

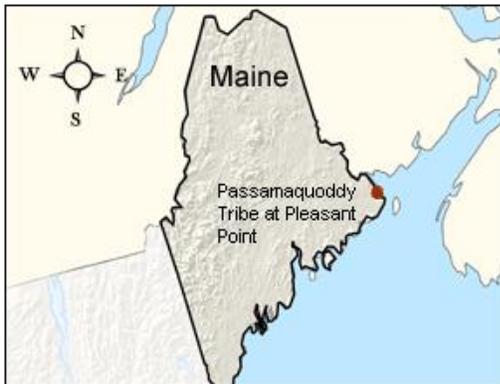
Passamaquoddy Tribe at Pleasant Point: Climate Change Impacts and Strategies

The most important number in the world right now is 350," says Steve Crawford, Director of the Passamaquoddy Tribes' Environmental Department. He's quoting James Hansen, Director of NASA's Goddard Institute for Space Studies and one of the world's leading authorities on climate change. Hansen is referring to parts per million of carbon dioxide in the atmosphere; CO₂ is rising and is responsible for much of the planet's present warming. "If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on earth is adapted," Hansen recently wrote, "...CO₂ will need to be reduced...to at most 350 ppm."



Steve Crawford, Environmental Director, Passamaquoddy Tribe at Pleasant Point

That stark assessment is particularly chilling when you consider atmospheric carbon now stands at nearly 390 parts per million and as of late 2008 the federal government was doing little to bring that level down. Although Crawford believes the incoming administration



will substantially increase climate change mitigation efforts on the national level, he isn't waiting for the feds to act. His tenacious focus on global warming and its mitigation, he half-jokes, presently takes up "110% of my time."

Those activities include developing alternative energy sources for Maine's Passamaquoddy Tribes, providing outreach to tribal members, consulting with a variety of government and tribal entities, and doing nonstop climate change evangelism with anyone willing to listen.

Our Climate Future is Now

In his role as chair of the Natural Resources Committee of the United South and Eastern Tribes (USET) cooperative, Crawford recently surveyed 25 Northeastern and Southern tribal environmental managers to determine how climate change is impacting their communities. His findings: Although they're aware of the issue, most managers are presently too bogged down in more immediate concerns. "It's on their radar," he says, "but because the worst impacts seem to be maybe a decade out, it just doesn't seem to grabbing hold of them yet."

Crawford believes climate change impacts are already here and are revealing themselves in a wide range of ecological impacts. "My biggest concern right now is the oceans," he says. "I used to make a living growing nori [a seaweed used to wrap sushi] off the coast here in the '90s. At the time, ocean acidity was at about 8.04. Now it's 7.92 [7.0 represents a balance between acid and alkaline; lower numbers equal higher acidity]. I've looked at a lot of research on lobsters and crustaceans. It looks like when pH gets to about 7.90, they can't survive because they can't process the calcium and magnesium carbonate they need for shell development." Ocean pH is

dropping due to increased uptake of carbon dioxide; without a worldwide reversal in carbon output into the atmosphere, the acidity level will increase.

The potential impacts on lobsters and shellfish-resources on which several Northeastern coastal tribes depend remains unclear. New England lobster harvesters have seen a rise in a shell wasting disease of unknown origin; the disease has rendered many lobsters unmarketable. "It's in line with what I'm looking at," Crawford says, "although nature isn't quite that cut and dried. I suspect the threshold [for shell-related problems] is probably lower [than the research indicates]."

Water temperature in the Atlantic off Maine and in the state's rivers remains cold enough, he says, to support salmonids such as brook trout and salmon. Crawford predicts that within five years, however, rising water temperatures to the south such as at Cherokee, NC, where Cherokee people depend on "put and take" fishing as part of their livelihood will cause the extirpation of all salmonid species in lower New England and farther south.

Storms, he says, are intensifying. In late November when this interview took place, a "Nor'easter" (severe wind and precipitation blowing off the ocean) had just occurred, another was approaching the day we spoke, and a third was predicted for later in the week. "That frequency is unusual," he says. Storm based erosion recently washed out local roads. "That's never happened before." He says increasing runoff will likely impact rivers and streams in the coming years, as well as the creatures that rely on them.

Research on regional storm events is lacking, Crawford acknowledges, and observations like his remain largely anecdotal. There's no doubt, however, about changes occurring in the region's forest ecosystems. Tribes that include the Passamaquoddy, Penobscot and Mohawk are seeing dramatic shifts in the forest makeup. For years, the dominant spruce fir association has been clear cut for harvests that go primarily to paper mill processing. These days, warmer temperatures spur re-growth in those cleared areas not back to spruce and fir but rather to hardwoods, primarily oak and maple.



