



Where is the Garbage in the Ocean?

By Lester W. Reed, Ph.D.

In November 2009, the *New York Times*, among other media, reported the existence of a “Pacific garbage patch, an area of widely dispersed trash that doubles in size every decade and is now believed to be roughly twice the size of Texas.” The reports identified plastic as the most common component of the trash in the patch due to its buoyancy and durability. Plastics are ubiquitous in both advanced and developing societies, where they can be found in disposable and durable products.

Without much thought, Americans immediately bought into the story and a myth was soon created. First-hand accounts by scientists and other observers, along with photos of isolated patches of floating trash, were used as evidence of the existence of the Garbage Patch.

In 2010, the Sea Education Association (SEA) reported along with Law, et al (2010) that during the last 25 years, floating plastic is most commonly measured by towing fine-mesh nets along the ocean’s surface. SEA’s data shows that most plastic samples collected are less than 1 cm. in size weighing no more than 0.15 grams.

Based on SEA’s 25-year record of plastic collected from the ocean, the scientists conclude, “The term ‘garbage patch’ is very misleading – there are no large islands of trash floating in the open ocean.” Due to its small

size, floating marine debris is generally not visible from the deck of a ship. Ocean currents do create “convergence zones” where floating debris accumulates. High concentrations of plastic debris have been observed in these zones in the north Atlantic and north Pacific. No one has been able to accurately measure the full size of these accumulation regions due to their remote locations, shifting boundaries as ocean currents change, and the variable sources of debris.



SEAPLEX researchers spotted a large net tangled with plastic in the “garbage patch.”
Credit: Scripps Institution of Oceanography

SEA readily admits, as do most other credible sources, that plastic waste in the world’s oceans is a serious threat to the ocean ecosystems. However, reports of a “continent-size toxic stew of plastic trash fouling a swath of the Pacific Ocean” exaggerate the true facts.

This topic can be used for a variety of educational purposes and levels. Suggested topics might cover: critically evaluate **media coverage** of this topic and its effects on public opinion regarding environmental issues; introduce the effects of plastic trash on sea life and then examine further the effect of plastic on individual sea creatures or specific ecosystems; follow the plastic garbage through the marine food web to evaluate the effect on sea life; discuss sources of plastic in the ocean and what individuals can do to effect positive change.

Law, K.L., et al. 2010. Plastic Accumulation in the North Atlantic Subtropical Gyre, *Science* 329: 1185-1188.

Insectivore Antics

Wynn W. Cudmore, Ph.D.

I witnessed an unusual event that must be recorded. While casually watching birds out my dining room window one recent summer afternoon, I was surprised to see an earthworm of modest size wriggle from the ground and hastily make its way along the surface. Shells from eaten sunflower seeds soon randomly adorned its moist body. This occurred, after all, beneath a bird feeder that is regularly filled with black oil sunflower seeds for our local feathered friends. I thought this an unusual behavior even though the soil was somewhat moistened by our first meager rain in several weeks earlier that morning. The image of a linear pattern of sunflower seeds marching along the ground added to the intrigue. I was about to count this up to one of those unusual, yet random events one encounters during life, when another earthworm of the same size and parentage made this same maneuver. The two seed shell-adorned annelids were making their way along the surface at right angles to each other at breakneck speed (for an earthworm, that is). I could accept the spontaneous appearance of one shell-toting earthworm, but why two at a time? Something was awry here.

My answer came as suddenly as the worms themselves. At precisely the same location that the two annelids had emerged just a few seconds earlier, the earth began to shift and crack. I blinked, thinking that my eyes were having a premature senior moment. As I

refocused, it became clear that I was observing a predator-prey drama that rivaled those that play out on the Serengeti Plains of Africa. A coast mole apparently had these two hapless earthworms in her sights, when they dashed to the surface to make their escape. One must assume that earthworm neural ganglia are of sufficient sophistication to know that moles are a fossorial mammal, reluctant to show their heads above the surface in broad daylight. The fact that worms are also fossorial was momentarily placed on the backburner as they squirmed for their slimy lives.

The drama would have been noteworthy had it ended there, but it did not. As the earthworms made what appeared to be a successful escape, one of the two chose a direction that approximated northwest. The consequences of this decision became clear at a distance of approximately one meter from the emergence site. "Northwest" was greeted by a third species at this gathering - a vagrant shrew who did not hesitate to question his good fortune, snatched the morsel and immediately consumed the little fellow.

