





## *The Danube - Black Sea Basin*

*Strategic Partnership for  
Nutrient Pollution Reduction:  
support to the GPA (\$98 m  
GEF)*

**UNDP; UNEP, World Bank; EU**

**16 basin countries**

**3 Regional projects**

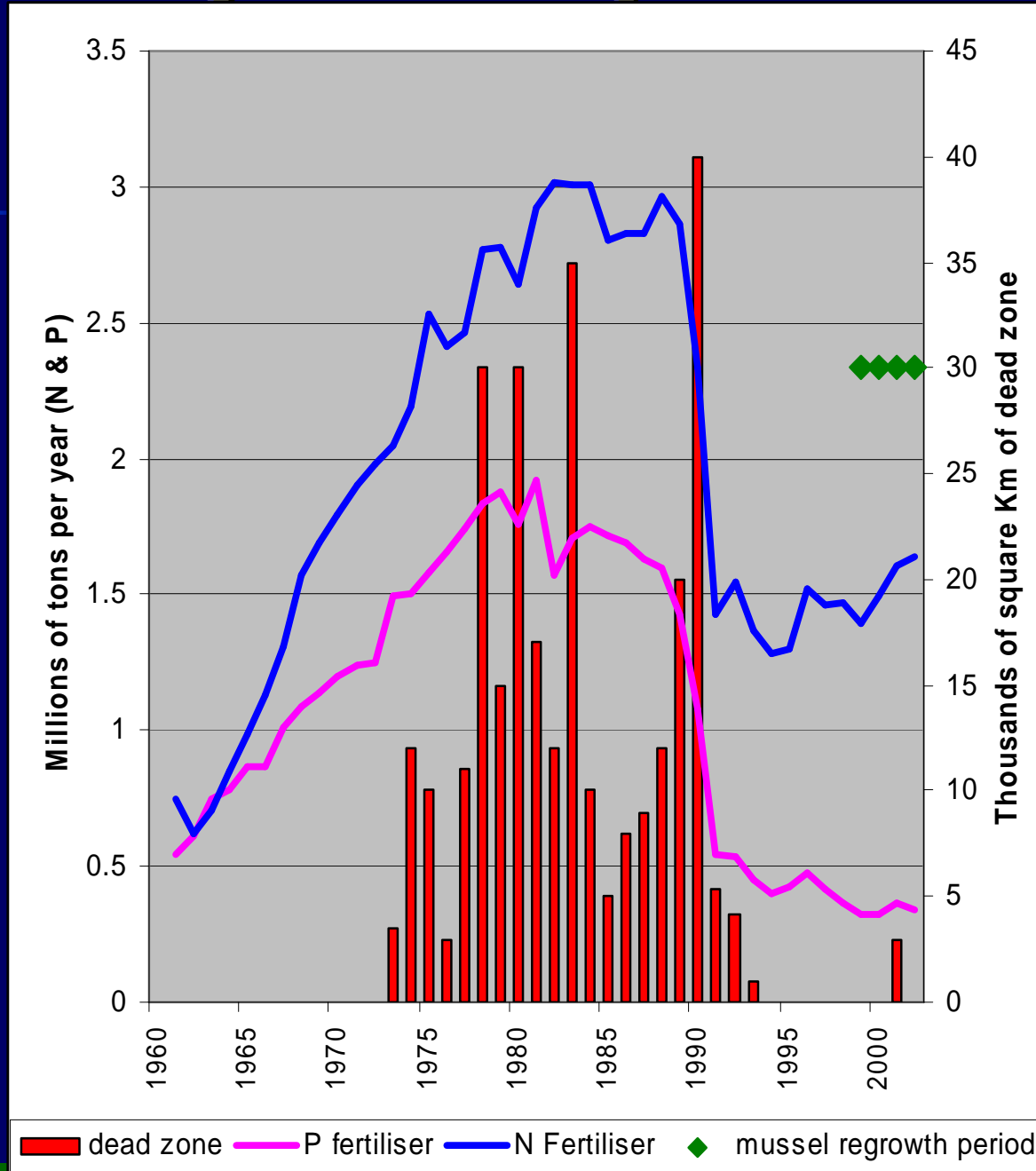
**\$70 million Investment Fund (WB)  
approved by GEF Council in 3 tranches-  
\$289 m co-financing & \$28 mil GEF  
regional projects UNDP and UNEP.**

**PROGRAM, not just PROJECTS with  
multiple PARTNERS**





# History of Impact






GEF

# Dynamics of Livestock Numbers in BS Coastal Country Sub-Basin

	1960	1970	1988	1997	2003
Cattle	47.8	56.2	65.6	35.3	23.4
Pigs	27.0	31.4	40.3	20.6	15.2
Sheep & goats	46.7	46.2	47.1	22.3	15.4
Poultry	207.7	262.0	452.4	290.6	356.5

