

Education for Sustainability

Four New England teachers bring climate and sustainability education to their classrooms



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1611 Harbor Road, Shelburne, Vermont 05482 • 802-985-8686 • www.shelburnefarms.org
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Starting conversations, changing habits

Marjie Bish & Annemarie Stout | Hanover Street School

Together, fourth-grade paraeducator Marjie Bish and third-grade teacher Annemarie Stout are beginning to bring sustainability into everything they teach at Hanover Street School —

whether that's tracking the weather, reducing waste, or simply observing trees with their young students. This new focus is a direct result of the time that Bish and Stout spent together at the Education for Sustainability (EFS) Institute at Shelburne Farms last summer.

"This is not a new curriculum," Bish said of the EFS Institute.

"This is a lens through which you see all of your other units. We need to use that lens as educators in everything we do."

Bish, who has been a paraeducator at the Lebanon, NH, school for 10 years, recruited Stout after attending a leadership program at Shelburne Farms in 2015.

"I came back and said 'This is amazing! Is there anyone else who thinks this might be amazing?'" Bish said. "Part of it was being able to share it with a colleague and friend. I wanted to have someone in my school with a sense of what this was about."

Stout, who has been a teacher for over 20 years, was a natural choice for the EFS Institute. "Annemarie has been doing this groundwork [around sustainability education] for a number of years," said Bish. "She has a passion for this, inside and outside of the classroom."

The pair have co-created a unit on sustainability together, which they are piloting this year in the school. They share ideas and resources, encouraging and supporting each other's projects. "She keeps me focused," said Stout.

Getting a weather station installed on the school roof was another of Bish's projects, inspired by one of the three

fourth-grade teachers she works with who remembered once doing a weather unit in collaboration with the state Fish & Game Department. Bish uses the weather station, which also conveys data to the website Weather Underground, as a way for her fourth-grade students to practice being scientists. They collect daily data on temperature, sky conditions, then analyze that data over time to look for trends.

"What does this winter look like compared to winters before?" Bish asks her students. "How will that affect animal populations? How do scientists use this information?"

"I'm trying to be a catalyst in the conversation," she added.

The scientific process of making observations and asking questions is a major skill that Bish and Stout are teaching their third and fourth graders. It's also a way to talk about sustainability.

"Just having students notice what's going on around them is huge," Stout said. "They're very self centered at that age. They're worried about lunch and what activities they'll have for PE. If we create a space safe enough to talk about [sustainability], it becomes part of the conversation of that day."

Stout recently had a conversation with her third-graders about waste in which she challenged



Fourth-graders working in the school garden. Inset, the new weather station.

Marjie Bish building
birdfeeders with her
afterschool Green Team.

them to not use straws for a week.

“Now, most of them don’t use one,” she said. “It’s easy to change habits at that age if you make it a fun challenge.”

In the past, Bish says, she was afraid that she would offend or scare her students by bringing up climate issues, but the EFS institute has given her a new bravery.

“I learned that, no, people are talking about this in schools. It’s OK to talk about,” Bish said. “Once you start doing that a little bit, it’s not that bad or as scary as you thought. That’s powerful.”

Learning how to be part of the world beyond themselves is a big part of what students work on in third and fourth grade, Bish said, and sustainability fits right into that. “They can say no to a straw, they can learn to turn off the lights when they leave the room and use both sides of the piece of paper,” she said. “You can teach good stewardship.”

Another one of Bish’s major takeaways from the EFS Institute came from a Canadian teacher. “She looked me square in the eye,” Bish recalls, “and said, ‘Whatever you do, just get them outside. Everything else will work out.’”

Bish takes this advice to heart in the afterschool Green Team she co-leads. She and a dozen third and fourth graders head outside in the early morning



twice a week, in the half-hour before school starts. In recent rambles, students have calculated the height of trees, made and installed bird feeders, and dug for worms. “There’s nothing more exciting than a worm!” Bish said with a laugh.

Bish said that she often makes discoveries right alongside her students. “I’m like, ‘I never noticed that! We have lichen growing on our trees! I wonder if this other tree has lichen?’” she said.

“When teachers give themselves permission to be outside, not knowing all the answers, that’s where the magic happens,” Bish said. “I hope we’re creating a culture as staff where we feel more comfortable taking those risks alongside the kids.”

Bish hopes that she and Stout can serve as resource to other teachers on climate and sustainability education — especially, she said, because New Hampshire is just beginning to adopt Next Generation Science Standards on a statewide level.

