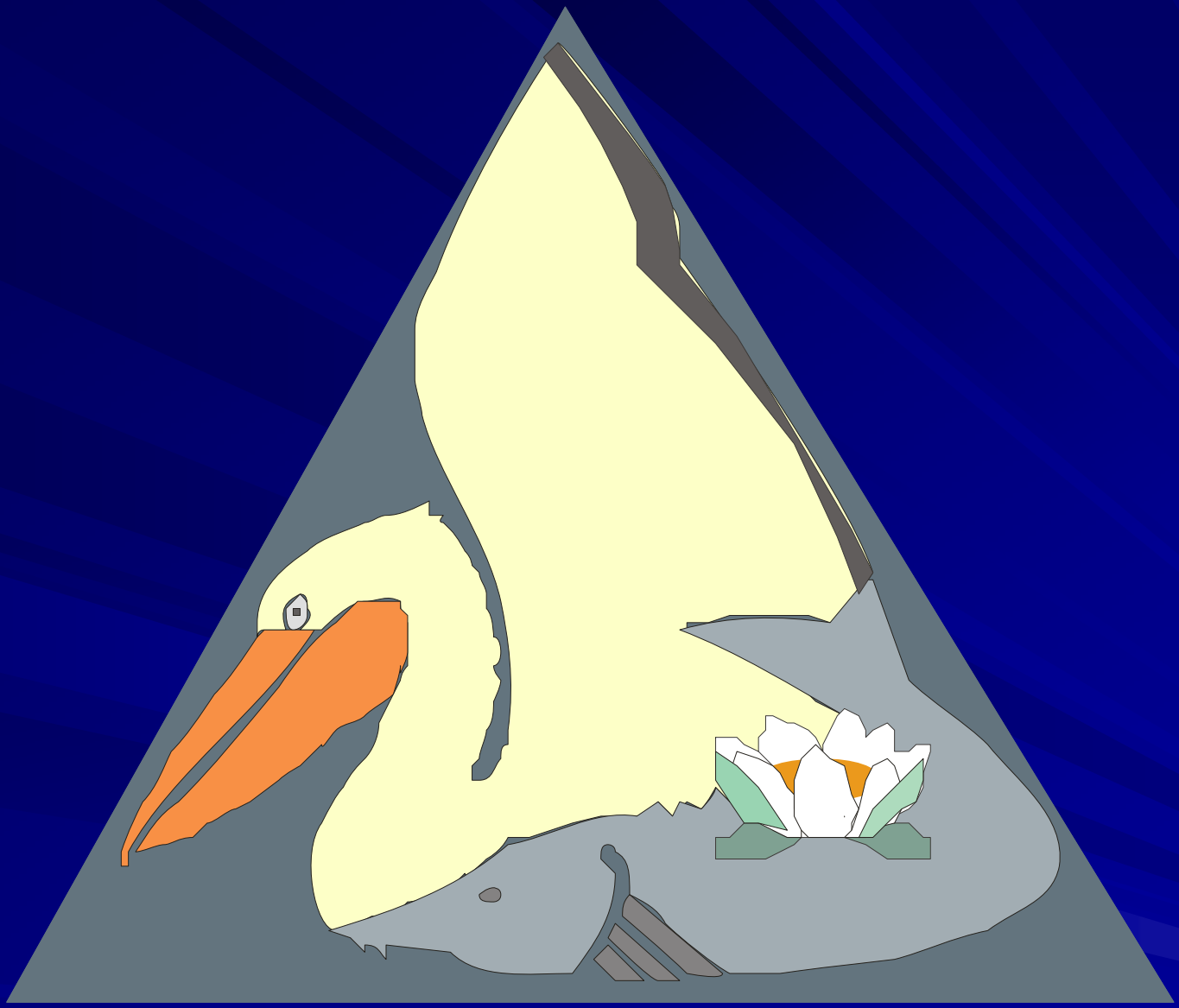


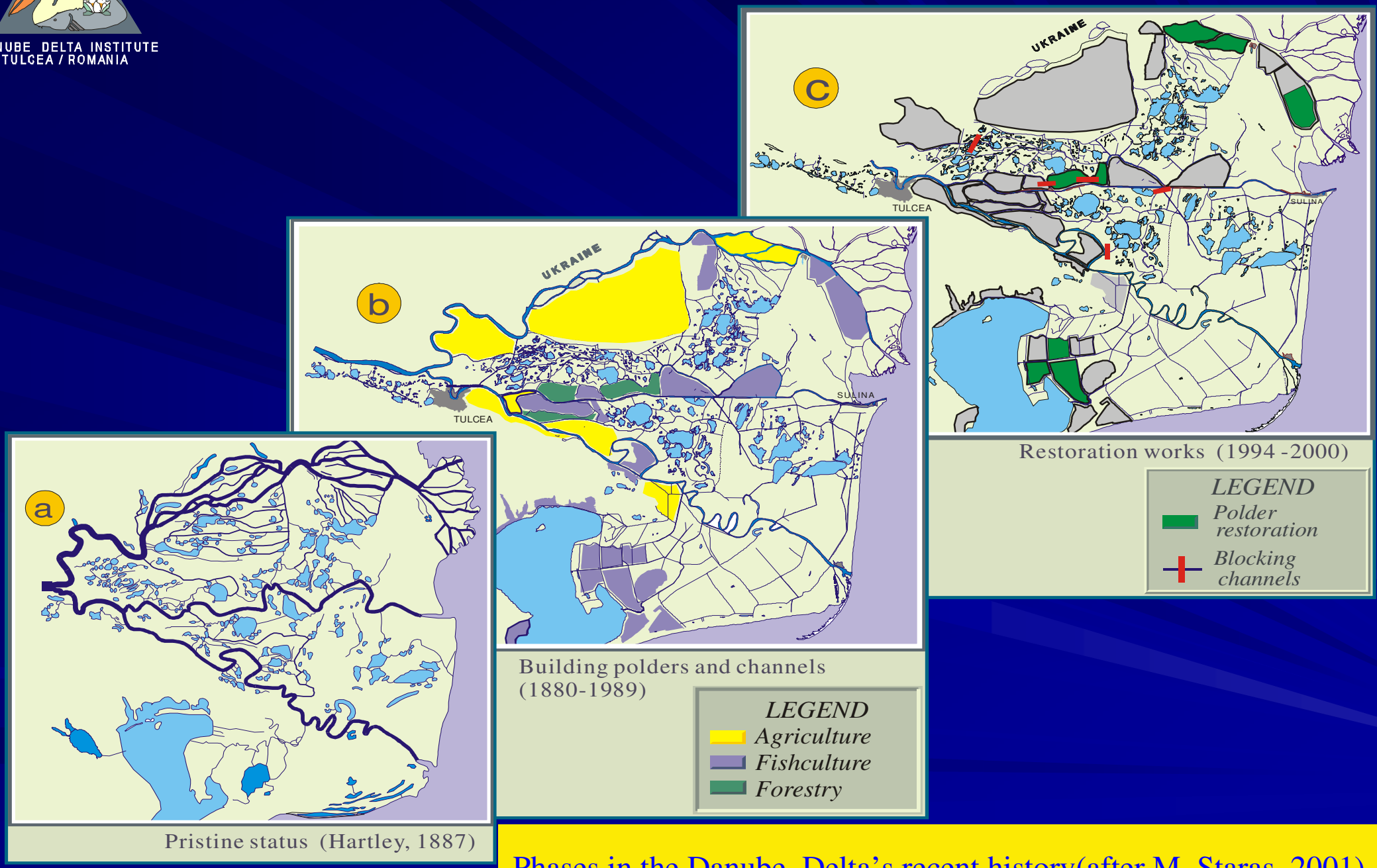
DANUBE DELTA INSTITUTE
TULCEA / ROMANIA

From wetland to wetland: failures and successes in decision making process regarding wetlands management and restoration in the Danube Delta during the last 50 years.

