DANUBE DELTA INSTITUTE
TULCEA / ROMANIA

Universitatea Ovidius
Constanta

wetHYDRO
Center of Excellence in Wetland Hydrology

THREATS AND MANAGEMENT IN THE DANUBE DELTA, Romania

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Conference for Wetlands: Monitoring, Modelling and Management, September 23, 2005, **Wierzba, POLAND**

Content

- Danube river and basin
- Management practices / Threats
- Effects
- Conclusions

Danube River

The second longest river in Europe after Volga
2,840 km - length
817,000 sq.km catchment basin – 8% of Europe surface

The river length is the same with Danube Delta channels length

The most international river in the world:
It crosses 10 countries (Germany, Austria, Slovakia, Hungary, Croatia, Serbia and Muntenegru, Romania, Bulgaria, Republic of Moldavia, Ukraine) and 4 capitals: Vienna, Bratislava, Budapest, Belgrade.

Springs in Black Forest mountains from 3 joined springs - Breg, Brigach and Donau Quelle - and ends in Black Sea through 3 branches - Chilia, Sulina and St. Gheorghe.

Danube River and Danube Basin

817,000 sq.km catchment basin – 8% of Europe surface

1990 - The Danube Delta Biosphere Reserve

- 1990 - declared "Biosphere Reserve"by the Romanian Government
- 1990 - included in the international network of biosphere reserves
  MAB UNESCO
- 1991 - declared RAMSAR site
- 1991 - included in the list of world's natural and cultural heritage

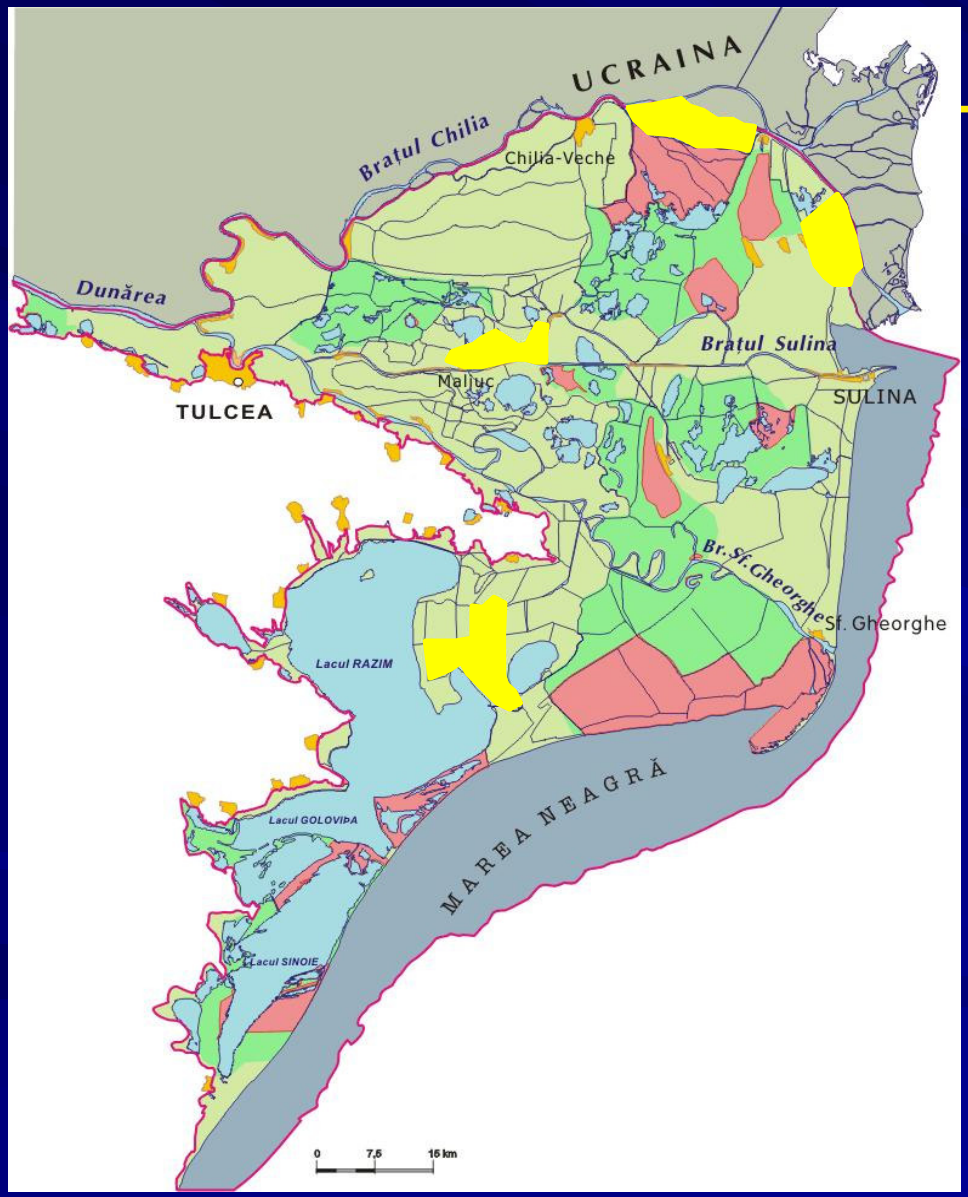
1990 - The Danube Delta Biosphere Reserve

GENERAL OBJECTIVES:

CONSERVATION AND PROTECTION
OF EXISTING NATURAL HERITAGE

SUSTAINABLE USE
OF THE NATURAL RESOURCES

1990 - The Danube Delta Biosphere Reserve



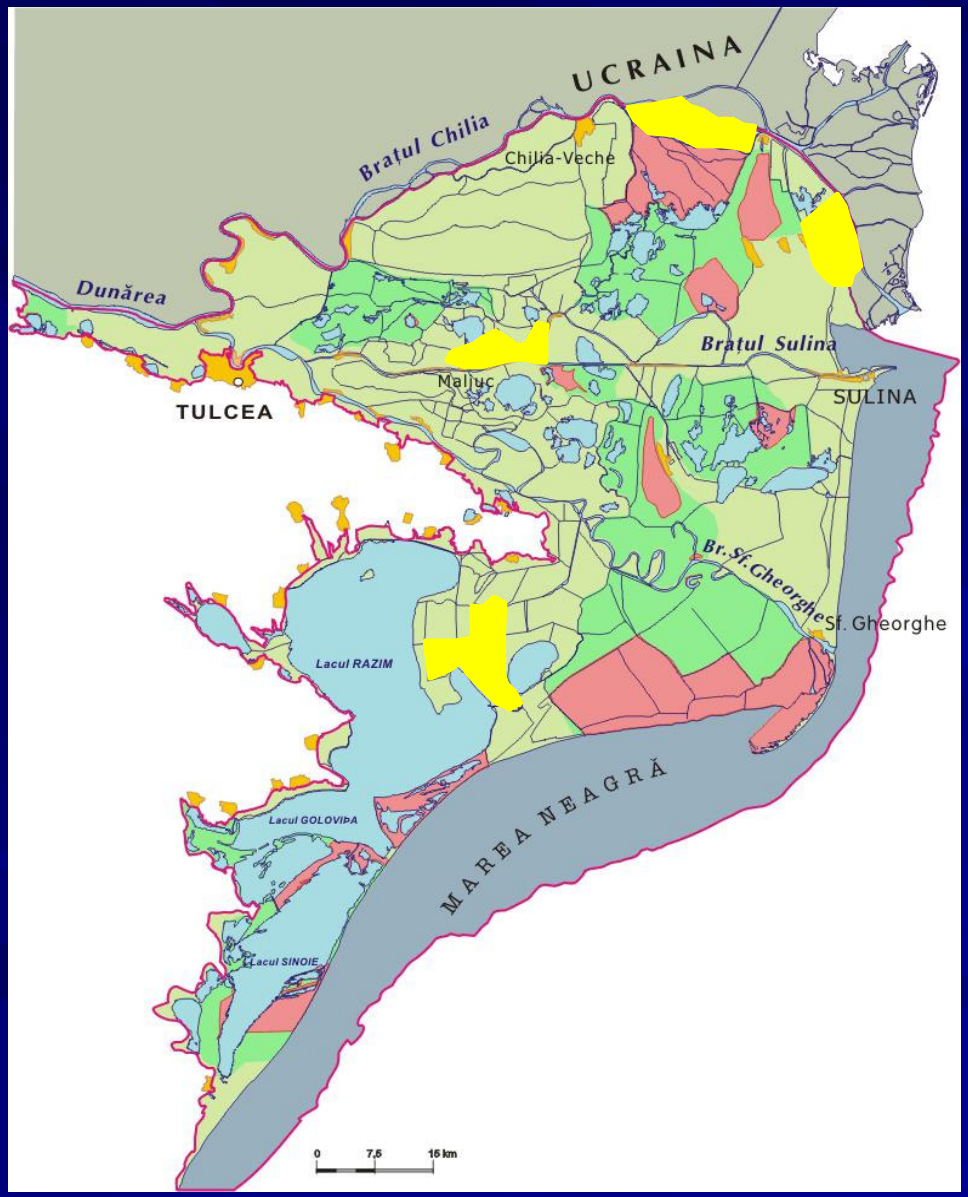
Three major functions :

