

Attitudes About Recreation, Environmental Problems, and Estuarine Health Along the New Jersey Shore, USA

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ABSTRACT / Management of ecosystems has advanced by an improvement in our understanding not only of how ecosystems function, but of how people perceive their functioning and what they consider to be environmental problems within those systems. Central to such management is understanding how people view estuaries. In this article I explore the perceptions and attitudes of people about coastal recreation, environmental problems, and future land use along the New Jersey shore (USA) by interviewing people who attended a duck decoy and craft show on Barnegat Bay. The people who were interviewed engaged in more days of fish-

ing than any other recreational activity and engaged in camping the least. There were significant differences in recreational rates as a function of gender and location of residence, with men hunting and fishing more than women and photographing less than women. Jet skis were perceived as the most severe environmental problem, with chemical pollution, junk, oil runoff and overfishing as second level problems. Birds were perceived as not an environmental problem at all. Fishing, hiking, preservation, and camping ranked as the highest preferred future land uses for the two sites examined (Oyster Creek Nuclear Generating Station, Naval Weapons Station Earle). The preferred future land uses for these two sites, which are not under consideration for land-use changes, were very similar to those of people living near the Department of Energy's Savannah River Site in South Carolina, despite the media attention and considerations of nuclear storage.

Public understanding of environmental problems is critical for successful conservation and management of ecosystems. Although attention is often focused on tropical ecosystems (Holl and others 1995) or on troubled ecosystems such as the Everglades (Bancroft and others 1992), there are many systems in urban and suburban environments that are equally in need of management. This is particularly true of the United States where a substantial proportion of our population lives along the coasts. Other countries are equally worried about coastal land use (Raine 1994). Changes in coastal environments often happen gradually, and these cumulative changes should be incorporated into regulatory and management procedures (Daily and Ehrlich 1992, Spaling and Smit 1993). Initially the public worried about the health of coastal estuaries that received the highest human use, but today we are also faced with depleted fish stocks, often of oceanic species (Safina 1994).

Maintaining healthy ecosystems that function within the greater land-margin interface requires a landscape approach to assessing ecosystem diversity and integrity (Lapin and Barnes 1995). However, public perceptions and concerns about these systems are equally critical,

particularly in urban and suburban environments (Slocombe 1993, Grumbine 1994). Decision makers recognize the importance of multiple uses of land (Yin and Pierce 1993), particularly in coastal environments. Managing ecosystems is clearly a social process (Norgaard 1992, Meffe and Viederman 1995), although we often ignore this perspective. Thus, solving many of our coastal problems may be linked to understanding how people use coastal resources, how they think the resources should be used in the future, and how they view the severity of environmental problems there.

In this paper I examine perceptions about the New Jersey shore, including recreational use, severity of environmental problems, and future land use. I interviewed people attending a duck decoy and crafts show near Barnegat Bay, New Jersey. I was especially interested in the relative ranking of environmental problems because the Mullica River has recently been designated a National Estuarine Research Reserve under NOAA, and the Barnegat Bay ecosystem was accepted under the EPA's National Estuary Program, which involves assessing the state of the estuary and developing a viable management plan. One objective of the present survey was to provide information on perceptions about environmental problems and future land use that would be useful in designing a management plan for Barnegat

KEY WORDS: Recreation; Perceptions; Environmental problem; Gender; Land use; Coastal

