will want the water to be safe for their families to play and fish. Local residents will want to preserve the cultural and aesthetic character of the place they call home. Creating a land-use plan that accommodates all these desires is a difficult task, but the current public participation process does not require input from a variety of stakeholders, only “citizens”.
Recommendation: Both the counties and the CRC need to ensure that a variety of voices are engaged to provide meaningful feedback during each step of the process.

Public involvement also needs to be encouraged throughout the entire process, not just during the initial visioning process. The current public participation mandates only require that the public be given an opportunity to speak, but does not require that the county make any effort to encourage effective involvement. Few citizens will make the effort to understand a 200-page plan, filled with technical analysis and policy statements, well enough to speak critically about it, essentially preventing public feedback once the plan starts to take shape. Unfortunately, the later stages of plan development are the crucial times for policy creation and development planning, times when it would be ideal for the public to be involved.

Recommendation: Make the plans more accessible to the public through language and design. Utilize stakeholder participation techniques to elicit and encourage meaningful discussion and feedback.

One last caution about public involvement, particularly for internet-savvy staff and researchers: there are parts of coastal North Carolina that have not fully embraced the internet as a crucial method of information distribution. Not all county officials and residents have web access or email. Counties cannot rely on web notices and digital PDFs to inform citizens about their proposed plans and opportunities for public involvement. Some, like Dare County, have made additional effort to have workshops and additional meetings focused on specific parts of the plan to encourage feedback. They are mindful that travel distance is also prevents citizen involvement, so they held workshops at multiple locations throughout their county to increase the diversity of community involvement. They also utilized a county-wide web and mail survey to gather opinions.

Recommendation: Think beyond the public participation requirement. Take advantage of a range of technological and social opportunities to engage citizens. Creating a public participation process that
is accessible (both physically and conceptually), meaningful, and topical will help counties engage their citizens and create more support for local CAMA plans.

**Length of the planning process.** Reviewing the survey results and the county CAMA planning history (table 4), one notices that the time between plan conception and plan approval has lengthened for many counties, with at least five plans taking over three years. Some survey respondents mentioned the time required for the State review and approval process was excessive. In the past 5 years, the U.S. has experienced a huge housing boom and subsequent crash, coupled with a severe economic recession. Those plans that have been caught in the review and approval process (like the Carteret County plan) are now based on severely outdated population and economic projects and needs. Additionally, while these plans languish, some counties are still deferring to plans created in the 90s. All parties need to make an effort to identify the reason behind this lag and to reduce the time between the plan's first complete draft and certification by the CRC.

*Recommendation: Determine why plans are taking so long to develop and approve. Evaluate if there is a substantial state review delay, and remedy the problem immediately.*

**Funding and outsourcing.** It became apparent through the survey that outsourcing plan development is very common, although the reasons are somewhat unclear (but likely revolve around a lack of expertise and funding for the scientific analyses). This evaluation did not examine if quality or content differences exist between county-plan and consulted-based plans, but one could assume that local planners would be much more attuned to local issues and circumstances than a consulting company. If federal and state funding continues to be scarce, the development of CAMA plans will become a substantial burden on many counties, particularly in rural areas. Since this study did not explore the effects of outside plan development or evaluate the funding process,
it is difficult to make informed recommendations, but these issues should be considered in future studies.

**Answering this study’s core questions**

**Are CAMA plans an effective planning document?**

Put simply, it depends. For counties with limited resources, county staff, and planning guidance, like Gates County, CAMA land-use plans are a valuable opportunity. These counties receive grants and technical support to develop a land-use plan that guides them through a visioning process, relevant data analyses, and policy development. For counties with a large planning staff and specialized planning tools and ordinances, the CAMA plan is likely a nuisance. It can’t be used in place of a full-fledged land-use plan since it doesn’t include several key elements, but it isn’t a truly a regulatory document either. CAMA plans often take multiple years to develop, and for some counties, by the time they’re approved, their source data and conclusions may even be outdated. As the requirements stand now, CAMA plans are effective planning documents for some and not others, but the process has great potential.

**Are CAMA plans successful at protecting environmental resources?**

In essence, the survey respondents had it right: CAMA plans encourage environmental protection, just not enough. The exercise of performing the required resource assessments and identifying vulnerable areas likely forces coastal counties to confront local environmental issues, even if they typically choose economic development over environmental protection. These analyses also become public, making the county more accountable for using that knowledge in future actions. But the requirement clearly doesn’t encourage explicit environmental regulations, as most counties defer to existing state and federal guidelines. The state should continue to look for ways to incentivize or require more stringent environmental protection.
Should CAMA plans be optional?

Yes and no. As mentioned before, most counties don’t enact any polices that exceed state and federal regulations, and the real strengths of their CAMA plans are data gathering and assessments. The real benefits of developing a CAMA plan are the environmental analyses and the exercise of identifying areas for future development based on environmental suitability.

These advantages can be achieved without requiring every county produce a specialized CAMA plan:

- The state should require that all counties show proof that they have performed a required set of environmental resource assessments and analyses, and that the results of these analyses have been made publicly (and perpetually) available and easily obtained.
- For counties with limited planning resources who rely on CAMA plans as their central planning document, they may continue to develop a traditional CAMA plan utilizing technical assistance (and funding, if available\(^\text{34}\)) from the State. The State could consider limiting which counties have access to need-based funding.
- For counties who already have other planning guidance documents, they may be exempted from developing a CAMA plan if they can show that they have incorporated coastal environmental protection into their other planning documents.
- The state would continue to offer planning and technical guidance to all counties, with an emphasis on support for local data needs, environmental analysis, and planning methodologies with environmental benefits (low-impact development, smart growth, etc.)

By making plans optional, the State can prevent the duplication of efforts by counties with alternative planning documents while still providing support for those without similar resources.

\(^{34}\) Federal and state grant funding for coastal plans hasn’t been available for the past two years due to the economic recession (John Thayer, personnal commun., August 2010). It is unclear how much of the money the State passed down to counties is dependent on initial federal funding, so even state planning grants may not be much of an incentive in the foreseeable future.
The state will be less burdened by the review of traditional CAMA plans, freeing up resources to help develop more locally specific data and planning resources.

If the State feels that counties are still not enacting stringent policies, it has the option to utilize the system of AECs to enforce coastal environmental protection. It could expand existing or create new AECs, allowing more regulatory oversight in county lands. This would obviously be met with resistance from local governments and stakeholders, but if successful, would be the safest way to ensure that the State’s environmental resources are being protected. It would, of course, place an administrative and enforcement burden on DCM, and the State would have to provide the necessary resources to support this action.

A less controversial option that could encourage more environmental protection is the use of stronger incentives for more restrictive environmental policies (not just grant funding for the planning process). For example, other states provide preferential transportation and environmental grant funding for counties or municipalities that create state-approved land-use plans. In this economic climate, there is not much financial flexibility for an approach like this, but it could be future option when economic conditions improve. Other options include expedited permitting or other fast-tracked administrative processes. The State would need to overhaul its 7B rules and create a more streamlined, policy-oriented planning requirement that moves away from a comprehensive planning process and toward an outcome-based process.
The original CAMA legislation was created with the goals of protecting and preserving North Carolina’s valuable coastal resources through strategic planning and development management. CAMA land-use plans were designated as a joint state-local process which would incentivize environmental protection through a series of assessments, scientific analyses, and policy creation. While not always effective as a planning or regulatory document, CAMA plans do ensure that every coastal county is aware of the environmental repercussions of its development decisions. With more oversight and assistance from the State, along with increased local involvement and investment, the CAMA planning process shows great promise for continuing North Carolina’s acclaimed history of coastal management.
REFERENCES

County CAMA plans


Other references


http://dcm2.enr.state.nc.us/planning/user_guide_lsa2005.pdf

http://dcm2.enr.state.nc.us/Handbook/section2.htm


Hooper, Mark, 2009. Letter to Maureen Meehan Will, District Planner, North Carolina Division of Coastal Management, concerning the Carteret County 2005 Land Use Plan Update, dated June 1, 2009. Submitted on behalf of Carteret County Crossroads. 8 p. Available online at: 


APPENDIXES

Appendix 1. CAMA 7B guidelines
15A NCAC 07B .0701 PLANNING OPTIONS

(a) Each county within the coastal area may prepare and adopt a CAMA Land Use Plan that meets the planning requirements adopted by the Coastal Resources Commission (CRC). The CRC shall prepare and adopt a CAMA Land Use Plan for each county that chooses not to prepare and adopt a CAMA Land Use Plan. Municipalities may develop individual CAMA Land Use Plans if:

1. the County delegates this authority to the municipality; or
2. the CRC grants this authority upon application from a municipality that is currently enforcing its zoning ordinance, its subdivision regulations and the State Building Code within its jurisdiction.

(b) The minimum types of plans presumed for municipalities, based on population, growth rates and the presence of Areas of Environmental Concern (AECs) are illustrated in Figure 1. In addition, community characteristics other than those listed in Figure 1, such as extent of growth and resource protection issues (e.g., water quality concerns), shall be considered when determining the type of plan to be prepared.

Figure 1: TYPES OF CAMA PLANS PRESUMED FOR MUNICIPALITIES

<table>
<thead>
<tr>
<th>POPULATION</th>
<th>GROWTH RATE*</th>
<th>OCEAN HAZARD AREAS</th>
<th>NON-OCEAN HAZARD AREAS**</th>
<th>DO NOT MEET STATUTORY THRESHOLD IN §113A-110 (c) ***</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 5,000</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 2,500</td>
<td>HIGH</td>
<td></td>
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</tr>
<tr>
<td>&gt;1,000 and &lt; 2,500</td>
<td>HIGH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1,000</td>
<td>HIGH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 2,500</td>
<td>MODERATE</td>
<td></td>
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<tr>
<td>&lt; 2,500</td>
<td>MODERATE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 2,500</td>
<td>LOW</td>
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<tr>
<td>&lt; 2,500</td>
<td>LOW</td>
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*GROWTH RATE (Source: Office of State Planning)

High \( \geq 18.4\% \)
Moderate \( > 9.2\% \) and < 18.4%
Low \( \leq 9.2\% \)

**Estuarine Waters, Coastal Shorelines, Public Trust Areas, and Coastal Wetlands

***113A-110 (c) provides that municipalities may develop individual plans if (1) the County delegates this authority to the municipality or (2) the CRC grants this authority upon application from a municipality that is currently enforcing its zoning ordinance, its subdivision regulations and the State Building Code within its jurisdiction.
(c) Types of Plans

(1) Workbook plan: This is a simplified CAMA Land Use Plan that addresses the following elements:

(A) statement of community concerns, aspirations and vision;
(B) existing land use map;
(C) land suitability analysis;
(D) local growth and development policies addressing each Management Topic and applicable Areas of Environmental Concern; and
(E) future land use map.