conservation of natural and cultural diversity

the social and economic development

logistic support for the most diverse activities

1990 - The Danube Delta Biosphere Reserve



- core areas(18), with a total area of 50,600 ha(8,7% of the total)
- buffer areas with an area of 223,300 ha
- economic areas, with an area of 306,100 hectares(52,8%)
- including 15,025 ha for ecological restoration

Danube Delta's importance

- the youngest land in Europe
- the third largest delta in Europe
- the 22nd delta in the world(in surface)
- the third in ecological significance among the 300 reserves of the world
- a highly productive area generating a large range of biological resources
- the most compact reed area in the world(170,000 ha)
- a place with the richest ornithological fauna in the world (over 325 species)

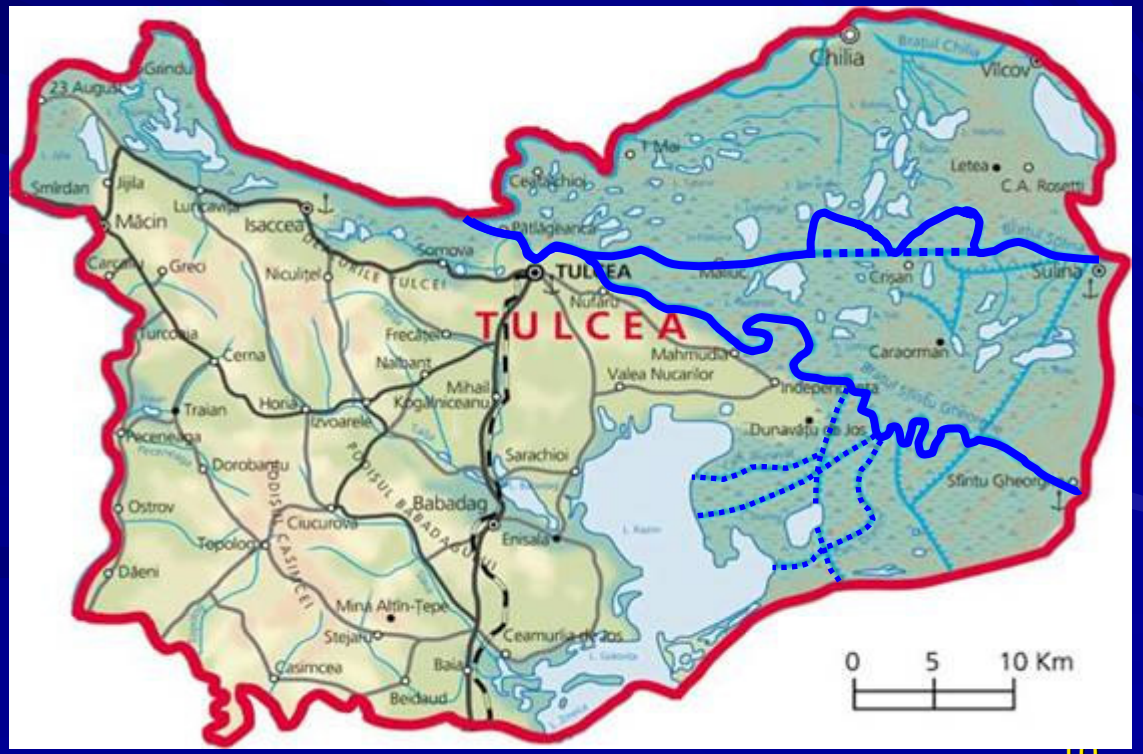
Previous management practices

- end of the 19th century :

- Sulina Channel was revamped for navigation

- beginning of the last century:

- cutting of channels



- from 1950 to 1970 :
  - "reed period"

- from 1970 to 1980 :
  - "fish culture period"

- from 1980 to 1989 :
  - "agriculture period"

{ dams were built
new channels were cut out
pumping stations were built

97,408 ha

* great polders Sireasa and Pardina were dammed up and drained
* other piscicultural and forest polders required the building of new dams