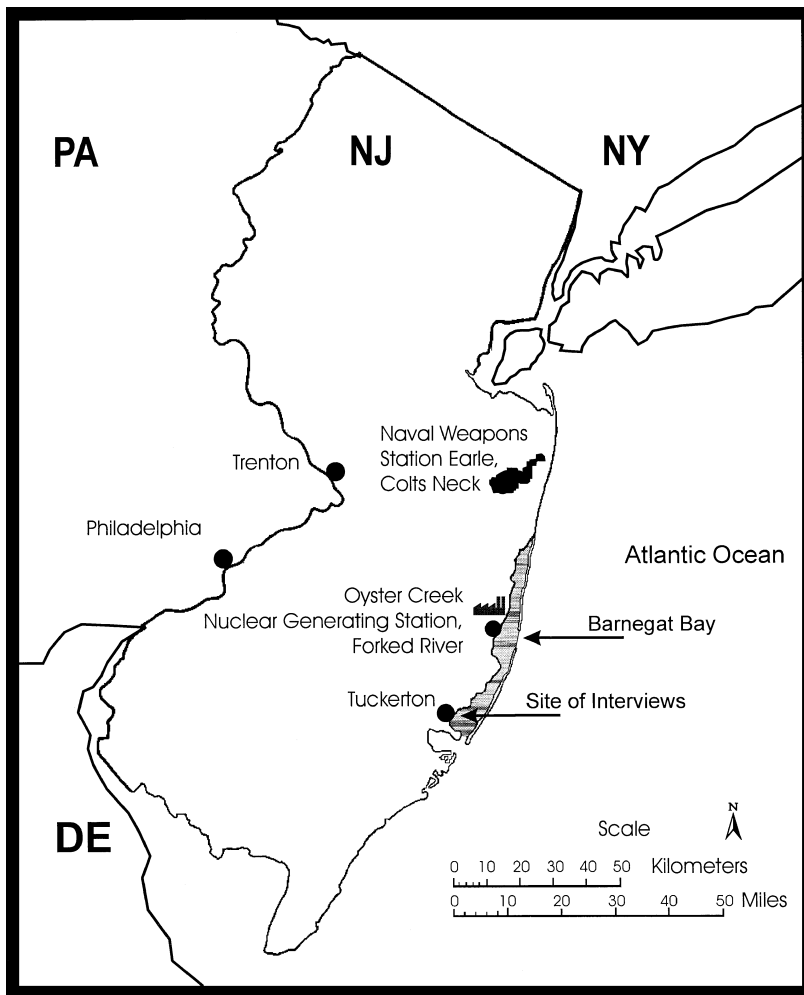


Figure 1. Map of New Jersey showing Barnegat Bay, site of decoy show at Tuckerton, and the site of the Oyster Creek Nuclear Generating Station and the Naval Weapons Station Earle.

Bay. An additional objective was to determine land-use preferences for two nearby facilities (one military, one nuclear) to explore the relative desire for recreational versus residential or industrial facilities.

New Jersey is the most densely populated state in the nation (Stansfield 1983). Much of the state is heavily industrialized and urbanized, although southern New Jersey still retains an agricultural aspect. Shore tourism is one of the most important industries in the state. Barnegat Bay encompasses some of the most highly used beach areas, and accounts for nearly 30% of the New Jersey shore. Unlike both the New York–New Jersey Harbor and Delaware Bay, both designated National Estuaries over five years ago, Barnegat Bay is not a major port or an oil transport route (Burger 1997), and it houses no major industries.

Methods

People were interviewed at the Barnegat Bay duck decoy and craft show held in Tuckerton, New Jersey,

28–29 September 1996 (Figure 1). This show, run by the Old Bayman's Museum, was visited by over 30,000 people during the weekend, and took place in three different locations. In addition to duck decoys, there were a number of crafts and fine arts, as well as competitions and food.

People were interviewed using a standard form, by people experienced in the interview process (Burger and others 1997). We identified ourselves as Rutgers people who were interested in their views about Barnegat Bay. The interview took 10–15 min, depending on how much people wanted to discuss each issue. Inquiries about the questions were answered only at the end of the survey; 32% of the 291 people interviewed were women, and ages ranged from 11 to 99.

People were selected randomly from those standing in line or eating; however, there is no indication that the sample was not representative of the people attending the show. Refusal rate was very low ($N = 4$), as most people were interested in expressing their concerns

about the shore. The people who attend such a show, however, are already a subset of the general population of New Jersey; they represent a group of people who are generally interested in the shore, and most expressed their interest in Barnegat Bay and volunteered information about their recreational activities along the shore. Since one of our initial objectives was to determine perceptions that would guide the formation of management plans for Barnegat Bay, it seemed reasonable to interview people who were interested in coastal issues and might have first-hand knowledge of these issues.