The Division of Coastal Management (DCM) shall provide a workbook plan template to municipalities preparing this type of plan containing all required data and examples of policy alternatives.

(2) Core plan: This plan addresses all of the plan elements in Rule .0702 of this Section (Elements of CAMA Core and Advanced Core Land Use Plans) in a complete and thorough manner. This type of plan is the standard CAMA Land Use Plan required for all 20 coastal counties.

(3) Advanced core plan: The plan prepared by local governments that, due to consideration of specific local conditions, elect to exceed the core plan requirements in two or more areas. This plan also may be used to help meet the requirements of other planning programs, such as the Environmental Protection Agency's (EPA) Phase II Stormwater requirements or hazard mitigation plans, that address the CAMA goals, or to address issues of local concern, (i.e. location of a new industry or redevelopment after storm events.)

(d) Counties preparing a CAMA Land Use Plan shall prepare a core plan at a minimum.

(e) Municipalities that contain AECs may prepare a Workbook Plan, Core Plan, or Advanced Core Plan, depending on the presumptive type of plan shown in Figure 1. However, the type of plan to be prepared may change depending on needs that are identified in the scoping process described in 15A NCAC 07L. Municipalities with Ocean Hazard AECs that choose to plan shall prepare a minimum of a Core Plan. Municipalities with only Non-Ocean Hazard AECs that choose to plan shall prepare a Core Plan if they meet the population and growth rate thresholds as shown in Figure 1. Municipalities with only Non-Ocean Hazard AECs that choose to plan and are at or below the population and growth rate thresholds shown in Figure 1 may prepare a Core Plan or a Workbook Plan.

(f) A County shall accept a municipality's locally adopted policies for inclusion in the County CAMA Land Use Plan for the municipality's jurisdiction if requested to do so by any municipality not preparing an individual CAMA Land Use Plan. Inclusion of a municipality's adopted policies shall occur either at the time of County CAMA Land Use Plan preparation or a subsequent County CAMA Land Use Plan amendment. The municipality's policies are limited to its jurisdiction and may differ from the County's policies.

(g) Municipalities may seek CRC certification for these plans if all requirements found in 15A NCAC 07B and G.S. 113A-110 are met.

History Note: Authority G.S. 113A-107(a); 113A-110; 113A-124; Eff. August 1, 2002.

15A NCAC 07B .0702 ELEMENTS OF CAMA CORE AND ADVANCED CORE LAND USE PLANS

(a) Organization of the Plan. The elements in this Rule provide general direction for development of the CAMA Core and Advanced Core Land Use Plans. A detailed Table of Contents shall be included and if the local government does not follow the outline described in this Rule, a matrix shall be included that shows the exact location of the following required elements.

(b) Community Concerns and Aspirations:

(1) Significant existing and emerging conditions: The plan shall include a description of the dominant growth-related conditions that influence land use, development, water quality, and other environmental concerns in the planning area.

(2) Key issues: The plan shall include a description of the land use and development topics most important to the future of the planning area. At a minimum, this description shall include public access, land use compatibility, infrastructure carrying capacity, natural hazard areas, water quality, and local areas of concern as described in Subparagraph (d)(3) (Land Use Plan Management Topics) of this Rule.

(3) A community vision: This shall consist of a description of the general physical appearance and form that represents the local government’s plan for the future. The community vision shall include statements of general objectives to be achieved by the plan. These objectives shall serve as the foundation for more specific objectives and policies stated elsewhere in the CAMA Land Use Plan. The objectives shall include changes that the local government feels are needed to achieve the planning vision.

(c) Analysis of Existing and Emerging Conditions within the planning jurisdiction. The purpose of this element is to provide a sound factual and analytical base that is necessary to support the land use and development policies included in the plan. The analysis shall be based upon the best available data or mapping information from state, federal and local sources. This element shall describe the following:
(1) Population, Housing, and Economy. The plan shall include an analysis and discussion of the following data and trends:
   (A) Population:
      (i) Permanent population growth trends using data from the two most recent decennial Censuses;
      (ii) Current permanent and seasonal population estimates;
      (iii) Key population characteristics;
      (iv) Age; and
      (v) Income.
   (B) Housing stock:
      (i) Estimate of current housing stock, including permanent and seasonal units, tenure, and types of units (single-family, multifamily, and manufactured); and
      (ii) Building permits issued for single-family, multifamily, and manufactured homes since last plan update.
   (C) Local economy: Employment by major sectors and description of community economic activity.
   (D) Projections. Short-term (five and ten year) and long-term (20-year) projections of permanent and seasonal population.

(2) Natural systems analysis. The purpose of the natural systems analysis is to describe and analyze the natural features and environmental conditions of the planning jurisdiction, and to assess their capabilities and limitations for development. This analysis shall include:
   (A) Mapping and analysis of natural features. The 14-digit hydrological units delineated by the Natural Resources Conservation Service shall be used as the basic unit of analysis of natural features. Maps of the following natural features shall be developed with data provided by DCM or other state agencies for analysis and plan development. These maps may be reproduced and included in the CAMA Land Use Plan at the option of the local government. If the maps are not included in the plan, they shall be made available to the public:
      (i) Areas of Environmental Concern (AECs);
      (ii) Soil characteristics, including limitations for septic tanks, erodibility, and other factors related to development;
      (iii) Environmental Management Commission (EMC) water quality classifications (SC, SB, SA, HQW, and ORW) and related use support designations, and Division of Environmental Health (DEH) shellfish growing areas and water quality conditions;
      (iv) Flood and other natural hazard areas;
      (v) Storm surge areas;
      (vi) Non-coastal wetlands including forested wetlands, shrub-scrub wetlands and freshwater marshes;
      (vii) Water supply watersheds or wellhead protection areas;
      (viii) Primary nursery areas, where mapped;
      (ix) Environmentally fragile areas, such as, but not limited to wetlands, natural heritage areas, areas containing endangered species, prime wildlife habitats, or maritime forests; and
      (x) Additional natural features or conditions identified by the local government.
   (B) Composite map of environmental conditions:
      (i) Composite map of environmental conditions: The plan shall include a map that shows the extent and overlap of natural features listed in Part (c)(2)(A) of this Rule and, based on the local government’s determination of the capabilities and limitations of these features and conditions for development, shows the location of the following three categories of land:
         (I) Class I – land containing only minimal hazards and limitations that may be addressed by commonly accepted land planning and development practices;
         (II) Class II – land containing development hazards and limitations that may be addressed by methods such as restrictions on types of land uses; special site planning; or the provision of public services; and
         (III) Class III – land containing serious hazards for development or lands where the impact of development may cause serious damage to the functions of natural systems.
      (ii) The CAMA Land Use Plan shall describe or list the features or conditions selected by the local government for inclusion in each class.
   (C) Environmental conditions. The plan shall provide an assessment of the following environmental conditions and features and discuss their limitations or opportunities for development:
(i) **Water quality:**

(I) Status and changes of surface water quality, including impaired streams from the most recent N.C. Division of Water Quality Basinwide Water Quality Plans, 303(d) List and other comparable data;

(II) Current situation and trends on permanent and temporary closures of shellfishing waters as determined by the Report of Sanitary Survey by the Shellfish Sanitation Section of the N.C. Division of Environmental Health;

(III) Areas experiencing chronic wastewater treatment system malfunctions; and

(IV) Areas with water quality or public health problems related to non-point source pollution.

(ii) **Natural hazards:**

(I) Areas subject to storm hazards such as recurrent flooding, storm surges and high winds;

(II) Areas experiencing significant shoreline erosion as evidenced by the presence of threatened structures or public facilities; and

(III) Where data is available, estimates of public and private damage resulting from floods and wind that has occurred since the last plan update.

(iii) **Natural resources:**

(I) Environmentally fragile areas (as defined in Part (c)(2)(A)(ix) of this Rule) or areas where resource functions may be impacted as a result of development; and

(II) Areas containing potentially valuable natural resources. These may include, but are not limited to the following: beach quality sand deposits, protected open space, and agricultural land, that may be impacted or lost as a result of incompatible development.

(3) **Analysis of Land Use and Development.** The purpose of the analysis of land use and development is to describe and quantify existing patterns of land uses, identify potential land use and land use/water use conflicts, determine future development trends, and project future land needs. The plan shall include the following mapping and analysis of existing land use:

(A) A map of land including the following: Residential, commercial, industrial, institutional, public, dedicated open space, agriculture, forestry, confined animal feeding operations, and undeveloped;

(B) The land use analysis shall include the following:

   (i) Table that shows estimates of the land area allocated to each land use;

   (ii) Description of any land use conflicts;

   (iii) Description of any land use – water quality conflicts;

   (iv) Description of development trends using indicators. These development trends may include, but are not limited to the following: building permits and platted but un-built lots; and

   (v) Location of areas expected to experience development during the five years following plan certification by the CRC and a description of any potential conflicts with Class II or Class III land identified in the natural systems analysis.

(C) Historic, cultural, and scenic areas designated by a state or federal agency or by local government. These areas and sites shall be located on either the existing land use map or a separate map; and

(D) Projections of future land needs. The analysis shall include short term (five and ten year) and long term (20-year) projections of residential land area needed to accommodate the planning jurisdiction’s projected future permanent and seasonal population (population projections as defined in Part (c)(1)(D) of this Rule (Analysis of Existing and Emerging Conditions). The projections of land needs may be increased up to 50% to allow for unanticipated growth and to provide market flexibility. For local governments experiencing low or no growth (as shown in Figure 1 in 15A NCAC 07B.0701), the projections of land needs may consider economic strategies in the final calculations.

(4) **Analysis of Community Facilities.** The purpose of the analysis of community facilities is to evaluate existing and planned capacity, location, and adequacy of key community facilities that serve the community’s existing and planned population and economic base; that protect important environmental factors such as water quality; and that guide land development in the coastal area. This analysis shall include:

(A) Public and private water supply and wastewater systems. The analysis of water and sewer systems shall include a description and map(s) of existing public and private systems, including existing condition and capacity; location of pipelines, documentation of any overflows, bypasses, or other problems that may degrade water quality or constitute a threat
to public health; existing and planned service areas; and future needs based on population projections. If any required information is not available for private systems, the local government shall so state in the plan and this factor may be eliminated from the analysis.

