Beyond Cleanup: Restoration and Regeneration

By Lisa Alexander

Based on the long roll-out, the training sessions and multiple meetings on the topic for the last couple of years, the biggest news in the Bureau of Waste Site Cleanup (BWSC) is the updated, streamlined, new and (hopefully) improved 2014 Massachusetts Contingency Plan. It was officially released on April 25 and BWSC sent a message to all, as follows:

> **REVISED MCP PUBLISHED**
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> Great News! As expected, the amended MCP is officially published in today's Massachusetts Register. The "unofficial" version is available on the DEP website at http://www.mass.gov/eea/agencies/massdep/cleanup/regulations/site-cleanup-regulations-and-standards.html#6
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> While most provisions take effect June 20, 2014, there are certain regulations that take effect **immediately** (April 25, 2014), including:
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> - The Reportable Concentrations for Oil and Hazardous Material in groundwater or soil listed in the Massachusetts Oil and Hazardous Material List at 310 CMR 40.1600;
> - The elimination of the requirement to submit an initial Tier I Permit Application, formerly 310 CMR 40.0704, from 310 CMR 40.0000; and
> - RPs, PRPs or Other Persons may conduct an initial Tier Classification of a disposal site in accordance with the Tier Classification Process and Basis for Tier Classification in 310 CMR 40.0510 and 310 CMR 40.0520, respectively.
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> (These effective dates are spelled out at 310 CMR 40.0005(7) through (10).)
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> In addition, while the new Method 1 Standards do not take effect until June 20, 2014 (meaning you can still use the "old" Method 1 Standards up to that date), one may (it is an option) use the new values in a Method 2 risk characterization pursuant to the provision at 310 CMR 40.0982(7).

Moving forward, we'll turn our focus to the transition, the closing of parts of the 1993 MCP, what our final rounds of audits under those regulations tell us, then the results as we move into the 2014 MCP, and the problems and benefits as we see them.

But before we do that, let's look something that rarely gets any attention: restoration and regeneration of ecosystems.

So often, "restoration" in this program means restoring the economically beneficial use of a Brownfield site, particularly those in or near urban areas. Sometimes we lose sight of the bigger picture – the restoration of ecosystems affected (mostly negatively) by decades of human activities.

Let's look at a local example. The New Bedford Harbor Superfund site was polluted for decades by polychlorinated biphenyls (PCBs) discharged directly to the harbor. This contamination affected and limited how the harbor was used – used for commercial activities, enjoyed for recreational activities, and how the natural processes functioned. To this day, the impacts of the PCBs to fish, shellfish and bird species can still be observed in and around the area. The cleanup has been underway for many years and a new additional settlement should expedite the process.

Massachusetts Division of Fisheries & Wildlife, Natural Heritage & Endangered Species Program has been working for several years to help encourage populations of the roseate and common tern populations in the islands around New Bedford Harbor. These two bird species were greatly affected by PCBs in the Harbor.

Recently, DEP/BWSC received a video about one of the many Natural Resource Damages restoration projects in New Bedford Harbor. This is a link to the video about the Sawmill Dam project: http://youtu.be/AT0Rv9uBJIs. The Executive Office of Energy and Environmental Affairs with DEP/BWSC, along with partners EPA, NOAA and US Fish and Wildlife have all worked together to support the restoration projects. This video, from one of our award recipients working with NOAA, documents an increase of the river herring and other fish. It's evidence that such restoration projects can achieve dramatic results beyond what remediation alone provides - and it's worth the effort.

On a larger scale, there recently has been a focus on reducing or eliminating emissions of various climate changing gases, from carbon dioxide to methane to chlorofluorocarbons. It sometimes seems that "fixing" the problem with so many emissions already in the atmosphere seems almost impossible, particularly since every action seems to have unexpected consequences. Yet new possibilities for mitigation – or even restoration emerge from quite unexpected sources. One example is *grazing cattle*.

As noted in our last LSPA newsletter article, corn-based ethanol will probably not be the last stop in the search for a cleaner, "greener," octane-boosting gasoline additive. While ethanol is certainly safer on several fronts, it has limitations. The energy inputs versus outputs are just one area of increasing controversy regarding use of corn grain as the feedstock for ethanol.

For starters, plowing and tilling soils, particularly chemically fertilized soils, has been found to have several negative effects and the documentation is piling up for this, such as:

- Wholesale plowing is leading to losses of topsoil[i]; exposing soils to the atmosphere also releases carbon dioxide from the soils. It doesn't look like a smoke stack, but the effects are similar and now being studied;
- Bt-corn, genetically modified to be resistant to certain herbicides, requires quite a bit of artificial nitrogen fertilizer and water. When plowed, these soils also release nitrous oxide, with effects 300 times more warming than carbon dioxide, a longer life in the atmosphere (120 years v 100 years) and the ability to damage the protective ozone layer[ii].
- The widespread and repeated use of herbicides has resulted in loss of biodiversity of native wildflowers, milkweed and grasses that used to grow on the borders and hedgerows of farms, leading to a crash in monarch butterfly populations[iii], bees and other pollinators.