Marian Tudor

Content

- management practices
- objectives/activity : navigation
- achievements / activity
- conclusion
- success vs. failure



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

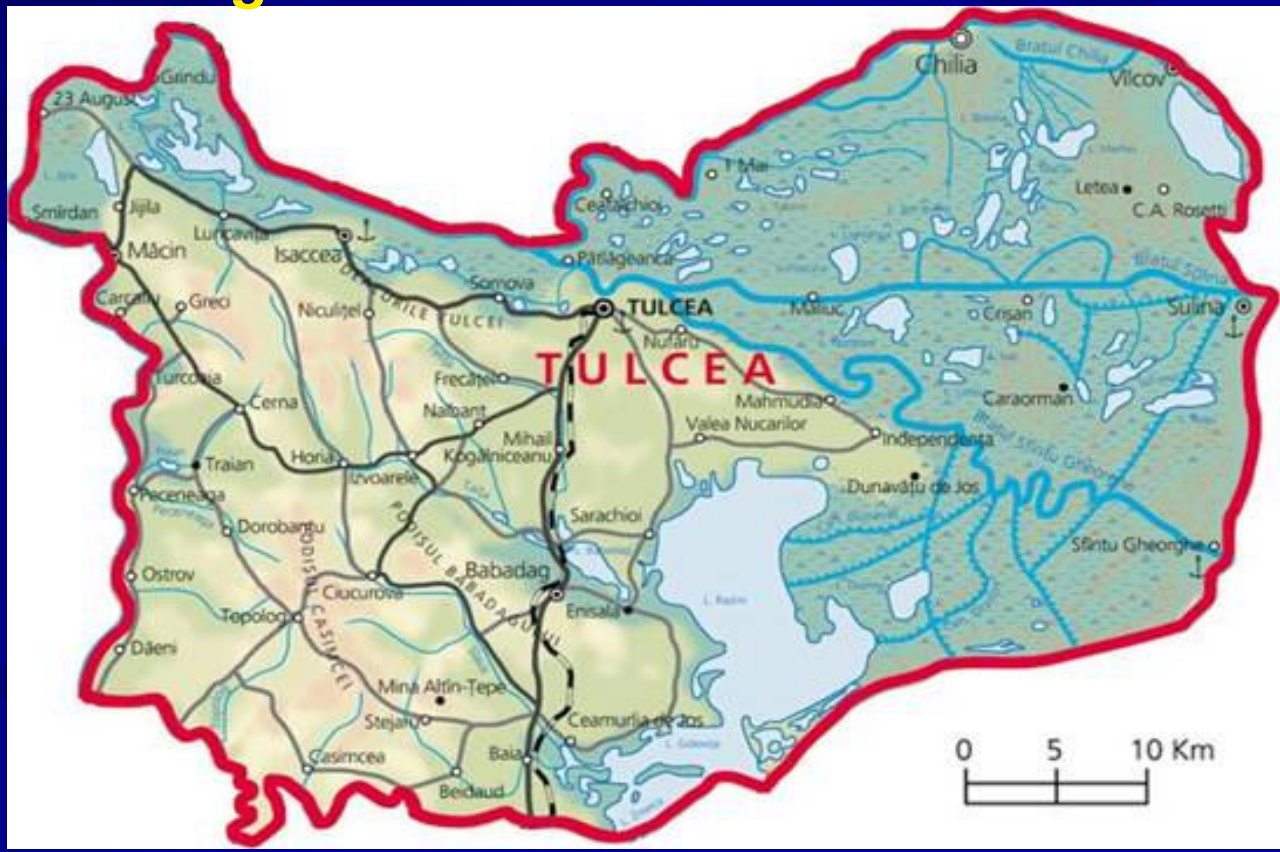
Previous management practices

- 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"

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

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

- from 1980 to 1989 :
  - "agriculture period"

