COASTAL MONITORING & OBSERVATIONS REVIEW

Land Use Change Worksheet

Part A

A major responsibility of NOAA's Coastal Change Analysis Program (C-CAP) is to document how land cover in coastal areas changes from one time period to the next. To do this, C-CAP uses satellite images (primarily the Landsat Thematic Mapper) to categorize land cover in coastal wetland habitats and adjacent upland areas. Extensive ground checks are used to verify that interpretations of satellite images are accurate with respect to land cover. By comparing images of the same area acquired at different times, it is possible to detect changes in land cover and make inferences about land uses that account for observed changes.

Data on changes in land use are often summarized in change tables. To get an idea of what a change table means, let's analyze two images of land use on a fictitious island in 1990 (Figure 1) and 1995 (Figure 2). Land use images consist of many individual blocks known as "pixels." Each pixel represents an area of ground, and the size of the pixel depends upon the characteristics of the sensor used to capture the image. To keep things simple, the data for Hokey Island consist of very large pixels, so there aren't very many of them. In reality, images obtained by the Landsat Thematic Mapper consist of pixels that are 30 meters x 30 meters, so there are many more pixels in these images (and a lot more data to analyze!).

The first step in this analysis is to identify the exact location of each pixel so that pixels representing the same location in the two images can be compared. One way to do this is to identify each pixel with the the latitude and longitude of the area it covers. Other systems commonly used include the Universal Transverse Mercator system and State Plane Coordinate System. Again, to keep things simple, we'll just use letters and numbers to identify the row and column corresponding to each pixel.

Figure 1
Hokey Island Land Use, 1990

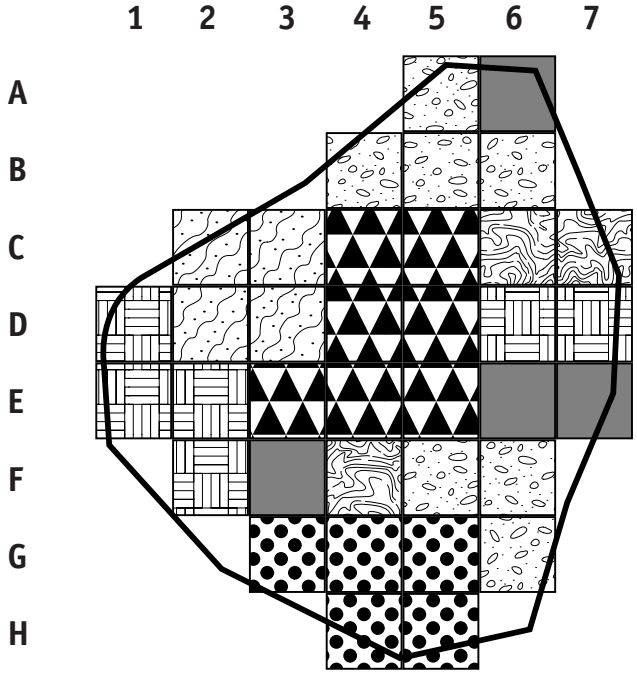
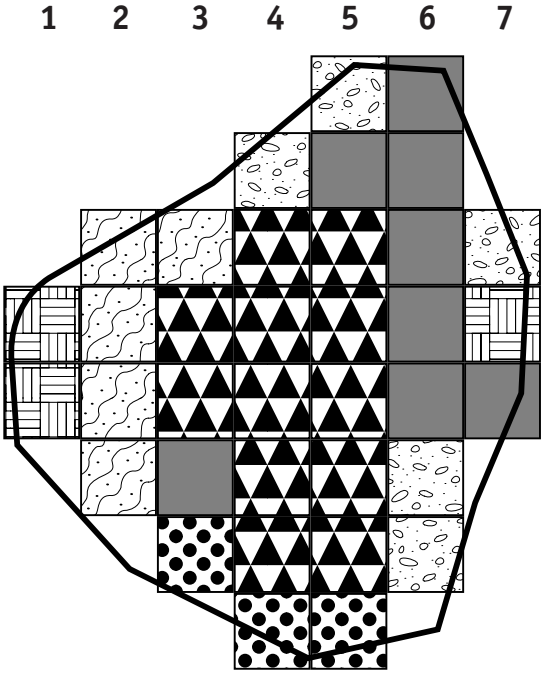
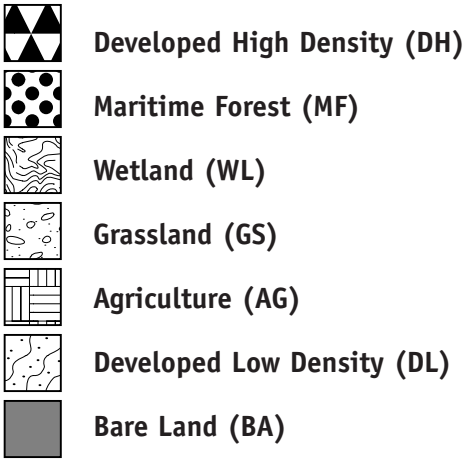
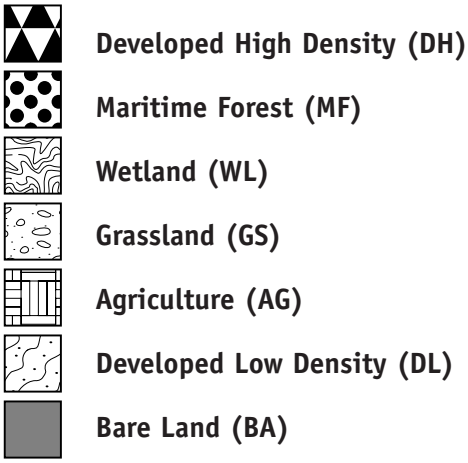