“We’re trying to make it happen from the bottom up,” Bish said, in a grassroots way, school by school and teacher by teacher.

Bish says that the EFS institute helped her to see that sustainability is about more than environmental stewardship. It’s about social and economic justice as well.

When teachers give themselves permission to be outside, not knowing all the answers, that’s where the magic happens.

—Marjie Bish

“Once you understand what sustainability means, it becomes very much a part of who you are as an educator,” Bish said. “It allows you to be more effective at what you’re doing because it allows you to connect in a human way. It takes something that’s very dry and abstract, and it brings it to life.”

Synthesizing physics & social justice

Andrew Njaa | Falmouth High School

Andrew Njaa operates on what he calls “education geologic time.” He’s been thinking about science education for all 20 years he’s been teaching at Falmouth High School in Maine.

This past January, those ideas came together for Njaa into a new course on climate change, which he will offer to his 11th and 12th grade students next semester.

The Education for Sustainability (EFS) Institute at Shelburne Farms started the wheels turning for Njaa’s new course. “I don’t know that sustainability in my head was that strong a thing,” he said. “I think combining sustainability and climate is a direct result of [the EFS Institute].”

“If you’re a physics teacher, sustainability isn’t in the Venn diagram,” Njaa said. “You’re not going to find a curriculum out there. You have to take what’s out there and adapt it, or create something new, which isn’t really

feasible when you’re prepping for two or three classes. You need time.”

The EFS Institute was “a combination of retreat and hard science,” he said, that gave him that time, and allowed him to start weaving the idea of sustainability into the many pieces of science and climate education that he has collected over the years.

“What happens in July,” Njaa said, “is mixing with something that happened a year and half ago and is bubbling around, and then comes out in January as a course description.”

Students taking Njaa’s elective course will learn the basics of climate change, conduct experiments to understand how energy moves through Earth systems, measure their carbon footprints, and read current research on climate change. Then, teams of students will develop a question based on their own interests, and do research and investigations to answer that question.

Njaa, a liberal arts major turned physics teacher, sees climate and sustainability education as more than just hard science.

“Last summer was part of the work that’s helping me frame doing science and humanities as a much more interdisciplinary approach,” he said. “Educationally, that seems to be a much more effective way of teaching, rather than me breaking science into physics, earth science, biology.”

“Everybody wants to teach things in a very linear way,” he added, “but nothing really is.”

Njaa sees food systems as an ideal interdisciplinary subject. “It’s a growth field in academics,” he said. “This is a place where we’re on the pivot point, where we can do a lot.”

Falmouth High School is increasing their emphasis on food and sustainability, including hiring a garden manager for their large school gardens, Njaa said, and his high schoolers are getting excited about food.

“One of my brightest students, when you talk about what she’s really interested in, it’s food systems,” he said. “Right now she’s really focused on food waste in the cafeteria.”

“It becomes a much more personal relationship with students because each one approaches [sustainability] through their experience and interest,” Njaa said. “A kid might say ‘I don’t do math, so I don’t do physics,’ but every kid wants to survive.”

What can I take from the garden manager in Philadelphia, from the kitchen people in Brooklyn? It’s those products of conversations that are really good.

—Andrew Njaa



The basic desire to survive, and the right to a good life for each person and for the planet, is where the idea of sustainability becomes real and relevant to Njaa's high school students.

"How do you make a world where there's a little more justice?

That's where kids get hooked," he said. "They're really passionate about social and environmental justice."

Njaa says he sees that passion across the student body. "The ones who sometimes feel like the most disengaged, when you talk to them, they're not at all," Njaa said. "They're just not oriented for school."

Njaa is working to create more opportunities for his students to be engaged by applying their learning to the real world.

"What I want is to create a place where students can do meaningful research at their level," he said. "They need some kind of anchor to do their research around." Njaa thinks that climate and sustainability would be an ideal research focus for his students, between the school's garden project and its location on the Gulf of Maine.

The diversity of attendees and speakers at the EFS Institute inspired new ideas for Njaa.

"Everyone brought really different programs when they walked in," he said. "It's all, what can I take from the garden manager in Philadelphia, from the kitchen people in Brooklyn? It's those products of conversations that are really good."

The conversation around sustainability is engaging to Njaa's students, as well. When he told some of his students about his new course on climate, he said that their response was: "Oh, you're offering that? Sign me up!"

"It was around the topic," he said, "it wasn't around me. That's what gives me hope that it will work."