(B) Transportation systems. The analysis of the transportation system shall include a map showing: the existing highway system; any segments deemed by the North Carolina Department of Transportation (NCDOT) as having unacceptable service levels; highway facilities on the current thoroughfare plan; and facilities on the current transportation improvement program. The analysis shall also assess the impact of planned highway or other transportation facilities on growth levels and development patterns.

(C) Stormwater systems. The analysis of public and permitted private stormwater systems shall include identification of existing drainage problems in the planning area; identification of water quality issues related to point-source discharges of stormwater runoff; and an overview of potential stormwater system requirements for local governments subject to the EPA’s Storm Water Phase II Final Rules.

(D) Other facilities. The local government may include additional facilities and services such as solid waste and health and safety in the analysis.

(5) Land Suitability Analysis. The purpose of the land suitability analysis is to determine the planning area's supply of land suited for development based on the following considerations: natural system constraints, compatibility with existing land uses and development patterns, the existing land use and development criteria of local, state, and federal agencies and the availability and capacity of water, sewer, stormwater management facilities, and transportation systems. The analysis shall include a land suitability map showing vacant or under-utilized land that is suitable for development. The following factors shall be considered to assess land suitability:

(A) Water quality;
(B) Land Classes I, II, and III summary environmental analysis;
(C) Proximity to existing developed areas and compatibility with existing land uses;
(D) Potential impact of development on areas and sites designated by local historic commissions or the North Carolina Department of Cultural Resources as historic, culturally significant, or scenic;
(E) Land use and development requirements of local development regulations, CAMA Use Standards and other applicable state regulations, and applicable federal regulations; and
(F) Availability of community facilities, including water, sewer, stormwater and transportation.

(6) Review of Current CAMA Land Use Plan. The purpose of the review of the current CAMA Land Use Plan is for the local governing body to review its success in implementing the policies and programs adopted in the plan and the effectiveness of those policies in achieving the goals of the plan. The review shall include consideration of the following factors:

(A) Consistency of existing land use and development ordinances with current CAMA Land Use Plan policies;
(B) Adoption of the land use plan's implementation measures by the governing body; and
(C) Efficacy of current policies in creating desired land use patterns and protecting natural systems.

(d) Plan for the Future. This element of the plan is intended to guide the development and use of land in the planning jurisdiction in a manner that achieves its goals for the community and CAMA. Policies affecting AECs shall also be used in making CAMA permit decisions. The plan for the future includes the local government's goals, land use and development policies, and future land use map:

(1) Land use and development goals. The following shall be considered in the development of the plan's goals:

(A) Community concerns and aspirations identified at the beginning of the planning process; and
(B) Needs and opportunities identified in the analysis of existing and emerging conditions.

(2) Policies:

(A) Policies included in the land use plan shall be consistent with the goals of the CAMA, shall address the CRC management topics for land use plans, and comply with all state and federal rules. The CAMA Land Use Plan shall demonstrate how the land use and development goals, policies and future land use map, as required in Subparagraph (d)(4) of this Rule, will guide the development and use of land in the planning jurisdiction in a manner that is consistent with the specific management goal(s), planning objective(s) and land use plan requirements of each Management Topic.

(B) The plan shall contain a description of the type and extent of analysis completed to determine the impact of CAMA Land Use Plan policies on the management topics; a description of both positive and negative impacts of the land use plan policies on the management topics; and a description of the policies, methods, programs and processes to mitigate any negative impacts on applicable management topics.
The plan shall contain a statement that the governing body either accepts state and federal law regarding land uses and development in AECs or, that the local government's policies exceed the requirements of state and federal agencies. If local policies exceed the State and Federal requirements, the CAMA Land Use Plan shall identify which policies exceed these requirements and to what extent. If the governing body intends to rely on Federal and State laws and regulations it shall reference these in the plan.

Land Use Plan Management Topics. The purposes of the CRC management topics are to insure that CAMA Land Use Plans support the goals of CAMA, to define the CRC's expectations for the land use planning process, and to give the CRC a substantive basis for review and certification of CAMA Land Use Plans. Each of the following management topics (Public Access, Land Use Compatibility, Infrastructure Carrying Capacity, Natural Hazard Areas, Water Quality, and Local Areas of Concern) include three components: a management goal, a statement of the CRC's planning objective, and requirements for the CAMA Land Use Plans:

(A) Public Access:
(i) Management Goal: Maximize public access to the beaches and the public trust waters of the coastal region.
(ii) Planning Objective: Develop comprehensive policies that provide beach and public trust water access opportunities for the public along the shoreline within the planning jurisdiction. Policies shall address access needs and opportunities, include strategies to develop public access, and identify feasible funding options.
(iii) Land Use Plan Requirements: Land use plan policies on ocean and public waterfront access shall establish local criteria for frequency and type of access facilities. These policies shall contain provisions for public access for all segments of the community, including persons with disabilities, and shall establish access criteria for beach areas targeted for nourishment.

(B) Land Use Compatibility:
(i) Management Goal: Ensure that development and use of resources or preservation of land minimizes direct and secondary environmental impacts, avoids risks to public health, safety and welfare and is consistent with the capability of the land based on considerations of interactions of natural and manmade features.
(ii) Planning Objective:
(I) Adopt and apply local development policies that balance protection of natural resources and fragile areas with economic development.
(II) Policies shall provide direction to assist local decision making and consistency for zoning, divisions of land, and public and private projects.
(iii) Land Use Plan Requirements:
(I) Establish building intensity and density criteria, such as floor area ratio and units per acre, consistent with the land suitability analysis for each land use designation on the Future Land Use Map.
(II) Establish local mitigation criteria and concepts. These may include, but are not limited to the following: cluster subdivision design, enacting local buffers, impervious surface limits, and innovative stormwater management alternatives.

(C) Infrastructure Carrying Capacity:
(i) Management Goal: Ensure that public infrastructure systems are appropriately sized, located and managed so the quality and productivity of AECs and other fragile areas are protected or restored.
(ii) Planning Objective: Establish level of service policies and criteria for infrastructure consistent with Part (c)(3)(D) (Projections of Future Land Needs) of this Rule.
(iii) Land Use Plan Requirements:
(I) Identify/establish service area boundaries for existing and future infrastructure.
(II) Correlate future land use map categories with existing and planned infrastructure such as wastewater, water infrastructure and transportation.

(D) Natural Hazard Areas:
(i) Management Goal: Conserve and maintain barrier dunes, beaches, flood plains, and other coastal features for their natural storm protection functions and their natural resources giving recognition to public health, safety, and welfare issues.
(ii) Planning Objective: Develop policies that minimize threats to life, property, and natural resources resulting from development located in or adjacent to hazard areas, such as those subject to erosion, high winds, storm surge, flooding, or sea level rise.
(iii) Land Use Plan Requirements:
(I) Develop location, density, and intensity criteria for new, existing development and redevelopment including public facilities and infrastructure so that they can better avoid or withstand natural hazards.

(II) Correlate existing and planned development with existing and planned evacuation infrastructure.

(E) Water Quality:
(i) Management Goal: Maintain, protect and where possible enhance water quality in all coastal wetlands, rivers, streams and estuaries.
(ii) Planning Objective: Adopt policies for coastal waters within the planning jurisdiction to help ensure that water quality is maintained if not impaired and improved if impaired.
(iii) Land Use Plan Requirements:
(I) Devise policies that help prevent or control nonpoint source discharges (sewage and storm water) such as, but not limited to the following: impervious surface limits, vegetated riparian buffers, natural areas, natural area buffers, and wetland protection.

(F) Local Areas of Concern:
(i) Management Goal: Integrate local concerns with the overall goals of CAMA in the context of land use planning.
(ii) Planning Objective: Identify and address local concerns and issues, such as cultural and historic areas, scenic areas, economic development, downtown revitalization or general health and human services needs.
(iii) Land Use Plan Requirements: Evaluate local concerns and issues for the development of goals, policies and implementation strategies. These may include timelines and identification of funding options.

(4) Future land use map. This map depicts application of the policies for growth and development, and the desired future patterns of land use and land development with consideration given to natural system constraints and infrastructure policies. The local government shall include such categories and descriptions of land uses and development as are required to accurately illustrate the application of its policies. At a minimum, the map shall show the following:
(A) 14-digit hydrological units encompassed by the planning area;
(B) areas and locations planned for conservation or open space and a description of compatible land uses and activities;
(C) areas and locations planned for future growth and development with descriptions of the following characteristics:
   (i) predominant and supporting land uses that are encouraged in each area;
   (ii) overall density and development intensity planned for each area; and
   (iii) infrastructure required to support planned development in each area.
(D) areas in existing developed areas for infill, preservation, and redevelopment;
(E) existing and planned infrastructure, including major roads, water, and sewer.

The local government may use additional or more detailed categories if required to depict its land use policies. If the future land use map shows development patterns or land uses that are not consistent with the natural systems analysis, or the land suitability analysis, then the plan shall include a description of the steps that the local government shall take to mitigate the impacts. In addition, the plan shall include an estimate of the cost of any community facilities or services that shall be extended or developed. The amount of land allocated to various uses shall be calculated and compared to the projection of land needs. The amount of land area thus allocated to various uses may not exceed projected needs as delineated in Part (c)(3)(D) of this Rule (Projections of Future Land Needs).

(e) Tools for Managing Development. This element of the plan provides a description of the management tools that the local government selects and the actions to be taken to implement the CAMA Land Use Plan. It also includes a five-year schedule for implementation. This element shall include:
(1) Guide for land use decision-making. Describe the specific role and the status of the land use plan policies and future land use plan map in local decisions regarding land use and development.
(2) Existing development program. Describe the community’s existing development management program, including local ordinances, codes, and policies, state and federal laws and regulations, and the role that the existing management program plays in implementing the plan. This description shall also include the community's approach to coordinating these codes and rules to implement the land use and development policies.
(3) Additional tools. Describe any of the following additional tools selected by the local government to implement the CAMA land use plan policies:
(A) Ordinances:
(i) Amendments or adjustments in existing development codes required for consistency with the plan;
(ii) New ordinances or codes to be developed;
(B) Capital improvements program. New, upgraded or expanded community facilities, such as but not limited to the following: water, sewer, stormwater, transportation, and other facilities, and policies regarding connections to and extensions of community facilities;
(C) Acquisition program. Planned acquisition of property, easements, or rights-of-way; and
(D) Specific projects to reach goals.

