International Perspectives

Assistance Needed to Gather Global Best Management Practices

by Chuck Chaitovitz

As agricultural production intensifies to meet the demand of population growth expected in the coming decades and the more than 1 billion people that face chronic hunger today, proper nutrient management best practices must be scaled-up to ensure the long-term stewardship, conservation, and sustainable management of our soil health and water resources. The Global Environment and Technology Foundation (GETF) is supporting the Global Environment Facility (GEF) and the United Nations Environment Programme (UNEP) to develop a global "tool box" of nutrient management best practices. This inventory and analysis activity is intended to help the policy makers and small farmers in the developing world scale-up and implement nutrient management best practices. We are particularly focusing on whole-farm planning and farming practices to promote sustainable nutrient management to secure crop production in the developing regions. We request the assistance of ASA, CSSA, and SSSA members to engage experts in the developing world to gather best practices and case studies of successful or unsuccessful practice (in order to draw lessons of what needs to be avoided) and project implementation.

Growing Global Challenge

The 2009 World Food Summit on Food Security stated that the world must produce 70% more food by 2050 than is currently produced to sustain a world population of nine billion. This growth will require an annual increase in crop production of 44 million metric tons, implying intensification of food production and fertilizer use.

However, due to inappropriate use of fertilizer in agricultural production systems and discharge of untreated sewage and wastewater, the quality of coastal water has been affected, leading to nutrient over-enrichment in coastal waters. These excess nutrients result in eutrophication and hypoxia, leading to declining coastal water quality with associated human health impacts, damage to biodiversity, and fish kills. The overall effect is to undermine the resilience of marine and coastal ecosystems, affecting in turn their ability to support coastal livelihoods such as fishing and tourism and their potential role in climate change adaptation and mitigation. The problems have become global in scope and significance. Figure 1 illustrates that these hypoxic "dead zones" have increased almost nine times since 1969.

In Asia, fossil fuel burning and high fertilizer use are the main causes. In Latin America, excess nutrient "hot spot" areas have emerged from biomass burning and biofuel production. Africa contends mainly with a shortage of available nutrients, though there are problem areas from sewage and fertilizer use.

Fig. 1. Coastal Hypoxic "hot spots" in coastal zones in 2010. *Illustration redrawn from Diaz, R.J., and R. Rosenberg. 2008. Spreading dead zones and consequences for marine ecosystems. Science 321:926–928.*

A Global Solution: The Global Partnership on Nutrient Management

To address the global nutrient challenge, UNEP facilitated the formation and launch of the Global Partnership on Nutrient Management, which is a multi-stakeholder partnership of governments, industry, the science community, civil society organizations, and United Nations agencies (see www.gpa.unep.org). UNEP with support from GEF also recently launched a project entitled, "Global Foundations for Reducing Nutrient Enrichment and Oxygen Depletion from Land Based Pollution in Support of the Global Nutrient Cycle" to address the key nutrient challenges including the hot spots in the developing world. The purpose of this project is to build capacity at the country level to foster and set in motion effective policy and investment interventions to address the threats to public health, biodiversity, and economic growth caused by nutrient pollution.

This effort will help:

- Identify and foster opportunities that can be applied by countries in a local context and be scaled up for more concerted national and international efforts

- Mainstream best practices and approaches within countries so that effective nutrient management is embedded in relevant policy measures and the benefits are realized

Pilot Projects for On-the-Ground Results

The Global Partnership on Nutrient Management will implement pilot projects in key developing world hot spots, such as Manila Bay, Lake Chilika, and Lake Laguna. Possible additional pilot regions include East Africa (countries around Lake Victoria), Thailand, Brazil, and Mexico. Following are the objectives of the pilot projects:

- Assess how best to increase adoption of nutrient management best practices in nutrient hot spot regions
- Identify data, information, and capacity needs to implement nutrient management strategies and subsequently develop a course of action based on these inputs
- Develop stakeholder analysis, which will form part of the needs assessment and take into account gender issues and social relations
- Strengthen predictive capability by applying the modeling work from component B and testing different policy options for the demonstration region
- Develop a nutrient management plan for the region with the help of the outcomes and the policy toolbox for addressing priority concerns and incorporate nutrient strategies in national and sectoral policies
- Assess the potential for scaling-up the use of practices, tools, and approaches developed under this project and come up with a report on lessons learned and recommendations for up-scaling

The Danube Regional Project

The Danube Regional Project (DRP) was established as a component of GEF's strategic partnership on nutrient reduction in the Danube/Black Sea Basin. GEF invested more than $17 million to reduce nutrient loading into the Danube River and its tributaries and to improve water quality in the Danube and the Black Sea. The project is designed to complement the activities of the International Commission for the Protection of the Danube River and undertook approximately 180 basin activities in addition to 130 national and regional small-grant projects.

The DRP has assisted countries in introducing new approaches (e.g., BAPs, BAT, etc.) that are intended to reduce impacts as economic conditions improve. The following are the best agricultural practices and experiences developed under the project:

General

- All farms larger than 5 ha and/or five animal units should calculate their resource economy every year by 1 April of the preceding year and cover at least the resource economy for nitrogen and phosphorous.

Crop production systems

- Every farm with at least 5 ha of arable crops should ensure soil sampling at least every five years.
- Crop rotation and fertilizing plans should be prepared every year for all farms larger than 5 ha, with the finishing date no later than 31 March (or 1 August for winter crops).
- Fertilizing plans should be based on the expected yield level and the needs of the crops and include both livestock manure and chemical fertilizer.

Livestock production systems

- Livestock should be fed with rations that are correctly balanced with energy, protein, and minerals in relation to productivity.
- Cleaning of stables with water should be avoided or reduced to a minimum.
- Watering of the livestock should happen in a way that hinders spill of water.

Livestock density

- Livestock numbers should be limited to ensure that nitrogen content in the manure is no more than 170 kg ha^{-1}. Manure should be sold to other farms or distributed to fields of other farms in case of a higher livestock density.

Livestock manure management

- There should be storage capacity for at least six months production of livestock manure at the farm. Production systems with use of bedding material need storage capacity for both liquid and solid manure. Production systems with deep bedding can store the manure on the field for up to six months if the manure has a minimum dry matter content of 30%.
- Farmers should limit the extent that rain water dilutes livestock manure.
- Spreading of manure from 15 October to 1 March should not take place, particularly not on frozen land or land with a slope of more than 7 degrees.
- Proper technology should be used for spreading livestock manure. Liquid manure and slurry should be spread with a band-laying system or be injected into the soil.
- Livestock manure should be incorporated into the soil within six hours.

C. Chaitovitz, Principal, Global Environment and Technology Foundation, Arlington, VA; chuck@getf.org