GULF OF MAINE INSTITUTE

**Update on GOMI Journal: *Learning to Steward the Gulf***

Volume I, No. 1 • Spring 2016

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# Letter from the Editor

By John Terry

Dear Reader,

It is a delight to welcome you to the first issue of Gulf of Maine Journal: Learning to Steward the Gulf. Ours is a platform for dialogue and action among teachers, students and scientists to promote a healthy Gulf and watershed.
While Gulf of Maine Journal's focus is on the Gulf of Maine and its watershed we are relevant to communities everywhere facing the struggle to prepare future generations to understand and manage the challenges of climate change. Our niche is to promote education throughout the Watershed that prepares students to be citizen stewards. This means they able to meet the scientific, engineering, technological and social challenges associated with local climate change and make the connection to the global. Getting students and their teachers out of classrooms and lecture halls and, along with field scientists, into the "messiness" of the real environment, we believe, best does this. There, the understanding of the complexities of natural systems and how to implement scientifically based solutions are best learned. This requires educators, scientists, and administrators to join the community in re-thinking how to educate our young. This includes collaboration that acknowledges local engagement is the model for and a key to unlocking the understanding of the global.

We at the GOMI Journal envisions a future managed by civically and scientifically informed citizens: a future ushered in by teachers and community collaborators who teach students, by way of rigorous connections to their communities, the political and scientific skills needed to be stewards. Students will learn deeply and intuitively the nature of real-world human and natural systems through regular interaction with them.

This notion of education is both old and new. Its Western tradition roots can be traced to ancient Greek philosophers. John Dewey consistently and doggedly proclaimed experiential community-based education to the nurturing life force of democracy. Maria Montessori, somewhat similarly, saw it to be a source of intellectual and social development. As Emily Flaherty in her Idea's Exchange article notes. More recently, the virtue of the approach is exhorted by prominent scientists and educators such as Sylvia Earle[1], Lester Brown[2], and Richard Louv[3], as means for meeting the contemporary need to educate citizens able to undertake the challenge to act in life-sustaining ways.

Those of us who “mess about in the muck” of natural and human quagmires understand the lessons learned are gained nowhere else. GOMI Journal is the only US/ Canadian publication committed to such an education goal. We cordially invite you to join the conversation. Article submission requirements and procedures are found below.

John Terry, PhD
Editor-in-Chief

[1] Earle, Sylvia, The World id Blue: How Our fate and Oceans Are One, 2009, National Geographic Society, Washington D.C>, ISBN 978-1-4262-0541-5

[2] Brown, Lester R., Brown, Lester, and World on the Edge: How to Prevent Environmental and Economic Collapse, 2011, W.W. Norton and Co., New York, ISBN 978-0-393-08029-9

[3] Louv, Richard, Last Child in the Woods: Saving Our Children from Nature Deficit Disorder, 2008, Algonquin Books, Chapel Hill. NC, ISBN 13:978-1-56512-605-3, Vitamin N: The Essential Guide to a Nature Rich Life, 2016, Algonquin Books, Chapel Hill, NC ISBN 9781616205782

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John P. Terry, founded the Gulf of Maine Institute in 1999. John was Editor-in-Chief, CYD (Community Youth Development) Journal from Aug. 1994 to Nov. 2002. John has broad teaching and administrative experience at the university level including the Massachusetts Institute of Technology, 1969-1984, University of Massachusetts, Lowell, 1985-1992, and Union College, Schenectady, NY, 1964-1969. John received national recognition in 2006 when selected as Civic Ventures,’ Lead with Experience Program 2006 Purpose Prize Fellows. He is also a 2008 recipient of the Gulf of Maine Council on the Marine Environment Visionary Award.

# Notes from Our Naturalist

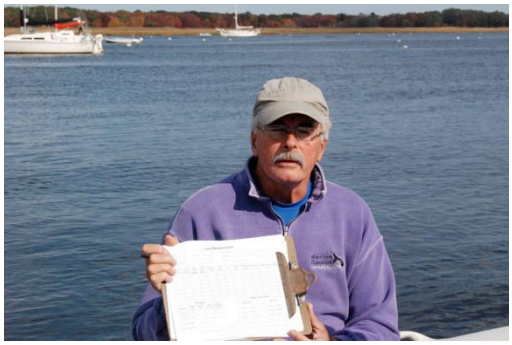
By John Halloran

As I write these notes in mid February, some warmer temperatures have started to get some things moving in the mostly frozen rivers that pour into the Gulf of Maine. By the time you read this in later spring the renewed cycle of life will be blooming again. Over 60 rivers, carrying a staggering 250 bilion gallons annually pour into the Gulf draining over 69,000 square miles of land from the five political boundaries. The runoff peaks in early spring when more than 2 million gallons per second of cold fresh water initiate a counterclockwise current that lasts most of the year.