97,408 ha

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

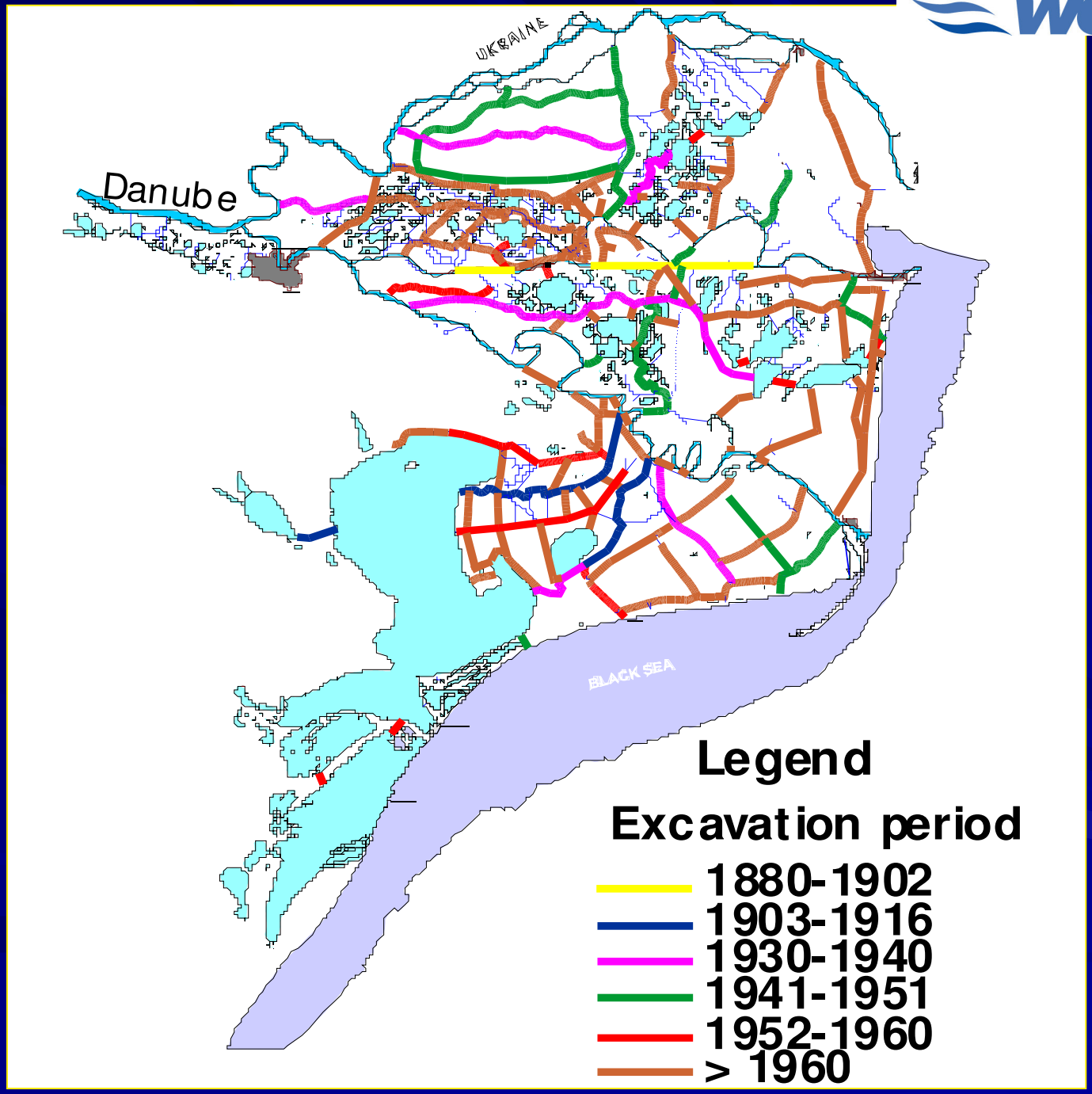
Objectives/activity : navigation

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


Danube
UKRAINE
BLACK SEA
Legend
Excavation period
1880-1902
1903-1916
1930-1940
1941-1951
1952-1960
> 1960

Objectives/activity : reed 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

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)

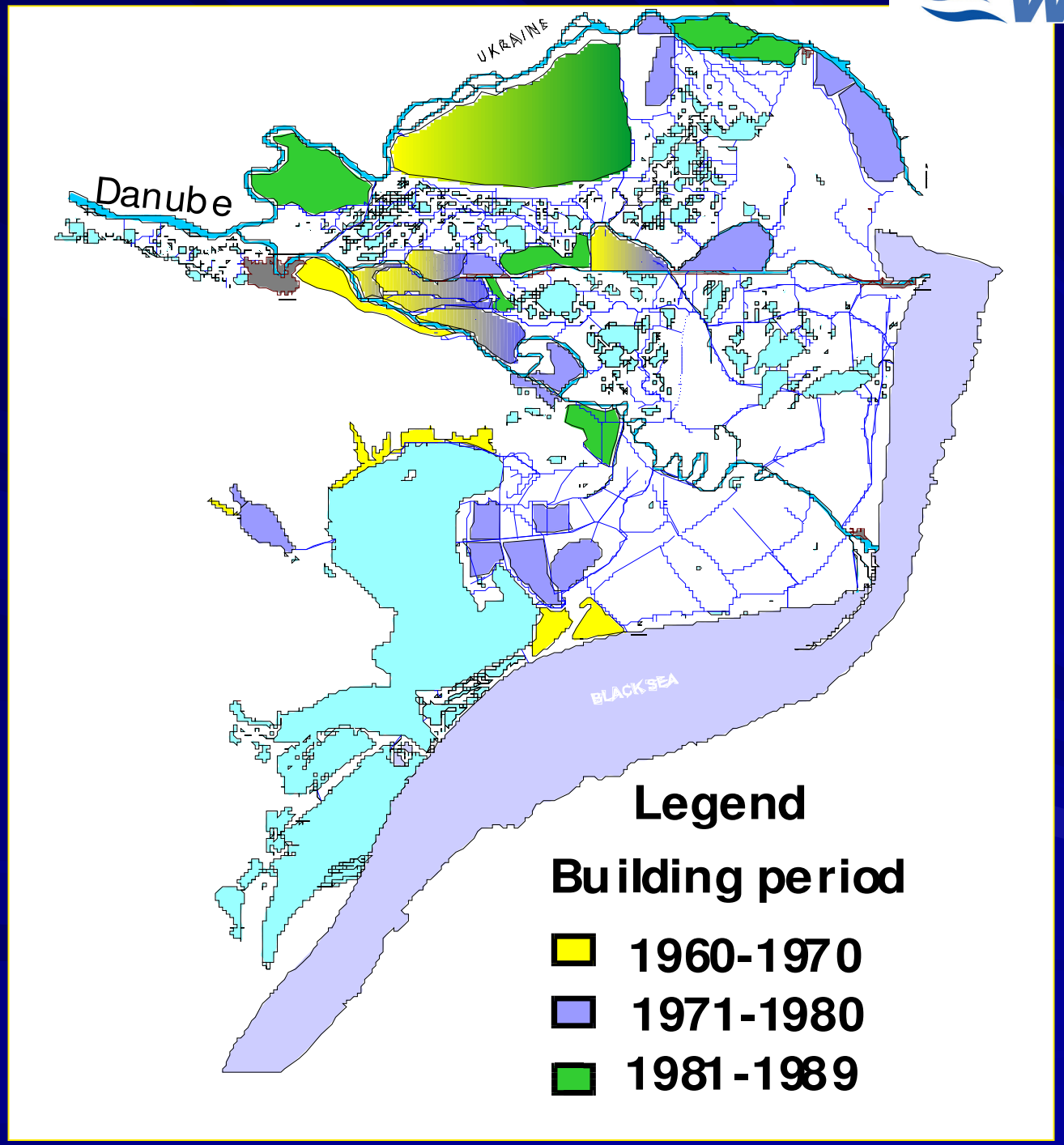
Objectives/activity: fishery - intensive exploitation

