



AP[®] Environmental Science 2003 Sample Student Responses

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3. Environmental conditions in coastal estuaries vary hourly and seasonally.

- Discuss TWO important causes for the variation in the temperature and/or salinity of an estuary. Be sure to include the connection between each cause and temperature and/or salinity.
- Discuss TWO roles that coastal wetlands play that are ecologically important, and TWO roles that wetlands play that are economically important.
- Identify and explain THREE ways in which humans have had a negative impact on or have degraded coastal wetlands.
- Choose one of the negative human impacts you identified in part (c), and explain one environmental policy and one economic incentive that could have prevented it.

A) An estuary's salinity will change hourly due to the tides. As the oceanic water comes in during high tide, it forces the less dense fresh water further back up the river, causing the estuary to become high in salinity. This process is reversed when the tide goes out and the freshwater extends its reach again. The temperature of an estuary will be lower during winter months because solar radiation is hitting the water at a shallow angle due to the tilt of the earth. In the summer months, the sun's rays hit the water directly warming it up.

B) Wetlands act as filters that remove all impurities and toxins from the local environment. This purifies the water and soil making it more hospitable for life. They also serve as huge nurseries for larval and early stages of young organisms. The B/C of the large amount of larval staged organisms in the area, there is abundant food available for larger organisms. Economically, wetlands provide billions of dollars in the form of ecotourism, because everyone

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loves to take videos through the wetland and look at all the aesthetically pleasing flora & fauna. Also, the shell fish and crustaceans that live in these areas are a highly lucrative staple in the Seafood Market, and are harvested each year in mass & fetch large ~~and~~ prices on the market providing thousands with livelihoods.

c) As humans, we ~~do~~ like to develop coastal wetlands because they are close to the beach. This development absolutely destroys the wetland & everything in it. Humans often pollute wetlands with solid wastes or industrial effluent or things like motor oil or thermal pollution. All this can kill vital species in a wetland, totally disrupting its sensitive ecosystem. Humans may overhunt a particular species in the wetland to the point it could cause a ~~for~~ breakdown in the food web, and when that occurs the entire ecosystem is compromised or negatively affected.

D) Development in wetlands could be halted if laws were passed that protected them from development. Economically, ~~the~~ the government could levy such a high tax on ~~that~~ developments in wetlands that it makes such ventures economically infeasible.

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(a) VARIATION IN SALINITY OF AN ESTUARY CAN BE CAUSED BY TIDAL MOVEMENT. AS THE TIDE COMES IN, IT BRINGS SALT WATER WITH MORE SALT CONTENT THAN THAT OF THE ESTUARY. AS THEY BEGIN TO MIX THE OVERALL SALINITY IS INCREASED.

TEMPERATURE OF AN ESTUARY MAY BE INCREASED DUE TO THERMAL POLLUTION UPSTREAM. IF SOME POWER PLANT DIVERTS WATER FOR COOLING AND THEN RELEASES THE HEATED WATER, IT MAY CAUSE A SIGNIFICANT INCREASE IN WATER TEMPERATURE FROM THE UPSTREAM USE, ALL THE WAY TO THE ESTUARY.

(b) ECOLOGICALLY, THE WETLANDS HAVE MANY ROLES. ONE OF WHICH IS TO FILTER AND CLEANSE WATER. AS WATER SEEPS THROUGH THE WETLANDS HARMFUL CHEMICALS OR NUTRIENTS ARE ABSORBED BY THE ECOSYSTEM AND SIGNIFICANTLY REDUCED BY A NATURAL PROCESS. ANOTHER IMPORTANT ROLE WETLANDS PLAY IS BEING A MIGRATORIAL STOP FOR MANY SPECIES OF BIRD. AS

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BIRDS MIGRATE, THEY EAT, REST, AND SEEK SHELTER. WETLANDS SERVE AS A HOME AND "ONE-NIGHTER" FOR MANY MIGRATORY SPECIES FULFILLING THEIR TRAVELING FLOCKS' NEEDS.