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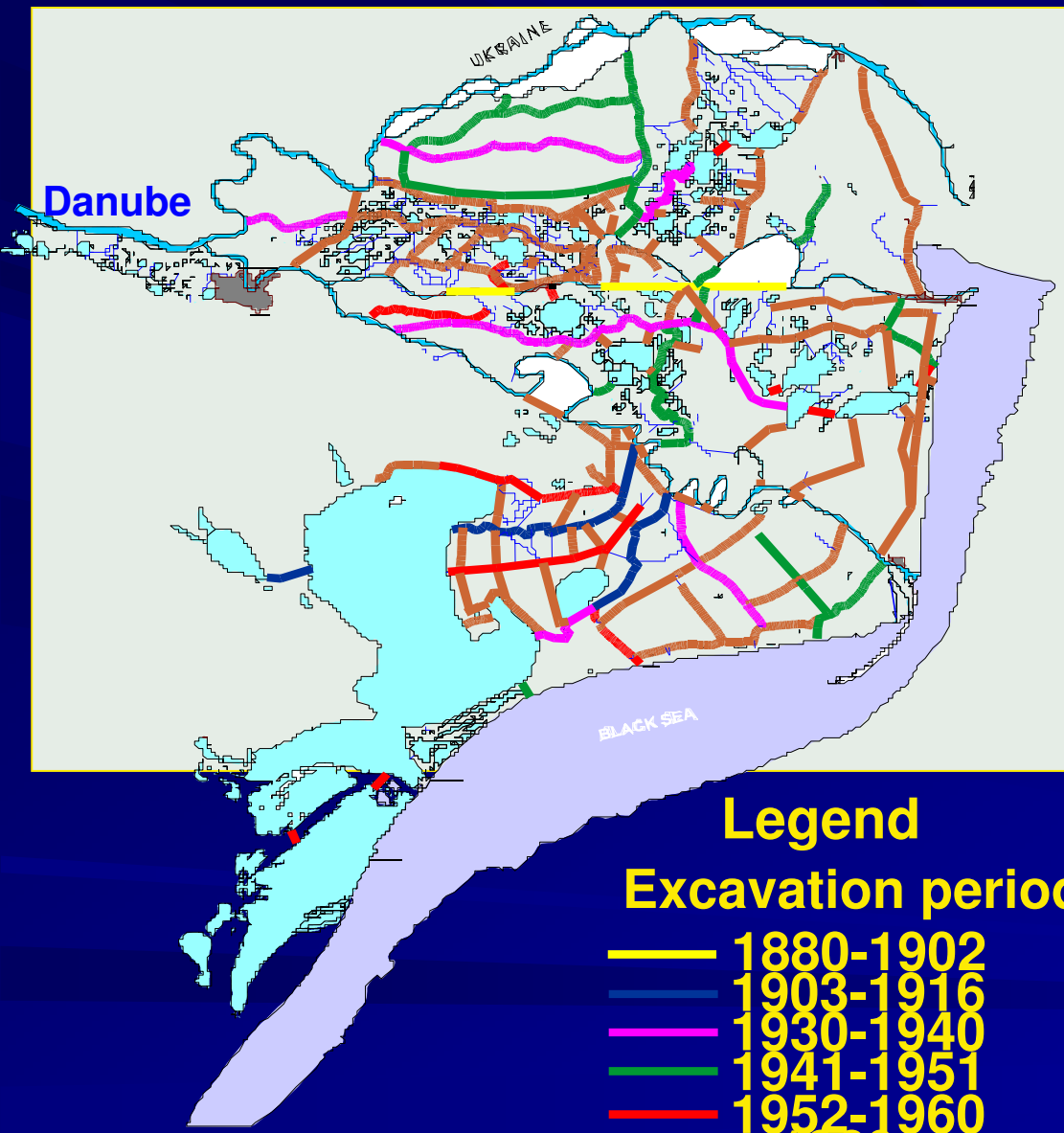
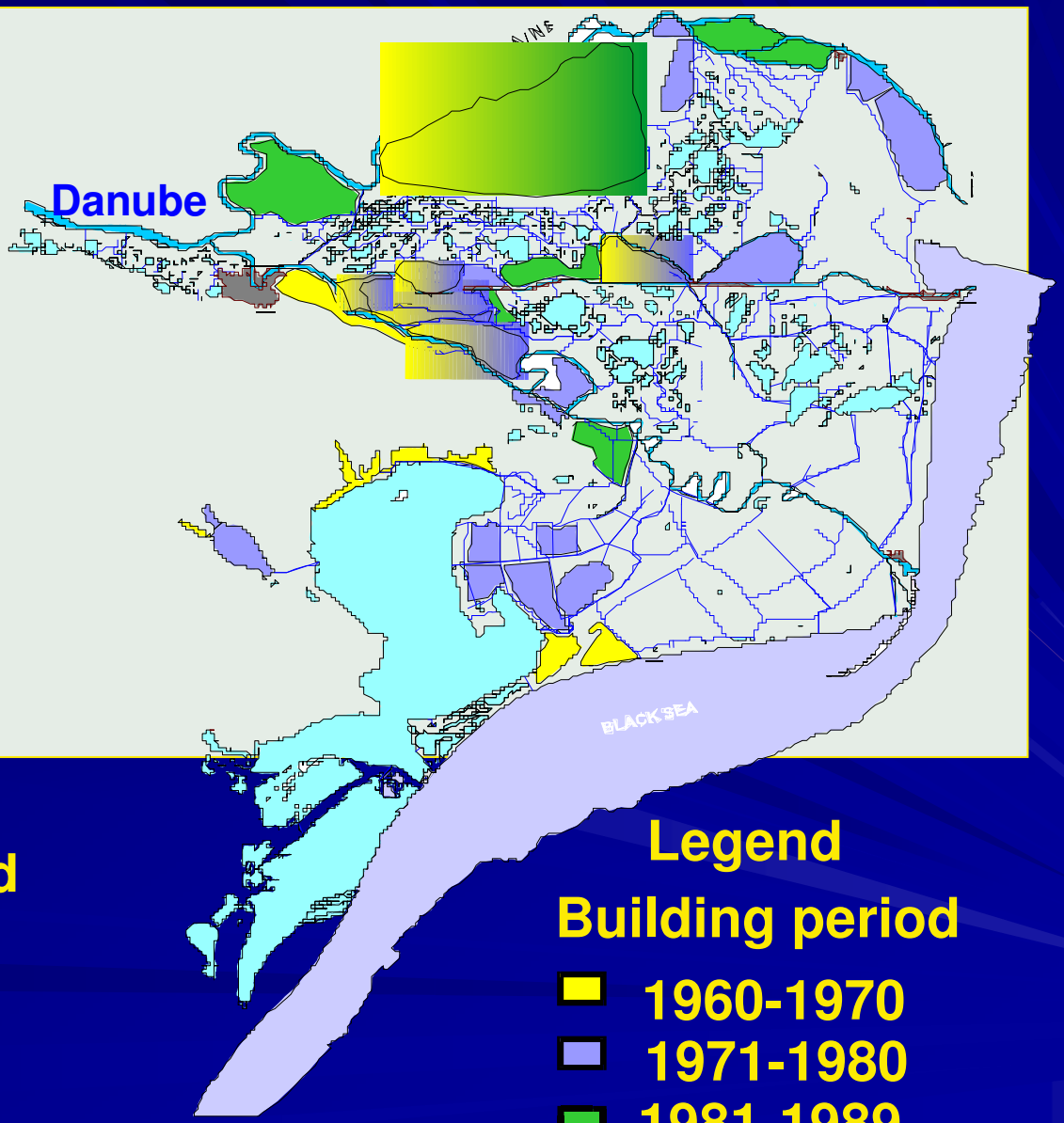
DAMMING AND CHANNEL EXCAVATIONS