The Gulf is a sea unto itself, cut off from the North Atlantic by two fish laden banks: George's Bank off Cape Cod and Brown's Bank off of Nova Scotia. These banks are underwater sand dunes formed as an outwash plain by retreating glaciers. The banks are shallow rising up from the sea floor to some tens of meters beneath the surface. Cold waters from the Labrador current enter the Gulf through the Northeast Channel and are funnelled north to the Bay of Fundy. These currents form a series of gyres churning counterclockwise by the earth's rotation til they are deflected by the arm of Cape Cod. Encountering the tip of Georges Bank, some water is deflected north into the main flow and some forms a clockwise gyre at the bottom of the Gulf.

The rivers entering the Gulf bring nutrients from the land which helps to fuel an explosion of phytoplanton in spring. As surface waters warm, they tend to stratify, capturing nutrient in the various layers. Phytoplankton make energy from the sun using available nutrient and storing it in chlorophyll. The spring bloom last 1-3 months involving untold numbers of phytoplankton which consume vast quantities of carbon dioxide while producing nearly half of the world's oxygen. Most phytoplankton are diatoms which use silica to produce a glasslike cell wall. The silica comes from erosion of granite bedrock and granitic soils. The hosts of phytoplankton are consumed by zooplankton while others drift down the layers to nourish deep sea coral communities on the bottom. The zooplankton community in the Gulf is dominated by a copepod called Calanus finnmarchicus. Whether floating in the topmost layers or travelling verically in the water column, the bright red, three millimeter long Calanus is favored by sand lance, herring, mackerel, all the way up to right whales and probably constitutes the largest biomass in the Gulf.

The population of Calanus waxes and wanes with warming temperatures. Lower numbers mean reduced calving and changing migration patterns in right whales, the world's most endangered cetacean. Some zooplankton are newly hatched crabs, starfish, lobster and fish which emerge to feed on phytoplankton. Currents and tides distribute the bounty providing food for fish, birds and whales. Once winter loses its grip the spring feeding frenzy begins in earnest. Whether it is Right whales rounding the tip of Cape Cod in April, Humpbacks cavorting in Massachusetts Bay in May or June, or Finbacks in the Bay of Fundy in July, the presence of these top consumers is a testament to the productivity of the Gulf which depends on some meltwater waking up our smallest living creatures.



John Halloran is the Director of Science for GOMI and a member of the GOMI Guide Team. John's interests focus on the ocean environment where he pursues educational adventure travel, research, and recreation by sail, paddle, and scuba. John is the founder and director of Adventure Learning, Newburyport, MA, which has been involved with educational outreach in area schools and recreational programs for teens and adults since 1980. A long-time educator, John was at the forefront of the experiential education movement in the U.S. for 36 years, he taught natural science in the Newburyport Public Schools. John has special interest and expertise in teacher training and standards for learning in math and science. His role has included direct teaching, teacher training, program development, grant writing, and developing partnerships with professionals in the field.

# Notes from the Field

By Colin Gibney

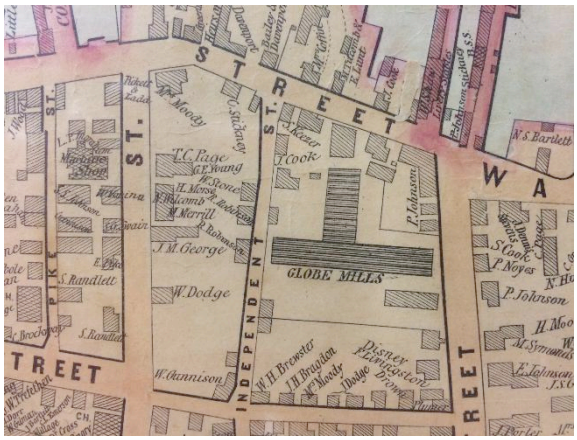
**Place-Based SciManities at River Valley Charter School**

Colin Gibney, is a middle school humanities teacher at the River Valley Charter School, Newburyport, MA.

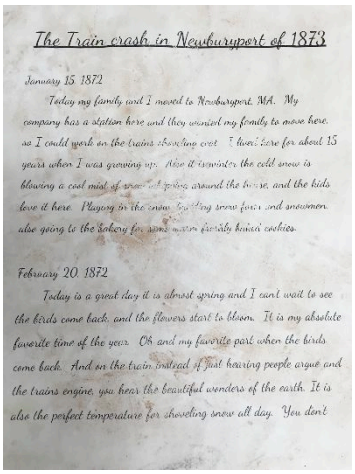
Teaching here near the mouth of the Merrimack River in historic Newburyport, Massachusetts presents us with rich and varied opportunities for connecting Science and Humanities. Glacial forces created this unique and dynamic environment, and nature continues to shape the area and the lives of those who live here. The interplay between natural forces and human impact is part of our history and remains newsworthy and relevant to us today. From the first Agawam who did their summer hunting and fishing here, to the English farmers who arrived in 1635, to the shipbuilders and merchants, to the mill owners, to residents today, humans have taken advantage of the natural resources and processes that go on here. As was true of their ancestors, although, to a differing extent, students' lives remain inextricably tied to our landscape and the forces of nature at play. With PBE, we aim to shed light on these connections.