* * *

A month after we interviewed Njaa for this piece, we reached out to ask how his elective climate course was going. Njaa had 12 students sign up and the course was set to run this spring — and then Falmouth High had a budget freeze, he said, because of a \$1 million cut in state funding.

"As of now," wrote Njaa in late March, "the course is on hold, but the demand is there, so I am going to persist and keep it in hand for next year."

Njaa is also planning to bring the theme of sustainability to Engineering Physics, a double-

block course matching hands-on projects with physics topics that he will co-teach next year. Njaa is developing the course with input from the students who will take it.

"There will definitely be an energy and climate monitoring component," he wrote.

Njaa is optimistic that Engineering Physics will have enough interest to run for the whole school year, not just a single semester. "We pitched it yesterday and got some pretty enthusiastic responses," he said.

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Shelburne Farms will continue to support Njaa's work, as well. He's signed up for Shelburne's Climate Resilience Fellowship, which supports middle and high school teachers in developing an interdisciplinary, place-based approach to teaching climate change. The program starts in May 2017.

Modeling kindness & sustainability

Sonia Clark | Essex Elementary School

When kindergarten teacher Sonia Clark returned to her class this past fall, she felt refreshed and ready, full of ideas for incorporating climate and sustainability issues into

her teaching. Then the presidential election happened. As the national political landscape shifted, Clark said, her focus became even clearer.

“My little kids, they’re hearing the hateful language and the negativity, and the ‘We can’t be with these people.’ I have to be on the other side of that,” she said. “I was like ‘OK, this is why you’re doing this: because you have to be a role model for how things can be.’”



A student tries out Clark’s “blubber” experiment, understanding first-hand what insulation means.

The kindergarten classroom at Essex Elementary School in Vermont is where Clark works to model that kindness toward people and the planet. She represented the very youngest learners in last summer’s Education for Sustainability (EFS) Institute at Shelburne Farms.

It’s a challenge, Clark says, to bring the huge concept of climate and sustainability down to a level where five-year-olds can understand and connect with it. Despite her initial concerns that the EFS institute would only benefit teachers of older grades, Clark got a lot out of the program.

“I made such wonderful connections with people,” she said. “It was really hopeful, seeing all of these little pockets of amazing things happening.”

Clark also realized that she didn’t need to completely overhaul the way she taught in order to incorporate sustainability. “I learned that some of the things that I already do are things that are perfect,” she said. “They just needed tweaking or expanding or framing in a new way.”

One of the major tweaks Clark has made is to continually tie her new lessons back to previous ones, helping her students notice changes in the environment over time.

At the beginning of the school year, for example, Clark’s class chooses a tree to “adopt.” The class visits the tree every few weeks to draw pictures and make observations. “Right now it’s just sleeping,” Clark said, when we talked to her in early February, “but we go out and visit it. We wait to see those buds in March, and see my kids get really excited.”

Clark is trying to find ways to connect her students with seasonal changes through food, as well. Her class had a harvest lunch in the fall where each student brought in a different vegetable, then worked together to prepare the veggies and make a big crockpot of soup.

“It was a way of embracing the seasons and what it means to nourish your body,” Clark said. “Let’s think about that delicious food and who is growing it.”

Thinking about animal habitats and food needs is another way Clark brings sustainability education to her youngsters.

“I make sure the students understand what the animals need to survive,” she said, “and then I make them begin to understand that what the

Preparing vegetables for
the harvest lunch soup.



animals need and what's in their environment is changing."

This year, Clark's class has been exploring monarch butterflies, a species whose habitat is threatened by climate change. Clark and her students brought monarch caterpillars into the classroom to observe in the fall and talked about the milkweed flowers that are the caterpillars' food source. That conversation continued in February, when Vermont's milkweed is buried in snow.

"We're checking out videos of the monarchs in Mexico," Clark said. "What do they need along the way, and what can we do to be a part of that?" The topic of flowers as a food source for the adult butterflies will return as her kindergarteners begin to plant and grow seeds this spring.

In a recent winter lesson on animal adaptation, Clark had her students try on a "blubber" glove — two rubber gloves with a layer of shortening between them — then dip the gloved hand and bare hand into ice water to feel the insulation that an extra layer of fat provides. She followed the experiment up with a book about polar bears, which included simple actions kids can take to reduce their effect on the environment, like turning off lights and using less water.