Legend

Excavation period

- 1880-1902
- 1903-1916
- 1930-1940
- 1941-1951
- 1952-1960
- > 1960

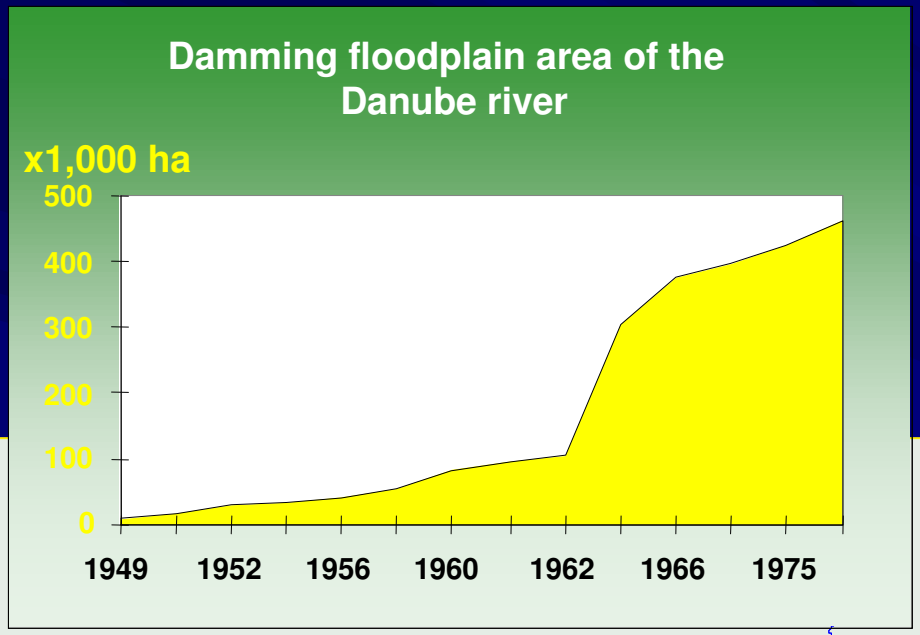


Legend

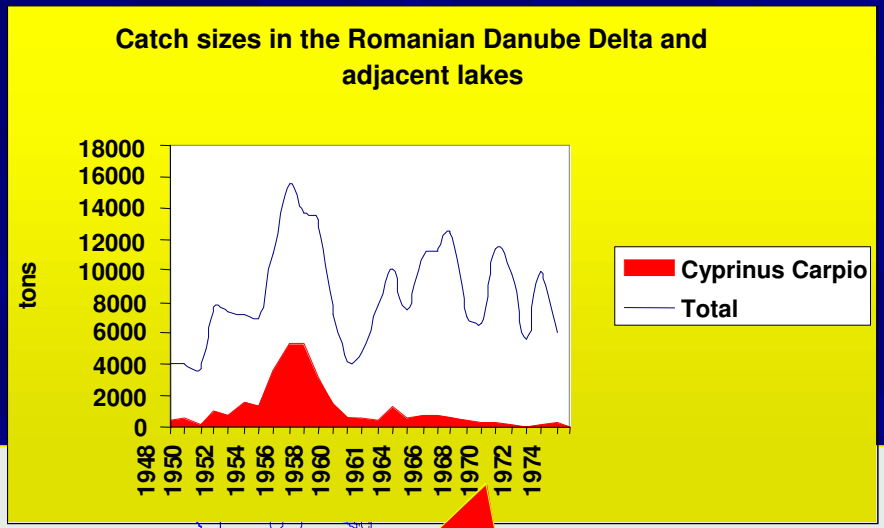
Building period

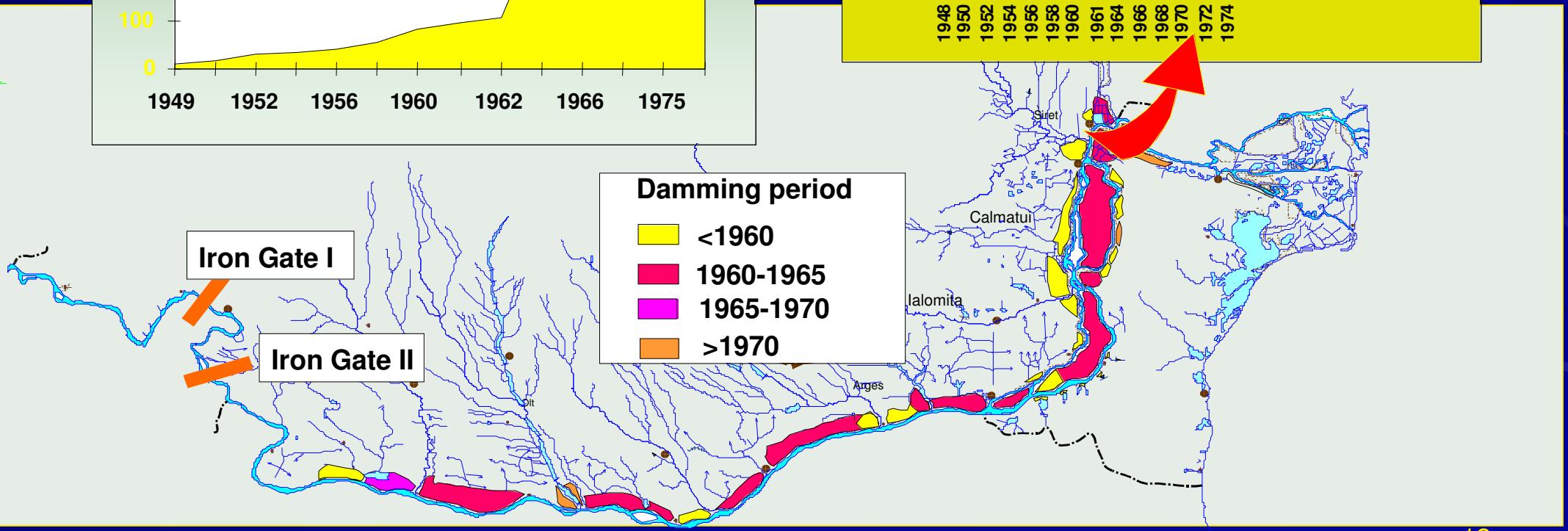
- 1960-1970
- 1971-1980
- 1981-1989

DAMMING OF DANUBE RIVER FLOODPLAIN



IMPACT ON DANUBE DELTA's FISHERY





CHANGES OF HYDROLOGY AND WATER CHEMISTRY

DANUBE RIVER

Water inflow (cm/s)

P(PO4) (mg/l)

N(NO3) (mg/l)

P(PO4) inflow
tons/year

N(NO3) inflow
tons/year

DELTA ECOSYSTEMS

Before 1960	1971-1980	1980-1989	2003-2004
309	359	620	700
<0,01	0,06	0,07	0,05
0,4	1,5	1,5	0,6
100	700	1400	1100
4000	17000	29300	13500

HUMAN INDUCED CHANGES IN THE DANUBE DELTA

Nitrogen: 300.000-400.000 t/year
Phosphorous: 45.000-60.000 t/year
Oil: 45.000-50.000 t/year