After identifying ourselves, we asked questions in four categories: demographic characteristics, recreational rates, environmental problems, and future land use. Demographic questions related to their age, gender, ethnic group, level of schooling completed, place of residence, and self-assessment of general health. Recreational questions related to the number of days they engaged in a variety of activities (regardless of location). For the environmental questions, people were asked to rate the severity of the problem on a scale of 1 (minor problem or nonexistent) to 5 (major problem) for the New Jersey shore. On questions of future land use, people were asked to rate potential use from 1 (low use) to 5 (high value for preferred use). Half the people were asked about future land use for the Oyster Creek Nuclear Generating Station and the other half were asked about future land use for the Naval Weapons Station Earle. Both are highly visible features of the area, and both have extensive land that is undeveloped. Oyster Creek is a nuclear power generating plant (800 acres) that borders the bay, and Earle is an 11,118-acre facility that is slightly north of Tuckerton (see Figure 1). If people inquired whether either were being turned back to the public, we answered that there were no immediate plans for either, but we were interested in their views should this ever happen. We choose these two because they are well known and represent different kinds of environmental problems: one with the attendant problems of nuclear power, and the other military with the contamination problems of some government installations. Further, both the military and the Department of Energy have extensive lands that they are considering decommissioning or returning to local jurisdictions, and we felt it would be helpful to know something about future land-use preferences of such facilities.

Rankings for environmental problems and future land use were examined by area of residence to test the hypothesis that people who lived around Barnegat Bay (=local) might have different perceptions or knowledge about environmental problems in the bay than those living farther away.

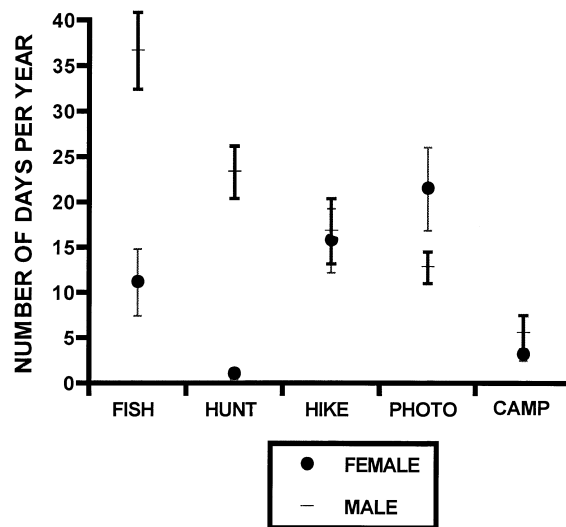


Figure 2. Recreational use for women (circles) and men (line).

Results

Recreational Use

In general, the most popular recreational activities were fishing, hiking, photography, and hunting, in that order. There were significant differences in rates of recreational activities as a function of gender and residence. There were significant gender differences in rates of fishing ($\chi^2 = 47.7$, $P < 0.0001$), hunting ($\chi^2 = 64.7$, $P < 0.0001$), and photography ($\chi^2 = 5.9$, $P < 0.02$, Figure 2). Men who were interviewed engaged in fishing up to 365 days a year and hunted up to 234 days a year; women hunted and fished much less. Women engaged in photography up to 300 days a year, while men engaged in photography up to 144 days a year. Many fewer people camped or hiked.

There were significant differences in recreational rates as a function of residence location (Figure 3). In general, people from out of state fished and camped more than those who lived in state. People who lived in northern New Jersey hiked more than people who lived elsewhere. People who lived in New Jersey engaged in photography more than those from out of state. There were no differences in hunting rates as a function of location.

