HIGHLIGHTS

# A GEF UNDP Project Promoting Nutrient Reduction Best Practices in Central and Eastern Europe

## About

The purpose of the Living Water Exchange is to inventory, assess and accelerate replication of nutrient reduction best practices across Central and Eastern Europe and Central Asia. The project inventoried the GEF's more than USD 100 million in investments over the last twenty years to find 38 nutrient relevant projects implementing 138 discrete nutrient reduction practices. Low cost interventions, such as wetlands restoration or agri-nutrient management implementation are among best value investments and offer solid opportunities for significant impact as part of an overall nutrient reduction system. These kinds of practices were showcased in Living Water Exchange pilot demonstrations and featured in key GEF investments throughout the region.

This document summarises the main project findings and outcomes for policy makers and potential donors, in particular the linking practices back to demonstrations and inventoried projects.

## Practices

The following is a list of eight best agricultural practices (BAPs) highlighted in the inventoried projects that have a high potential impact for reducing nitrogen and phosphorous from agriculture in the region as assessed by the project team expert judgment.

### Riparian Buffers

These can be either forest or grass. They should receive no fertiliser or manure addition, livestock should be excluded (including geese) and runoff should be controlled so it enters the buffer as sheet rather than channelised flow. The first 10m of width it critical for nitrogen removal. Buffers generally have a low to moderate phosphorous removal efficiency.

**Project Examples**: The UNDP/GEF Danube Regional Project – Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation in the Danube River Basin – is an example of the use of grass and tree buffers. In the Lower Elan Valley, to help restore the floodplain, a number of tree species were planted to control soil erosion and protection from agricultural practices. Elsewhere, additional afforestation was implemented. In The Olsavica Valley, grasslands were restored to act as a buffer between agricultural land and the stream. The Living Water Exchange Project in the Western Ukraine established a 5 m wide plum tree buffer along the Irshavka River. Planting trees is a good practice to retard soil erosion and should be encouraged. When trees and/or grasses as used to interest water from agricultural lands it is imperative that information be provide on the width of the planting. Effectiveness of buffers for nutrient removal is greatly dependent on width.

### Nutrient Management

Managing the amount, source, placement, form and timing of the application of plant nutrients and soil amendments. Soil test

LIVING WATER EXCHANGE

**DEMONSTRATION PROJECT**

**Demonstration projects:** The Living Water Exchange invested USD 147,111 in four pilot demonstration projects to showcase the impact and catalytic nature of low cost interventions – significant opportunities to reduce nutrient loading, improve local water quality, ensure practice replication and involve the local communities in the region. The following outline the best practices and outcomes from each demonstration:

## Tirana, Albania

Constructed Wetland for Nutrient Reductions in the Waters of Tirana River (USD 38,569): The objective of this project is to reduce nutrient pollution in the Tirana River by developing and evaluating the "first ever" constructed wetland system in Albania along the banks of the river.

### Key practices

The constructed wetland including a sedimentation basin to hold suspended solids, a second basin consisting of shallow layer of surface water, flowing over mineral (sandy) or organic (peat) soils and vegetation (marsh plants) to remove nutrients and a larger third basin comprised of trees and larger vegetation for polishing effluent and creating wildlife habitat (frogs have started to reside in this area).

- Water sampling and analysis determined the level of pollution and is important as part of a monitoring programme to identify any trends and impacts as a result of the project.
- Outreach to the community is important in building awareness of the capacity and capability of constructed wetlands to address nutrient pollution

### Lessons learned

- Land ownership is a critical consideration to ensuring the outcomes, security and sustainability of the project. While the location of the site was selected by the Municipality of Tirana in an area of floodplain, illegal houses were being built adjacent to the site.
- The wetlands size is important in ensuring appropriate nutrient reduction; if it is too small for the amount of river water diverted through the system, the impact is minimal.

The project disseminated the constructed wetland model to key stakeholders in Albania to serve as a model for

replication on small streams, wastewater from villages and towns and restoration of previous wetlands that had an important role in filtering the pollution from rivers in the past (wetlands in Albania were extensively drained from 1950-1990). The project will also serve as a model for the construction of more wetlands for all the streams and effluents that empty in Ishmi River aiming to reduce nutrients in this river and consequently the decrease eutrophication in Ishmi estuary and Adriatic Sea.

**DEMONSTRATION PROJECT**

## Slobozia Mare, Moldova

The Decrease of Water Pollution Sources in Prut river basin through the Promotion and Implementation of the Best Agricultural Practices (USD 55,200): The objective of this project is to reduce nutrient pollution from agricultural sources in the Prut River basin. The project worked with local stakeholders to construct a manïcomposting procedures, encourage the use of composted manure as a nutrient source for "ecological agricultural production" and raise awareness of best agricultural practices in the area.