This year our PBE collaboration began with each student identifying a place of personal interest around our area. After proposing the place to us and getting our approval, they visited their spot, and recorded observations in words and sketches, in what we call a "sit spot journal." Students then drafted a hand-drawn map of their site based on their journals, satellite images, and other resources. As a focus, we asked them to identify and discern among the natural features of the site and the human impacts present. Among the items on our rubric

of requirements, the final maps showed the Mighty Merrimack River or at least in what direction it could be found.




Next, we took a trip to the Archives Center at the Newburyport Public Library where primary sources, including old maps (see left), revealed something of the history of each place. In some cases, the resources went back in time as far as the 1600s and the earliest of English settlements. Using this research, historical fiction pieces were written from someone who would have visited, lived or worked at the student's site back in an earlier time. Among the required elements of the written piece were sensory descriptions of the natural and human features as they may have appeared in the past and a description of the role the River played in the important subject's life. Some of the tea-stained final drafts (see right) were quite convincingly written.



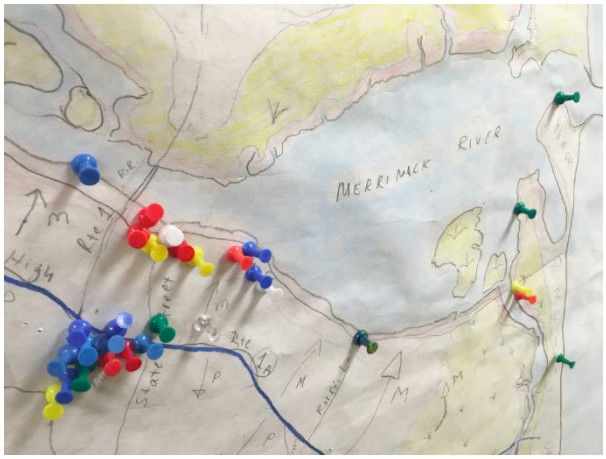
The Train crash in Newburyport of 1873

January 15 1872

Today my family and I moved to Newburyport MA. My company has a station here and they wanted my family to move here so I could work on the trains shoveling coal. I have been here for about 15 years when I was growing up. Now it is winter the cold snow is blowing a cool mist of snow all spring around the house, and the kids love it here. Playing in the snow building snow forts and snowmen also going to the bakery for some warm freshly baked cookies.

February 20 1872

Today is a great day it is almost spring and I cant wait to see the birds come back, and the flowers start to bloom. It is my absolute favorite time of the year. Oh and my favorite part when the birds come back. And on the train instead of just hearing people argue and the trains engine, you hear the beautiful wonders of the earth. It is also the perfect temperature for shoveling snow all day. You don't

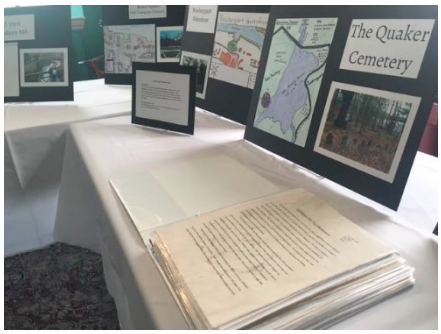



We then upped the science end of things some and tied this work to Rebecca's current unit on Ecosystems. After sharing their learning from science class field trips, and examining topo maps, satellite images and definitions of a variety of local ecosystems, students helped construct a large map reflecting the rough location of each ecosystem in our area. Pushpins indicate the location of the places studied, while shading quickly identifies the ecosystem in which each place resides (see pic).

Finally, we asked students to return to their places one more time for another “sit spot journal.” We were confident they’d have a deeper understanding of the history of the place, be ready to reflect on the features of its ecosystem, and think about their connections with the river and the natural ebb and flow of nature around here. Questions such as, "What do natural processes have to do with human activities in your place in the past and today?" were posed and explored.

It is this wrestling with complicated webs of human activities, natural history, scientific concepts and students' own lives that are at the heart of why we do SciManities. We also hope students will come to appreciate the

local environment with a deeper sense of understanding, connection and gratitude, perhaps leading to further exploration and stewardship of what's here.




From their last "sit spot journals," students crafted a piece of writing, this time from their own point of view, on their connections to the land, the River, and human activities. These writings, their historical fiction writings, and their hand drew maps, were featured at a week-long public exhibit at the Custom House and Maritime Museum in downtown Newburyport this May (see left). The crowning piece of the displays was a self-portrait of each student at his or her place. The excerpt below is from an 8th-grade journal, and it exhibits exactly the types of connections we were hoping to see.