These data can also be used to examine relative activities within a region. For example, most people engaged in fishing more often than other activities, except for those living in northern New Jersey, where hiking and photography ranked slightly higher. Except for the out of state people, camping ranked relatively low (Figure 3).

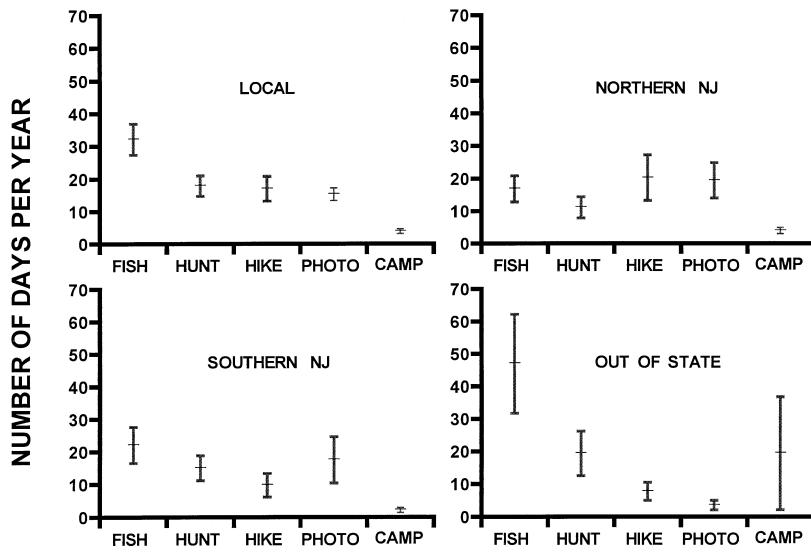


Figure 3. Recreation use as a function of place of residence (mean \pm standard error).

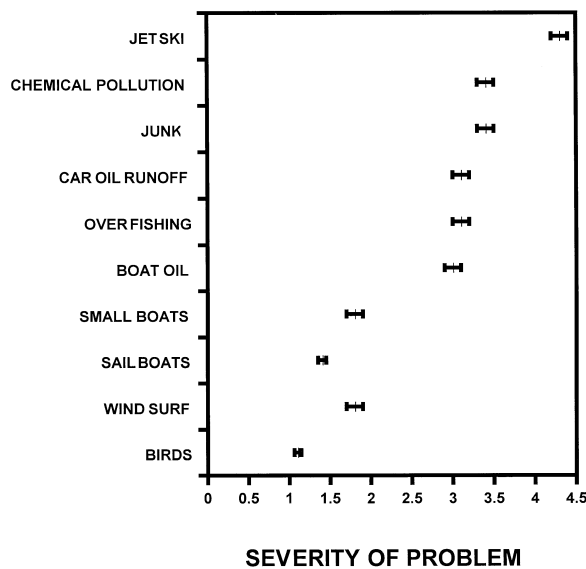


Figure 4. Relative ranking of the severity of several environmental problems for the New Jersey shore. Given are mean (vertical line) and standard error (horizontal line).

Environmental Problems

Overall, there were significant differences in people's perceptions of the severity of environmental problems (Figure 4). By far the most significant problem was jet skis (herein used to refer to all personal watercraft), followed by chemical pollution, junk, oil, and overfishing. Wind surfing, sailboats, small boats, and birds were perceived as insignificant problems for the New Jersey shore. Many people commented that the birds were there first, and if they took too many fish they obviously needed them to survive.

There were some significant gender and residence differences in the perceptions of the severity of environmental problems (Tables 1 and 2). Where there were gender differences, women rated the problem as more severe than did men. There were no gender differences, however, in the ratings for the five they rated as most severe (Table 1).

In contrast, there were significant locational differences in how people ranked the three most severe environmental problems (Table 2). People living in southern New Jersey, but not on the bay, ranked jet skis as less of a problem than did people living elsewhere. People living around Barnegat Bay ranked chemical pollution and junk in the water as a less severe problems than people from elsewhere.