DANUBE

HUMAN INDUCED CHANGES IN THE LOWER DANUBE RIVER BY

HABITAT REDUCTIONS

BY

DAMMING UPSTREAM FLOODPLAIN AND 22% OF THE DELTA

AND

BUILDING BARRAGES AT KM 942 AND KM 863 FROM RIVER MOUTHS

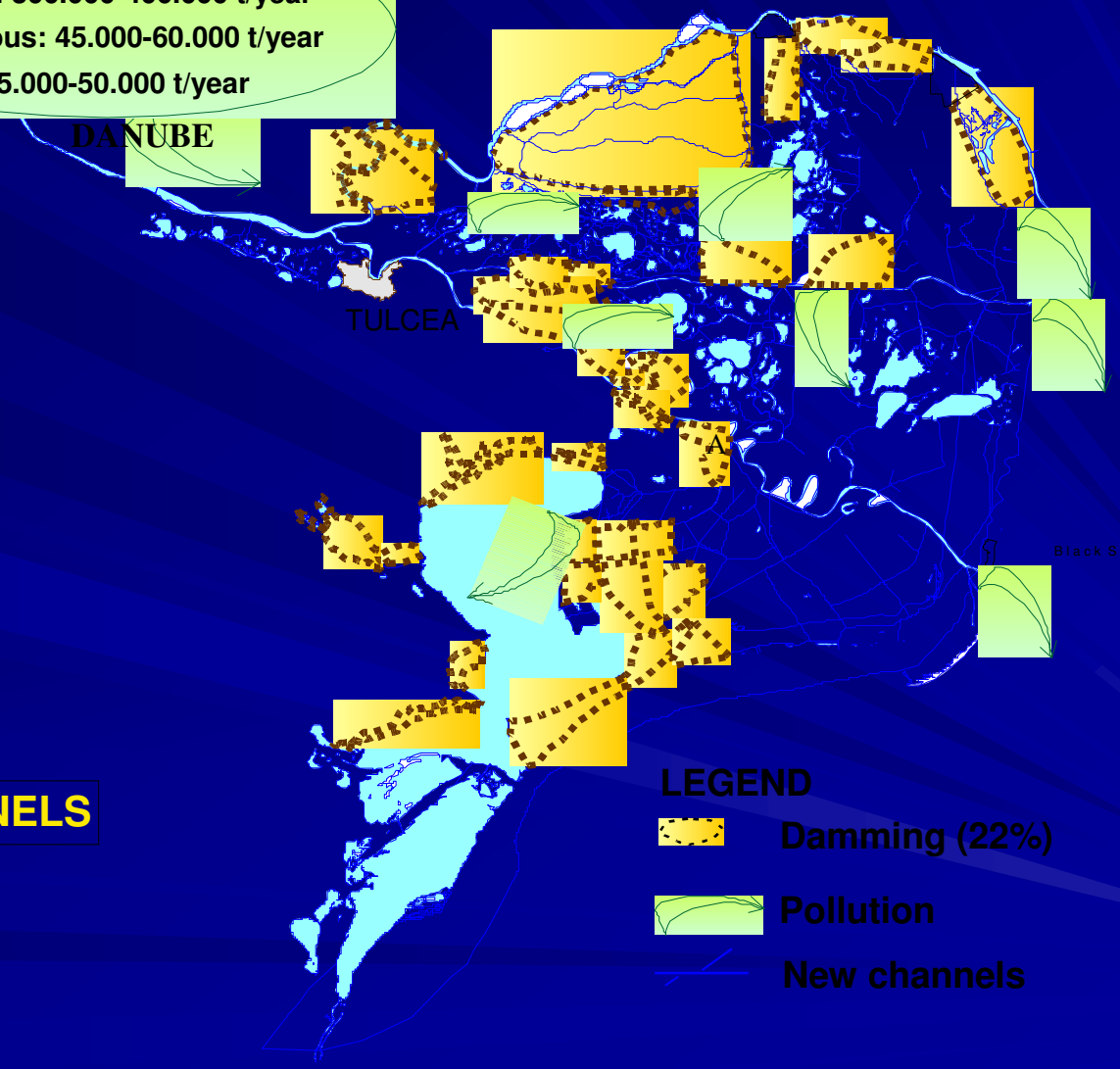
HABITAT ALTERATIONS

BY

POLLUTION

AND

DRADGING CHANNELS



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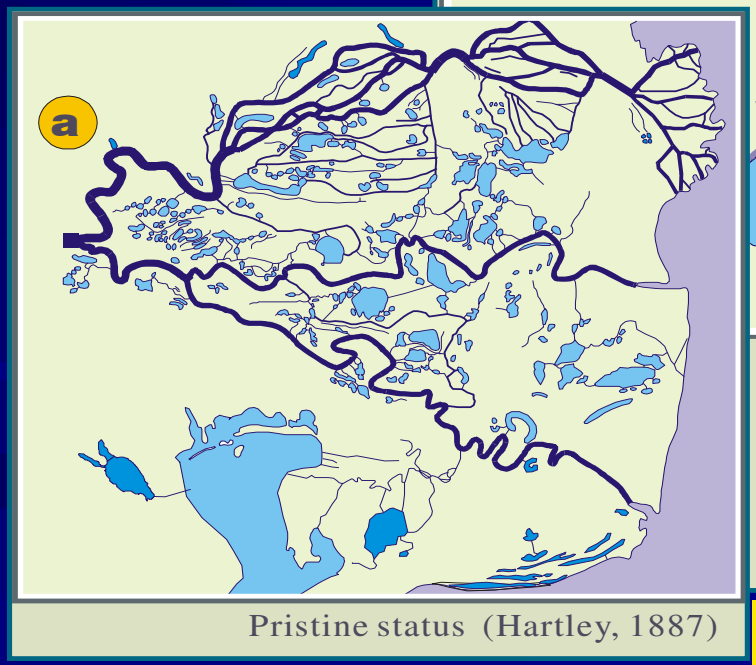
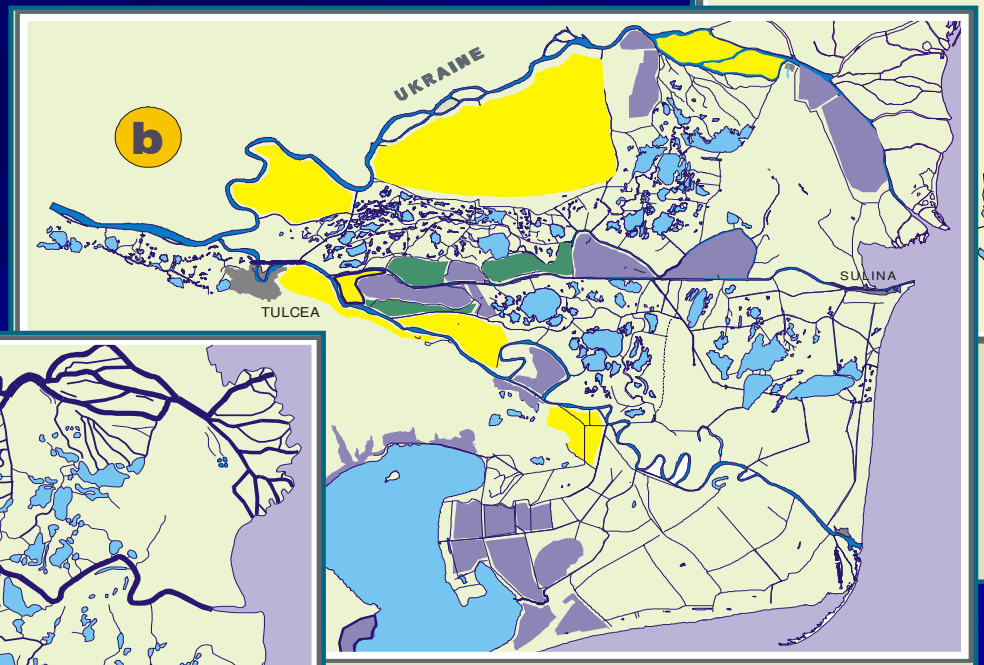
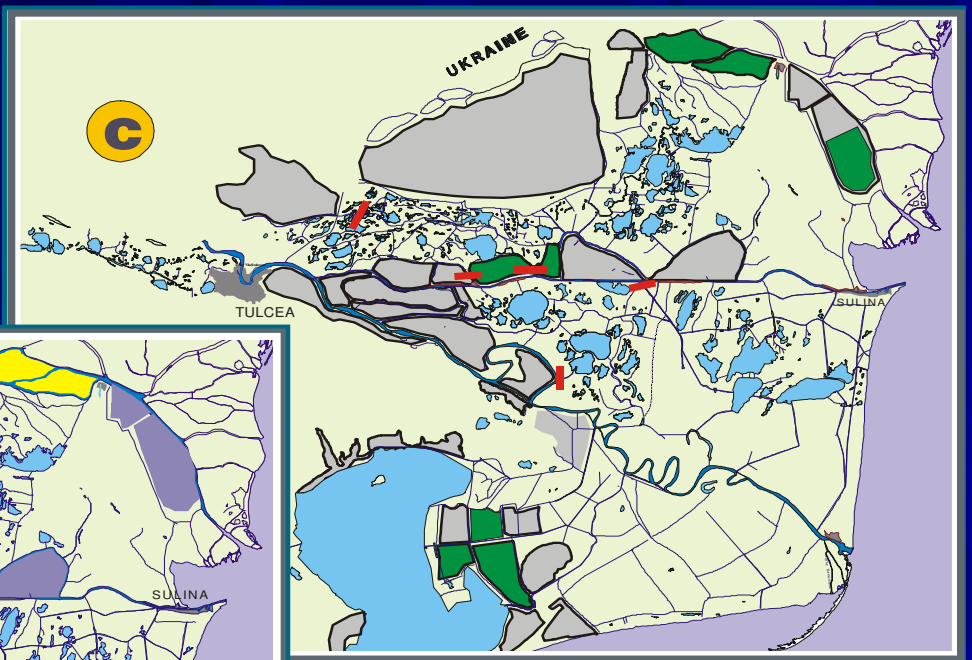