(4) Action plan/schedule. Describe the priority actions that will be taken by the local government to implement the CAMA Land Use Plan and specify the fiscal year(s) in which each action is anticipated to start and finish. The document shall contain a description of the specific steps that the local government plans to take to involve the public in monitoring implementation of the CAMA Land Use Plan, including the adoption of local ordinances that affect AECs. The action plan shall be used to prepare the implementation status report for the CAMA Land Use Plan.

History Note: Authority G.S. 113A-102; 113A-107(a); 113A-110, 113A-111, 113A-124;
Eff. August 1, 2002;
15A NCAC 07B .0801  PUBLIC HEARING AND LOCAL ADOPTION REQUIREMENTS
(a) Public Hearing Requirements. The local government shall provide documentation to DCM that it has followed the process required in G.S. 113A-110; and such notice shall include per .0802(b)(3), the disclosure of the public opportunity to provide written comment following local adoption of the Land Use Plan.
(b) Final Plan Content. The final decision on local policies and all contents of the CAMA Land Use Plan consistent with the CAMA land use planning rules shall be made by the elected body of each participating local government.
(c) Transmittal to the CRC. The local government shall provide the Executive Secretary of the CRC with as many copies of the locally adopted land use plan as the Executive Secretary requests, and a certified statement of the local government adoption action no earlier than 45 days and no later than 30 days prior to the next CRC meeting. If the local government fails to submit the requested copies of the locally adopted land use plan and certified statement to the Executive Secretary within the specified timeframe, the local government may resubmit documents within the specified timeframe for consideration at the following CRC meeting.

History Note: Authority G.S. 113A-107(a); 113A-110; 113A-124; Eff. August 1, 2002. Amended Eff. January 1, 2007; February 1, 2006

15A NCAC 07B .0802  PRESENTATION TO COASTAL RESOURCES COMMISSION FOR CERTIFICATION
(a) Re-Certification: If the CRC adopts new CAMA Land Use Plan rules, plans shall be updated within six years of the effective date of the new rules. If a scoping process is held, a summary shall be provided to the CRC along with the request for re-certification of the existing CAMA Land Use Plan.
(b) Committee Designated by CRC to Review Local Land Use Plans:
   (1) The appropriate DCM District Planner shall report to the committee designated by the CRC as to the type of plan being presented, highlight any unique characteristics of the plan, identify any land use conflicts with adjacent planning jurisdictions or other state/federal agencies, identify any inaccuracy or inconsistency of items in the plan, and recommend certification, conditional certification, or non-certification.
   (2) The Land Use Plan shall be presented to the committee designated by the CRC by an elected local official, municipal or county staff member, or designated citizen representative.
   (3) The public shall have an opportunity to present written objections, comments, or statements of support prior to action by the committee designated by the CRC. Written objections shall be received by DCM no less than 15 business days prior to the next scheduled CAMA Land Use Plan review meeting and shall be limited to the criteria for CRC certification as defined in Subparagraph (c)(3) of this Rule. Written objections shall identify the specific plan elements that are opposed. A copy of any objections shall be sent by the DCM to the local government submitting the CAMA Land Use Plan.
   (4) The local government may withdraw the submitted CAMA Land Use Plan from CRC consideration at any time before review.
(c) CRC Certification:
   (1) The CRC shall certify the CAMA Land Use Plan following the procedures and conditions specified in this Rule.
   (2) Provided the locally adopted land use plan has been received by the Executive Secretary no earlier than 45 days and no later than 30 days prior to the next CRC meeting, the CRC shall certify, conditionally certify or not certify the plan at that meeting or mutually agreed upon date. If the CRC fails to take action as specified above the plan shall be certified.
   (3) The CRC shall certify plans which:
      (A) are consistent with the current federally approved North Carolina Coastal Management Program; and
      (B) are consistent with the Rules of the CRC; and
      (C) do not violate state or federal law; and
      (D) contain policies that address each Management Topic. If a local government cannot meet any CAMA Land Use Plan requirement contained within Paragraphs (d) and (e) of 15A NCAC 07B .0702 the plan shall include a description of the analysis that was undertaken, explain the reason(s) the requirement could not be met, and the local government's alternative plan of action to address the CAMA Land Use Plan requirements. If such description(s) are not included in the plan, it shall not be certified; and
(E) contain a local resolution of adoption that includes findings which demonstrate that policy statements and the Future Land Use Plan Map (FLUP) have been evaluated, and determine that no internal inconsistencies exist.

(d) Non-Certification: If the plan is not certified the CRC shall within 30 days inform the local government as to how the plan might be changed so certification can be granted. Until the plan is certified, the pre-existing certified CAMA Land Use Plan shall remain in effect.

(e) Conditional Certification: If the plan is conditionally certified, the CRC shall within 30 days provide the local government with condition(s) that shall be met for certification. Until the condition(s) is met on a conditionally certified plan, the pre-existing certified CAMA Land Use Plan shall remain in effect. When the local government complies with all conditions for a conditionally certified plan, as determined by the Executive Secretary of the CRC, plan certification is automatic with no further action needed by the CRC.

History Note: Authority G.S. 113A-107(a); 113A-110; 113-111; 113A-124;
Amended Eff. September 1, 2006.
15A NCAC 07B .0901 CAMA LAND USE PLAN AMENDMENTS

(a) Normal Amendment Process:

(1) The CAMA Land Use Plan may be amended and only the amended portions submitted for CRC. If the local government amends half or more of the policies of the CAMA Land Use Plan, a new locally adopted plan shall be submitted to the CRC.

(2) The local government proposing an amendment to its CAMA Land Use Plan shall provide to the Executive Secretary of the CRC or her/his designee written notice of the public hearing, a copy of the proposed amendment (including text and maps as applicable), and the reasons for the amendment no less than 30 days prior to the public hearing. After the public hearing, the local government shall provide the Executive Secretary or her/his designee with a copy of the locally adopted amendment no earlier than 45 days and no later than 30 days prior to the next CRC meeting for CRC certification. If the local government fails to submit the requested documents as specified above to the Executive Secretary within the specified timeframe, the local government shall be able to resubmit the documents within the specified timeframe for consideration at the following CRC meeting.

(3) For joint plans, originally adopted by each participating jurisdiction, each government shall retain its sole and independent authority to make amendments to the plan as it affects their jurisdiction.

(4) CRC review and action on CAMA Land Use Plan amendments shall be in the same manner as provided in 15A NCAC 07B .0802 (b), (c), (d) and (e), except amendments to Land Use Plans which were certified prior to August 1, 2002 are exempt from subsection .0802(c)(3)(D)

(5) The local resolution of adoption shall include findings which demonstrate that amendments to policy statements or to the Future Land Use Plan Map (FLUP) have been evaluated for their consistency with other existing policies.

(b) Delegation of CRC Certification of Amendments to the Executive Secretary:

(1) A local government that desires to have the Executive Secretary instead of the CRC certify a CAMA Land Use Plan amendment shall first meet the requirements in Subparagraphs (a)(1) through (3) of this Rule and the following criteria defined in Parts (b)(1)(A) through (D) of this Rule. The local government may then request the Executive Secretary to certify the amendment. The Executive Secretary shall make a determination that all criteria have been met, and mail notification to the local government and CRC members, no later than two weeks after receipt of the request for certification. The CRC's delegation to the Executive Secretary of the authority to certify proposed amendments is limited to amendments that meet the following criteria:

   (A) Minor changes in policy statements or objectives for the purpose of clarification of intent; or
   (B) Modification of any map that does not impose new land use categories in areas least suitable for development as shown on the Land Suitability Map; or
   (C) New data compilations and associated statistical adjustments that do not suggest policy revisions; or
   (D) More detailed identification of existing land uses or additional maps of existing or natural conditions that do not affect any policies in the CAMA Land Use Plan.

(2) If the Executive Secretary certifies the amendment, the amendment shall become final upon certification of the Executive Secretary, and is not subject to further CRC review described in 15A NCAC 07B .0802 (Presentation to CRC for Certification).

(3) If the Executive Secretary denies certification of the amendment, the local government shall submit its amendment for review by the CRC in accordance with the regular plan certification process in 15A NCAC 07B .0802 (Presentation to CRC for Certification).

(c) Any amendments to the text or maps of the CAMA Land Use Plan shall be incorporated in context in all available copies of the plan and shall be dated to indicate the dates of local adoption and CRC certification. The amended CAMA Land Use Plan shall be maintained as required by G.S. 113A-110(g).

(d) Within 90 days after certification of a CAMA Land Use Plan amendment, the local government shall provide one copy of the amendment to each jurisdiction with which it shares a common border, and to the regional planning entity.

(e) A local government that receives Sustainable Community funding from the Department pursuant to 15A NCAC 07L shall formulate and submit to the CRC for certification a CAMA Land Use Plan Addendum during its first year as a Sustainable Community, and if new planning rules have been adopted by the CRC, shall update the CAMA Land Use Plan within six years of adoption of these new planning rules.

History Note: Authority G.S. 113A-107(a); 113A-110; 113A-124;
Amended Eff. February 1, 2006.

*Carteret County Plan Evaluation*
should use these criteria as a starting point, but in the process of plan making they should adapt them and craft their own criteria to fit their circumstances.

Finally, in this chapter we describe a plan-making process that combines analysis with design. Although analysis is important to the process and actually absorbs the bulk of explanation in the following chapters, planners cannot analyze their way to a solution. This requires participatory design: the leap from analysis into the realm of invention and synthesis to produce consensus-based solutions that strike an appropriate balance among the environmental, economic, social equity, and livability values of a community.

**Appendix**

**Plan-Quality Evaluation Protocol**

**INTERNAL PLAN-QUALITY CRITERIA** (1-4)

<table>
<thead>
<tr>
<th>1. ISSUES AND VISION STATEMENT</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.1 Is there a preliminary assessment of major trends and impacts of forecasted change during future planning period?</td>
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1.2 Is there a description of the community's major opportunities and threats for desirable development?  

1.3 Is there a review of the problems and issues currently or potentially facing local government?  

1.4 Is there a vision statement that identifies in words an over-all image of what the community wants to be and look like?  