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

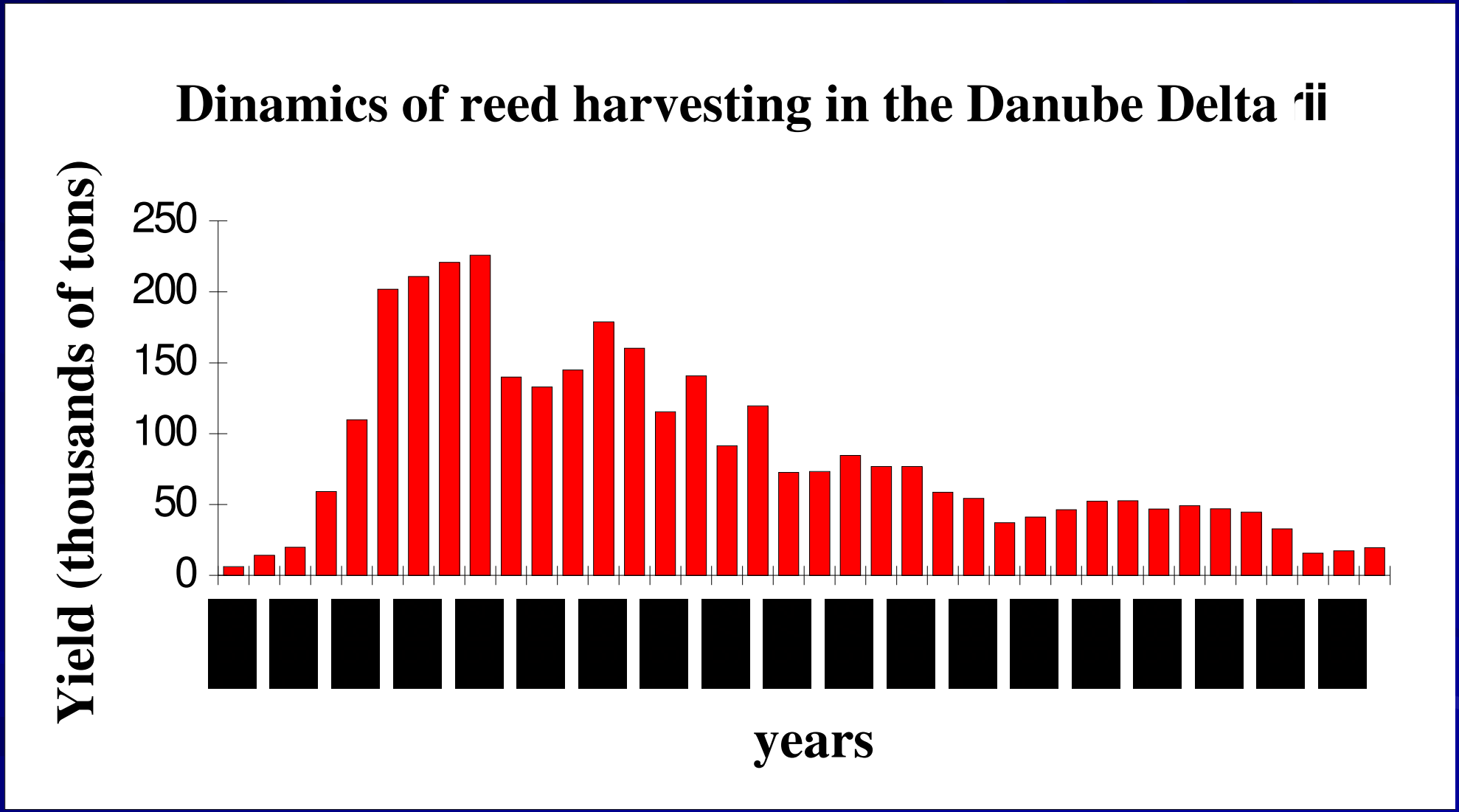
1955 : 11,000 to/year
1956 - 1965 : 16,500 to/year
1966 - 1980 : 20,000 to/year
1983 - 1990 : 104,962 to/year

(Mirica, 1957)


UKRAINE
Danube
BLACK SEA
Legend
Building period
1960-1970
1971-1980
1981-1989

RESULTS / ACTIVITY:

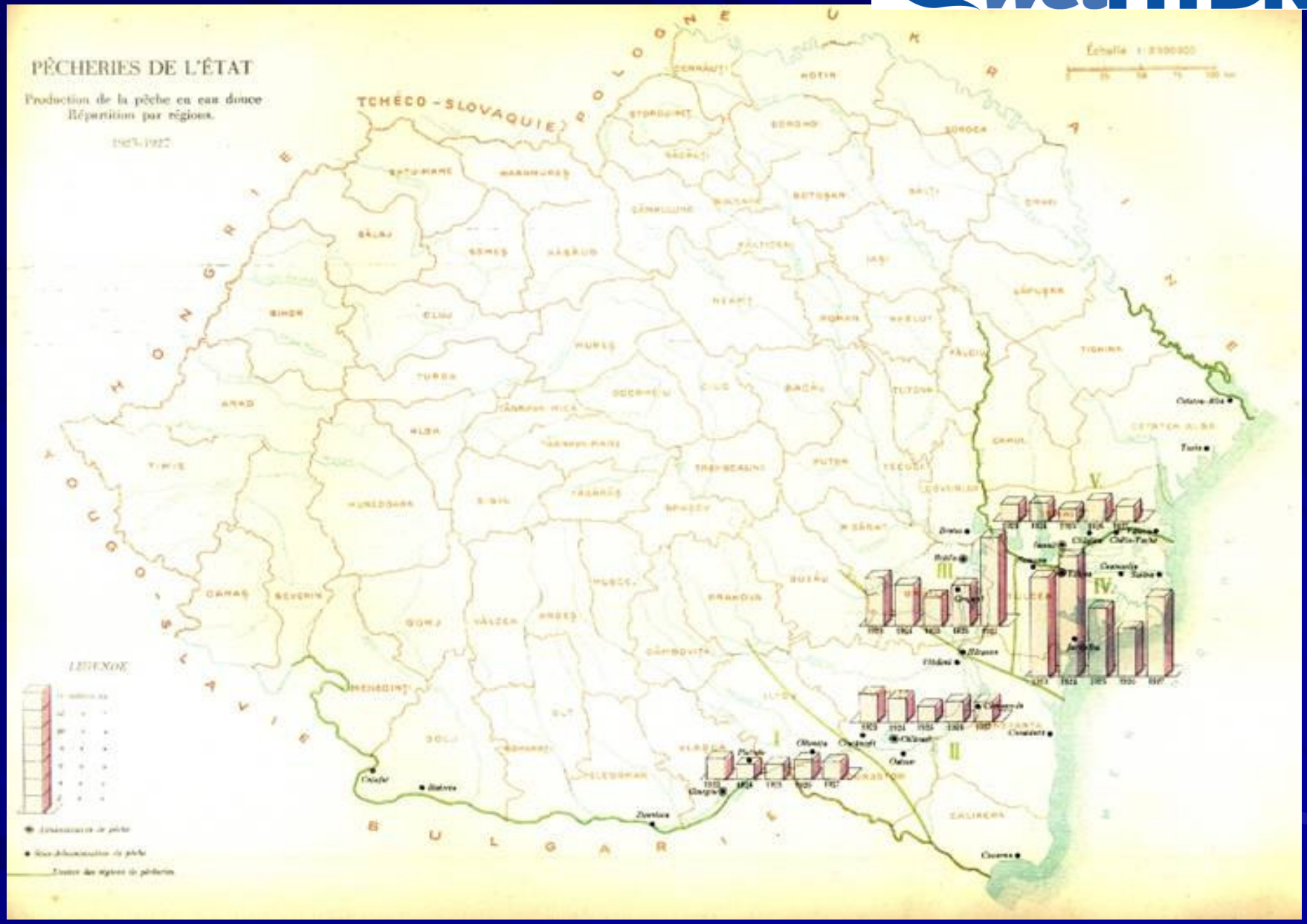
REED EXPLOITATION



after Hanganu, 1994

RESULTS / ACTIVITY

FISHERIES



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

PÊCHERIES DE L'ÉTAT

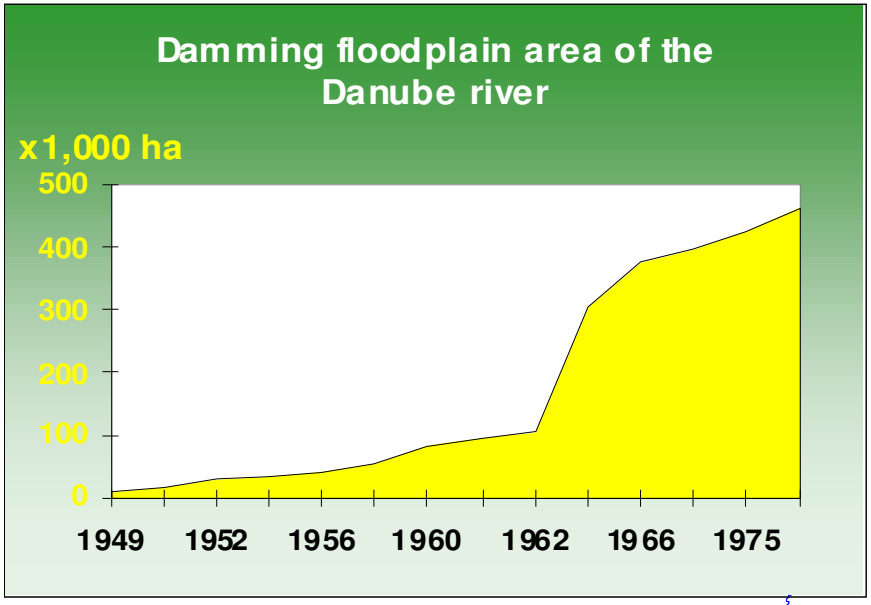
PRODUCTION DE LA PÊCHE EN EAU DOUCE

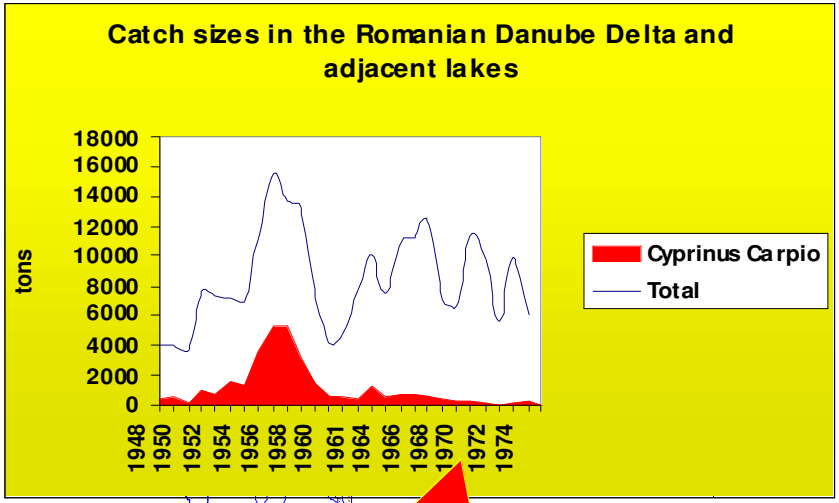
	ESPÈCES	1923	1924	1925	1926	1927
		quintaux	quintaux	quintaux	quintaux	quintaux
1	Morue	700	2.850	2.390	2.320	3.840
2	Esturgeon	1.290	1.490	1.160	1.250	2.460
3	Sterlet	320	490	230	270	740
4	Pastrouga (Variété d'esturgeon)	530	330	320	330	620
5	Silure	11.160	14.920	10.680	6.470	11.420
6	Carpe	49.890	60.190	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

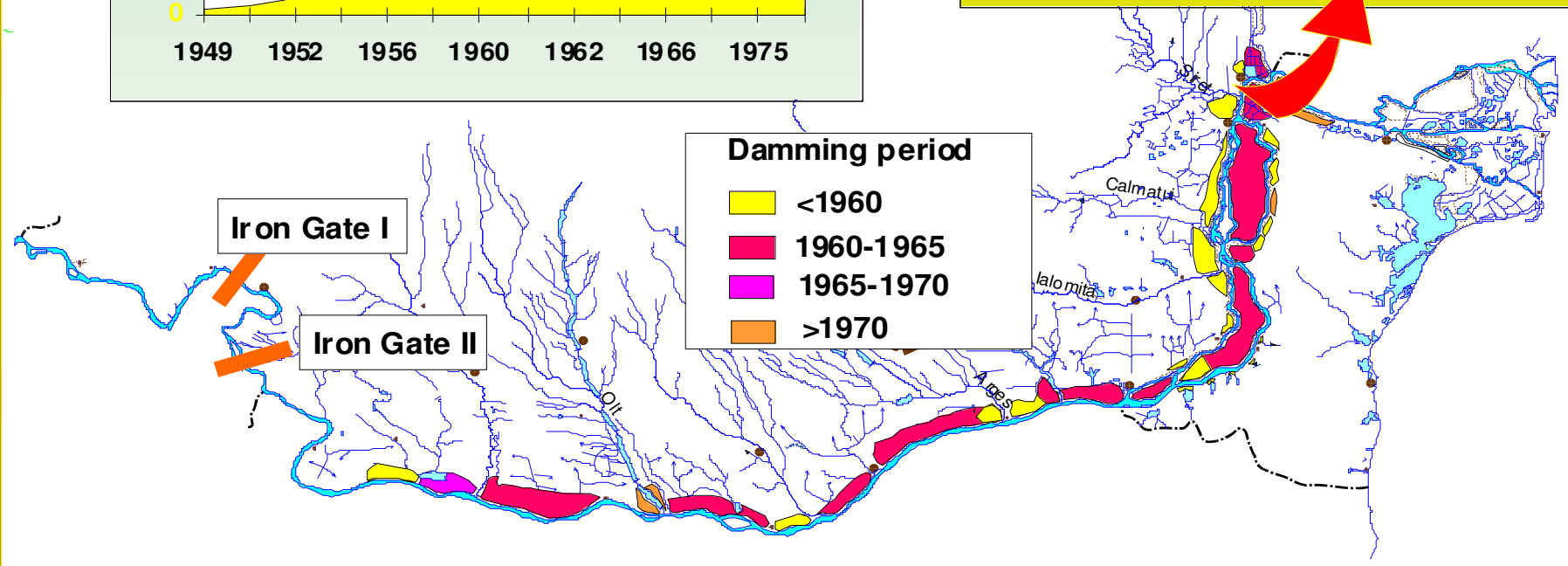
L'agriculture en Roumanie, Ministere de l'agriculture et des domaines, Bucharest, 1929