Future Land Use

There were significant differences in how people ranked potential future land uses for Oyster Creek and Earle, but in general, they ranked the uses similarly for the two sites (Figure 5). They ranked fishing, hiking, preservation, hunting, and camping as appropriate uses, were neutral about nuclear energy production, and disagreed fairly strongly that either site should be used for nuclear storage, factories, or homes (Figure 5). As might be expected, people ranked hiking and preservation lower for the Oyster Creek Nuclear Generating Station than they did for the Naval Weapons Station Earle.

There were very few gender differences in how people ranked future land uses (Table 1). Women ranked both hunting and fishing significantly lower than men, perhaps reflecting their lower participation in these activities (Figure 2).

Table 1. Perception of problems along New Jersey shore and future uses for Oyster Creek Nuclear Generating Station and Naval Weapons Station Earle^a

	Men	Women	Kruskal-Wallis χ^2 (<i>P</i>)
Sample size	197	94	
Rating of environmental problems			
Jet skis	4.38 ± 0.09	4.19 ± 0.14	1.3 (NS)
Chemical pollution	3.31 ± 0.11	3.64 ± 0.16	3.0 (NS)
Junk	3.32 ± 0.10	3.55 ± 0.16	2.0 (NS)
Car oil	3.12 ± 0.11	3.28 ± 0.17	0.7 (NS)
Overfishing	3.12 ± 0.11	3.06 ± 0.17	0.1 (NS)
Boat oil	2.84 ± 0.11	3.41 ± 0.16	8.75 (0.003)
Small fishing boats	1.67 ± 0.08	1.97 ± 0.14	4.8 (0.03)
Wind surfers	1.65 ± 0.08	2.01 ± 0.15	5.2 (0.02)
Sailboats	1.40 ± 0.06	1.52 ± 0.09	2.4 (NS)
Birds eating too many fish	1.18 ± 0.05	1.12 ± 0.05	0.0 (NS)
Rank for future uses			
Hunting	3.84 ± 0.13	2.84 ± 0.21	17.1 (0.0001)
Fishing	4.04 ± 0.12	3.03 ± 0.20	17.5 (0.0001)
Camping	3.60 ± 0.13	3.08 ± 0.23	3.2 (NS)
Hiking	3.76 ± 0.13	3.35 ± 0.22	2.1 (NS)
Build houses	1.24 ± 0.07	1.36 ± 0.14	0.0 (NS)
Build factories	1.40 ± 0.09	1.57 ± 0.15	0.7 (NS)
Continue nuclear energy production	2.81 ± 0.21	3.17 ± 0.27	0.8 (NS)
As a preserve	3.51 ± 0.15	3.87 ± 0.19	1.6 (NS)
For nuclear waste storage	1.64 ± 0.12	1.43 ± 0.14	1.2 (NS)
Hunting/fishing only	2.60 ± 0.14	1.97 ± 0.14	5.3 (0.02)

^aGiven are means ± standard error of rankings where 1 = no problem (or low preferred land use) and 5 = very severe problem (or high preferred land use). NS = not significant.

Discussion

Recreational Use

Clearly fishing is an important recreational activity for the people interviewed in this study, regardless of their gender or place of residence. Both men and women engaged in an average of ten or more days of fishing a year, and some people engaged in fishing for several months a year. This suggests that managers and regulators must take into account fishing needs and opportunities when developing management plans for Barnegat Bay and elsewhere along the New Jersey shore.

The people interviewed hunted for far fewer days than they fished, regardless of where they were from. This was surprising since the interviews were conducted at a duck decoy show where I expected to find hunters. This could reflect three things: (1) decoys are an art form that many people like to view, (2) many people

who would never consider hunting collect decoys, and (3) this show is a celebration of the shore as much as it is of hunting. As a show that features the shore, the views of the people attending partly reflect those of people who are genuinely concerned about the shore. Similar decoy shows are held all along the Atlantic coast in the fall and early spring, and draw people who may be similarly appreciative of shore culture.