"Those are valuable woods," he says, "but they require different harvesting equipment and techniques. You're talking a half million dollar operation for the skidder and other equipment. Most tribes just don't have that kind of money. This is 100% related to climate change."

Global warming has also begun to impact the Passamaquoddy Tribes' primary money crop, blueberries. They experienced a bumper yield last year on their 5000 acres of blueberry fields the largest single entity operation in the world. But the incursion of a species of grass from farther south created serious problems once the berries reached maturity. "The grass grows to five feet tall," Crawford explains, "so even though we had a great growing year, it was much harder to harvest. We probably lost 10-20% of the crop yield because the grass was too hard to get through."

Warmer temperatures seem to be encouraging the gradual movement north of other southerly

plant species as well. "Sweetgrass" and black ash used by regional tribes for basketweaving, grow more difficult to find each year. Crawford says the decline in ash began as far back as the '50s, but he suspects climate change is a major factor in the tree's thinning numbers.

New insects are also invading the region, he says. Existing pests, notably ticks, are multiplying exponentially in the warming Northeastern climate and are laying waste to Maine's moose population. "They're basically draining them dry," he says. "Wildlife biologists describe this as one of the biggest wildlife problems we have." Insects from more southerly latitudes are moving north, too, Crawford says; the impacts of this ecological shift remain unclear.

Local Action to Change the World

Crawford devotes much of his present effort at Passamaquoddy to addressing climate-change issues. The tribe is focusing on several areas: wind, solar, and tidal power generation; re-gasification from the local landfill; and algae based biodiesel production.

Three sites on the reservation have been identified as productive wind turbine sites. One is in preliminary development and two more are undergoing feasibility studies. Two Federal Energy Regulatory Commission pilot projects, funded by BIA, will soon be underway as part of a three year study; the turbines are set to be installed off the tribe's coast this summer. Development of a cooperative solid waste re-gasification project with Washington County Towns is progressing. And the tribe is presently working with the Rural Renewable Energy Alliance to arrange for solar panel installations on tribal homes by winter of 2009.

Already underway at Passamaquoddy is a unique project that turns algae into diesel fuel. The process, Crawford says, is one that any tribe can develop, utilizing a few basic pieces of equipment and knowledge gleaned from the Internet. "The algae program was one I could do without grants," he explains. "You grow algae vertically, in one foot diameter tubes. Other tribes, such as the Eastern Cherokees, are really interested in what we're doing."



"We have some [algae-growing tubes] at our sewage treatment plant. If you have 2000 gallons of these things and harvest every four days, you can make 300 gallons of biodiesel per month, and it'll run any diesel engine. You can do this process in your kitchen." Diesel produces substantially less carbon dioxide than gasoline, and the process is carbon neutral, as the algae takes in CO₂ to grow. By next spring the tribe will have installed a 1000 gallon array of algae growing tubes. Crawford points out that plant to diesel production is something individuals can achieve with minimal effort and financial outlay. "If you built a 10'x20' greenhouse in your backyard," he says, "you could make your own diesel and never have to go to a gas station again." Right now, he says, biodiesel can be produced for about \$2 per gallon a price that might not presently seem too attractive with the price of gas having plunged in recent months. The cost of gas will rise again,

however, as it always does, and Crawford emphasizes that tribal sovereignty is strongly enhanced when a tribe achieves fuel independence.

A Structure for Climate Protection

For the tribes, Crawford believes, a good model for climate change mitigation and/or adaptation could mimic the four part format the Bureau of Indian Affairs now uses to fund its Integrated Resource Management program, a general support mechanism for tribes. The structure, he says, could be easily adapted, and would involve four steps:

1. Measure the amount of climate change in your area.
2. Recognize what the changes are. "That takes some study."
3. Develop a plan of action. For example, if local plants used in basket making are disappearing, finding a substitute plant might be an option. Developing a renewable energy source to power tribal generators or other equipment, thereby reducing GHG emissions and helping the tribe achieve energy independence, might be another goal.
4. Find the funding to implement the plan.

Crawford believes immediate action is required to reverse a warming process that will otherwise have catastrophic consequences for all. Until the federal government steps in with an aggressive plan that pulls together the nation's will and resources, states and tribes will continue to be the main drivers of the climate change response effort. He notes, "Jim Hansen points out that people were saying sea-level rise wouldn't really hit until around 2100. He says it could be a big issue by 2030. This is not way down the road; this is right now."

Resources

Passamaquoddy Tribe at Pleasant Point website: <http://wabanaki.com/>

United South and Eastern tribes, Inc (USET) website: <http://www.usetinc.org/Home.aspx>

Powerpoint presentation: [Climate Change Impact on Eastern Tribes](#)

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