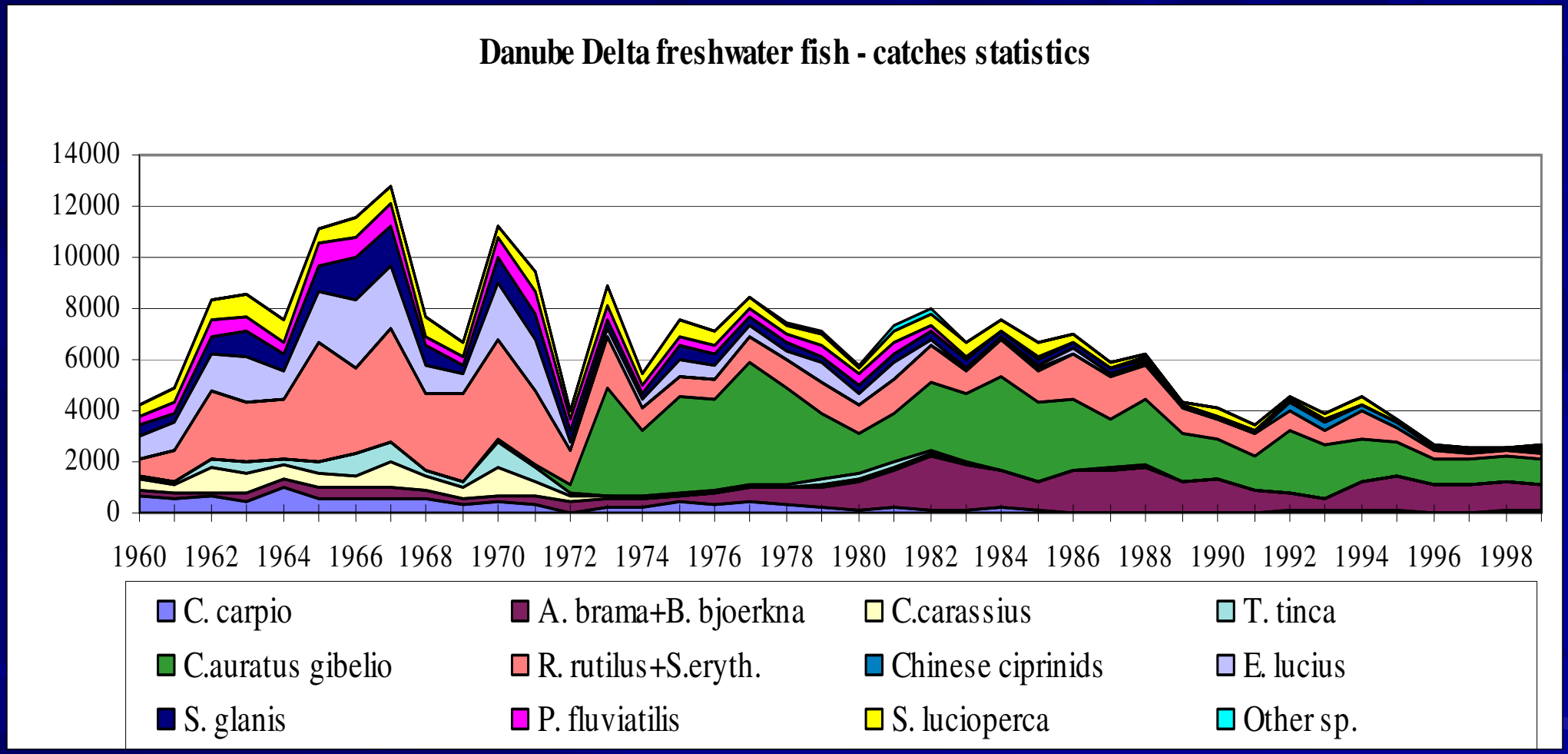
DAMMING OF DANUBE RIVER FLOODPLAIN

IMPACT ON DANUBE DELTA's FISHERY

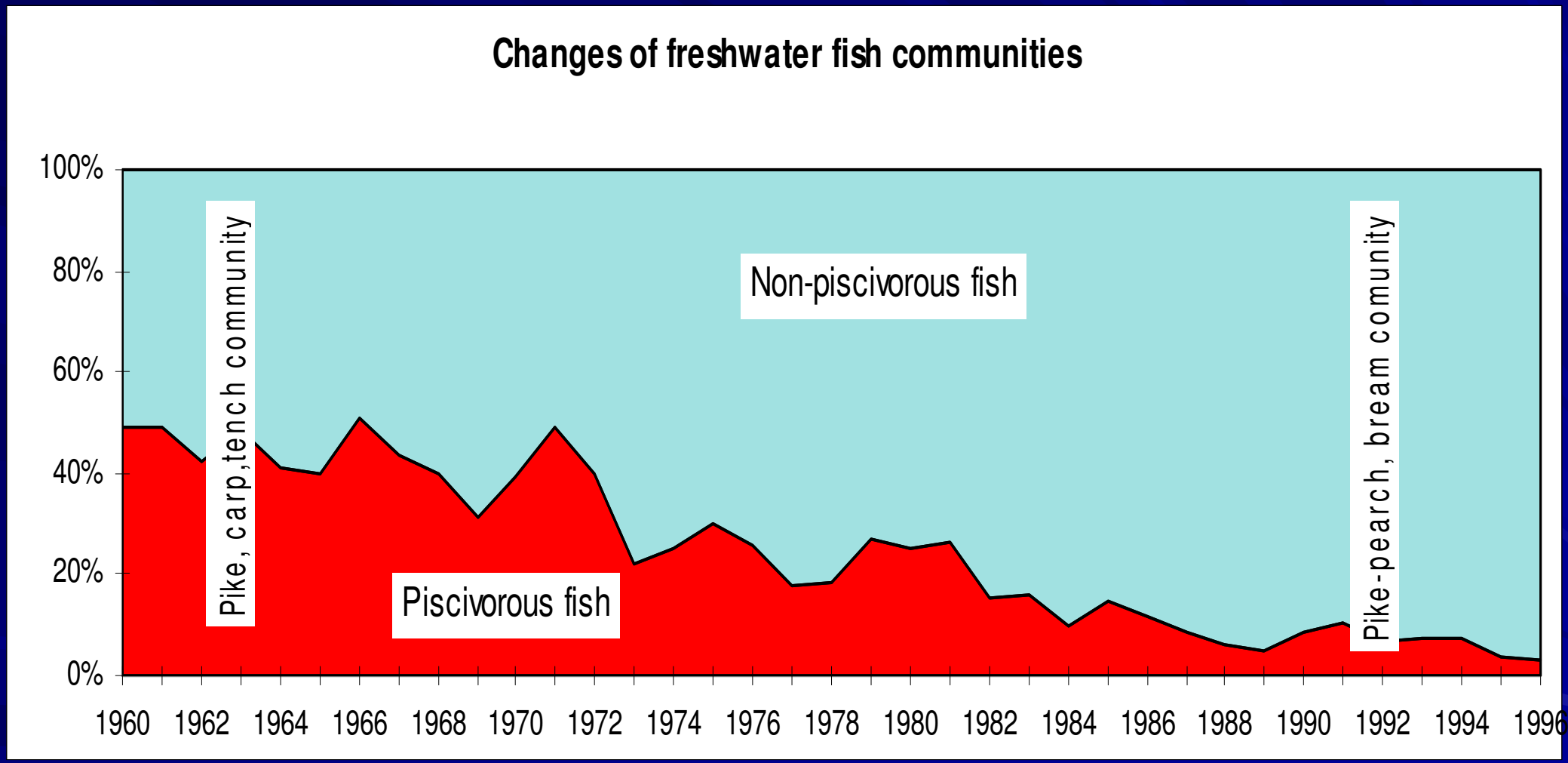




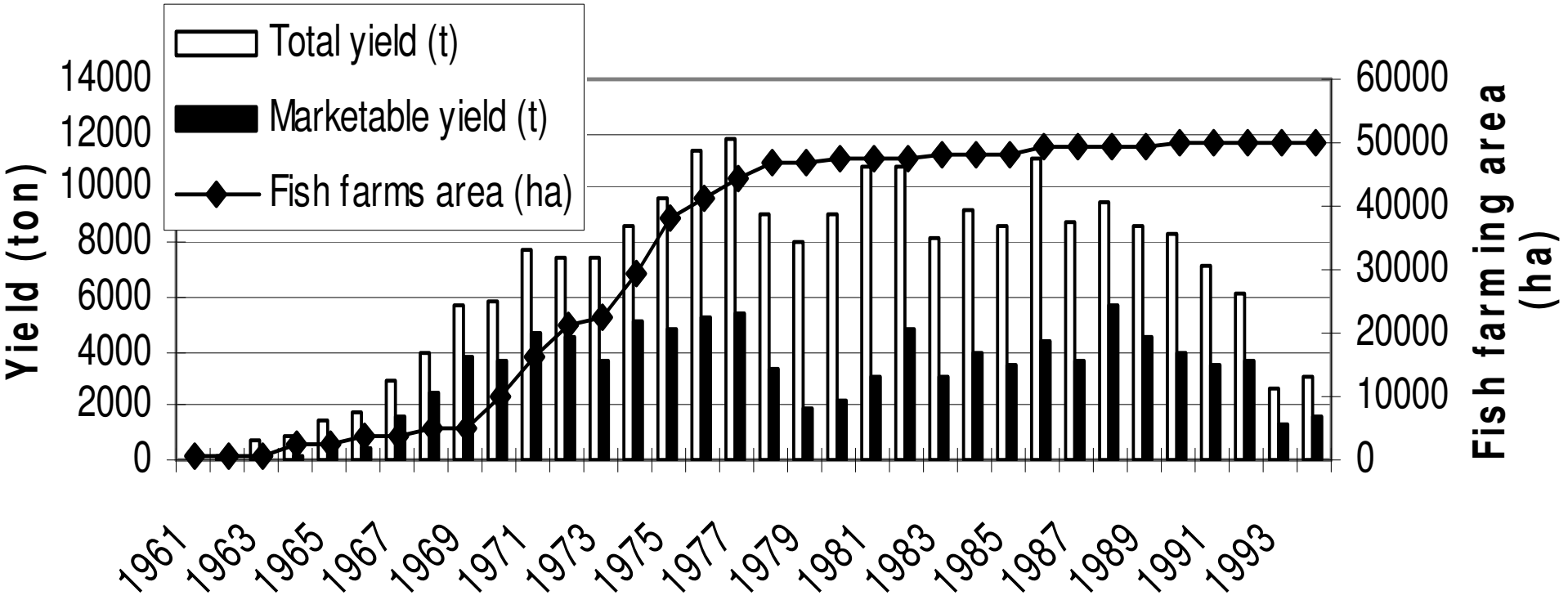