Figure 2
Hokey Island Land Use, 1995







Next, fill in Table 1 to summarize land cover for each pixel in 1990 and 1995. Notice that the images exclude pixels that cover less than half of Hokey Island, and that some pixels (on the edges) also include areas that are not part of Hokey Island. This is why smaller (and therefore more numerous) pixels give a more accurate estimate of land cover.

Table 1

Pixel	1990 Land Cover	1995 Land Cover
A5		
A6		
B4		
B5		
B6		
C2		
C3		
C4		
C5		
C6		
C7		
D1		
D2		
D3		
D4		
D5		
D6		
D7		
E1		
E2		
E3		
E4		
E5		
E6		
E7		
F2		
F3		
F4		
F5		
F6		
G3		
G4		
G5		
G6		
H4		
H5		

Now it's time to construct a change table. Table 2 is a matrix with land use categories for 1990 in the first column, and land use categories for 1995 in the first row. Reading the chart from left to right should show how many pixels for each land use category in 1990 changed to another category in 1995. Use Table 1 to fill in Table 2. The central diagonal cells with bold outlines show how many pixels for each category did not change between 1990 and 1995. What trends does the change table reveal?

Table 2

To 1995 → / From 1990 ↓	DH	MF	WL	GS	AG	DL	BA	Total Acres
DH								
MF								
WL								
GS								
AG								
DL								
BA								
Total Acres								

Part B

Table 3 is a change table documenting changes in the Mermentau River Basin, Louisiana, between October 1992 and February 1996. Use this table to answer the following questions:

1. What are the top three land cover types in the Mermentau River Basin?

_____

_____

_____

2. What uses might be associated with the dominant land cover types?

_____

_____

_____

3. Which three land cover categories had the highest number of acres changed between October 1992 and February 1996?

4. Describe the steps in an ecological succession that includes these land cover categories.

5. Is there other evidence of this succession in the change table?

6. What percentage of wetlands were converted to other land cover categories?

7. Which land cover category accounts for the majority of wetland conversions in this change table? How serious is the loss of wetlands in the Mermentau River Basin?

Table 3

From/To	Developed	Cultivated	Grassland	Forested	Scrub/ Shrub	Wetlands	Bare	Water	Total Acres	Changed
Developed	71,033	0	2	0	0	0	0	9	71,044	11
Cultivated	6	1,631,330	4,408	175	5,873	60	98	759	1,642,710	11,380
Grassland	107	961	339,795	17,775	81,662	66	103	424	440,893	101,098
Forested	49	1,559	67,769	866,990	16,230	107	324	2,006	955,033	88,044
Scrub/Shrub	46	1,362	20,961	50,942	105,770	3,371	274	53	182,781	77,010
Welands	2	37	146	143	65	1,172,769	837	39,803	1,213,802	41,033
Bare	46	17	120	7	11	157	4,326	1,836	6,519	2,193
Water	2	125	120	102	8	6,508	4,262	790,347	801,474	11,127
Total Acres	142,532	1,635,391	433,321	936,134	209,619	1,183,038	10,224	835,228		