Pristine status (Hartley, 1887)



Building polders and channels
(1880-1989)

LEGEND
Agriculture
Fishculture
Forestry



Restoration works (1994 -2000)

LEGEND
Polder restoration
Blocking channels

Phases in the Danube Delta's recent history(after M. Staras, 2001)

Objectives vs. results: navigation

1868 - 1902 : first works to improve conditions for navigations started
- 9 bend were rectified
- 167 groynes were built

1923 : works for prolongation of Sulina channel into the Black sea
- the length of the prolongation is now 7,5 km

Effects:

- the length of Sulina channel decreased with 21 km
- the discharge from Sulina Channel increased from 7 to 18% of Danube volume
- deepening of the channel from 5 up to 11 meters
- influences on the shore streams

Objectives vs. results : reed exploitation

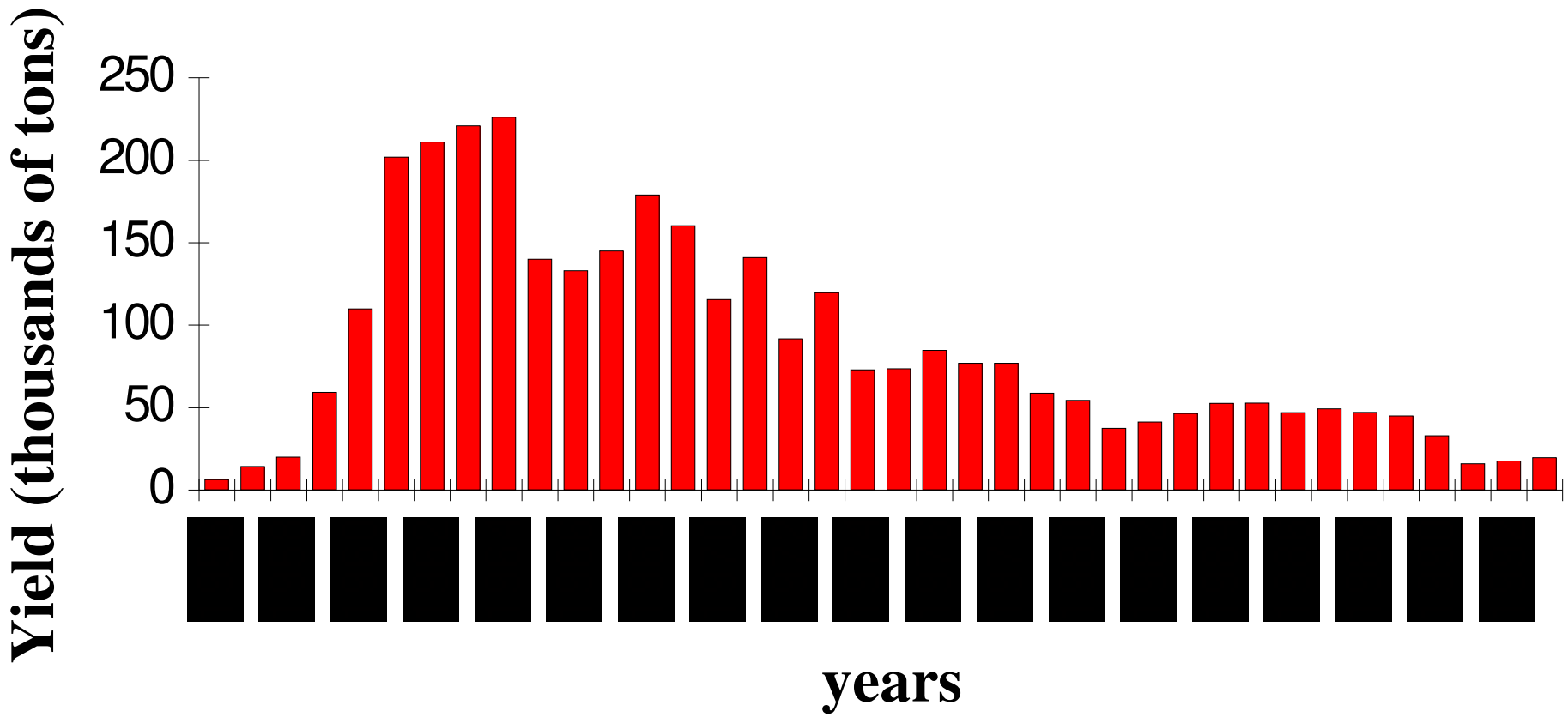
Conference in Maliuc, 29.05 - 1.06.1956
organized by Romanian Academy, Committee of Hydrology, in order to support the transformation of the Danube Delta by the end of 1956, as stipulated in HCM 2768/31.XII. 1954

Danube Delta = 434,000 ha, out of which 284,000 ha are reedbeds (270,000 ha compact)

Objectives:
1962 - 1963 : 27,669 ha, providing 403,000 to/year
1963 - 1970 : 48,500 ha
1970 - 1980 : 240,000 ha in polders(180,000 ha compact reedbeds), providing 1,600,000 to/year

(Rudescu&Niculescu, 1957)

