Reversing large scale hypoxic areas caused by basin-wide nutrient pollution: The Danube/Black Sea story

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The Problem

- Between 1970-80 the ecosystem of the western Black Sea collapsed
- By 1990, losses of bottom feeding animals were estimated at 60 million tons, including 5 million tons of fish, and about 40,000 km² of the NW shelf of the Black Sea was effectively considered a “dead zone”.
History of Impact

Millions of tons per year (N & P)

- dead zone
- P fertiliser
- N Fertiliser
- mussel regrowth period

Thousands of square Km of dead zone

Dead zone


0 0.5 1 1.5 2 2.5 3 3.5 4

0 1 2 3 4 5 6 7 8 9 10 11 12

International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau
The Intervention

GEF funding from International Waters Focal Area budget since 1991:

- **UNDP** projects (> $50 mill.)
- Nutrient Reduction Investment Fund $70/$300 million in co-financing

→ Triggered investment portfolio of 500+ project worth of over $500 million.
The Results

- **Water quality and ecosystem improvement**: effective elimination of the “dead zone”
- Phosphorus emissions **reduced by 50%**
- Nitrogen emissions **reduced by 50%**
- Oxygen levels at **near saturation** in most areas
- Number of benthic species **increased 1.5-2 times** with respect to 1980
Black Sea LME - Reduction of Eutrophication & Hypoxia
Black Sea macrophytes & Black Sea Angels

Ecological Status Class dynamics of macrophytes for Odessa: trend towards general improvement

Mollusc Barnea candida or Black Sea Angel has now returned to the Black Sea
An ecological sentinel which reacts rapidly to pollution of the Black Sea, mostly by nutrients
Was found in significant quantities since 2015
A living proof that the Danube became cleaner and its contribution of nutrients in the Black Sea has decreased.
Danube – Black Sea Basin Strategic Partnership for Nutrient Pollution Reduction

Financial scope: $100 m GEF Support to the GPA

Actors: UNDP; UNEP, World Bank; EU

Geographical scope: 16 basin countries

Technical assistance: 3 Regional projects funded by GEF

Investment: $70 million Investment Fund (WB) with $330 m co-financing

PROGRAM: beyond PROJECTS, and with multiple PARTNERS
Long-term goal: Black Sea ecosystems recover to conditions similar to those observed in the 1960s.

Intermediate goal: avoiding that the loads of nutrients and hazardous substances discharged into the seas exceed mid 1990s levels.

Requirement: Comparable assessment of inputs of nutrients & hazardous substances on the Black Sea.
Load assessment programme

Integrated with the **Danubian TransNationalMonitoringNetwork** (TNMN)

Pollution loads are calculated for **BOD5**, **inorganic nitrogen**, **ortho-phosphate-phosphorus**, **dissolved phosphorus**, **total phosphorus**, **suspended solids** and **chlorides**

Special load assessment programme for BSC at **Reni, Romania**

Minimum sampling frequency - at least **24 per year**
## Danube loads to Black Sea - ICPDR to BSC

**Parameter** | **TNMN load** | **unit**
--- | --- | ---
Suspended solids | 9980 | x 1000 t/a
N-NH4 | 17.8 | x 1000 t/a
N-NO3 | 278.7 | x 1000 t/a
N-inorg | 301.3 | x 1000 t/a
N-total | 393.6 | x 1000 t/a
BOD5 | 379.5 | x 1000 t/a

**Parameter** | **TNMN load** | **unit**
--- | --- | ---
P-PO4 | 12.8 | x 1000 t/a
P-total | 28.1 | x 1000 t/a
Cd | 17.6 | t/a
Cu | 1030.7 | t/a
Pb | 121.5 | t/a
Hg | 1.8 | t/a
Si | 850 | x 1000 t/a

*Status 2014*
Replication and scale up

Source-to-Sea Action Platform

• Management approaches to S2S continuum
• Helping generate financing
• Coordination and cooperation basins with LMEs

Linking SDG 14 and SDG 6 Targets:

• Water quality improvement by pollution reduction
• Reduction marine pollution from LBS including nutrients

Knowledge management (e.g. GEF/UNDP projects):

• IW:Learn
• LME:Learn
Lessons learned

✓ Solid legal and/or institutional framework
✓ Adaptive management
✓ National ownership via broad stakeholder participation and involvement
✓ Establish networks of like-minded people: scientists in academia and government agencies, laboratories
✓ Communication: both nationally and internationally, and with other regional stakeholders and key players
✓ Find the right mix of intervention tools: TA with investment
✓ Proper timing is about seizing the opportunities provided by political processes when they arise
✓ Rapport between the project management (PCU) and the regional governing body (Secretariat) is essential
Contacts and further information

www.icpdr.org
Catalysing Ocean Finance: http://www.undp.org
Hypoxia and Nutrient Reduction in the Coastal Zones: https://www.thegef.org
GEF Strategic Partnership on Black Sea and Danube Basin
http://web.worldbank.org
http://www.blacksea-commission.org/
http://emblasproject.org/
#Thank you!

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