MAXIMUM SCORE: 8  
SUBTOTAL: 7

<table>
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<tr>
<th>2. FACT BASE</th>
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<tbody>
<tr>
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A. Description and Analysis of Key Features of Local Planning Jurisdiction

2A.1 Present and future population and economy  

2A.2 Existing land use, future land use needs, and current land supply for the future  

2A.3 Existing (and future needs for) community facilities and infrastructure that serve community's population and economy  

2A.4 State of natural environment, which represents valuable and vulnerable resources and physical constraints to land use  

MAXIMUM SCORE: 8  
SUBTOTAL: 8
B. Techniques Used to Clearly Identify and Explain Facts

2B.1 Are maps included that display information that is clear, relevant, and comprehensible? 2

2B.2 Are tables that aggregate data relevant and meaningful to the planning area under study? 2

2B.3 Are facts used to support reasoning of explanation for issues? 2

2B.4 Are facts used to support reasoning of explanation for policy directions? 2

2B.5 Are methods used for deriving facts cited? 1

2B.6 Are data sources cited? 2

2B.7 Are baseline spatial data and inventories adequate? 2

2B.8 Are official projections critically scrutinized and validated? 0

2B.9 Are projections clearly tied to plan's policies? 2

MAXIMUM SCORE: 18
SUBTOTAL: 15

3. GOAL AND POLICY FRAMEWORK

Coding Categories:
2 = Most
1 = Some
0 = None

3.1 Are goals clearly stated? 2

3.2 Are policies internally consistent with goals wherein each policy is clearly tied to a specific goal (or goals)? 2

3.3 Are policies tied to a specific action and/or development-management tools (e.g., vague policy — reduce flood risk vs. detailed policy — reduce development densities in floodplain)? 1

3.4 Are policies mandatory (with words like shall, will, require, must) as opposed to suggestive (with words like consider, should, may)? 1

MAXIMUM SCORE: 8
SUBTOTAL: 6

4. PLAN PROPOSALS

Coding Categories:
2 = Identified, clear
1 = Identified, vague
0 = Not identified

A: Spatial Design

4A.1 Does plan have a future land use map? 2

4A.2 Are land use areas related to transportation proposals? 2

4A.3 Are land use areas related to water and sewer proposals? 2

4A.4 Are land use areas sized to accommodate future growth? 2
4A.5 Are proposed locations of land uses tied to suitability
of landscape features?
MAXIMUM SCORE: 10
SUBTOTAL:

Coding Categories:
2 = Most
1 = Some
0 = None

B. Implementation:
4B.1 Are actions for implementing plans clearly identified?
4B.2 Are the actions for implementing plans prioritized?
4B.3 Are timelines for implementation identified?
4B.4 Are organizations with responsibility to implement
policies identified?
4B.5 Are sources of funding to implement the plan identified?
4B.6 Is there a timetable for updating the plan?
MAXIMUM SCORE: 12
SUBTOTAL

C. Monitoring:
4C.1 Are goals quantified based on measurable objectives (e.g.,
60 percent of all residents within 1/4 mile of transit service)?
4C.2 Are indicators of each objective included (e.g., annual
percentage of residents within 1/4 mile of transit service)?
4C.3 Are organizations identified that are responsible for
monitoring and/or providing data for indicators?
4C.4 Is there a timetable for updating the plan based, in part,
on results of monitoring changing conditions?
MAXIMUM SCORE: 8
SUBTOTAL

EXTERNAL PLAN QUALITY CRITERIA (5-8)

5. ENCOURAGE OPPORTUNITIES TO USE PLAN

Coding Categories:
2 = Identified, clear
1 = Identified, vague
0 = Not identified

5.1 Is the plan imaginative, offering compelling courses of action
that inspire people to act?

5.2 Does the plan portray a clearly articulated, action-oriented
agenda (i.e., prioritized and flexible alternative courses of action
that clearly identify overarching solutions)?
5.3 Does the plan provide clear explanations of alternative courses of action that enhance community flexibility and adaptation in dealing with complex situations? 0

5.4 Is the legal context that requires planning explained (e.g., meet federal/state mandates, identify top priority issues that need to be addressed to ensure legal defensibility)? 1

5.5 Is the administrative authority for planning indicated (council or planning commission resolution, state law, federal requirements)?
MAXIMUM SCORE: 10
SUBTOTAL: 2

6. CREATE CLEAR VIEWS AND UNDERSTANDING OF PLANS
Categorizing:
2 = Identified, clear, relevant
1 = Identified, vague
0 = Not identified

6.1 Is a detailed table of contents included (not just list of chapters)? 2
6.2 Is a glossary of terms and definitions included? 1
6.3 Is there an executive summary? 0
6.4 Is there cross-referencing of issues, goals, objectives, and policies? 1
6.5 Is plain English used (avoiding poor, ungrammatical, verbose, jargon-filled, unclear language)? 2
6.6 Are clear illustrations used (e.g., diagrams, pictures)? 2
6.7 Is spatial information clearly illustrated on maps? 2
6.8 Are supporting documents included with the plan (videos, CD, GIS, Web site)? 0
MAXIMUM SCORE: 16
SUBTOTAL: 10

7. ACCOUNT FOR INTERDEPENDENT ACTIONS IN PLAN SCOPE
Categorizing:
2 = Identified, clear
1 = Identified, vague
0 = Not identified

7.1 Are horizontal connections with other local plans and programs explained? 1
7.2 Are vertical connections with regional or state policies and programs explained? 1
7.3 Is a process for intergovernmental coordination explained for providing infrastructure and services, protecting natural systems, and mitigating natural hazards (flooding)? 0
MAXIMUM SCORE: 6
SUBTOTAL: 2
8. PARTICIPATION OF ACTORS

8.1 Are organizations and individuals that were involved in plan preparation identified? 0
8.2 Is there an explanation of why the organizations and individuals identified in the plan were involved? 0
8.3 Are the stakeholders who were involved representative of all groups that are affected by the policies and implementation actions proposed? 0
8.4 Is there an explanation of participation techniques that were used? 2
8.5 Is there a clear explanation of how stakeholder involvement in plan is related to prior planning activities? 0
8.6 Is the plan's evolution described, including effects on citizens and private stakeholder groups? 1
8.7 Does the plan explain the support and involvement of key public agencies (public works, economic development, parks)? 0
8.8 Does the plan incorporate input from a broad spectrum of stakeholders? 0

MAXIMUM SCORE: 16
SUBTOTAL: 3

OVERALL MAXIMUM SCORE: 120
OVERALL TOTAL (Sum subtotals from 1-8): 16

Notes

1. A limited number of studies applied various aspects of these conceptual dimensions of plan quality in testing the quality of local plans and the casual factors that explain variation in quality, including, for example, presence and design of state and federal plan mandates, local socioeconomic conditions, and local commitment and capacity to plan. In the United States, see, for example, Berke and French 1994; Godschalk et al. 1999, ch. 9; and Nelson and French 2002; in New Zealand, see Berke, Ericksen, and Dixon 1997.

References

Dare County Plan Evaluation
should use these criteria as a starting point, but in the process of plan making they should adapt them and craft their own criteria to fit their circumstances.

Finally, in this chapter we describe a plan-making process that combines analysis with design. Although analysis is important to the process and actually absorbs the bulk of explanation in the following chapters, planners cannot analyze their way to a solution. This requires participatory design: the leap from analysis into the realm of invention and synthesis to produce consensus-based solutions that strike an appropriate balance among the environmental, economic, social equity, and livability values of a community.

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Plan-Quality Evaluation Protocol
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1. ISSUES AND VISION STATEMENT

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1.3 Is there a review of the problems and issues currently or potentially facing local government? 2
1.4 Is there a vision statement that identifies in words an over-all image of what the community wants to be and look like? 2

MAXIMUM SCORE: 8

SUBTOTAL 8

2. FACT BASE

Coding Categories:
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A. Description and Analysis of Key Features of Local Planning Jurisdiction

2A.1 Present and future population and economy 2
2A.2 Existing land use, future land use needs, and current land supply for the future 2
2A.3 Existing (and future needs for) community facilities and infrastructure that serve community’s population and economy 2
2A.4 State of natural environment, which represents valuable and vulnerable resources and physical constraints to land use 2

MAXIMUM SCORE: 8

SUBTOTAL 8
B. Techniques Used to Clearly Identify and Explain Facts

2B.1 Are maps included that display information that is clear, relevant, and comprehensible?  
2B.2 Are tables that aggregate data relevant and meaningful to the planning area under study?  
2B.3 Are facts used to support reasoning of explanation for issues?  
2B.4 Are facts used to support reasoning of explanation for policy directions?  
2B.5 Are methods used for deriving facts cited?  
2B.6 Are data sources cited?  
2B.7 Are baseline spatial data and inventories adequate?  
2B.8 Are official projections critically scrutinized and validated?  
2B.9 Are projections clearly tied to plan’s policies?  
  MAXIMUM SCORE: 18
  SUBTOTAL: 15

3. GOAL AND POLICY FRAMEWORK

Coding Categories:
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3.1 Are goals clearly stated?  
3.2 Are policies internally consistent with goals wherein each policy is clearly tied to a specific goal (or goals)?  
3.3 Are policies tied to a specific action and/or development-management tools (e.g., vague policy—reduce flood risk vs. detailed policy—reduce development densities in floodplain)?  
3.4 Are policies mandatory (with words like shall, will, require, must) as opposed to suggestive (with words like consider, should, may)?  
  MAXIMUM SCORE: 8
  SUBTOTAL: 6

4. PLAN PROPOSALS

Coding Categories:
2 = Identified, clear
1 = Identified, vague
0 = Not identified

A: Spatial Design

4A.1 Does plan have a future land use map?  
4A.2 Are land use areas related to transportation proposals?  
4A.3 Are land use areas related to water and sewer proposals?  
4A.4 Are land use areas sized to accommodate future growth?
4A.5 Are proposed locations of land uses tied to suitability of landscape features?
MAXIMUM SCORE: 10
SUBTOTAL: 9

Coding Categories:
2 = Most
1 = Some
0 = None

B. Implementation:
4B.1 Are actions for implementing plans clearly identified? 2
4B.2 Are the actions for implementing plans prioritized? 0
4B.3 Are timelines for implementation identified? 2
4B.4 Are organizations with responsibility to implement policies identified? 2
4B.5 Are sources of funding to implement the plan identified? 0
4B.6 Is there a timetable for updating the plan?
MAXIMUM SCORE: 12
SUBTOTAL: 7