- At the same time, some of the "weeds" in the corn, soy and cotton are becoming resistant to the most widely used herbicides[iv] leading to even more toxic ones now being proposed, against growing public opposition[v];
- There are arguments over whether the combined energy inputs to produce corn (grain) based ethanol is net positive or negative relative to the energy produced from it[vi]; many researchers believe that ethanol from *other* crops, particularly certain grasses, would be superior and will reduce or prevent the nitrous oxide losses[vii]. Several of these grasses, requiring almost no inputs, are now being studied as sources of cellulosic ethanol.

While all this may not bode well for corn-based ethanol, it turns out that quite a few people are also starting to take a fresh look at grazing cattle in a managed way. Meanwhile, there have been many studies showing that corn fed animals raised in large feedlots need more antibiotics, have too little omega-3 and too much omega-6 and saturated fat, making them less healthful for human consumption[viii] than grass-fed, free-range animals. Now, it turns out that grazing cattle on grasslands might not only reduce climate change gases entering the atmosphere, it may be the best, fastest way to also to capture carbon from the atmosphere and put it back into the soils from whence it came.

These methods are based on the work of Allan Savory, one of the first to understand that ruminating animals were not the *cause* of desertification and biodiversity decline, but rather, the antidote, and when properly done, could restore even the most degraded environments. One of the many videos about the work Allan Savory has done, mostly in Africa, can be found at: http://www.ted.com/talks/allan_savory_how_to_green_the_world_s_deserts_and_reverse_climate_change.

It seems to contradict the arguments that everyone should save the planet by going vegan, but evidence is mounting. People are starting to demonstrate that the best way to reverse desertification, replenish topsoil, and not only reduce carbon emissions but *remove* excess carbon dioxide from the atmosphere[ix], keep nitrous oxide in the ground, and restore biodiversity of both plant and animal species, is to put ruminating animals back on the prairies[x]. As the animals stomp the plants and manure into the ground, microbes quickly digest and restore the nutrients to the topsoil, building as much as six inches of topsoil in a few years time. Now researchers are starting to look for ways to quantify these results.

One of the newest videos on the topic, by Peter Byck, http://vimeo.com/80518559, shows ranchers in Canada and North Dakota, *Soil Carbon Cowboys*, describing how their ranching methods have changed, saving money in fertilizers, antibiotics and seed, and resulting in easier herd management and healthier animal and prairies. (While not a BWSC focus, there is a conference on this topic in the Boston area; information can be found at http://bio4climate.org/conference-2014/.)

Perhaps one day there will be a sea change in the way we think about the environment. Maybe it will turn out that using more of nature's methods, and less industrial ones (with the attendant toxic chemicals), will be the best solution for people and the planet.

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[i] http://www.seattlepi.com/national/article/The-lowdown-on-topsoil-It-s-disappearing-1262214.php article indicates it takes "hundreds" of years to rebuild 1-2 inches of topsoil, however, some no-till cattle ranchers have seen build up of as much as 6 inches of topsoil in a few years (see onthecommons.org reference).

[ii] http://www.brightsurf.com/news/headlines/68193/Nature_How_the_N2O_Greenhouse_Gas_Is_Decomposed.html information on nitrous oxide emissions from modern "traditional" farming methods, problems, etc.

[iii] http://www.cbc.ca/news/technology/monarch-butterfly-numbers-drop-to-new-lows-1.1867164 notes use of herbicides in the corn belt in US and other factors.

[iv] http://www.nytimes.com/2010/05/04/business/energy-environment/04weed.html?pagewanted=all&_r=0 Roundup no longer effective on pigweed (amaranth).

[v] http://foodpoisoningbulletin.com/2014/cfs-warns-the-epa-will-approve-agent-orange-on-ge-crops/ EPA may be set to approve new herbicide.

[vi] http://extension.oregonstate.edu/news/release/2007/01/study-finds-net-energy-biofuels-comes-high-cost compares several different potential feedstocks for ethanol.

[vii] http://www.brightsurf.com/news/headlines/82493/Lower_nitrogen_losses_with_perennial_biofuel_crops.html evaluation of certain grasses for ethanol.

[viii] http://eatlocalgrown.com/article/grass-fed-vs-feedlot-beef-difference.html compares and contrasts grass-fed and grain-fed beef.

[ix] http://onthecommons.org/can-cattle-save-us-global-warming also notes that utilities in Canada are buying into this idea, supporting no-till farmers to offset carbon produced by their power plants.