"Looking into history books and old road maps, we know see how there was a human impact in this area; it would explain the isolated Pine Forest on the other side of the stream. Perhaps that was where the man once cut a field only to let nature reclaim the land, and creating a forest (that is not yet at the climax-succession stage). There's so much history in this area, it is almost overwhelming, but all I can do to appreciate it is to breathe in the fresh, late spring air, and hope that someday in my […] life I will be able to be part of [its] history as well." ~ By Anders U.

# Idea Exchange

By Emily Flaherty

**Why Meaningful Watershed Educational Experiences (MWEEs) are Important**

Emily Flaherty is Ocean Literacy Educator and School to Sea
Coordinator, Salem Sound Coastwatch, Salem MA

In a NOAA MWEE students construct ideas to create their own knowledge base of what is true and what is meaningful by connecting to their local environment through observation and experience. Such experiences provide a sense of attachment that leads to meaningful stewardship.

As our education ebbs and flows, with standards based instruction and one-size fits all teaching and learning, educators know that at the roots of why they are teachers results from their desire to provide students experiences that help them to construct meaning and purpose to the world around them. There is a deep need for teachers to feel supported in this by their administrators and colleagues and through such professional development opportunities as Learning to Steward the Gulf.

Construct the Learning! (Aka Constructivism)

There has been nothing more empowering to me as an educator than seeing a student immersed in learning and enjoying it, however, there has been nothing more empowering to me as an outdoor educator than seeing students immersed in place and constructing their own meaning to the text in a book. As Jean Piaget stated:

> "The principal goal of education in the schools should be creating men and women who are capable of doing new things, not simply repeating what other generations have done."
> – Jean Piaget, The Origins of Intelligence in Children, 1953.

An example from The Private Universe Project1 may help illustrate: Project staff interviewed Ivy League graduates asking them how a log from a tree can become so massive through the process of photosynthesis. The results were interesting to watch, as students from prestigious universities were not able to explain this universal process1. They were adamant that carbon dioxide does not have mass and cannot be the source of biomass in the tree. The Project went on to interview middle school students before and after an in depth series of lessons on photosynthesis. The teacher explicitly told their middle students that carbon dioxide and water combine in the process to create glucose as food for the plant. Students still did not understand that carbon dioxide has mass and contributes to the biomass of a tree. In the end the researchers had the students observe dry ice – able to see the carbon dioxide they finally accepted that mass was there.

During such moments students can construct their own meaning and explanation to the real world and phenomena all around them. In this way teaching becomes creating the experiences. Photosynthesis is just one of the hundreds of concepts that we cognitively grapple with as build an understanding of the world around us. With learning opportunities missed it is inevitable

some misunderstanding and/ or false conclusions will result. Such results may have significant individual and social consequences as we struggle to meet the challenges of climate change.

Unsolidify the Misunderstandings!

There are many ways for students to form misconceptions whether it be an idea that was simply heard and filed away as fact, an assumption that was made from an observation or simply someone telling them something that was untrue.
Misconceptions aren't all bad as they provide an opportunity to challenge students to rethink an idea about something they thought was true and lead them to a deeper understanding. Through meaningful experiences, those grounded in intentional goals and allowing of freedom of exploration, students will be able to rebuild their ideas of the world. This is the most efficient way to undo misconceptions. This takes time, intention and immersion in place. Using the above as an example, the logic of the process follows.

The intentional learning goal: Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms (Next Generation Science Standards).

Freedom of exploration: immerse students in place to investigate and find examples of organisms that they think are photosynthesizing – what evidence are they using to determine this?
Grapple with the misunderstanding: what role does CO2 play in photosynthesis: How does matter and energy flow through the process of photosynthesis?

Use the processes of science: students form a question to investigate, using the learning goal to guide them, plan and carry out an investigation, analyze and interpret data and construct an argument from the evidence.

Forming the question: How do plants survive only on water, light, and CO2? Does carbon dioxide have mass and contribute to photosynthesis? "If a plant doesn't get air will it live?"
Using the Claims – Evidence – Reasoning framework can be helpful in middle school and younger students. High school students should follow a scientific research structure.
Support student grappling: What if their question still doesn't get them to the end point set by the intentional learning goal? Bring back the dry ice (metaphorically) – show them the mass that exists, as seeing is usually believing.

Through this intentional process, students build a deeper understanding of reality based on observation and analysis. In other words, they learn scientific inquiry may apply to many phenomena beyond photosynthesis.

Make it Local!
The place brings it all together; it weaves each aspect of learning from all disciplines together into one. Using math, science, art, language arts, geography, and history to view the world through the same lens create a vivid and lively picture that deepens student's understanding of the world around them. We see the excitement of students in place when they have these rich experiences and take them to the classroom and beyond making connections and building a sense of awareness that wasn't there before. When we understand our place – how the storm drains

travel throughout it, how the landscape has changed over time or how the slope of the riverbank affects the watershed – any new authentic learning will enhance how we steward the place we call home.