The differences in recreational activities as a function of gender were expected: men hunt and fish more than women. Women in this study, however, engaged in photography more than men, and this should also be taken into account when planning for estuarine management. Perhaps particular photography opportunities could be provided for this user group.

Hiking was relatively important for all groups, suggesting that providing some longer trails in estuarine situations might be useful both for increased recreational opportunities and to allow public education about the shore. Camping ranked relatively low for all New Jersey residents, although it ranked higher for out-of-state people. This latter finding is not surprising since the Jersey shore is generally accessible on a day-trip basis for most people living in New Jersey.

Environmental Problems

There were differences in perceptions about environmental problems. Jet skis ranked as the most severe environmental problem overall, for both men and women and for people from most regions. Other severe problems were chemical pollution, junk, oil and overfishing. Things that were not perceived as problems were wind surfers, small boats, sailboats, and birds. Birds ranked the lowest as an environmental problem.

The problem of jet skis in estuarine situations is a difficult and thorny one. For those who use jet skis, it is clearly fun and exhilarating to run over the surface of the water at great speeds, going into areas of the bays and estuaries that are generally inaccessible. Because jet skis travel on top of the water, they can go farther up into creeks and into shallower water than any other type of watercraft. The very features that make them so appealing to those who own them are the ones that are disadvantages for people living around the bay and for the ecosystem itself.

For people living around the bay, jet skis are noisy, ubiquitous, and interfere with other recreational activities. Many of the fishermen expressed concerns that these boats made it impossible for people to fish or crab from the shore because they created huge wakes and scared away the fish. Many people were concerned for the safety of people who might be wading, swimming, or crabbing in areas used by jet skis. Nearly everyone

Table 2. Perception of problems along New Jersey shore and future uses for Oyster Creek Nuclear Generating Station and Naval Weapons Station Earle^a

	Local	Southern NJ	Northern NJ	Out of zone	Kruskal-Wallis χ^2 (P)
Sample size	163	44	62	21	
Rating of environmental problems					
Jet skis	4.37 ± 0.09 (A)	3.81 ± 0.22 (B)	4.46 ± 0.15 (A)	4.44 ± 0.26 (A)	10.0 (0.02)
Chemical pollution	3.21 ± 0.13 (B)	3.83 ± 0.20 (AB)	3.52 ± 0.18 (AB)	4.20 ± 0.33 (A)	9.3 (0.02)
Junk	3.14 ± 0.12 (B)	3.67 ± 0.22 (AB)	3.57 ± 0.17 (AB)	4.00 ± 0.33 (A)	10.5 (0.01)
Car oil	3.05 ± 0.12 (AB)	3.73 ± 0.20 (A)	3.05 ± 0.21 (AB)	2.88 ± 0.39 (B)	6.7 (NS)
Overfishing	3.10 ± 0.12 (A)	2.88 ± 0.23 (A)	3.07 ± 0.21 (A)	3.33 ± 0.36 (A)	1.3 (NS)
Boat oil	2.99 ± 0.12 (A)	3.20 ± 0.23 (A)	2.98 ± 0.19 (A)	2.56 ± 0.35 (A)	2.3 (NS)
Small fishing boats	1.83 ± 0.10 (A)	1.71 ± 0.18 (A)	1.76 ± 0.16 (A)	1.29 ± 0.14 (A)	2.6 (NS)
Wind surfers	1.79 ± 0.10 (A)	1.63 ± 0.18 (A)	1.72 ± 0.16 (A)	1.84 ± 0.27 (A)	1.8 (NS)
Sailboats	1.52 ± 0.08 (A)	1.35 ± 0.11 (A)	1.27 ± 0.09 (A)	1.47 ± 0.16 (A)	4.0 (NS)
Birds eating too many fish	1.18 ± 0.05 (A)	1.19 ± 0.12 (A)	1.14 ± 0.10 (A)	1.00 ± 0.00 (A)	3.8 (NS)
Rank for future uses					
Hunting	3.49 ± 0.15 (A)	3.76 ± 0.30 (A)	3.49 ± 0.26 (A)	3.56 ± 0.60 (A)	0.3 (NS)
Fishing	3.51 ± 0.15 (A)	4.10 ± 0.24 (A)	4.12 ± 0.19 (A)	3.56 ± 0.60 (A)	5.4 (NS)
Camping	3.32 ± 0.16 (A)	3.55 ± 0.32 (A)	3.63 ± 0.21 (A)	3.56 ± 0.60 (A)	1.2 (NS)
Hiking	3.49 ± 0.16 (A)	3.48 ± 0.32 (A)	4.02 ± 0.20 (A)	3.30 ± 0.60 (A)	3.6 (NS)
Build houses	1.26 ± 0.08 (B)	1.96 ± 0.32 (A)	1.07 ± 0.05 (B)	1.00 ± 0.00 (B)	19.2 (0.0003)
Build factories	1.46 ± 0.10 (B)	2.26 ± 0.32 (A)	1.16 ± 0.11 (B)	1.22 ± 0.22 (B)	18.8 (0.0003)
Continue nuclear energy production	3.02 ± 0.22 (A)	3.56 ± 0.37 (A)	2.60 ± 0.39 (A)	2.63 ± 0.57 (A)	3.6 (NS)
As a preserve	3.57 ± 0.16 (A)	3.22 ± 0.34 (A)	3.83 ± 0.24 (A)	3.56 ± 0.60 (A)	3.5 (NS)
For nuclear waste storage	1.54 ± 0.12 (A)	1.82 ± 0.34 (A)	1.56 ± 0.19 (A)	1.50 ± 0.33 (A)	0.6 (NS)
Hunting/fishing only	2.35 ± 0.14 (B)	3.41 ± 0.30 (A)	2.09 ± 0.19 (B)	2.44 ± 0.44 (B)	13.0 (0.005)