The EFS institute reminded Clark of the importance of modeling

this kind of stewardship to her students. "I try to let them know that I'm always thinking in that way, of taking care of the environment," she said. "We turn off the lights when we leave the classroom. I'm thinking about where I'm walking."

Clark tries to convey that constant connection to the environment to her fellow teachers as well — who, she says, are often more focused on academics than sustainability.

"They don't understand that that relationship between yourself and the environment is happening anyway," she said. "It isn't just composting, or doing something extra. Whether you want to admit it or not, you're modeling how you interact with the world."

Clark shines most brightly, however, when she speaks about her five-year-old students.

"I love being in my classroom with my kids," she said. "They're so genuine, they really care about each other, they're curious." Cultivating this caring and curiosity, Clark says, is

at the heart of education for sustainability on a kindergarten level.

"These little people are going to enter a world very soon where they will have some really tough things to face, environmentally," she said. "My job as a teacher — and I don't take this lightly — my job is to build a community of kids who care about each other and work interdependently. Their ability to problem-solve

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and figure things out together is going to be crucial. Hopefully I'm giving them some small examples of that."

Follow Sonia Clark on Twitter to see more pictures of activities in her classroom: @kinderclark.

A focus on climate awareness, solutions

Courtney Asaro & Emma Jenkins | J.J. Flynn Elementary School

Second and third grade students at J.J. Flynn Elementary are “very excited,” said teacher Emma Jenkins, about a new arrival this winter: a weather station on the school’s campus in the

socioeconomically and ethnically diverse New North End neighborhood of Burlington, Vermont. The station is being built with assistance from Burlington business Dealer.com and will be connected to Weather Underground.

The station was just one idea hatched by Jenkins and Courtney Asaro, the school’s K-5 STEAM teacher, at this past summer’s Education for Sustainability (EFS) institute at Shelburne Farms. The pair spent much of

the weeklong institute crafting their other idea, a six-lesson unit on climate change. They have been implementing that unit at J.J. Flynn this winter.

“When I talk about climate change, most kids have no idea what I’m talking about,” said Asaro, adding that this current issue is not generally part of the curriculum for younger grades. “There’s a need for awareness.”

This awareness can start with simple observations. Jenkins’s students have already been collecting data about weather: temperature, precipitation, cloud cover. “It’s someone’s job every week to be the daily weather checker,” said Jenkins. With the new weather station, she says, “they can compare and contrast the data they’re getting versus this highly technical piece of equipment.”

Jenkins and Asaro’s climate change unit builds on current lessons on weather and

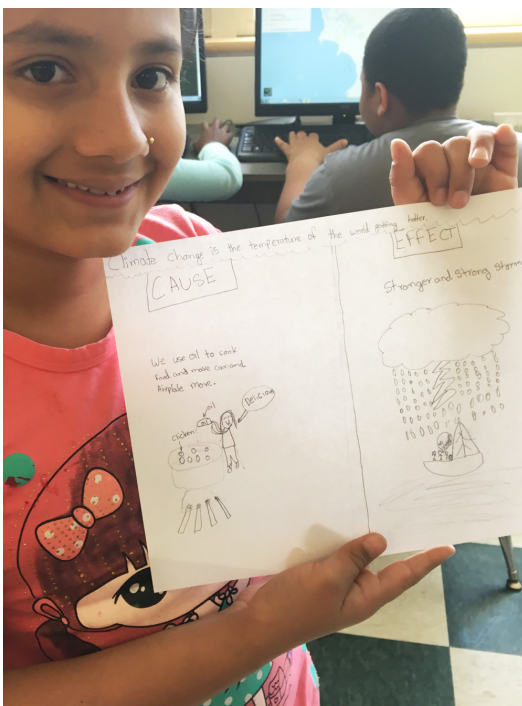
ecosystems to help students grasp larger patterns. “We’ll have kids look at weather data over the years to really understand what climate change is,” said Jenkins.

The unit is inquiry based, meaning that lessons guide students to wonder and ask questions in response to new learning. This learning doesn’t have to be based on purely scientific observations; Jenkins says they’ve tried to bring in the art part of STEAM, as well. “We’re going to have them color some maps to reflect temperature changes in different decades,” she said.

“We might bring in a multi-generational aspect,” added Asaro. “There’s a nursing home across the street. We might go over there and have the kids ask the old folks how the weather has changed over time.”

Jenkins’s students have been enthusiastic about these projects. “My class loves science,” she said. “It’s hands-on. All types of students can thrive.”