Suggested Further Sources

**General**

John Dewey, Jean Piaget, and David Sobel are all pioneers in the field at bringing this thinking to the forefront in the education community.

**Books**

Piaget's The Origins of Intelligence in Children referenced above.
Sobel, David, and Gregory A. Smith. (2010). Place-and Community-Based Education in Schools. New York: Routledge.
Keely, Page. (2016). Science Formative Assessment. Corwin and NSTA Press.

**Internet**

A good primer and background on the theorists:
http://www.ucdoer.ie/index.php/Education_Theory/Constructivism_and_Social_Constructivism
A personal favorite on the place-based education: https://orionmagazine.org/article/look-dont-touch1/

1 Harvard-Smithsonian Center for Astrophysics created The Private Universe Project. The Project has produced a 9-part workshop series derived from the work pioneered in Project STAR (Science Teaching through its Astronomical Roots, a high school physical science course based on astronomy) and is an extension of its award-winning video, A Private Universe, which documents students' astronomical ideas and how they change. The Private Universe Project Teacher Workshops alert science teachers to the problems posed by their students' preconceived ideas and encourage teachers to devise solutions to these problems tailored to students' specific needs. To learn more, go to: https://www.cfa.harvard.edu/sed/.

# Student Forum

**Newburyport Drifters – By Tommy Furlong**

The Gulf of Maine (ranging from Cape Cod to Nova Scotia) is warming faster than any other body of water in the world.

Here in Newburyport, a group of concerned students and scientists are working to reverse the global environmental catastrophes. For the last ten years the Gulf of Maine Institute (GOMI) has taken the lead in addressing invasive species, composting, water quality, sea level rise, and most recently an ocean drifter's project. Sea level rise directly impacts Newburyport citizens who must understand that with only a seven meter rise their entire boardwalk would be under the ocean.

Drifters are a joint project of National Oceanic Atmospheric Association (NOAA) and GOMI. GOMI students have taken charge of the project in using applied engineering to build drifters and track ocean currents, temperature, and eventually salinity.
A drifter has four long sails (about 4 feet tall), two buoys near the top of a center shaft holding it all together, and a transmitter connected up top. The drifters are taken out to the Gulf by boat and once launched they float upright with about ninety percent of the body floating underwater.

So what is the environmental purpose? By floating underwater, the drifter is capable of picking up water currents and remaining unaffected by the wind. This allows them to follow the currents and in turn gives us the ability to track lobster larvae, red tides, and cold shocked turtles.

The Cape Cod GOMI team focused in on the location of cold shocked turtles. They launched a set of drifters and tracked where the popular currents dragged them. Using this data, they were able to form a predicted destination for the paralyzed turtles.
We live on a planet whose surface is made of seventy-one percent water. We live in a city where we are a five-minute drive away from the ocean. And we live a region with a body of water that has one of the worst temperature change rates in the world. By engineering the drifters and tracking the data, we gain a sense of accomplishment and purpose. We are given an insight into our connection with the ocean, not just regionally but globally. We get to understand that we are making a true difference.

Trying to extend our reaches GOMI has partnered with both the Newburyport Nock Middle School and River Valley Charter School. Together the partnership has resulted in the building and launching of even more drifters.


So if you have an interest in the betterment of the environment or you have an interest in the improvement of your hometown GOMI and the oceanic drifter's project is a program, you should support and learn more about. GOMI projects have influenced much of the Gulf of Maine. However, the drifter project has given GOMI a renewed sense of accomplishment while we have hopped onto a booming industry with growing importance.
The project allows students in communities all across the Gulf of Maine to experience science, to partner with NOAA scientists and become the environmental stewards needed to build a healthy environment for our future.

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Tommy Furlong is a long-term member of the Newburyport GOMI team and a recent graduate of Newburyport High School, MA. Tommy will be attending American University, Washington DC this fall where he will be preparing for a career in journalism.

**My Experience with Ocean Drifters – By Andrea Samuelson**

I have done many things with ocean drifters, and it all started in eighth grade at the R.A. Nock Middle school where I was a part of a Drifters pilot project. At the Nock, seven other students and I were asked to construct four drifters using canvas sails and two-by-fours. We learned that drifters follow tides to track currents in the ocean. Once our drifters were deployed, we received the tracking information from the satellite transmitter on top, and we learned they do even more. One of the drifters helped to track a red tide bloom. “Red tide” is a harmful alga bloom that is toxic to marine life and especially shellfish. The drifter showed us what organisms were affected by the red tide. The data is beneficial to us because people won’t make the mistake of eating these shellfish.