### Key practices

- Construction of a centralised manure composting facility that provides an opportunity to educate the farmers on proper application methods, rates and timing, and crop and field management to optimise nutrient use and minimise loss
- Mayoralty leadership was important to ensure buy-in of farmers to use the centralised composting facility.
- Training and education of farmers in composting, manure use, and other Best Agricultural Practices

- Best agricultural practice training curricula including key themes such as the following: 1) types of agricultural systems, biodiversity ensuring ecosystem protection; 2) agriculture and water, soil, air, biodiversity, pesticides; 3) pollutant agriculture; 4) techniques for appropriate fertilisers applications; 5) ecological solutions for pollution reduction; and , 6) manure composting and the correct use of the compost as fertiliser
- Five village meetings and five educational sessions in schools and colleges on ecological agricultural best practices; a train-the-trainer session on ecological issues for local geography teachers; joint meetings with other nearby comïmunities; and leaflets, brochures, and posters highlight approaches to change behavior
- An experimental garden, a surface of 200 $m^2$ which is located at the kindergarten of Slobozia

### Lessons learned

- Interaction with the GEF/World Bank Moldova Agricultural Pollution Control Project, which developed two types of platforms – small and large: The small platforms shared by farms are being utilised but the large platforms do not have funds to transport the manure so they remain unused. This demonstration learned the following from these discussions:
  - Size of the central platform is to scale for the village.
  - Awareness and buy in from the village and farmers.
  - Mayoralty commitment to address transportation issues.

*For more information please visit http://www.youtube.com/watch?v=tfAjKisrTss*

analysis and manure analysis are essential components of a nutrient management plan.

**Project Examples**: The Danube River Enterprise Pollution Reduction Project (DREPR) in Serbia is a good example of the inclusion of nutrient management. By the implementation of a Code of Good Agricultural Practices including nutrient management, the project prepared 86 farm nutrient management plans. This was accomplished through the support of three Local Advisory Units. Projects like the GEF/World Bank Moldova Agricultural Pollution Control Project help to institutionalise soil testing along with crop nutrient management as part of their overall nutrient management approach.

### Manure Management

This practice deals primarily with the proper collection, storage and handling of manures and the management of animal confinement area runoff, where animals are confined for significant periods. This includes the ability to evenly apply the manure at the appropriate agronomic rate, as determined in the nutrient management plan. Managing the amount, source, placement, form and timing of the application of manures is usually done in combination with fertiliser planning as part of the nutrient management plan.

**Project Examples**: The GEF/World Bank Turkey Anatolia Watershed Rehabilitation Project has constructed about 335 farm-based manure storage platforms with a goal of establishing manure management systems for 10 percent of the households within each of the 28 micro-catchments in the project area. The platforms in addition to helping store manure are also being used for composting. Both manure and compost use are gaining interest due to high fertiliser prices. Implementation of these manure management strategies is being complimented by increased water quality monitoring.

## Ecological/Organic Production Systems

Ecological/organic production systems are not really BAPs but rather a systems approach that relies on organic inputs. Ecological agriculture requirements and expectations can drive implementation of many BAPs. Documented nutrient management and manure management should be standard requirements for ecological agriculture and many other practices, such as buffers, should be expectated. It should also be noted that growing crops ecologically (organically) can actually make long-term nutrient management and erosion control more challenging than in conventional production systems.

**Project Examples**: The Russia and Estonia Development and Implementation of the Lake Peipsi/Chudskoe Basin Management Programme is one of several GEF-funded projects that included "eco-farming" practices as one suite of measures to control pollution from crop production. The project supported BAPs including vegetative buffer strips, new drainage systems, and following additional good agricultural practices.

## Wetland Restoration/Creation

Returning natural/historic functions to a former wetland results in a gain in wetland acres. Nutrients and suspended particles are removed via settling. Nitrogen is further removed primarily via plant and microbial uptake and nitrification-denitrification reactions, while phosphorus is further removed by soil sorption.

**Project Examples**: The GEF-World Bank Bulgarian project on Wetlands Restoration and Nutrient Reduction is a good example of a cost effective use of restored wetlands. In fact the project succeeded in restoring 30% more wetlands than originally planned. Over time, a better quantification of nutrient reductions will be gained but the project presently is a model with a high replication value.
Also, the GEF-World Bank Hungary - Reduction of Nutrient Discharges project has shown the value of restored wetlands in the Danube-Drava National Park with an estimated 5,500 t/yr N reduction and a 264 t/yr P reduction. As importantly, this restored area will provide knowledge and technical data on the mechanisms of nutrient reduction in the future.