C. Monitoring:
4C.1 Are goals quantified based on measurable objectives (e.g., 60 percent of all residents within 1/4 mile of transit service)? 1
4C.2 Are indicators of each objective included (e.g., annual percentage of residents within 1/4 mile of transit service)? 1
4C.3 Are organizations identified that are responsible for monitoring and/or providing data for indicators? 0
4C.4 Is there a timetable for updating the plan based, in part, on results of monitoring changing conditions?
MAXIMUM SCORE: 8
SUBTOTAL: 2

EXTERNAL PLAN QUALITY CRITERIA (5-8)

5. ENCOURAGE OPPORTUNITIES TO USE PLAN

Coding Categories:
2 = Identified, clear
1 = Identified, vague
0 = Not identified

5.1 Is the plan imaginative, offering compelling courses of action that inspire people to act? 1

5.2 Does the plan portray a clearly articulated, action-oriented agenda (i.e., prioritized and flexible alternative courses of action that clearly identify overarching solutions)? 2
5.3 Does the plan provide clear explanations of alternative courses of action that enhance community flexibility and adaptation in dealing with complex situations?  0

5.4 Is the legal context that requires planning explained (e.g., meet federal/state mandates, identify top priority issues that need to be addressed to ensure legal defensibility)?  2

5.5 Is the administrative authority for planning indicated (council or planning commission resolution, state law, federal requirements)?  2

MAXIMUM SCORE: 10

SUBTOTAL: 7

6. CREATE CLEAR VIEWS AND UNDERSTANDING OF PLANS

Coding Categories:
2 = Identified, clear, relevant
1 = Identified, vague
0 = Not identified

6.1 Is a detailed table of contents included (not just list of chapters)?  2

6.2 Is a glossary of terms and definitions included?  1

6.3 Is there an executive summary?  2

6.4 Is there cross-referencing of issues, goals, objectives, and policies?  1

6.5 Is plain English used (avoiding poor, ungrammatical, verbose, jargon-filled, unclear language)?  2

6.6 Are clear illustrations used (e.g., diagrams, pictures)?  2

6.7 Is spatial information clearly illustrated on maps?  2

6.8 Are supporting documents included with the plan (videos, CD, GIS, Web site)?  0

MAXIMUM SCORE: 16

SUBTOTAL: 12

7. ACCOUNT FOR INTERDEPENDENT ACTIONS IN PLAN SCOPE

Coding Categories:
2 = Identified, clear
1 = Identified, vague
0 = Not identified

7.1 Are horizontal connections with other local plans and programs explained?  2

7.2 Are vertical connections with regional or state policies and programs explained?  1

7.3 Is a process for intergovernmental coordination explained for providing infrastructure and services, protecting natural systems, and mitigating natural hazards (flooding)?  2

MAXIMUM SCORE: 6

SUBTOTAL: 5
8. PARTICIPATION OF ACTORS

Coding Categories:
2 = Identified, clear, relevant
1 = Identified, vague
0 = Not identified

8.1 Are organizations and individuals that were involved in plan preparation identified? 0
8.2 Is there an explanation of why the organizations and individuals identified in the plan were involved? 0
8.3 Are the stakeholders who were involved representative of all groups that are affected by the policies and implementation actions proposed? 0
8.4 Is there an explanation of participation techniques that were used? 2
8.5 Is there a clear explanation of how stakeholder involvement in plan is related to prior planning activities? 0
8.6 Is the plan's evolution described, including effects on citizens and private stakeholder groups? 0
8.7 Does the plan explain the support and involvement of key public agencies (public works, economic development, parks)? 0
8.8 Does the plan incorporate input from a broad spectrum of stakeholders? 0

MAXIMUM SCORE: 16
SUBTOTAL: 2

OVERALL MAXIMUM SCORE: 120
OVERALL TOTAL (Sum subtotals from 1-8): 91

Notes

1. A limited number of studies applied various aspects of these conceptual dimensions of plan quality in testing the quality of local plans and the casual factors that explain variation in quality, including, for example, presence and design of state and federal plan mandates, local socioeconomic conditions, and local commitment and capacity to plan. In the United States, see, for example, Berke and French 1994; Godschalk et al. 1999, ch. 9; and Nelson and French 2002; in New Zealand, see Berke, Fricksen, and Dixon 1997.

References

Gates County Plan Evaluation
should use these criteria as a starting point, but in the process of plan making they
should adapt them and craft their own criteria to fit their circumstances.

Finally, in this chapter we describe a plan-making process that combines analy-
sis with design. Although analysis is important to the process and actually absorbs
the bulk of explanation in the following chapters, planners cannot analyze their
way to a solution. This requires participatory design: the leap from analysis into
the realm of invention and synthesis to produce consensus-based solutions that
strike an appropriate balance among the environmental, economic, social equity,
and livability values of a community.

Appendix

Plan-Quality Evaluation Protocol
INTERNAL PLAN-QUALITY CRITERIA (1-4)

1. ISSUES AND VISION STATEMENT

   Coding Categories:
   2 = Identified, detailed
   1 = Identified, vague
   0 = Not identified

   1.1 Is there a preliminary assessment of major trends and impacts
       of forecasted change during future planning period?  2
   1.2 Is there a description of the community's major opportunities
       and threats for desirable development?  2
   1.3 Is there a review of the problems and issues currently or
       potentially facing local government?  1
   1.4 Is there a vision statement that identifies in words an over-all
       image of what the community wants to be and look like?

       MAXIMUM SCORE: 8
       SUBTOTAL: 7

2. FACT BASE

   Coding Categories:
   2 = Identified, clear, relevant
   1 = Identified, vague
   0 = Not identified

   A. Description and Analysis of Key Features of Local Planning Jurisdiction
   2A.1 Present and future population and economy  2
   2A.2 Existing land use, future land use needs, and current land
       supply for the future  2
   2A.3 Existing (and future needs for) community facilities
       and infrastructure that serve community's population
       and economy  2
   2A.4 State of natural environment, which represents valuable and
       vulnerable resources and physical constraints to land use

       MAXIMUM SCORE: 8
       SUBTOTAL: 8
B. Techniques Used to Clearly Identify and Explain Facts
2B.1 Are maps included that display information that is clear, relevant, and comprehensible?
2B.2 Are tables that aggregate data relevant and meaningful to the planning area under study?
2B.3 Are facts used to support reasoning of explanation for issues?
2B.4 Are facts used to support reasoning of explanation for policy directions?
2B.5 Are methods used for deriving facts cited?
2B.6 Are data sources cited?
2B.7 Are baseline spatial data and inventories adequate?
2B.8 Are official projections critically scrutinized and validated?
2B.9 Are projections clearly tied to plan's policies?
MAXIMUM SCORE: 18
SUBTOTAL

3. GOAL AND POLICY FRAMEWORK

Coding Categories:
2 = Most
1 = Some
0 = None

3.1 Are goals clearly stated?
3.2 Are policies internally consistent with goals wherein each policy is clearly tied to a specific goal (or goals)?
3.3 Are policies tied to a specific action and/or development-management tools (e.g., vague policy—reduce flood risk vs. detailed policy—reduce development densities in floodplain)?
3.4 Are policies mandatory (with words like shall, will, require, must) as opposed to suggestive (with words like consider, should, may)?
MAXIMUM SCORE: 8
SUBTOTAL

4. PLAN PROPOSALS

Coding Categories:
2 = Identified, clear
1 = Identified, vague
0 = Not identified

A: Spatial Design
4A.1 Does plan have a future land use map?
4A.2 Are land use areas related to transportation proposals?
4A.3 Are land use areas related to water and sewer proposals?
4A.4 Are land use areas sized to accommodate future growth?
4A.5 Are proposed locations of land uses tied to suitability of landscape features?
MAXIMUM SCORE: 10
SUBTOTAL:

Coding Categories:
2 = Most
1 = Some
0 = None

B. Implementation:
4B.1 Are actions for implementing plans clearly identified?
1
4B.2 Are the actions for implementing plans prioritized?
0
4B.3 Are timelines for implementation identified?
2
4B.4 Are organizations with responsibility to implement policies identified?
0
4B.5 Are sources of funding to implement the plan identified?
0
4B.6 Is there a timetable for updating the plan?
MAXIMUM SCORE: 12
SUBTOTAL
3

C. Monitoring:
4C.1 Are goals quantified based on measurable objectives (e.g., 60 percent of all residents within 1/4 mile of transit service)?
0
4C.2 Are indicators of each objective included (e.g., annual percentage of residents within 1/4 mile of transit service)?
0
4C.3 Are organizations identified that are responsible for monitoring and/or providing data for indicators?
0
4C.4 Is there a timetable for updating the plan based, in part, on results of monitoring changing conditions?
MAXIMUM SCORE: 8
SUBTOTAL
0

EXTERNAL PLAN QUALITY CRITERIA (5-8)

5. ENCOURAGE OPPORTUNITIES TO USE PLAN

Coding Categories:
2 = Identified, clear
1 = Identified, vague
0 = Not identified

5.1 Is the plan imaginative, offering compelling courses of action that inspire people to act?
0

5.2 Does the plan portray a clearly articulated, action-oriented agenda (i.e., prioritized and flexible alternative courses of action that clearly identify overarching solutions)?
0
5.3 Does the plan provide clear explanations of alternative courses of action that enhance community flexibility and adaptation in dealing with complex situations?

5.4 Is the legal context that requires planning explained (e.g., meet federal/state mandates, identify top priority issues that need to be addressed to ensure legal defensibility)?

5.5 Is the administrative authority for planning indicated (council or planning commission resolution, state law, federal requirements)?