As a freshman at the GOMI summer conference in Nova Scotia, I was a part of the drifter's theme team. First, we made a mini-drifter using materials that we thought would allow it to float and have a well-designed center of gravity when tested. Ocean drifters don't have a specific design but just need to be able to float and move with the tide. When we built the two drifters in Nova Scotia, we used metal poles instead of wood to see if they would be more durable. We deployed the drifters into the Bay of Fundy which has the highest recorded tides in the world, and I watched it quickly float away from the boat.

Ocean drifters have the potential to help us discover almost anything about the ocean. Drifters could help us measure temperature, salinity, climate change and even record data on marine life and invasive species. For example, I went to Cape Cod this year with GOMI to rescue sea turtles that wash up on shore from cold shock. I learned how drifters are used to finding where they are beached. If an ocean drifter follows the same tide as the cold-stunned turtles, then the drifter can track the wind and wave patterns that will lead us to them. One group found a beached Loggerhead turtle in Wellfleet, Massachusetts during the search. It was rehabilitated at the Boston aquarium because we found it with the help of drifter data. In the future, it might even be possible to track the North Atlantic gyre that sea turtles follow by attaching a small transmitter to a turtle’s shell. I have enjoyed my experience with ocean drifters so far because there are infinite possibilities to what drifters could help us accomplish now and in the future.

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Andrea Samuelson is a member of the GOMI Newburyport team, and a graduated with honors from Newburyport High School, class of 2018. Andrea has been involved with GOMI in the NOAA Ocean Drifters Project since middle school.

# Research Updates

By Dr. Anne Giblin

**Rising Sea Levels Demonstrate Climate Change Impacts Local Communities**

Sea level is expected to rise significantly over the next century due to global climate change. The Intergovernmental Panel on Climate Change estimated that average global sea level would rise between 7.5 inches and 3 feet by 2100, but the predictions are very uncertain. Some scientists, in fact, have predicted that sea level rise may be much greater, up to 7 feet.

Global sea level change or "ecstatic" sea level change, is due to two causes. The first is the thermal expansion of the volume of the oceans due to warming (a kilogram of warm water takes up more space than the same mass of colder water). The second is an increase in the volume of water in the oceans due to the melting of ice on lands, such as the Greenland and the Antarctic Ice sheets. The melting of ice on the oceans, such as the northern polar ice cap has little impact on sea level since the weight of the ice already impacted sea level, and the water is already in the ocean. (Example: ice melting in your drink doesn't overflow the glass).

Relative sea level rise, which is the relationship between the height of the ocean and the land, can vary considerably from place to place. This is because in some areas the land may be either rising or sinking relative to sea level. At high latitudes, the land surface has changed as the crust adjusts to the loss of the huge weight of the ice present on land from the ice ages. In New England, the position of the Gulf Stream also affects local sea level. Overall, sea-level rise rates in the Gulf of Maine are relatively high compared to many other regions. For example, records from Boston show that over the last century sea level rose a little more than 10 inches and rates may have increased over the last two decades (Figure).

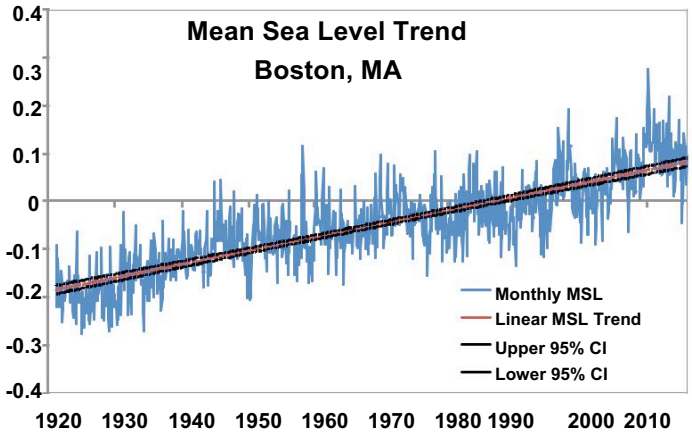
Teaching students about sea-level rise offer an opportunity to enhance their understanding of the science of global change while providing some concrete examples of how it might impact them and their communities. Most coastal communities now have good elevation data, and students can use these data to map where sea level will be in the future. There are also on-line tools students can use to explore the implications of sea-level rise on not only their own communities but places all over the world (https://coast.noaa.gov/digitalcoast/tools/slr.html).

In addition to mapping exercises, some teachers have had their students walk from the beach to the center of town placing signs or using chalk on roads to show which areas might be underwater in 2100 (often with other community activities such as earth day). Others have gone out during times of the highest tides of the year and shared images with other communities around the Gulf of Maine (http://gulfofmaine.kingtides.net/). After gaining a better understanding of the issues, students can then explore ways in which their community might

become more resilient to climate change (http://www.gulfofmaine.org/2/climate-network-homepage/ ).

High tide at the Ipswich Yacht Club during a storm.