 Numbers of 'large' livestock have fallen to about one-third of the level in 1988

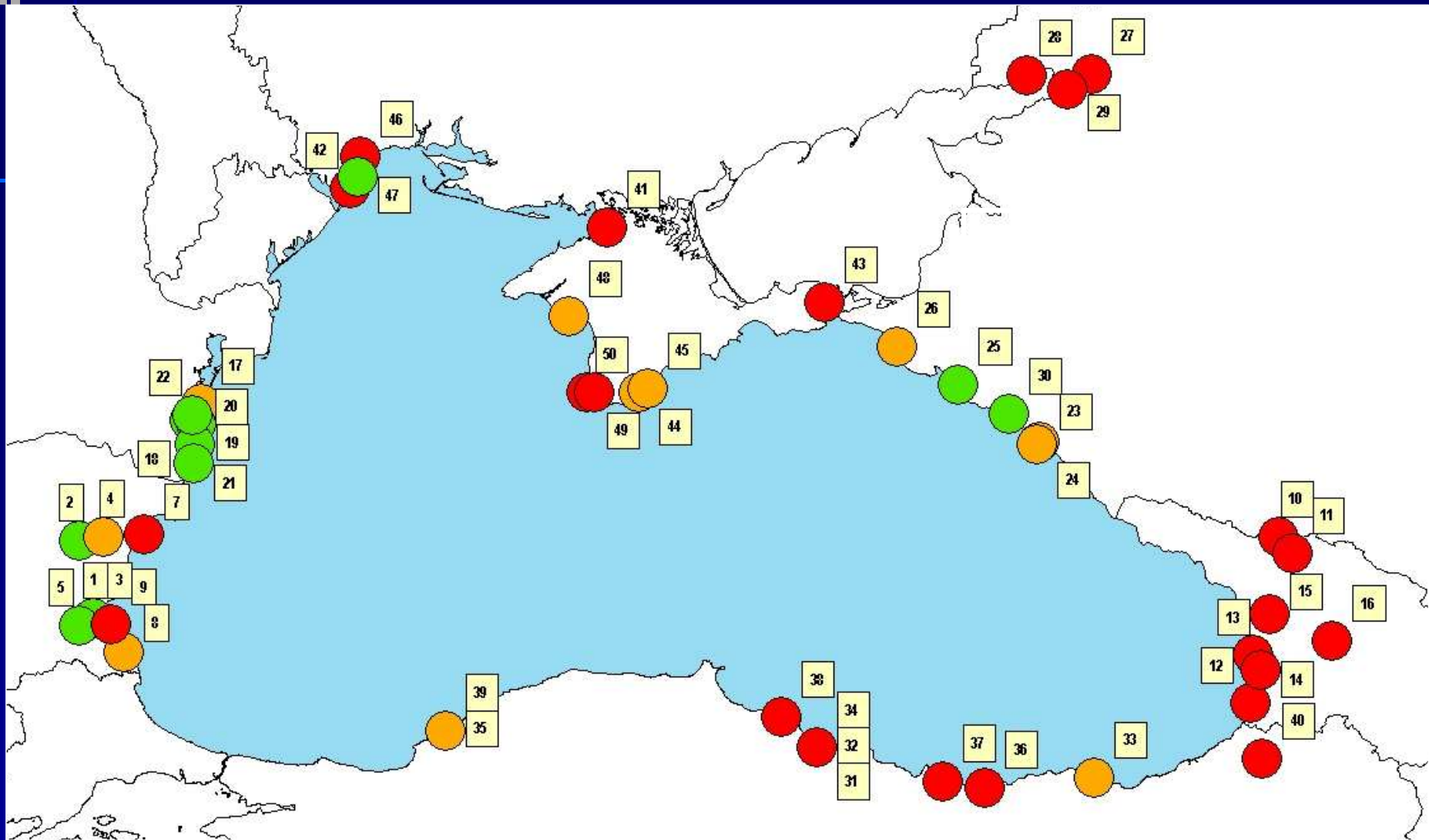


# Nutrient Inputs

Nutrient source (tonnes)	DIN (tonne)	%DIN	PO <sub>4</sub> -P (tonne)	%PO <sub>4</sub> -P
Direct discharges from large UWWTPs	6,120	1	2,150	8
Direct discharges from large industrial sources	1,180	0	250	1
River loads	497,590	52-68	20,043	70
Bosphorus Strait	29,000	3-4	6,000	21
Kerch Strait	?	?	?	?
Atmospheric deposition	203,040– 431,460	28-45	0	0
Total	736,930- 965,350	100	28,443	100



# Capital Investments – Black Sea



- 14 Capital investments made (or no longer required due to a change in use)
- 10 Some progress in implementing capital investments
- 26 Further work required

\$143M spent by end 2005; \$340M more by end 2015



# Capital Investments – Danube Basin

Timeframe	No. of Projects	Total Investment \$M	Nutrient Removal (t/yr)	
			N	P
Completed by Dec 2003	56	803	5,300	1,000
Completed in 2004 and 2005	35	475	4,500	800
Completed after 2005 (fully financed)	50	1,365	>10,000	>2,000
GEF/ World Bank Nutrient Reduction Investment Fund (2001-2008)	10	330	15,500	5050
<b>TOTAL</b>	<b>149</b>	<b>2,973</b>	<b>&gt;35,300</b>	<b>&gt;8,850</b>

