Global action on reversing degradation of river catchments and adjacent large marine ecosystems through GEF and UNDP partnerships

Vladimir MAMAEV 1* & Alfred M. DUDA 2
[1]UNDP/GEF, Bratislava, Slovakia
*E-mail: vladimir.mamaev@undp.org
[2]GEF Secretariat, Washington DC, USA

Disruption of the global nitrogen cycle and excessive loading of nitrogen and phosphorus pollution from agriculture, human sewage, and industry have created more than one hundred "Dead Zones" of coastal water quality and environmental degradation across the planet. These "Dead Zones" seem to be expanding, projections of future degradation are alarming, and urgent action on pollution reduction is needed in river basins draining to these areas to restore and protect coastal areas and enclosed seas. This paper focuses on the issue of "Dead Zones" in the coastal oceans which can be divided into sub-units known as Large Marine Ecosystems (LMEs). The Global Environment Facility (GEF) and its partner agencies UNDP and the World Bank have collaborated for 15 years in efforts to assist the countries to address this adverse coastal impact form land-based activities. Over $300 mil of GEF grants and $1.3 Billion in co-financing have been mobilized in an initiative to help GEF recipient countries to address this growing problem. Specific examples from the Black Sea LME and connected Danube Basin as well as East Asian LMEs and connected land-based activities are presented. The paper describes the use of LMEs for this task, the processes used by GEF to foster country commitments to action, and the actual investments in the agriculture, municipal, and industrial sectors as well as in floodplain and wetland restoration for reducing nitrogen, phosphorus, and other pollutants.

Beginning in the 1970s and continuing through to the early 1990s, nutrient-enrichment of the Black Sea LME resulted in oxygen depletion, causing mass mortalities of animal life within huge areas of the NW Shelf. The GEF for the last 15 years has supported several regional projects in the Danube-Black Sea Region to reduce nitrogen and phosphorus pollution in the Danube Delta and downstream Black Sea. 16 countries have worked together with GEF, UNDP, and World Bank assistance and the European Union to address these land-based pollution sources creating dead zones in the Danube Delta and Black Sea. Pilot demonstrations for nutrient reduction in the agriculture, municipal sewage, and industrial sectors and to trap nutrients in restored floodplains are proving to be cost effective ways of reversing coastal dead zones with potential annual reductions of 15,645 tonnes of nitrogen and 5,050 tonnes of phosphorus. Nutrient emissions to the Danube have been substantially reduced over the last 15 years (nitrogen emissions have decreased by about 20% and phosphorus by almost 50%), and the North West Shelf of the Black Sea is showing quite remarkable signs of recovery. Measurable improvements have been observed in the Danube and Black Sea ecosystems over the last decade and a half. Nowhere has such nitrogen and phosphorus pollution reduction been achieved as to reverse the documented dead zone of oxygen depletion in the Black Sea ' s NW shelf. Ultimately, the GEF-funded actions in the Danube-Black Sea basin demonstrate how countries can work together to reduce land-based pollution and Dead Zones. Outcomes of these interventions are favorable in terms of on-site effectiveness and multi-country cooperation.

This initiative is now being replicated in East Asian LMEs with the GEF/UNDP PEMSEA program and World Bank investments. The East Asian Seas (EAS) region comprises six Large Marine Ecosystems (LMEs) - East China Sea, Yellow Sea, South China Sea, Sulu-Celebes Sea, Indonesian Sea and the Gulf of Thailand. In the last 30 years, 11 percent of the region's coral reefs collapsed while 48 percent are currently in a critical condition and over 80 percent are at risk. Mangroves have lost 70 percent of their cover in the last 70 years while seagrass beds' loss ranges from 20-60 percent. Unless properly managed, the current rate of loss will result in the removal of all mangroves by 2030, while reefs face collapse within 20 years. Investments in China, Vietnam, and Philippines, are described in this paper along with an agriculture pollution reduction project just outside of Shanghai that will (i) reduce land- based pollution from the rural/agricultural sectors of the coastal areas and the East China Sea ; (ii) promote and replicate cost-effective and resource-efficient agricultural sector pollution control and waste management ; (iii) promote and replicate methodologies appropriate for the cost-effective management of wastewater from diverse rural communities; (iv) protect water resources and enhance access to sanitation in rural areas; and (v) encourage and facilitate coastal conservation.

Special efforts in the Yellow Sea LME and the Hai River Basin draining to the YS LME are highlighted. Of the 64 large marine ecosystems in the world's oceans, the Yellow Sea is one of the most significantly affected by human development. Bordering countries share common problems with pollution from

municipal and industrial sites as well as agriculture. Degradation of the environment is shown by reduced fish catches; shifts in species biomass (partly caused by over-fishing); red tide outbreaks, degradation of coastal habitats (caused by extensive coastal development) and climate variability. The Yellow Sea LME is also an important global resource supporting substantial populations of fish, invertebrates, marine mammals, and seabirds, many of which are threatened by both land and sea-based sources of pollution as well as loss of biomass, biodiversity, and habitat resulting from extensive economic development in the coastal zone, and by the unsustainable exploitation of natural resources.

Surface and groundwater quality in the Hai river basin, has been seriously degraded due to lack of effective pollution control combined with increasing population, industrial output, and intensification of agriculture and livestock production. Over 80% of the river stretches in the Basin are classified as polluted. Groundwater contamination of drinking water aquifers is a widespread, yet poorly understood, problem in the Hai Basin. Degradation of urban water supply aquifers can have large-scale public health impacts and destroy a valuable resource. Contamination of shallow aquifers from agricultural runoff and use of polluted irrigation water threatens the water supply source for man y rural communities. There is also extensive seawater intrusion on the littoral plain of Hebei, threatening irrigation, rural, and urban water supplies. Discharge of pollutants into the Bo Hai Sea, particularly around the mouth of the Hai River near Tianjin, have resulted in large and frequent "red tide" incidents which can contaminate shellfish and poison humans that consume them. Globally, the GEF 4 Strategy for International Waters contains a global initiative on further action in support of the Global Programme of Action. Opinions of conference participants will be sought as to whether such an initiative should be continued in future phases of the GEF.