MAXIMUM SCORE: 10

SUBTOTAL: 2

6. CREATE CLEAR VIEWS AND UNDERSTANDING OF PLANS

<table>
<thead>
<tr>
<th>Coding Categories:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 = Identified, clear, relevant</td>
</tr>
<tr>
<td>1 = Identified, vague</td>
</tr>
<tr>
<td>0 = Not identified</td>
</tr>
</tbody>
</table>

6.1 Is a detailed table of contents included (not just list of chapters)?

6.2 Is a glossary of terms and definitions included?

6.3 Is there an executive summary?

6.4 Is there cross-referencing of issues, goals, objectives, and policies?

6.5 Is plain English used (avoiding poor, ungrammatical, verbose, jargon-filled, unclear language)?

6.6 Are clear illustrations used (e.g., diagrams, pictures)?

6.7 Is spatial information clearly illustrated on maps?

6.8 Are supporting documents included with the plan (videos, CD, GIS, Web site)?

MAXIMUM SCORE: 16

SUBTOTAL: 11

7. ACCOUNT FOR INTERDEPENDENT ACTIONS IN PLAN SCOPE

<table>
<thead>
<tr>
<th>Coding Categories:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 = Identified, clear</td>
</tr>
<tr>
<td>1 = Identified, vague</td>
</tr>
<tr>
<td>0 = Not identified</td>
</tr>
</tbody>
</table>

7.1 Are horizontal connections with other local plans and programs explained?

7.2 Are vertical connections with regional or state policies and programs explained?

7.3 Is a process for intergovernmental coordination explained for providing infrastructure and services, protecting natural systems, and mitigating natural hazards (flooding)?

MAXIMUM SCORE: 6

SUBTOTAL: 3
8. PARTICIPATION OF ACTORS

Coding Categories:
2 = Identified, clear, relevant
1 = Identified, vague
0 = Not identified

8.1 Are organizations and individuals that were involved in plan preparation identified? 1
8.2 Is there an explanation of why the organizations and individuals identified in the plan were involved? 0
8.3 Are the stakeholders who were involved representative of all groups that are affected by the policies and implementation actions proposed? 0
8.4 Is there an explanation of participation techniques that were used? 1
8.5 Is there a clear explanation of how stakeholder involvement in plan is related to prior planning activities? 0
8.6 Is the plan's evolution described, including effects on citizens and private stakeholder groups? 1
8.7 Does the plan explain the support and involvement of key public agencies (public works, economic development, parks)? 0
8.8 Does the plan incorporate input from a broad spectrum of stakeholders?

MAXIMUM SCORE: 16
SUBTOTAL: 3

OVERALL MAXIMUM SCORE: 120
OVERALL TOTAL (Sum subtotals from 1-8): 65

Notes

1. A limited number of studies applied various aspects of these conceptual dimensions of plan quality in testing the quality of local plans and the causal factors that explain variation in quality, including, for example, presence and design of state and federal plan mandates, local socioeconomic conditions, and local commitment and capacity to plan. In the United States, see, for example, Berke and French 1994; Godschild et al. 1999, ch. 9; and Nelson and French 2002; in New Zealand, see Berke, Ericksen, and Dixon 1997.

References

Appendix 3. Survey instrument

A. Respondent information.

NOTE: Your survey responses will not be individually referenced to your position or county. Results will only be published as aggregated responses to ensure confidentiality.

1. Are you a county commissioner, planning/adjustments board member, or county employee?
   - County Commissioner
   - Member of Planning or Adjustments Board
   - County employee
   - Other ______

2. Which county do you work for or represent?
   [Select CAMA county from drop down menu]

3. How long have you been a commissioner, board member, or planning employee for your county?
   (Please indicate total time you have been involved in land-use planning for your county, even if it encompassed multiple jobs/terms or if the periods were not sequential.)
   - Less than 1 year
   - 1-2 years
   - 3-5 years
   - 5+ years

B. CAMA land-use plan development and usage.

4. Does your job or position involve decisions or activities which are addressed in your county’s CAMA plan?
   - Yes
   - No
   - I don’t know

5. Does your job or position involve any of the following actions? (Check all that apply.)
   - Approval or review of new development proposals
   - Approval or review of modifications to existing development
   - Approval or review of requested CAMA variances
   - Enforcement of CAMA regulations and permits
   - Assisting people who are applying for CAMA permits
6. Have you read your county’s CAMA land-use plan?
(If your county is currently revising their CAMA plan, please use the existing approved plan for your answer.)
☐ I have read the entire plan
☐ I have read most of the plan
☐ I have read some of the plan
☐ I have not read any of the plan

7. Do you use or consult your county’s CAMA land-use plan when considering a decision that involves development or environmental issues?
(Include instances where you knowingly apply CAMA polices without physically referencing your CAMA plan.)
☐ Always
☐ Most of the time
☐ Sometimes
☐ Rarely
☐ Never

[If you answered “Always” or “Most of the time”, skip to #9]

8. If you do not consistently use or consult your CAMA plan, why not?
☐ The CAMA plan or policies do not apply
☐ CAMA plan is not user-friendly
☐ Plan policies aren’t clear or enforceable
☐ I defer to another guidance document (for example, a Unified Development Ordinance or Comprehensive Plan)
☐ Other, please explain: ______

9. Were you involved with the development of your county’s most recent CAMA land-use plan?
(If your county is currently revising their CAMA plan, please use the in-progress draft plan for your answer.)
☐ Yes
☐ No
☐ I don’t know

[If you answered “No”, skip to #15]

10. Which of the following were readily available during the development of your plan? (check all that apply)
☐ Personnel time
☐ Personnel expertise
☐ Obtaining source information and data
☐ Performing scientific analyses
☐ Financial resources to fund personnel
☐ Financial resources to fund data or analyses
☐ Other _____
11. Which of the following were limited during the development of your plan?  
(check all that apply)  
☐ Personnel time required  
☐ Personnel expertise required  
☐ Obtaining source information and data  
☐ Performing scientific analyses  
☐ Financial resources to fund personnel  
☐ Financial resources to fund data or analyses  
☐ Other _____

12. Did your county use any external consultants or analysts to help develop your CAMA plan?  
☐ Yes, consultants developed most of the plan using county input  
☐ Yes, some parts of the plan were outsourced  
☐ No, everything was done by county staff  
☐ I don’t know.

[If you answered “No”, skip to #15]

13. If yes, why did your county use external consultants or analysts to help develop your plan?  
(check all that apply)  
☐ County personnel were qualified, but did not have enough available time  
☐ County personnel did not have enough technical expertise  
☐ County did not have necessary information or resources  
☐ Cheaper to outsource  
☐ Quicker to outsource  
☐ Other, please explain _____  
☐ I don’t know

14. If yes, what parts of the plan were outsourced?  

[ open-ended answer ]
C. Opinions about your CAMA land-use plan.

15. Please indicate if you agree or disagree with the following statements:

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>The CAMA land-use planning process provides valuable information about my county.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My county’s CAMA plan was developed in a timely manner.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developing a CAMA plan was a worthwhile use of personnel.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developing a CAMA plan was an efficient use of our financial resources.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My county’s CAMA land-use plan is an effective planning tool.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My county’s CAMA plan supplements our other guidance documents and plans in a beneficial way.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We use information collected during the development of our CAMA plan for other uses.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. Opinions about the CAMA land-use planning process.

16. Please indicate if you agree or disagree with the following statements:

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>The CAMA land-use planning requirement encourages counties to protect coastal resources.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The CAMA planning requirement adequately protects environmental resources.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most of the analysis required for our CAMA plan is beneficial to my county.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The CAMA plan is an effective way to get the public involved with the planning process.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The state and federal consistency requirement is an important aspect of CAMA plans.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The CAMA planning process is straightforward and easy to understand.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The CAMA planning requirement is flexible and allows for my county to incorporate our planning priorities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAMA land-use plans should be optional (without deferring planning control to the State).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
17. What are the MOST beneficial aspects of the CAMA plan or process?

[open-ended answer]

18. What are the LEAST beneficial aspects of the CAMA plan or process?

[open-ended answer]

19. How could the CAMA land-use planning process be improved?

[open-ended answer]
Appendix 4. Expanded GIS methodology

This section provided detailed information about the spatial analysis used to obtain the results discussed in the “Spatial Analysis” sections of the case-study evaluations.

Extracting and preparing the core maps for ArcMap

Using Adobe Acrobat Pro 9, Environmental composite, land suitability, and future land use maps were extracted from their respective county’s CAMA plan PDF. Individual map information can be found in appendix table 4-1. Each map was first opened in Illustrator CS3 to test if it had preserved its vector formatting. If so, all extraneous information was deleted to aid in later classification. Extraneous information included labels, frames, background colors, legends, stroke paths, and roads. Once the map had been simplified as much as possible, each group of polygons representing similar classifications was divided into a separate Illustrator layer and labeled appropriately. Each thematic group of polygons was recolored into easily distinguishable RGB combinations. The final simplified maps were exported as AutoCad drawing (.dwg) files.

In some cases, the imported map retained vector formatting for some of the extraneous information (labels, legends, etc.) but converted the crucial information (the classification polygons and base map) into a raster. For these maps, the extraneous information was deleted and the map was exported as a 300 dpi tiff from Illustrator.

In cases where no vector information was preserved when imported into Illustrator, the PDF was imported into Photoshop CS3, converted to an RGB file at 300 dpi at the original page size. All extraneous information was erased. In the case of the Carteret County land suitability map, the map was covered with a fairly dense network of roads. Because these roads would significantly interfere with classification and later analyses, the roads were eliminated by overdrawing with the pencil tool. This was done at a very high magnification using a very small tool size (usually 5 pixels wide,

---

35 Roads were preserved in Gates County maps for later georeferencing, as the county boundaries used in the Gates CAMA plan maps were very generalized and often obscured by classification polygons.

36 When exported as a .dwg file and imported into ArcGIS, the layer labels will be converted into attribute fields and applied to all features within that Illustrator layer.

37 This step was also in preparation for future classification. Since ArcGIS utilizes RGB values to create signatures which distinguish different classes, assigning RGB values as dissimilar as possible should help Arc isolate classes more accurately. For example, extreme RGB values of 0:0:255 and 255:0:0 should be easier to separate than the values 147:25:213 and 83:76:157.
the typically width of the rasterized road line) to prevent any manipulation of the map content. Once this was completed, the map was saved as an RGB .tif file.

The Dare County future land use map also necessitated a special conversion method. Not only would it not retain any vector information, but it was provided as a series of eight local area maps instead of one large map (due to the county’s long, narrow shape). These maps also had a great amount of extraneous information (including individual parcel boundaries) that would prevent an accurate classification if converted directly into a raster. Fortunately, parcel data had already been obtained from Dare County for a previous (unused) analysis (Greg Ball, GIS Coordinator for Dare County, personal commun.). Using a copy of the parcel data, each local area map was recreated using ArcMap’s selection tools. A group of similar parcels were selected visually and attributed with the appropriate future land use classification within an editing session. The only interpretation that was necessary was for maps sections like that of Avon, which appear to be colored using a 500 ft buffer from the roadway. This resulted in some parcels being assigned to two different classes. For this analysis, each parcel was assigned to the class that visually appeared to cover more than half of the parcel area. Once all parcels had been attributed using the CAMA plan maps, extracted Dare County municipal boundaries were used to attribute remaining DOT municipality parcels (which are outside of County jurisdiction and were not shown on CAMA planning maps)( Department of Transportation, 2009).