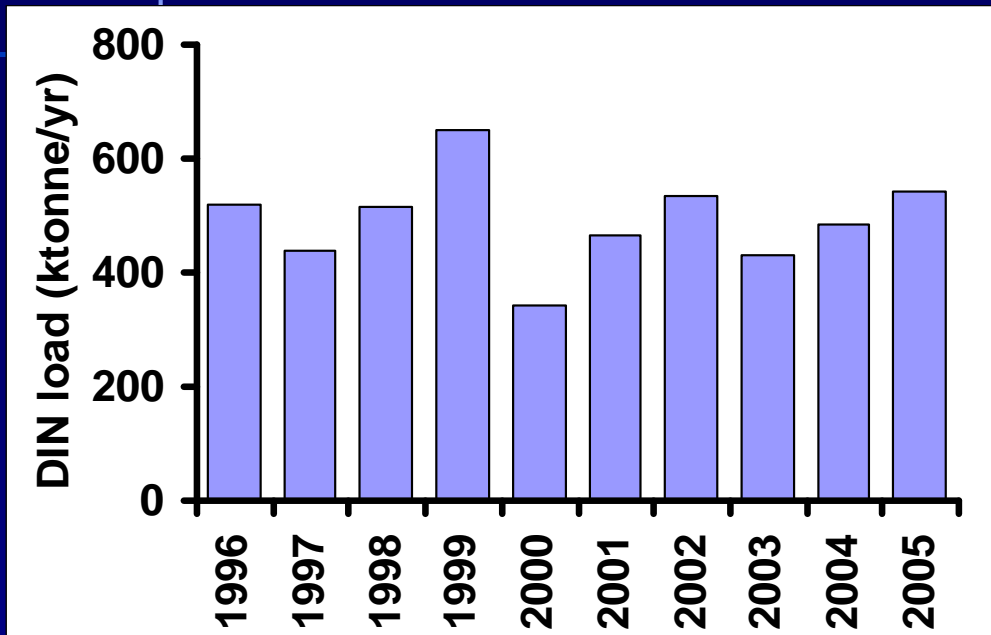


## ***Cross-sector Nutrient Reduction Projects in the GEF/WB Danube/Black Sea Basin Investment Fund***

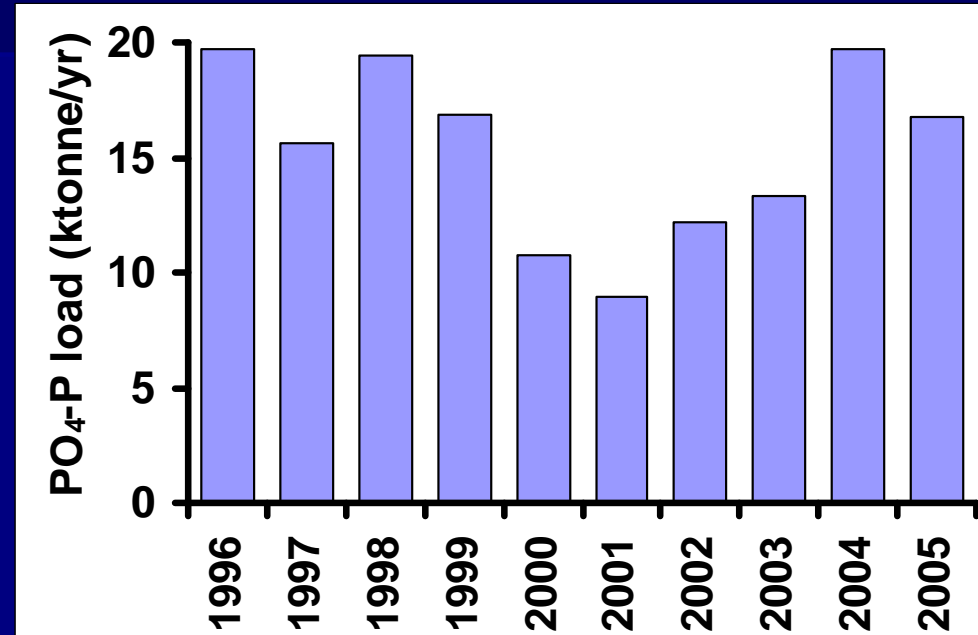
Tranche	Project title	Status	GEF \$
1	Romania: Agricultural Pollution Control	Approved	5.15
1	Bulgaria : Wetland Restoration and Pollution Reduction	Approved	7.50
1	Moldova: Agricultural Pollution Control	Approved	4.95
1/2	Turkey: Anatolia Watershed Rehabilitation	Approved	7.00
2	Serbia and Montenegro: Reduction of Enterprise Nutrient Discharges	Approved	9.02
2/3	Bosnia-Herzegovina : Water Quality Protection	Approved	4.25
3	Hungary: Reduction of Nutrient Discharges	Approved	12.50
3	Moldova: Wastewater, Environmental Infrastructure	Approved	4.56
3	Romania: Integrated Agriculture Nutrient Pollution Control	Approved	5.00
3	Croatia: Agricultural Pollution Control	Approved	4.81
3	Ukraine: Odessa Sewage	Pending	5.00