Dinamics of reed harvesting in the Danube Delta



after Hanganu, 1994

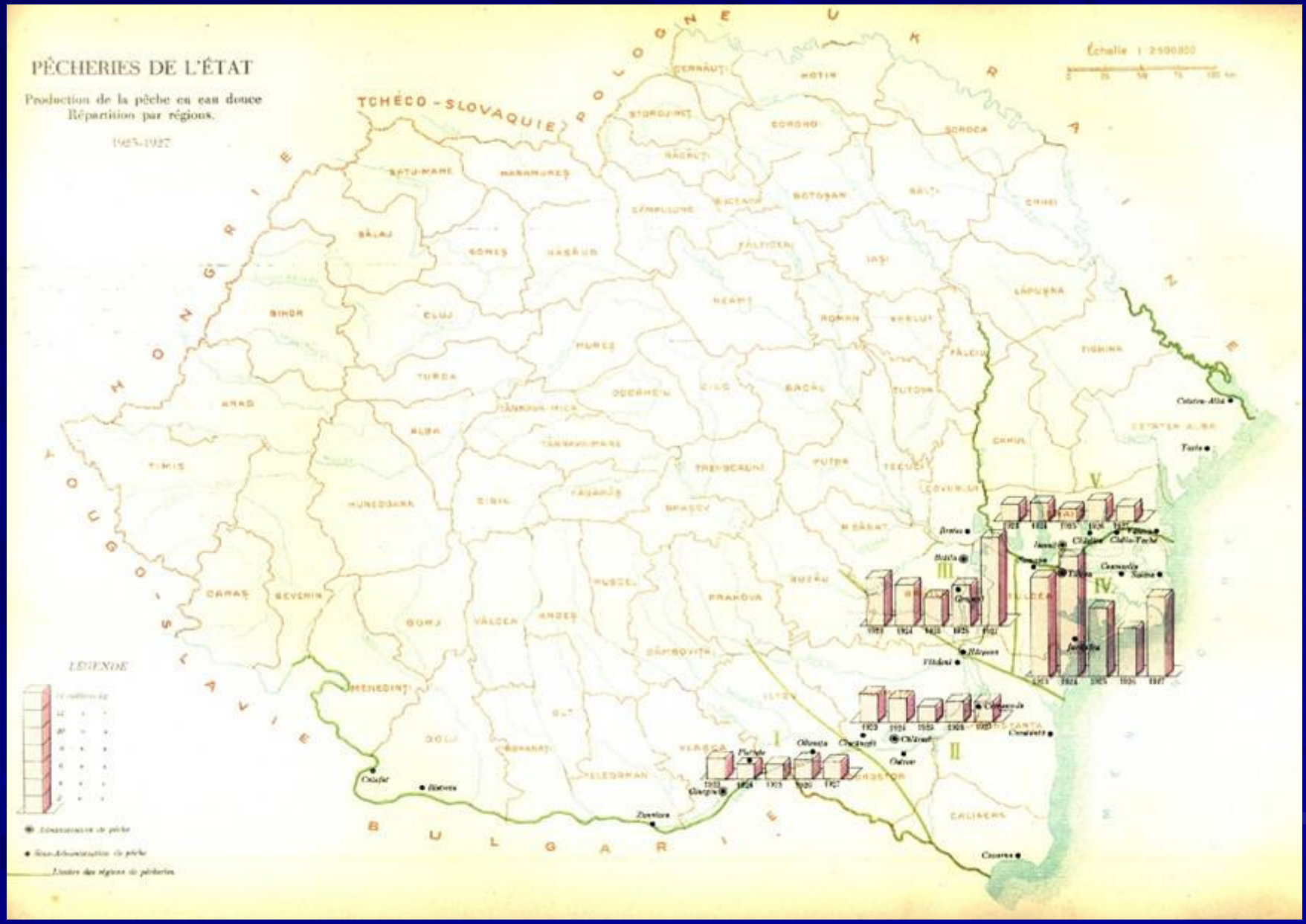
Objectives vs. results: fishery - intensive exploitation

Conference in Maliuc, 29.05 - 1.06.1956

organized by Romanian Academy, Committee of Hydrology, in order to support the tranformation of the Danube Delta by the end of 1956, as stipulated in HCM 2768/31.XII. 1954

1955 : 11,000 to/year
1956 - 1965 : 16,500 to/year
1966 - 1980 : 20,000 to/year
1983 - 1990 : 104,962 to/year

(Mirica, 1957)



L'agriculture en Roumanie, Ministere de l'agriculture et des domaines, Bucharest, 1929

PÊCHERIES DE L'ÉTAT

PRODUCTION DE LA PÊCHE EN EAU DOUCE

	ESPÈCES	1923	1924	1925	1926	1927
		quintaux	quintaux	quintaux	quintaux	quintaux
1	Morue	700	2.850	2.390	2.320	3.840
2	Esturgeon	1.290	1.490	1.160	1.250	2.460
3	Sterlet	320	490	230	270	740
4	Pastrouga (Variété d'esturgeon)	530	330	320	330	620
5	Silure	11.160	14.920	10.680	6.470	11.420
6	Carpe	49.890	60.190	19.240	33.010	55.820
7	Sandre	11.710	12.770	9.470	8.250	13.220
8	Brème	6.440	6.450	11.930	8.390	10.870
9	Brochet	31.750	30.670	23.430	15.890	36.070
10	Tanche	3.470	6.150	2.600	5.390	11.760
11	Maquereaux	1.190	470	2.710	670	3.840
12	Carassin	8.810	15.260	5.280	—	—
13	Trigle	720	590	300	180	130
14	Perche	5.470	6.270	4.040	2.630	6.370
15	Rouget	610	570	280	520	910
16	Muge	8.900	4.950	2.040	1.590	3.220
17	Raie	5.150	3.920	1.730	830	620
18	Autres espèces	105.020	87.690	67.150	87.420	98.630
19	(Caviar)	270	280	500	350	200
	Total	25,340to	25,631to	16,548to	17,576to	26,000to

L'agriculture en Roumanie, Ministere de l'agriculture et des domaines, Bucharest, 1929

Evolution of ichtyofauna within the Danube Delta 1963 - 2004

- before 1963: optimal conditions for fish species

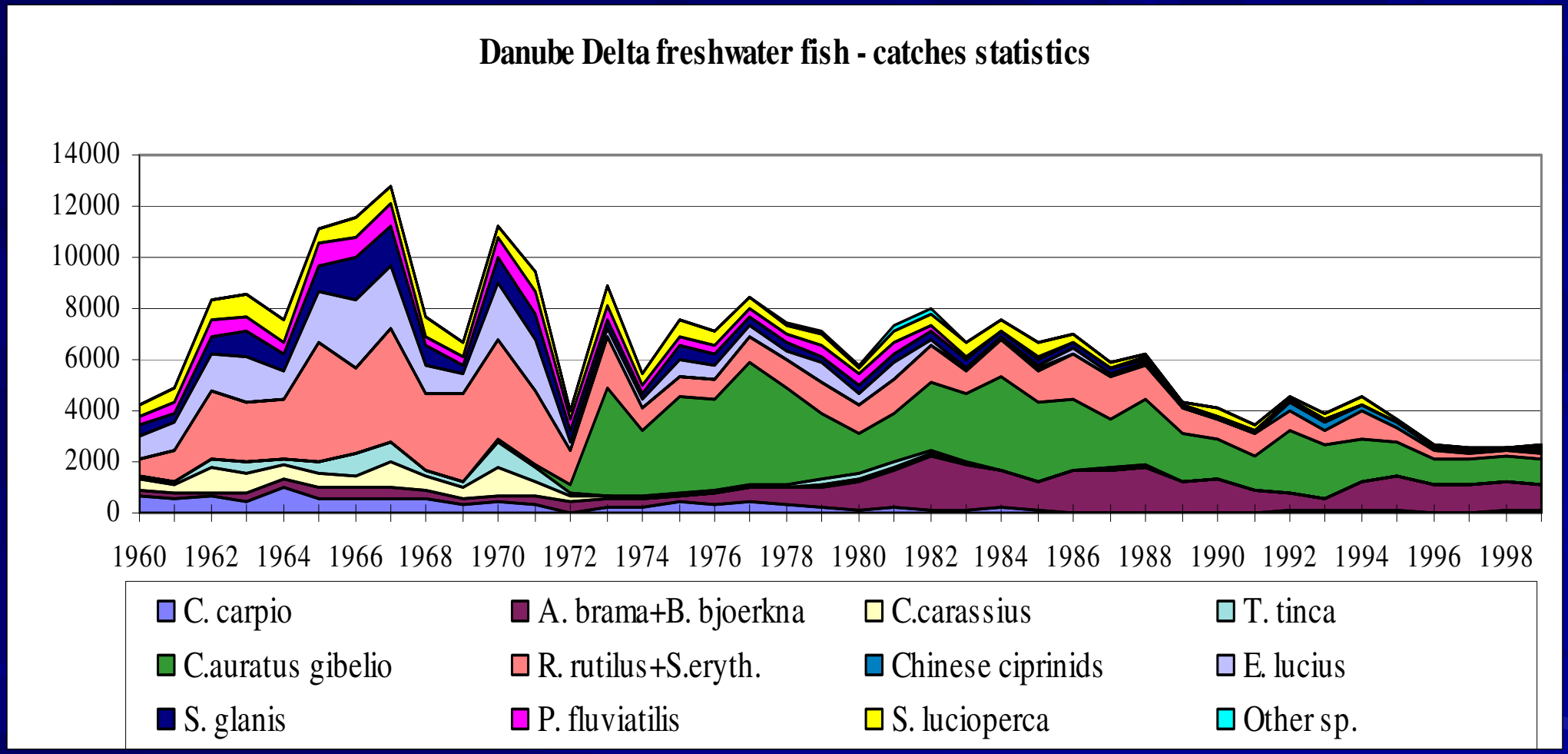
- 1964 - 1974: decline in the valuable species % from 70(1964) to 35(1973)
  - in the same time the Danube floodplain upstream the delta decrease
  - the fishponds reach the size of 26,000 ha
  - the capture is still high(9100 to/yr)
  - the most affected by the changes was carp population