Asaro, who has been teaching for seven years, notes that J.J. Flynn has an especially diverse student body for Vermont, including



A J.J. Flynn student illustrates a cause and effect of climate change.

We want to make sure we’re saying that there are solutions, that we’re not telling the kids that the world is ending. There is hope!”

—Emma Jenkins

Students at J.J. Flynn
creating maps comparing
average temperatures in
different decades.

many new Americans “whose
parents are just trying to survive.”

“It’s diverse in where their
families are at in terms of social
justice, too,” she said. “So it’s
important to talk about.”

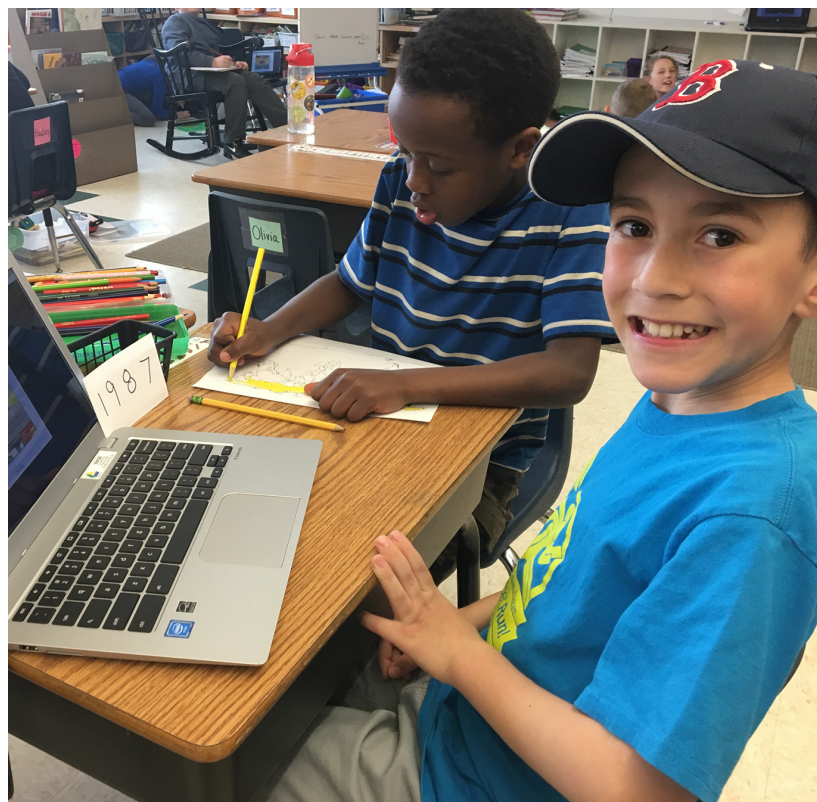
Social justice and teaching are
connected for Jenkins as well,
who has been an educator for
four years.

“I’m an activist,” she said. “That’s
why I got into education. I
was excited to teach it to such
a young population. I want
awareness built when they’re
younger so they realize that
[sustainability and climate
change] is really a place where we
need engineering solutions.”

Jenkins says that the EFS
Institute helped her to both see
how complex climate change is,
and how to put that complexity
into terms that younger students
can understand.

“The state climatologist, Lesley-
Ann Dupigny-Giroux, came to
speak,” recalled Jenkins. “She
was really good about putting it
into kid-friendly language. She
helped us frame what our model
of climate change was going to
be, and put it into cause and
effect. That’s the challenge of
it: We want to make sure that
students really understand the
cause.”

Being at the EFS Institute gave
Jenkins and Asaro the space and
time to develop these bigger



ideas into a unit to use in the
classroom.

“Not only is it in a beautiful
location and you get to work with
really smart people, but a lot of
independent work time is built
in,” Jenkins said, noting that
participants got an hour or more
of open work time each day. “You
can be super productive and
actually accomplish goals that
you set that week.”

Asaro agrees. “For a teacher to
come back with a finished project
that they can use the next year is
huge,” she said.

This spring, Asaro and Jenkins
will get their weather station up
and running and keep fine-
tuning their six-lesson unit.
They’re also working on bringing
composting and vermiculture to
their classrooms.

“We’re trying to integrate
sustainability ideas in daily

practice with these small things,”
said Asaro.

Jenkins would like to do an
energy audit at J.J. Flynn next
year, and Asaro wants to figure
out how to educate students

*When I talk about climate
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—Courtney Asaro

about the geothermal and solar
systems that power and heat the
school.

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said. “There is hope!”