^aGiven are means ± standard error of rankings where 1 = no problem (or low preferred land use) and 5 = very severe problem (or high preferred land use). Like letters are not significant when all four groups are considered (Duncan Multiple Range Test). NS = not significant.

expressed the desire that jet skis should be regulated in some ways.

Many people who expressed concerns about jet skis, noted that noise was excessive, eelgrass (*Zostera* spp.)

beds were destroyed, creek bottoms and narrow channels were disrupted, and nesting birds were harassed by jet skis. Clearly the results of this survey indicate that there is overwhelming concern for the health and well-being of the New Jersey shore with respect to jet skis.

Chemical pollution and junk ranked as the next most severe environmental problems for the New Jersey shore. The former no doubt represents concerns emanating from media attention to pollution, and the latter reflects beach closures. Moreover, anyone visiting any shore can see junk of various types along the shore, and the media has publicized the plight of dolphins, fish, and sea turtles that swallow balloons, plastic bags, and other junk.

Overfishing also ranked relatively high as an environmental problem, but it is clear that this question bears further examination because it really included two different problems: recreational fishing and commercial fishing. Many people who were asked this question said there was no recreational overfishing but there was commercial overfishing. Thus it is difficult to interpret the results with respect to this aspect. The relative role of different kinds of fishing on the health and well-being of the New Jersey shore bears further investigation.

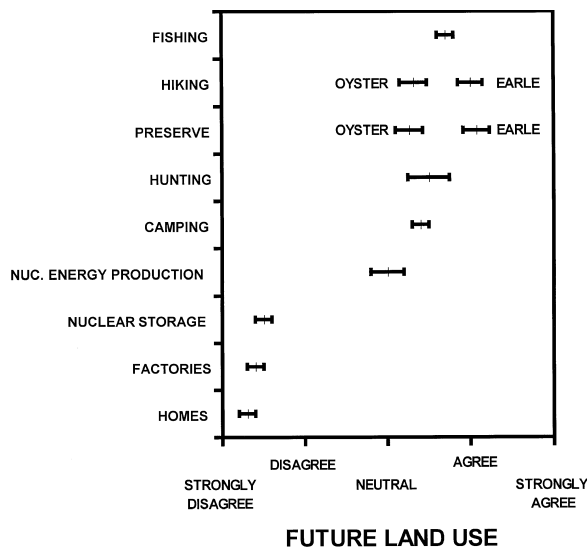


Figure 5. Relative ranking of future land use for Oyster Creek Nuclear Generating Station and Naval Weapons Station Earle, assuming that they were decommissioned and the land were available.