## Erosion Control & Conservation Tillage (Residue Management)

This practice involves the planting, growing and harvesting of crops with minimal disturbance to the soil surface through the use of minimum tillage, mulch tillage, ridge tillage, or no-till.

**Project Examples**: The GEF-funded project on the Tisza River Basin in Romania, Ukraine, Serbia, Hungary, and the Slovak Republic included a number of erosion control practices such as establishment of an ecological corridor, and restoration of grasses and trees on river banks.

## Grazing Management

This practice utilises pasture management and grazing techniques to improve the quality and quantity of the forages grown on pastures and to reduce the impact of animal travel lanes or other degraded areas of the pastures. Prescribed grazing should be applied on a continuing basis throughout the occupation period; the grazing plan should be reviewed or re-evaluated annually to determine if adjustments or modifications are needed; in-season evaluations of the current feed and forage supply are needed; the grazing infrastructure should be maintained in good working order.

**Project Examples**: The Olsavica Valley reclamation site of the UNDP/GEF Danube Regional Project – Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation in the Danube River Basin – incorporated the use of stream fencing. Grazing animals were destroying a number of spring-wetlands and fencing was installed to protect these wetlands. There was no indication, however, if alternative sources of water for the cattle were provided.

## Cover Crops

Cereal cover crops reduce erosion and leaching of nitrogen into groundwater by maintaining vegetation on cropland and holding nutrients within the root zone. This practice involves the planting and growing of cereal crops with minimal disturbance of the surface soil. To qualify as a cover crop, nutrients must not be applied (e.g., manure,

commercial fertiliser, compost). If possible, the cereal can be harvested early for hay or silage and the subsequent crop can be planted directly into the residue, thus providing erosion control through "no-till". If the cereal is not harvested as hay, it can be killed/suppressed early in spring by mowing or with herbicides, and the summer crop can be planted into the residue. If the residue is left, it will provide nutrients for the summer crop. If ecologically optimal nutrient application rates are made, they should be adjusted for the nutrients in the residue.

In addition to cereal cover crops, legumes may be used as cover crops. In addition to providing a vegetative ground cover they can provide up to 100 kg/ha of nitrogen for the following crop.

**Project Examples**: The GEF/World Bank Croatia Agricultural Pollution Control project has incorporated demonstrations of cover crop technologies. The goals are to show reduced nutrient loss, protection from soil erosion and compaction, and maintenance of soil organic matter. The plan includes demonstrating cover crops on up to 200 ha annually in each participating county.

## Peer-to-Peer Exchanges

The LWE project undertook peer-to-peer exchanges among policy makers, practitioners and donors were held at the demonstrations sites. While to varying degrees, all events provided solid examples of how sharing information, experiences and practices can lay the foundation for cooperation, capacity building and replication.

**DEMONSTRATION PROJECT**

## Kruševac, Serbia

Help the "Celije" Lake on the Rasina River nearby Krusevac with Experiences of Natural Processes (USD 19,342): The objective of this project is to reduce the impacts of nutrient pollution on water quality in Lake Celije and the surrounding watershed by improving agricultural practices and managing nutrient pollution. Lake Celije and the Rasina River were chosen because of high population pressures resulting in elevated nutrient loads from wastewater into the lake.

### Key practices

- A "biological filter" at the in-flow to the lake created a low-cost option that channeled the flow through the reed beds by construction of a 50 m channel to retain nutrients and sediments
- Creation of a buffer zone made of 10,200 trees covering 10.8 ha in the catchment of the Rasina River in order to reduce soil erosion and prevent sediment overloads

- Education and awareness raising through workshops, training sessions, and public lectures
- Media, promotional and lobbying activities including TV and radio presentations to increase understanding of the nutrient problems and the potential solutions in this project
- Water quality and quantity indicator surveys of Rasina River and Blatasnica River as well as for Rasina Delta, which were performed and obtained from Institute for Public Health in Krusevac. Chemical analysis of erosion sediment and sludge in area of Rasina Delta was conducted as well.

### Lessons learned

Land ownership is a critical consideration to ensuring the outcomes, security and sustainability of the project. Farmers illegally planted corn up the banks of the river delaying planting of riparian buffers until after the completion of the project.

The project team was successful at securing significant co-financing from bilateral support from the Dutch Embassy (boas, vehicles, staff resources, etc.) and this will also assist with the on-going requirement to supervise and continue to monitor the results of this successful project.