Once all maps had been exported into Arc-friendly files (.tifs and .dwgs), they were imported into ArcMap. Raster .tif files were georeferenced to DOT county boundaries and road files (Department of Transportation, 2009) using Arc’s Georeferencing tool. AutoCAD .dwg files (the polygon layer) were converted to shapefiles and georeferenced using the Spatial Adjustment tool. Specific information can be found in appendix table 4-1.
**Appendix table 4-1.** Import methodology for environmental composite, land suitability, and future land use maps.

<table>
<thead>
<tr>
<th>Layer</th>
<th>Import from plan PDF</th>
<th>Editing and export</th>
<th>Georeferencing method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carteret</td>
<td>Vector into Illustrator.</td>
<td>Extraneous information removed (roads, labels, etc.) removed. Exported as CAD .dwg</td>
<td>Converted to shapefile; used spatial adjustment menu to reference to Carteret County boundary shapefile.</td>
</tr>
<tr>
<td>Environmental composite</td>
<td>Converted to 300 dpi raster in Photoshop</td>
<td>Extraneous information was erased; overlapping roads were eliminated by overdrawing with pencil tool. Exported as .tiff</td>
<td>Georeferenced to Carteret County boundary shapefile.</td>
</tr>
<tr>
<td>Land suitability</td>
<td>Vector into Illustrator.</td>
<td>Extraneous information removed (roads, labels, etc.) removed. Exported as CAD .dwg</td>
<td>Converted to shapefile; used spatial adjustment menu to reference to Carteret County boundary shapefile.</td>
</tr>
<tr>
<td>Future land use map (FLUM)</td>
<td>Created using Dare County parcel shapefile38</td>
<td>FLUM recreated by visually assigning parcel polygons (in an Arc Map editing session) based on visual comparison to PDF FLUM maps.</td>
<td>Parcel data was projected into NAD83 (originally provided in NAD27).</td>
</tr>
<tr>
<td>Dare</td>
<td>Vector into Illustrator.</td>
<td>Extraneous information removed (labels, frames, etc.). Due to the number and complexity of compound shapes, map was exported as a 300 dpi .tiff</td>
<td>Georeferenced to Dare County boundary shapefile.</td>
</tr>
<tr>
<td>Environmental composite</td>
<td>Vector into Illustrator.</td>
<td>Extraneous information removed (labels, frames, etc.). Due to the number and complexity of compound shapes, map was exported as a 300 dpi .tiff</td>
<td>Georeferenced to Dare County boundary shapefile.</td>
</tr>
<tr>
<td>Land suitability</td>
<td>Created using Dare County parcel shapefile38</td>
<td>FLUM recreated by visually assigning parcel polygons (in an Arc Map editing session) based on visual comparison to PDF FLUM maps.</td>
<td>Parcel data was projected into NAD83 (originally provided in NAD27).</td>
</tr>
<tr>
<td>Gates</td>
<td>Vector into Illustrator.</td>
<td>Extraneous information removed (roads, labels, etc.) removed. Exported as CAD .dwg</td>
<td>Converted to shapefile; used spatial adjustment menu to reference to Gates County FLUM</td>
</tr>
<tr>
<td>Environmental composite</td>
<td>Converted to 300 dpi raster in Photoshop</td>
<td>Cropped, no other editing needed. Exported as .tiff</td>
<td>Georeferenced to Gates County boundary shapefile.</td>
</tr>
<tr>
<td>Land suitability</td>
<td>Vector into Illustrator.</td>
<td>Extraneous information removed (labels, minor roads, etc.) removed. FLUM categories separated into separate layers. Exported as CAD .dwg</td>
<td>Converted to shapefile; used spatial adjustment menu to reference to Gates County FLUM</td>
</tr>
<tr>
<td>Future land use map (FLUM)</td>
<td>Vector into Illustrator.</td>
<td>Extraneous information removed (labels, minor roads, etc.) removed. FLUM categories separated into separate layers. Exported as CAD .dwg</td>
<td>Converted to shapefile; used spatial adjustment menu to reference to Gates County FLUM</td>
</tr>
</tbody>
</table>

---

38 The Dare County FLUM PDFs would not import into Illustrator as vectors, however a vector-based shapefile was required for later analyses. However, the Dare FLUM categories were assigned by parcel, so the FLUM was recreated from parcel data (provided by Dare County).
Preparing files for comparison

[From here forward, Arc processes were performed using the Model Builder if possible.]

After the map files were imported and georeferenced, all remaining shapefiles were converted to rasters, using the classification category attribute as the conversion field (eliminating the need for classification later). Raster files were also made of the county boundaries, and these were assigned as a raster mask in the Raster Attributes field in the Model Properties.

For those maps imported as RGB rasters, they needed to be classified. Using the Classification toolbar (new to ArcMap 10), training samples were defined using polygons. The main classification categories were identified, as well as transitional areas, public or municipal lands, water, and any boundary lines that were not eliminated during the initial processing. Once the training samples were saved, the classification was performed using the Maximum Likelihood Classification tool. Where necessary, the resulting classes were merged using the Reclass tool.

Performing the comparison

Once all the rasters had successfully been created and reclassed, they were again simplified and standardized in preparation for the zonal comparison using the reclass tool (appendix table 4-2). Extraneous map categories (water, boundaries, public and municipal lands) were merged together.
Appendix table 4-2. Reclassification values assigned in preparation for zonal analysis.

<table>
<thead>
<tr>
<th>Reclass value</th>
<th>Carteret</th>
<th>Dare</th>
<th>Gates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Developed</td>
<td>Urban transition</td>
<td>Developed</td>
</tr>
<tr>
<td>2</td>
<td>Limited transition</td>
<td>Limited transition</td>
<td>Growth</td>
</tr>
<tr>
<td>3</td>
<td>Community</td>
<td>Community</td>
<td>Transition</td>
</tr>
<tr>
<td>4</td>
<td>Rural with services</td>
<td>Rural</td>
<td>Community</td>
</tr>
<tr>
<td>5</td>
<td>Rural</td>
<td>Limited conservation</td>
<td>Rural</td>
</tr>
<tr>
<td>6</td>
<td>Conservation</td>
<td>Conservation</td>
<td>Conservation</td>
</tr>
<tr>
<td>0</td>
<td>Protected</td>
<td>Municipal</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Land suitability map</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 High suitability</td>
</tr>
<tr>
<td>2 Medium suitability</td>
</tr>
<tr>
<td>3 Low suitability</td>
</tr>
<tr>
<td>4 Least suitable</td>
</tr>
<tr>
<td>0 Boundary, Municipal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Class 1 – minimal hazards</td>
</tr>
<tr>
<td>2 Class 2 – some hazards</td>
</tr>
<tr>
<td>3 Class 3 – severe hazards</td>
</tr>
<tr>
<td>0 Municipal, Boundary, Water</td>
</tr>
</tbody>
</table>

After the raster maps had been simplified and reclassed, three analyses were performed using the Zonal Histogram tool. This tool produces a count of the number of cells of each class (from the value input layer) contained in each zone (from the zonal input layer). Appendix table 4-3 shows the three analyses performed on each set of county maps. Charts with the resulting counts can be seen in the case-study evaluation section in the body of this report.

Appendix table 4-3. Zonal histogram analyses performed for each case-study county.

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Value input (count the number of these classes...)</th>
<th>Zonal input (...grouped by these classes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental composite and land suitability</td>
<td>Environmental composite</td>
<td>Land suitability</td>
</tr>
<tr>
<td>Environmental composite and future land use map</td>
<td>Environmental composite</td>
<td>Future land use map</td>
</tr>
<tr>
<td>Land suitability and future land use map</td>
<td>Land suitability</td>
<td>Future land use map</td>
</tr>
</tbody>
</table>
Finally, to determine any spatial patterns or significance, the environmental composite and land suitability maps were compared to the future land use map by combining the categories of each map into a set of new hybrid categories using the Raster Calculator tool (appendix table 4-4). The following calculation was used:

\((\text{"future land use map" } \times 10) + (\text{"environmental composite map" or "land suitability map"})\)

This calculation resulted in a set of new two-digit categories that represented all possible combinations of the two maps’ input categories (appendix table 4-5). Categories of interest were color coded and the remaining categories were shaded white. For example, Class 3 lands (severe development hazards, from environmental composite map) that were also earmarked as “developed” (future land use map) were shaded as red, as these are the least ideal lands to be developed.

**Appendix table 4-4.** Map inputs for spatial comparison.

<table>
<thead>
<tr>
<th>County</th>
<th>Input (category/raster value represented by the 10’s digit)</th>
<th>Input (category/raster value represented by the 1’s digit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carteret</td>
<td>Future land use map</td>
<td>Environmental composite map</td>
</tr>
<tr>
<td></td>
<td>Future land use map</td>
<td>Land suitability map</td>
</tr>
<tr>
<td>Dare(^{39})</td>
<td>Future land use map</td>
<td>Environmental composite map</td>
</tr>
<tr>
<td>Gates</td>
<td>Future land use map</td>
<td>Environmental composite map</td>
</tr>
<tr>
<td></td>
<td>Future land use map</td>
<td>Land suitability map</td>
</tr>
</tbody>
</table>

\(^{39}\) Because Dare County’s land suitability map only contains “suitable” and “regulated” categories, and because they acknowledge that even environmentally sensitive lands will be considered for development, comparing this map to the future land use map would not yield any enlightening results about their preferential development decisions. Therefore, this analysis was omitted.
Appendix table 4-4. Map inputs for spatial comparison.

<table>
<thead>
<tr>
<th>New class value</th>
<th>Future land use category</th>
<th>Environmental composite category</th>
<th>Color code</th>
<th>New class value</th>
<th>Future land use category</th>
<th>Land suitability category</th>
<th>Color code</th>
</tr>
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<td></td>
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<td>high</td>
<td></td>
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<td></td>
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<tr>
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<td>protected</td>
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<td></td>
<td>3</td>
<td>protected</td>
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</tr>
<tr>
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<td>protected</td>
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Carteret County

Dare County
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<table>
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<tr>
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<tr>
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<table>
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Gates County

<table>
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<th>Community</th>
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