# River Nutrient Loads

## Inorganic N

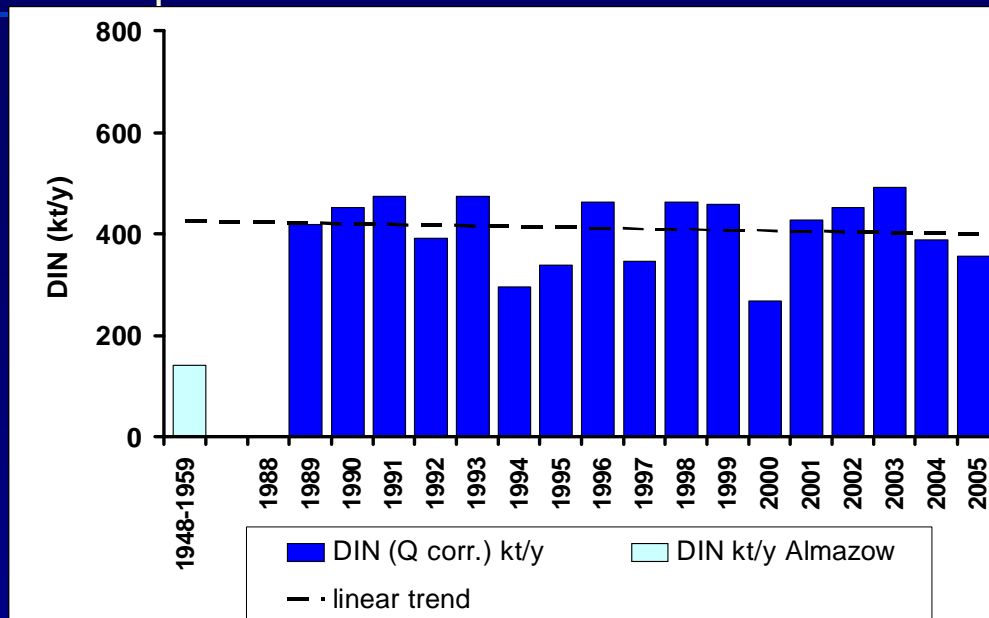


## Phosphate-P

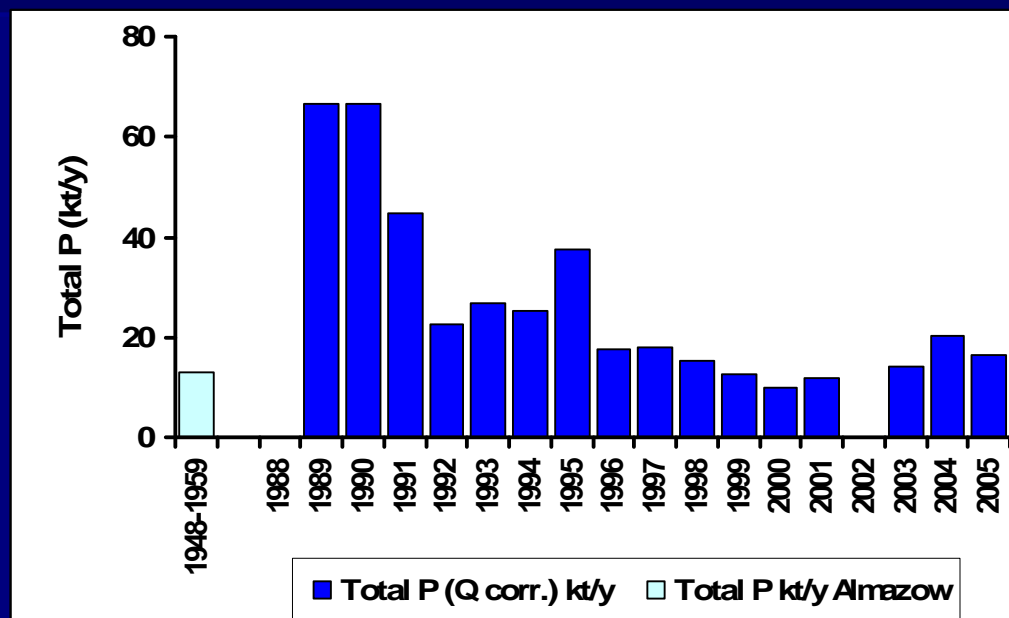


**Trends in combined river nutrient loads to the Black Sea, 1996-2005**