The following are the key experiences from these events:

- Forty attendees seems to be the maximum level of participation to ensure robust discussions and solid stakeholder representation.
- A good cross section of stakeholders among the policy, agriculture, environment, water management and donor communities is needed to ensure that all views are appropriately represented and to drive change, cooperation and capacity at both the county and farm levels.
- The maximum opportunity to foster cooperation among countries requires careful consideration of geographies and political interests as in Moldova and Albania. For instance, government participants from Armenia, Azerbaijan and Georgia committed to exploring a regional transboundary project focusing on an integrated approach to nutrient reduction and will develop a table of common interest as a first step. The GEF/UNDP Kura-Aras River Basin Project may offer a vehicle to implement such an initiative. The Minister of Environment for Albania called for a follow-up ministerial meeting to discuss capacity building and nutrient pollution solutions.
- The two day format with facilitated breakout sessions and then site visit worked more effectively than the one day session that attempted to include both discussion and site visit in Serbia.
- Participants in several of the peer-to-peer exchanges underscored how important publicity was an to raise public awareness and public education regarding the need for pollution control, especially nutrient reduction.
- Other needs identified were training sessions in the region on specific practices and funding to assist small landowners implement nutrient reduction practices.

**DEMONSTRATION PROJECT**

## Zakarpattya Oblast, Ukraine

Best Practices of Fertilisers Reduction from Agricultural Lands in Upper Tisza Basin (USD 34,000): The objective of this project is to demonstrate cost-effective measures to reduce nutrient loads by highlighting good agricultural practices, using Irshavka River as an example. The villages of Siltse and Zarichya were selected for the project because they are at the centre of a developing closed hoophouse cabbage and vegetable production industry that is changing the hydrology of the region and increasing nutrient pollution.

### Key practices

- Construction of a buffer zone of plum trees to remove nutrient and sediment while maintaining some economic value (more than 700 trees and bushes were planted)

- Use of the buffer zone to deter dumping of manures and solid wastes along the river bank
- Development of a comprehensive local strategy regarding basic advice and suggestions for local officials, citizens and farmers to reduce nutrient loading through better home management of waste and sewage, expansion of buffers and vegetable production without pollution of the river
- Use of a well-organised team with prior experience working together to facilitate progress in the short time frame of the project

### Lessons learned

The local strategy is solid vehicle to ensure that the practices discussed during this project are sustained and replicated.

*For more information please visit*
*http://www.youtube.com/watch?v=3V6Lecv18fg*

The following are additional sample outcomes from the project regarding sustainability and knowledge transfer:

- There was interest by the Millennium Challenge Corporation (MCC) to facilitate connections with technical proposal winners to replicate practices throughout Moldova, and help with social mobilization on Central Irrigation Systems tasks under the MCC Compact that could offer a path to demonstration sustainability.
- The GEF Small Grants representative who attended the Albania session voiced possible support for funding constructed wetlands projects in the region.
- The GEF project manager from Lake Skadar-Shkoder Integrated Ecosystem Management Project in Albania/Montenegro, who participated in the Serbian exchange discussed interest in more information on constructed wetlands.
- The GEF project manager from the UNEP Mediterranean Large Marine Ecosystem Project expressed interest in further discussions on best practice and demonstration replication.
- There was good discussion among participants at the Serbian exchange, especially regarding possible transfer of nitrogen injection technology from the Anatolia River Basin Rehabilitation Project in Turkey.

## Next Steps

The following are the key next steps beyond the period of performance of the project and transferring actions to additional organisations:

- Ensure that the inventory forms the foundation of the Policy Tool Box of policies, measures and financial instruments under the new GEF/UNEP project "Global foundations for reducing nutrient enrichment and oxygen depletion from land-based pollution, in support of Global Nutrient Cycle";
- Continue to engage thought leaders and key additional agricultural organisations to build awareness of the nutrient reduction best practices inventoried;
- Partner with farmer and agricultural organisations in the region including the Federation of Agricultural Associations ULE and Ganja Agribusiness Association to replicate practices;
- Facilitate a dialogue between such organisations and the ICPDR to implement joint measures agreed to by ICPDR members; and
- Continue to engage venture capital firms such as the new Small Enterprise Assistance Fund's Agribusiness fund in India to discuss funding and partnering to deploy technologies and replicate practices in other key nutrient "hot spots".

### About the Living Water Exchange

The Living Water Exchange, a GEF/UNDP project promoting nutrient reduction best practices in Central and Eastern Europe, will share information and accelerate the replication of the most appropriate nutrient reduction practices developed from GEF and other investments in the region.

For more information, please visit
**http://nutrient-bestpractices.iwlearn.org/**
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