Future Land Use

As a higher and higher percentage of people concentrate along coasts in the United States and elsewhere in the world, it is clear that future land-use planning is critical to maintaining healthy ecosystems. This is important for human health as well since our own well-being depends on functioning ecosystems for potable drinking water, agricultural lands, and recreational lands (Burger and Gochfeld 1996).

Managing ecosystems has been the purview of local, state, and federal government agencies. However, recently, several groups have noted the importance of including stakeholder views in the process of decision-making (NRC 1994, Wernick 1995). Although scientific knowledge is clearly essential to management and regulatory decisions, it should not occur in the absence of policy and social considerations (Meffe and Viederman 1995). The President's Commission on Risk Assessment and Risk Management (1996) recently noted the importance of placing stakeholder participation in the center of an iterative process of decision making.

Inclusion of the public is particularly critical for future land-use decisions where there are no absolutes and where different stakeholders have different agendas. The United States and other nations are facing the legacy of the Cold War that left many hundreds of sites contaminated, some with nuclear wastes, others with a variety of chemical wastes (Kunreuther and others 1990, Barke and Jenkins-Smith 1993, Grumbly 1996). Further, there are a number of CERCLA (Superfund) sites and other nuclear facilities that require some degree of cleanup. Either these sites must be cleaned up to pristine standards or decisions about cleanup must be based on risk and future land use.

In this paper I examined perceptions about future land use for two well-known sites to find out how people viewed potentially contaminated sites that were not contentious and that had not become the focus of the media. Most of the perception work to date has revolved around sites where attitudes and feelings were already well established. Neither of the two sites examined in this study have had large contamination accidents, nor has there been major concern for environmental health and safety.

Nonetheless, perceptions of future land use were very similar to those found for places where nuclear concerns are foremost. For example, the same series of land-use choices were given to people attending a sportsmen's show in Columbia, South Carolina, near the Department of Energy's Savannah River Site (Burger and others 1997). Surprisingly, the land-use choices were very similar: people ranked hunting, fishing, hiking, and land stewardship the highest, and nuclear storage, houses, and factories the lowest. Both surveys

clearly indicated that recreational and preservation uses ranked significantly higher than industrial, residential, or nuclear activities. Furthermore, both groups distinguished clearly between continued nuclear production and nuclear storage. People interviewed ranked nuclear production as a possible or neutral future land use, yet ranked nuclear storage very low.

Since the Oyster Creek Nuclear Generating Station is located on Barnegat Bay (or very close to it), while the Naval Weapons Station Earle is not, I had predicted that it would rank higher with respect to all recreational activities. However, it did not, and in fact ranked significantly lower for both hiking and preservation. This may relate to the greater potential for recreational use at Earle since it is much larger.

Conclusions

Developing a management plan for Barnegat Bay, and for any coastal estuary, requires not only sound biological data, but information on how the public uses coastal resources, and how they view environmental problems and potential future land uses. The results of this study indicate that there are gender and residence differences in recreational rates, and in the rankings of the severity of environmental problems and future land uses. However, residence and gender differences were relatively small compared to overall differences in environmental rankings and future land uses. Overall, people ranked jet skis as severe environmental concerns, and birds, wind surfers, and sailboats as minor concerns. Furthermore, people ranked recreational uses much higher than nuclear storage, factories, and housing. These data can be used to help design a management plan for Barnegat Bay and will be useful for managers from other estuaries when considering their future plans.

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