## Inorganic N

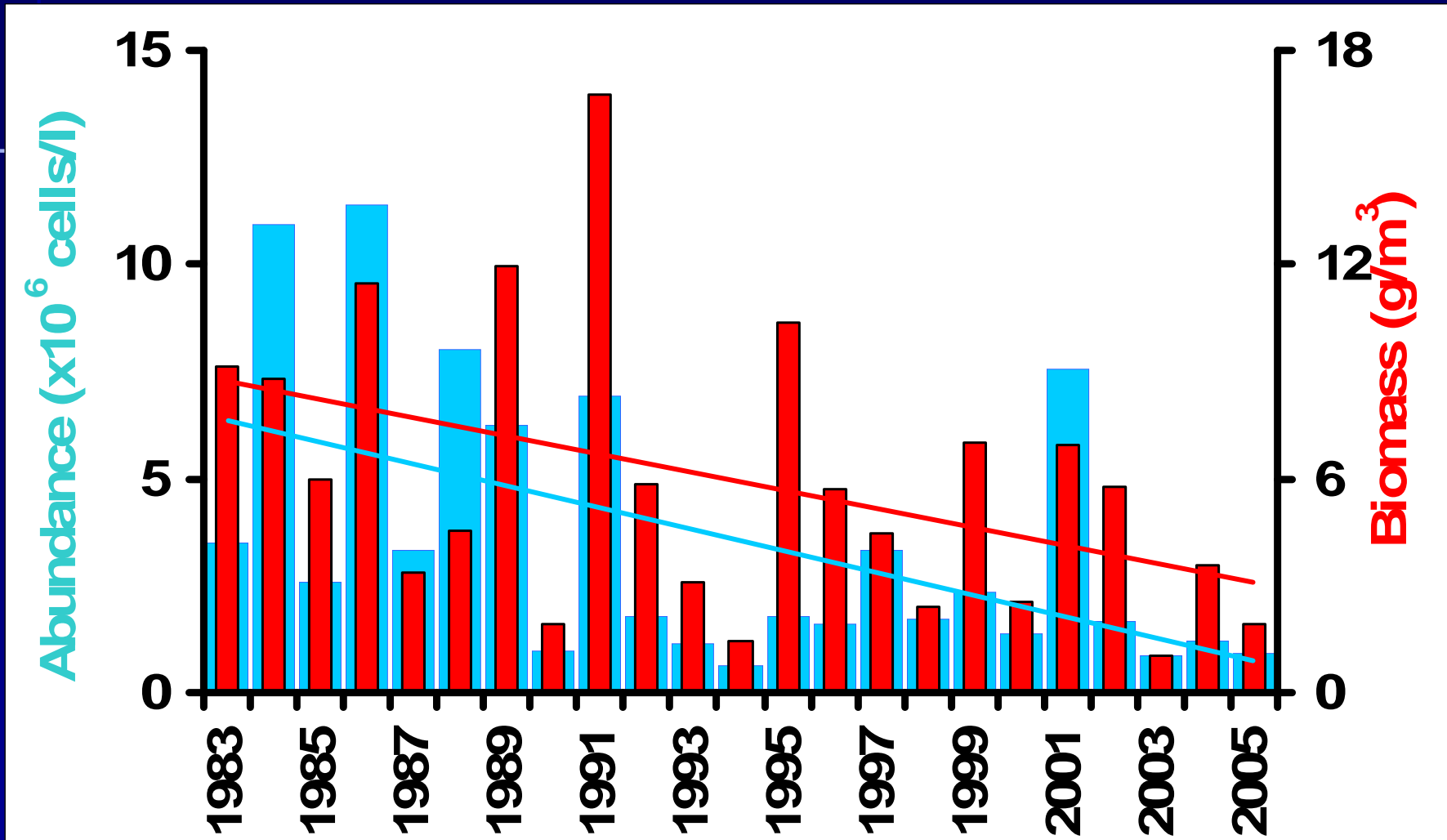


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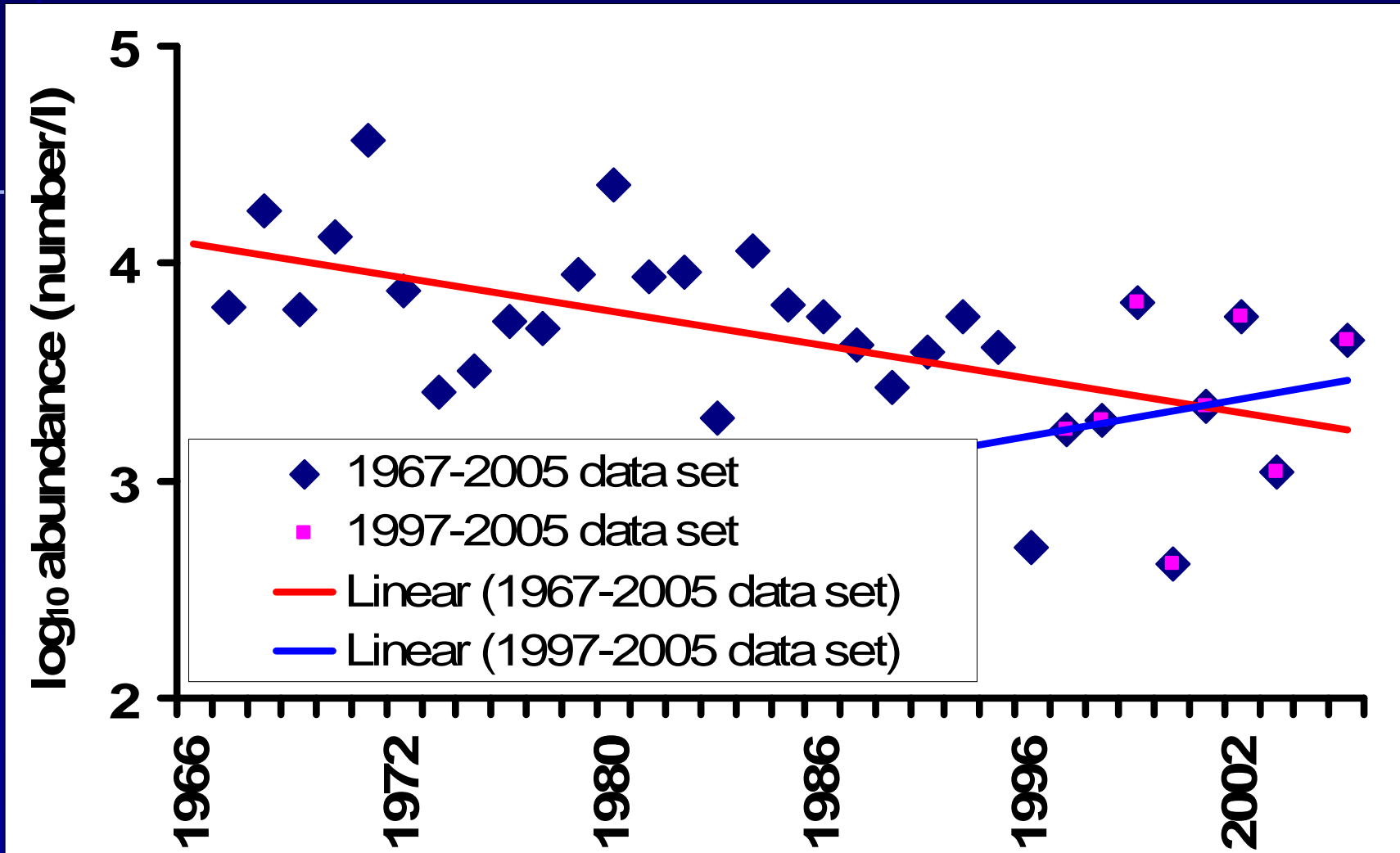
**Trends in river Danube nutrient loads to the