WETLANDS ARE IMPORTANT ECONOMICALLY IN THEIR ABILITY TO CLEANSE WATER. THIS ABILITY REDUCES THE AMOUNT OF FUNDS SPENT ON WATER TREATMENT OR CHEMICAL TESTING AS A RESULT OF ^{HUMAN} WATER POLLUTION.

WETLANDS HAVE MANY DIFFERENT TYPES OF LIFE. THIS IS ECONOMICALLY IMPORTANT BECAUSE THESE ORGANISMS, SUCH AS A RUBBER TREE, CAN BE OBTAINED, PROCESSED, AND SOLD AS GOODS TO DEMANDING CONSUMERS. THIS IS PROFITABLE YET ENVIRONMENTALLY DETRIMENTAL.

(C) ONE NEGATIVE HUMAN IMPACT IS THE DEVELOPMENT OF COASTAL WETLANDS. FILLING IN NATURAL HABITAT TO BUILD HOTELS AND RESTAURANTS IS A NEGATIVE IMPACT BROUGHT ON BY EXPANDING HUMAN POPULATION.

POLLUTION OF THE WETLANDS IS ANOTHER NEGATIVE IMPACT RESULTING FROM HUMAN WASTE DISPOSAL. AS HUMANS POLLUTE THE WATERWAYS WITH OIL OR AGRICULTURAL RUNOFF, THESE HARMFUL CHEMICALS ARE NOT GOOD FOR WETLAND ECOSYSTEM AND CAN ACCUMULATE TO UNSAFE LEVELS, CAUSING DEATH, IN MANY ORGANISMS.

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(d) DEVELOPING WETLANDS COULD HAVE BEEN PREVENTED BY ZONING WETLANDS AS "NON-DEVELOPING" LAND. THIS ~~WOULD~~ POLICY WOULD LEAVE THE WETLANDS LEGALLY UNTOUCHED AND SAFE FROM DESTRUCTION.

ECONOMIC INCENTIVES SUCH AS NOT PAYING TAX ON THE LAND, COULD HAVE BEEN GIVEN TO BUYERS IN AGREEMENT TO DEVELOPING AN INSIGNIFICANT AMOUNT OF LAND FOR A HOME OR BARN, ETC. THIS WOULD EXCITE BIG PROPERTY OWNERS AND HELP REAL ESTATE SALES INCREASE EVEN MORE.

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A) One important cause for the variation of the salinity of an estuary is the amount of water in the estuary. If there has been a drought, then less water would be in the estuary and the salinity would be greater. If there were a lot of rain or other precipitation, then more water would be in the estuary thus lowering the salinity. Also, time of year would have an impact on the temperature of an estuary. If it was the winter, the water would be colder than in the summer when the sun would heat the water.

B) Wetlands are very important to the environment. First, wetlands are a home for many endangered species, such as the wood duck, and also a home and feeding/watering place for animals such as the deer and bat. Also, wetlands are a place that has a great amount of biodiversity among plants and animals which create a natural, "erosion free" environment. Wetlands are economically important also. Many campgrounds advertise boating/canoeing at their site which would not be popular without the wetlands. Also, wetlands contain many plants and trees, such as the sycamore, that are grown into seedlings and then sold (this is done near Dave's Cove).

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c) Humans have had a negative impact on coastal wetlands. Humans use herbicides/pesticides on their lawns and plants which runoff into local waterways which are then many times taken through the wetlands. Also, many roadways have been built on top of or through wetlands which in turn destroys the wetland. Lastly, many homes are built in or near wetlands. In Ocean City, near the Delaware border, many homes are being built on the bayside in the wetlands because there is no other place to build them.

d) Wetlands could have been saved, and still can be if a few changes are made in regard to pesticides/herbicides. First, the clean water act should add a policy that limits the amount and frequency that herbicides and pesticides can be used. For example, the could ban home use of herbicides and allow it only for places in which the health of grass is important, such as a golf course, or baseball/football field. An economic incentive/disincentive could be that taxes are raised on the purchase of herbicides/pesticides and the tax money from the purchases could go towards protecting wetlands and other water bodies that are endangered by herbicides/pesticides.

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