- 1975 - 1982: fishponds area increased up to 61,000 ha
  - the capture is about 8,000 - 10,000 to/yr

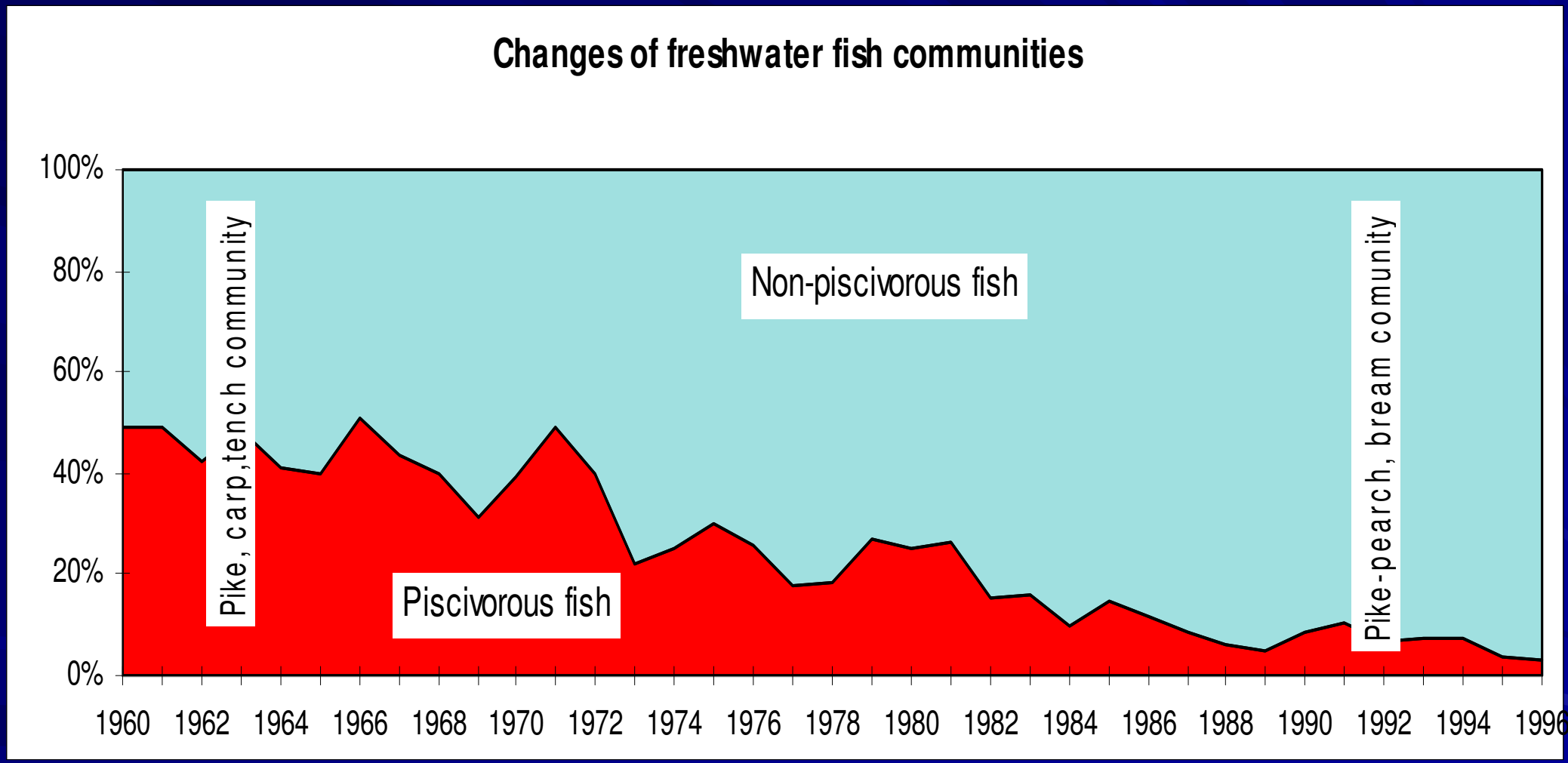
1983 - 1989 : the capture declined (4,600 to in 1989)
- the economic important species declined to 10,7-30,2 %

1990 - 2004: the capture declined dramatically (3,000 to in 2004)
- fisheries policy subject to multiple changes

after Munteanu et al., 1990



after Staras, Navodaru & Cernisencu



after Staras, Navodaru & Cernisencu

CLIMATIC CHANGES AND THEIR IMPACT ON DANUBE DELTA

DANUBE RIVER low water level has a major impact on DANUBE DELTA

- **Water (lacustrine) surface reduction**

- **Marsh or lacustrian areas changes into partial or total drained fields**

Low water level impact on shoreline vegetation

- **Macrophytes habitat reduction**
- **Bushes and reed expansion**

DANUBE RIVER low water level has a major impact on DANUBE DELTA

- **Eutrofication**

- **Reduction of aquatic species which consist basic food resource of birds**

Migration from colonies

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DANUBE RIVER low water level has a major impact on DANUBE DELTA

Easy access of predators (golden wolf, fox, ratoon dog) and hunters to colonies due to lake dry bottom

CONCLUSION

- **1868 - 1902 : navigation oriented politics**
- **1950 - 1990 : natural resources exploitation politics**
- **1990 - present : biosphere reserve status**

but

2003 - natural resources - leased to concessionaires
- aquatic resources(fish, frogs, others)
- reed

2004 - elections - change in policy / management
- Ukrainian channel Bastroe was cut

2005 - aquatic resources became administrated by a State Agency but leasing contracts are difficult to be canceled

October 2005: Master Plan for sustainable development of the Danube Delta to be approved

Overall conclusion: inconsequence, lack of coordination (national and international) & lack of continuity

unchanged: only core areas

QUO VADIS DANUBE DELTA?

QUO VADIS DANUBE DELTA?

EXPLOITATION ?

Preservation & RESTORATION ?

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