Black Sea, 1989-2005**

# Evidence of Recovery - Phytoplankton



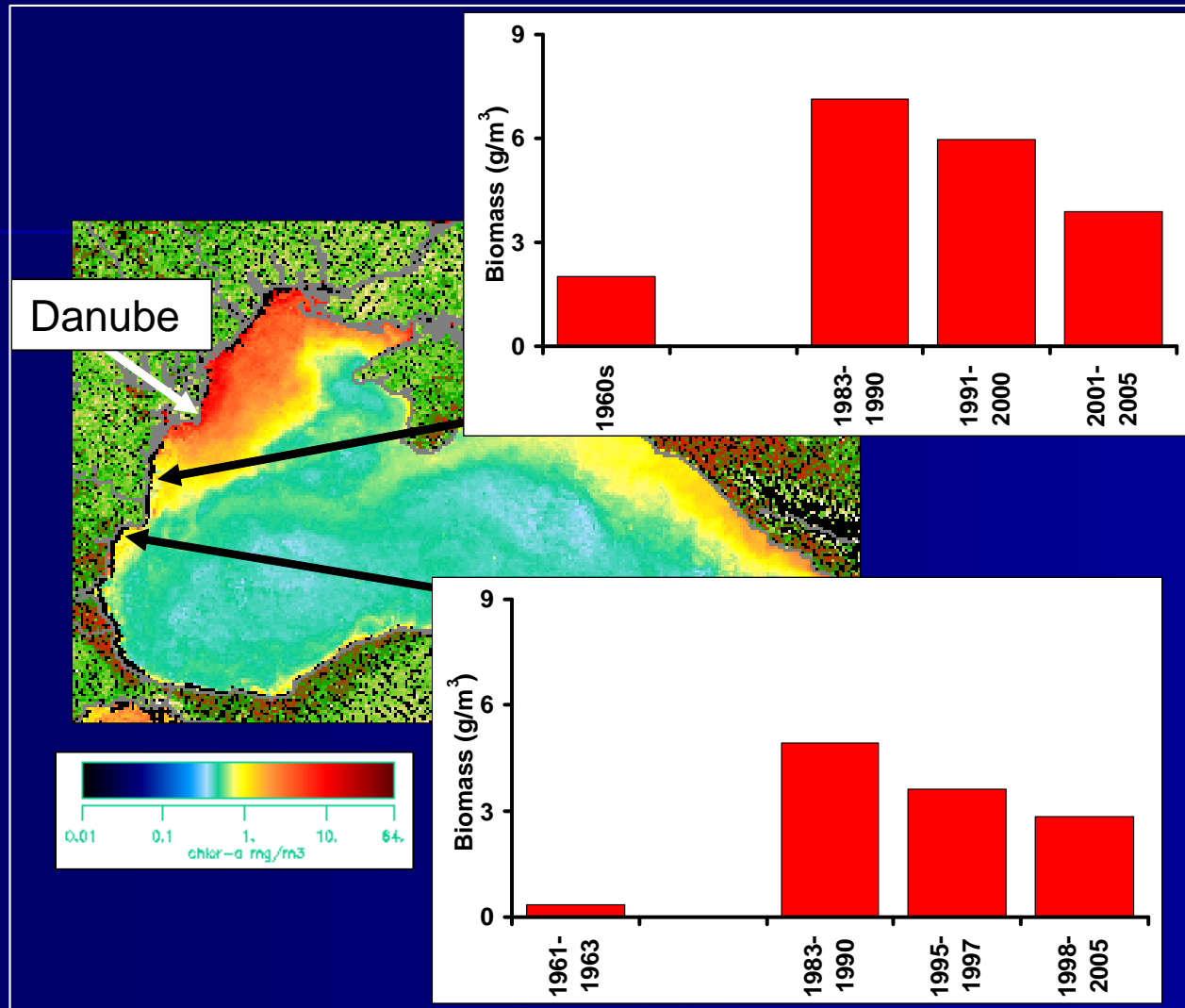
Phytoplankton cell density and biomass (average annual data) offshore of Constanta, Romania (1983-2005)