So, what do we have here? Predator avoidance behavior by earthworms? Opportunistic feeding by a vagrant shrew? Or perhaps something more complex? Have I witnessed cooperative hunting by two different, but closely related species? The mole chases down the earthworms into the waiting jaws of Mr. Shrew. If this is the case, perhaps I have witnessed only part of the drama. For if I have seen everything, what's in it for the mole?



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Shrew, Mole images from www.wildbritart.com

What's In a Name?

Lester W. Reed, Ph.D., Jon Yoder

Juliet in Shakespeare's *Romeo and Juliet* asks "What's in a name? That which we call a rose By any other name would smell as sweet." That is true, but the answer ignores the fact that not all roses are the same regardless of what we call them.

The same is true about the names given to several curriculum approaches used in K-12 education – many involve a focus on local communities. They are known as service-based, place-based or community-based education.

Although each approach uses the local community as a focus and can be used to varying degrees from kindergarten to high school programs, each is different in the scope of its pedagogical orientation and expected student outcomes.

Service-based education takes students into the community to do service projects. The focus is to experience real world work skills while accomplishing tasks that enhance the community. Examples range from improving parks or recreational facilities to removing graffiti. The activities may not involve community sponsors, are often not institutionalized as a permanent curriculum, and are usually not aligned with state content standards.

Place-based programs are also accomplished in the community, but unlike service-based education, may integrate activities that support state content standards. The program



Students conduct intertidal transect study.
Photo by Robert Jamgochian

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is generally institutionalized, and although specific experiences may change, the program is a formal part of the school's curriculum and content standards. Place-based curriculum is usually developed by teachers, may involve community sponsors, but does not necessarily come from a invitation for authentic work from community sponsors.

Community-based education is the most comprehensive of the programs using the community as a place for learning. Here the program, like place-based programs, is a formal part of the curriculum and is tied to mandated state content standards. The development of these programs is shared by the teacher and students from a direct invitation from a community sponsor. This shared responsibility strengthens the relationship between the school and the community - a valuable outcome tangential to student learning. The involvement of community sponsors creates an investment of the sponsors into the quality and success of the school's efforts, extending past just the one or two community-based offerings. In return, students serve as a resource for the partner to achieve their goals and objectives. The binding of the school to the broader community, not just parents, is a valuable asset. The result is young citizens that understand and participate in their community.

NCSR under the leadership of Co-PI Jon Yoder, has become a flagship creator of curriculum development guides and nationwide training in community-based education. Most recently, the Center has published a manual depicting five successful programs using the community-based approach. For more information on NCSR's community-based component visit www.ncsr.org/secondary/index.html or contact Jon at ncsradm@chemeketa.edu.

Announcements and Opportunities:

NCSR NEWS

NEW Manual available - Now!

Community-based Education - Model Programs is a guide for teachers who are developing or conducting community-based education with their students. The guide showcases five different community-based education programs and offers encouragement and tips for teachers working on this approach. Available now! For more information or to download/request a hard copy, go to: www.ncsr.org/materials/Community-basedEducationModelProgram.html

NEW! NCSR About Us

Find the newly created “catalog” listing detailed information about our materials and services to make your “shopping” easier. See: www.ncsr.org/documents/NCSRAboutUs.pdf Please share with your colleagues!

NCSR submits proposal

NCSR has applied for our next NSF-ATE grant which emphasizes aquaculture and invasive species topics.

2011 Wetland Mitigation Institute

NCSR's faculty Summer Institute *Wetlands Mitigation and Management* will be held at the **Oregon Garden** in Silverton, Oregon on July 10-15, 2011. The institute will feature curriculum currently under development by NCSR staff and will include field, laboratory and lecture activities. Oregon Garden and other locations in the mid-Willamette Valley provide an ideal setting for the institute. Natural and constructed wetlands, an outdoor aquatic ecology laboratory and a variety of wetland mitigation projects are all within easy driving distance from the Garden. Institute participants will be provided meals and lodging during the institute and receive a \$500.00 stipend for attendance. Eligible applicants are undergraduate faculty at community colleges, universities and four-year colleges who teach natural resource technical courses and life science courses such as general biology and environmental science. The institute will be limited to 12 participants. The application period will be opened in January 2011. Mark your calendars now for this outstanding professional development opportunity and watch for further information during the next few months.



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