This graph shows changes in sea level measured by NOAA at the Boston, MA tide gauge since 1920. The vertical axis is a measure of sea level relative to a value established in 1988. The blue line shows the monthly data. The red line is the average trend line over the entire time period, which equals a sea level rise rate of 0.28 cm/yr.



Dr. Anne Giblin is a senior scientist at the Ecosystems Center Marine Biological Laboratory, Woods Hole, and Massachusetts. Dr. Giblin's major research interest is cycling of elements in the environment. Current projects include an assessment of how a major sewage diversion has altered sediments in Boston Harbor and Massachusetts Bay; how increased N inputs; how hydrologic disturbances alter nitrogen cycling in estuaries; and how pathways of nitrogen cycling change with increased nitrogen inputs in arctic lakes. Anne is committed to bringing science to youth and youth people to science.

# Climate Change Cafe: Dialogue for Social Change

By Shari Melto

**Why is dialogue important for our future leaders?**

In the blink of an eye, today's youth will become world citizens and world leaders. They will face " the first time, never seen before" challenges, like working with people across the globe to create break-through technology solutions, when 9 billion humans from fossil fuels and ensure that we all make a deliberate, cooperative transition to a sustainable world. Daunting tasks!

**Although science and technology capabilities are necessary for success, they are no longer sufficient. Interpersonal capabilities like dialogue, empathy, listening, negotiation and collaborative problem solving (and cultural agility) are becoming important for building the trust, understanding, and collaboration we will need to navigate through diverse worldviews. Unfortunately, these skills have been sorely neglected. As a result, our current level of emotional and social skills (EQ) is far below what our future leaders will need to succeed on the global stage.**

Deborah Tannen, the author of The Argument Culture – Stopping American's War of Words, says the problem begins with our "argument culture which urges us to approach the world – and the people in it – in an adversarial frame of mind. It rests on the assumption that opposition is the best way to get things done -- the best way to discuss an idea is to set up a debate."

Our growing dependence on technology is creating an "empathy gap," even among children. Middle School teachers already see symptoms on the playground: "Twelve-year-olds play like eight-year-olds...They don't seem able to put themselves in the place of other children. The kids aren't cruel. But they are not emotionally developed."

Sherry Turkle, author of Reclaiming Conversation – The Power of Talk in a Digital Age, shares an alarming fact: EQ (Emotional Intelligence) among college students has plummeted 40%, mostly in the past decade. It is a trend that researchers link to the growth of digital communications.

And the lack of emotional and social intelligence among many leaders in the political, mass media and corporate arenas is frightening.

Time is short, and the stakes are high. As we navigate through the coming decades, conflict around climate change will be inevitable. However, we can eliminate some of it, de-escalate much of it and tap the potential in the rest of it if we learn to 'think together differently.' We will need to reduce our dependence on debate just as we must reduce our dependence on fossil fuels. And then we can replace argument with more productive, more sustainable ways to think together.

"A sign of success would be that whenever conflicts and disagreements arise, our first reaction will be to ask ourselves how we can solve them through dialogue and discussion rather than through (argument or) force." – The Dali Lama

"It's important not to confuse the difficult with the impossible." We can make significant progress if we begin today to develop dialogue skills in every classroom and in every community. As a new civic engagement program, the GOMI Climate Café provides teachers and students with powerful dialogue skills that they can use every day to help shape a better future.

What is a GOMI Climate Café?

The GOMI Climate Café is based on the World Café, an international organization whose goal is to "awaken and engage collective intelligence through conversations about questions that matter." The GOMI Café has the following specific targets:

Help students develop dialogue skills, e.g. advocacy, empathy, inquiry, deep listening;
Create opportunities for students to practice these skills in conversation with peers, families, and communities around the issue of climate change; and
Prepare GOMI students to become engaged community citizens and to act on behalf of the environment.

Following is a recent example of a Climate Café ...

Twenty people drifted into the Climate Cafe to find card tables decked out with red and white checked tablecloths, drawing paper and colored markers. Each table included a student from the Newburyport GOMI team and three adults. After everyone settled in with their coffee or tea, Maddie Conway, GOMI student, welcomed the group, shared the purpose of the Climate Café, and posed the question for the day that had been created by the Café host – the First Religious Society, Unitarian Universalist (FRSUU) Climate Change Project. Then Sarah Simon, GOMI student, set the stage by delivering the speech that twelve-year-old Severn Suzuki made at the 1992 Rio de Janeiro Climate Conference which famously "stopped the world for five minutes."

After Abigail Moore, GOMI student gave participants brief instructions about the dialogue process and explained their ‘cue cards,’ everyone took a few quiet moments to gather their thoughts and sketch out his or her response to the drawing paper in front of them. Then each person had ten minutes to share their ideas while tablemates listened intensely, asked clarifying questions, and paraphrased what they heard. After everyone had a chance to share ideas, there was time for open discussion followed by a quick debriefing from each table for the benefit of the entire group. The Café was closed after an hour – but many people continued their conversations, even as we began to pack up.
Feedback from our host team and Café participants were very supportive. “(The GOMI students) Could not have been more thoughtful in designing their presentation, which was thoroughly competent, and the skillful manner in which they engaged the ensuring discussions was exemplary. It was a wonderful opportunity for the students to participate with the larger community on this critical issue. Other comments: “exceptional; wonderful, so knowledgeable, well-spoken and poised; they give us all hope for the world!” The exciting news is that our host wants to co-sponsor another GOMI Climate Café this fall.