# GEF Evidence of Recovery - Zooplankton



Summer abundance of Cladocera and Copepoda three nautical miles offshore of Cape Galata, Bulgaria (1967-2005)

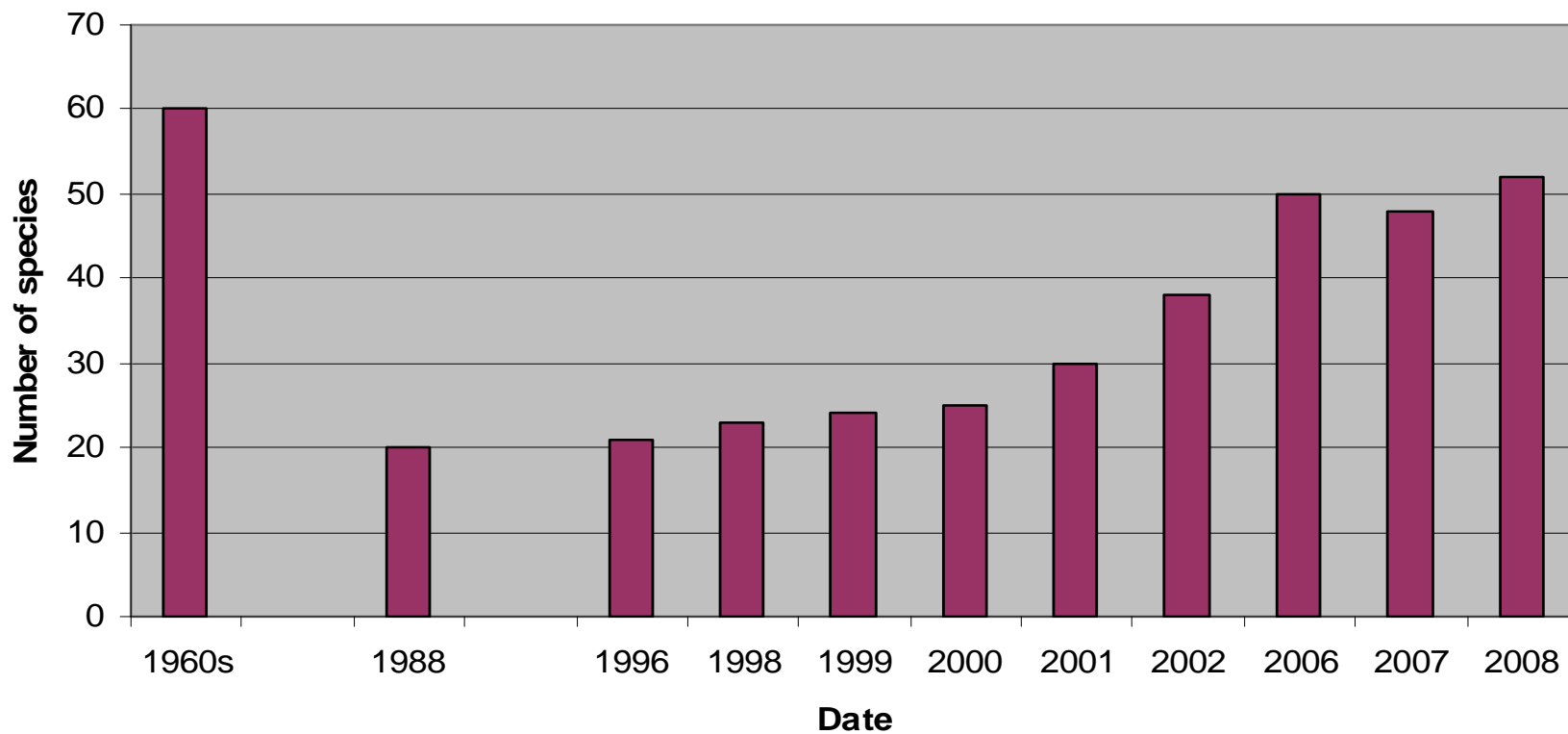
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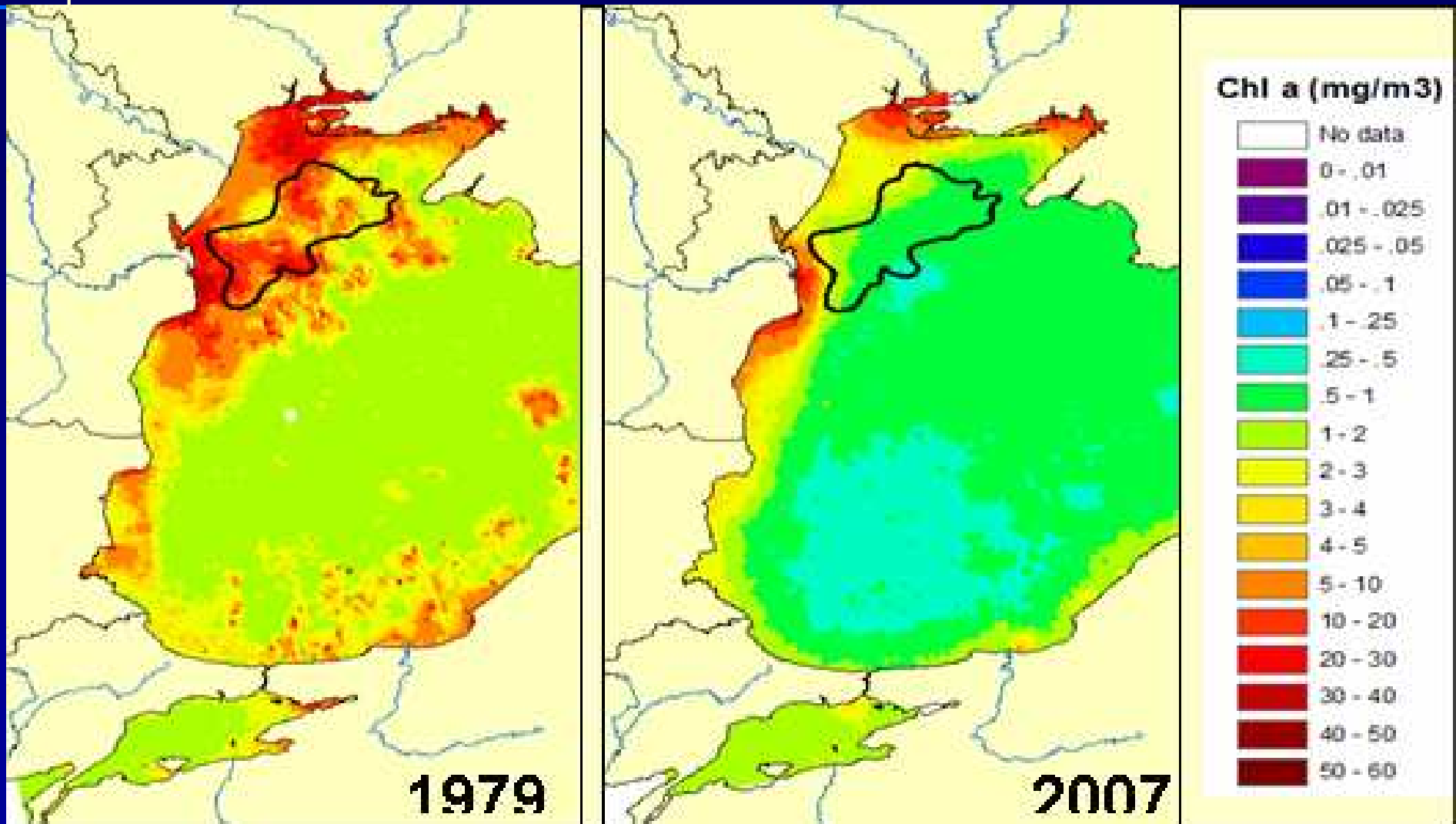
Phytoplankton biomass on the decrease, but some way to go to reach levels observed in the 1960s

# Macrozoobenthos

Zoobenthos - Constanta (RO)



# *Black Sea LME-Reduction of Nutrients: Reduction of Eutrophication & Hypoxia*





# Improved Black Sea Ecological Status

In 2007, following conditions of the Black Sea were identified:

- The “Dead Zone” in the Western Black Sea has been virtually eliminated
- Oxygen Levels are at near saturation in most areas
- Number of Benthic Species increased 1.5-2 times with respect to 1980
- Invasive alien species (Mnemiopsis) significantly curtailed
- Upper reaches of the Danube Basin no longer considered at risk