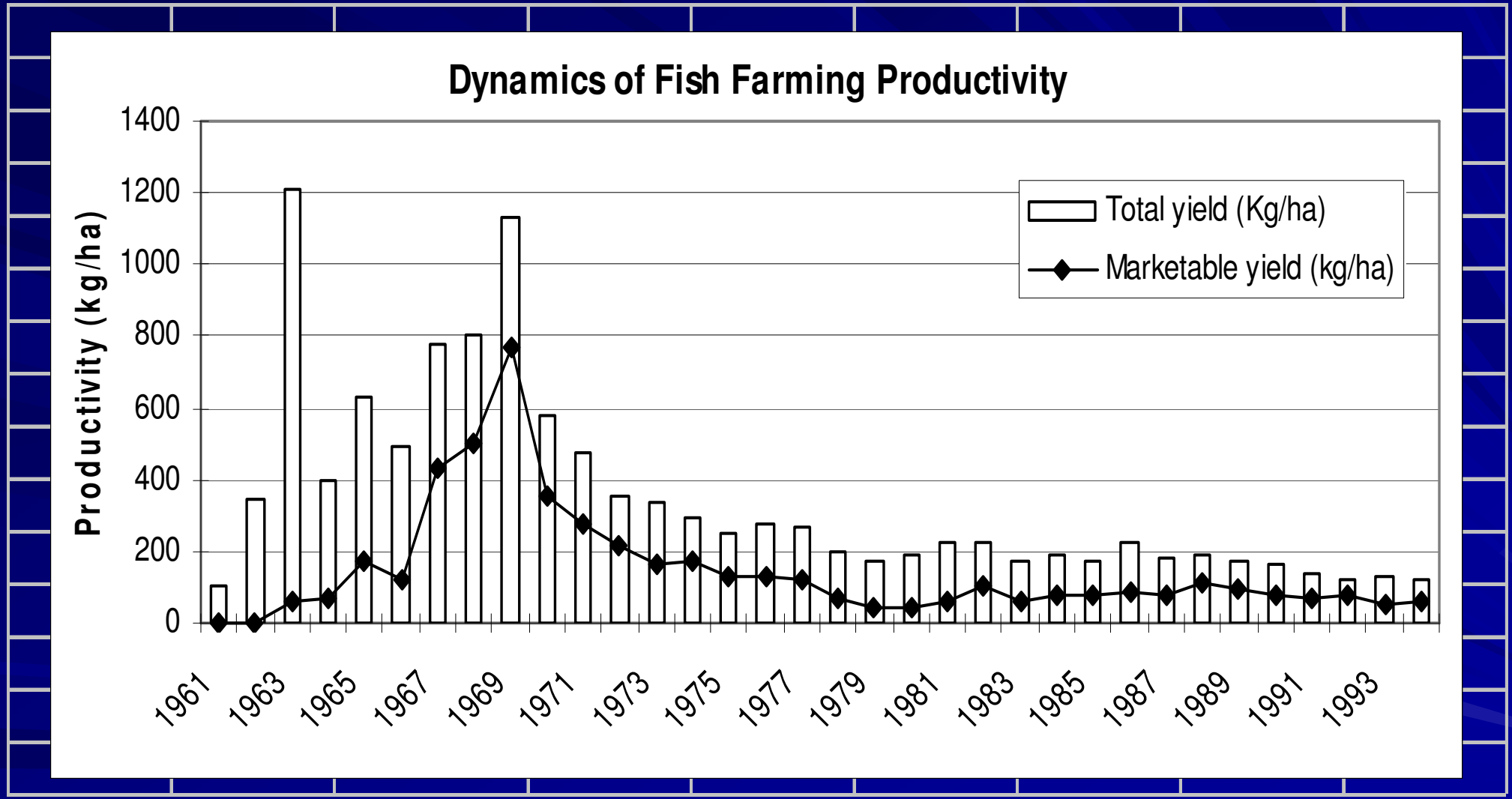
after Staras, Navodaru & Cernisencu



after Staras, Navodaru & Cernisencu



Evolution of fish farming building and yield results in the Danube Delta (after Navodaru, 1998)