Climate Cafés at our monthly GOMI team meetings have generated a lot of productive “thinking together, " and students have been enthusiastic: “This was the best meeting we’ve ever had!” One lively discussion, “How can students engage more teachers on climate change issues?” resulted in an action plan that students will work on together and present to the principal this fall.

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Shari Melto has more than 20 years working in organizational development helping leaders and organizations perform at their best. At McKinsey & Co, she led global leaders through challenging organizational changes. With the support of a MacArthur grant, Shari, worked with non-profits to help them move beyond a founder-led model to long-term sustainability. Her background, combined with her passion for the environment and training as a teacher helps GOMI create an exciting and sustainable future.

# Book Review

By John Halloran

**The New Wild: Why Invasive Species Will Be Nature's Salvation**, Fred Pearce, Beacon Press, 2015

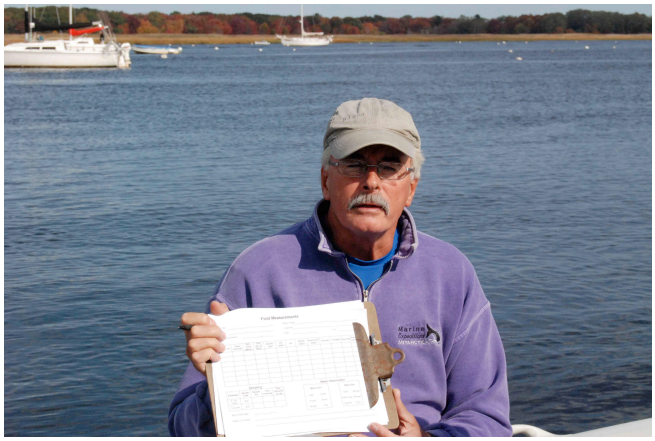
Environmental writer Fred Pearce is an environmental consultant at New Scientist and a frequent contributor to the Guardian and e360, Yale's prestigious website. For a long time he, and many others including me have followed the crowd describing invasive as “evil interlopers” that must be controlled so our perceived “good” native species can maintain their place in our favorite ecosystems. Most conservationists and scientists share this seemingly unassailable viewpoint. But asks Pearce “ What if the traditional view is wrong?

**What if we should be welcoming the invaders?**

Ever since my first GOMI conference 13 years ago when I partnered with Jim Morris, a plant ecologist working with the Plum Island Long Term Ecosystem Research team (PIE- LTER), I have been troubled by his question about invasive in the salt marsh. “Isn't it just evolution? These invasive are better adapted to live here than our so called natives”. In The New Wild, Pearce goes on a six continent journey exploring the questionable costs of dealing with the invaders and revealing several outdated intellectual sources that have shaped our ideas about the balance of Nature. The author acknowledges certain destructive and disruptive patterns by some introduced species but also points out that most of the time they either die out or settle down and become part of the biodiversity of the new “rewilded” ecosystem. In this instance, the case for keeping them out seems to be flawed.

Pearce maintains that mainstream environmentalists are right that we need a rewilding of the earth but are wrong if they think it can be done by re-engineering ecosystems. Humans have changed the planet too much and in the case of our salt marshes, our “native species” evolved to accommodate an ecosystem created 4-5 thousand years ago before human intervention. In his travels and reporting, the author has found a growing group of scientists who are taking a fresh look at how species interact in the wild. According to these ecologists, we should applaud the “dynamism” of these aliens and the novel ecosystems they create.

In an era of climate change and widespread ecosystem damage, it is essential that humans find ways to help nature regenerate. To be an environmentalist in the 21st century may mean celebrating Nature's wildness and capacity for change. Nature always finds a way, and we may not be faced with an ecosystem populated by organisms of our choosing but what wins out may well be the best choice for the ecosystem we now have.



John Halloran is the Director of Science for GOMI and a member of the GOMI Guide Team. John's interests focus on the ocean environment where he pursues educational adventure travel, research, and recreation by sail, paddle, and scuba.John is the founder and director of Adventure Learning, Newburyport, MA, which has been involved with educational outreach in area schools and recreational programs for teens and adults since 1980. A long-time educator, John was at the forefront of the experiential education movement in the U.S.For 36 years, he taught natural science in the Newburyport Public Schools. John has special interest and expertise in teacher training and standards for learning in math and science. His role has included direct teaching, teacher training, program development, grant writing, and developing partnerships with professionals in the field.