(after Navodaru, 1998)

Evolution of ichtyofauna within the Danube Delta 1963 - 1990

- 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 value 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 %

after Munteanu et al., 1990

CHANGES OF HYDROLOGY AND WATER CHEMISTRY

DANUBE RIVER

Water inflow (cm/s)

P(PO4) (mg/l)

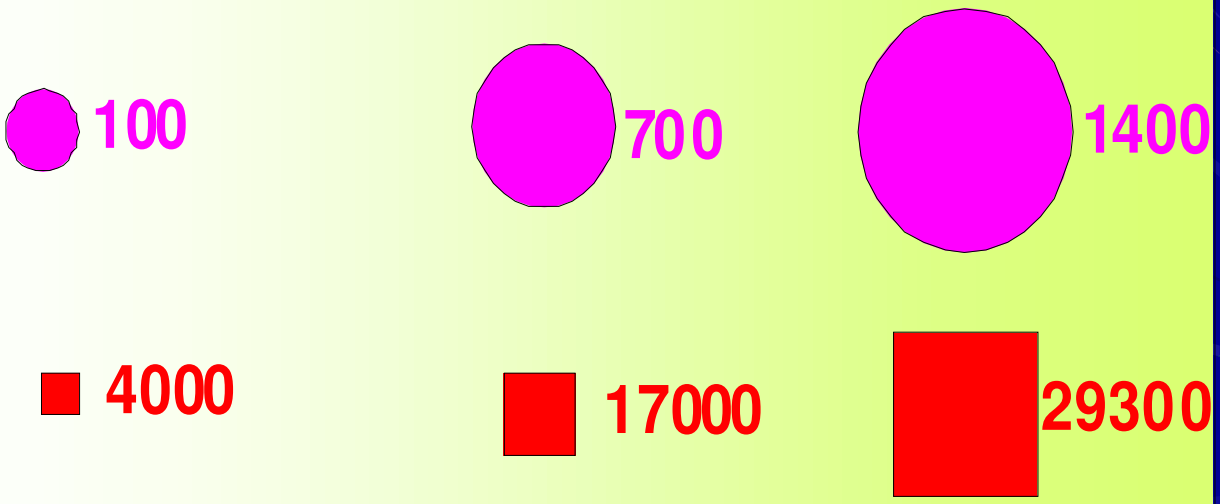
N(NO3) (mg/l)

P(PO4) inflow
tons/year

N(NO3) inflow
tons/year

DELTA ECOSYSTEMS

Before 1960	1971-1980	1980-1989
309	359	620
<0,01	0,06	0,07
0,4	1,5	1,5



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

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

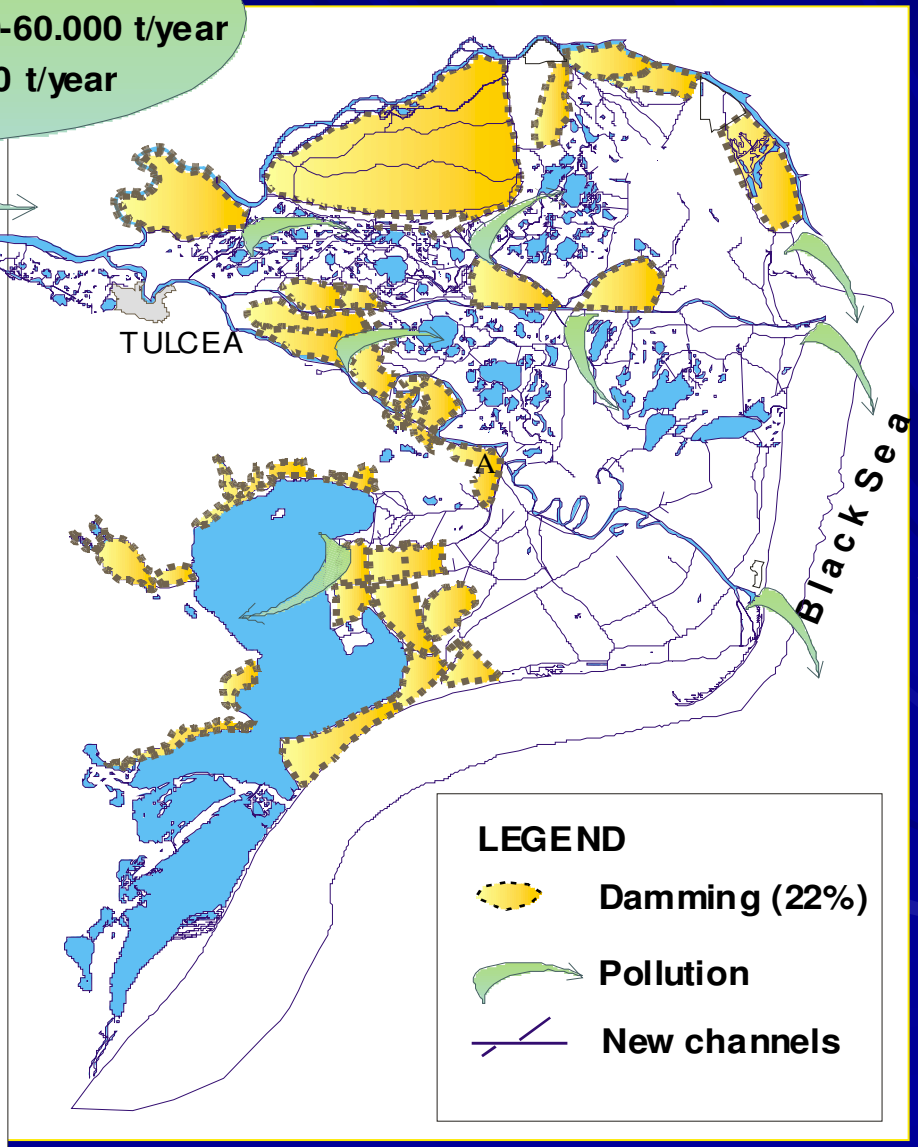
HABITAT ALTERATIONS

BY

POLLUTION

AND

DRADGING CHANNELS



1990 - The Danube Delta Biosphere Reserve

GENERAL OBJECTIVES:

- 1990 - declared "Biosphere Reserve" by the Romanian Government

CONSERVATION AND PROTECTION OF EXISTING NATURAL HERITAGE

- 1990 - included in the international network of biosphere reserves

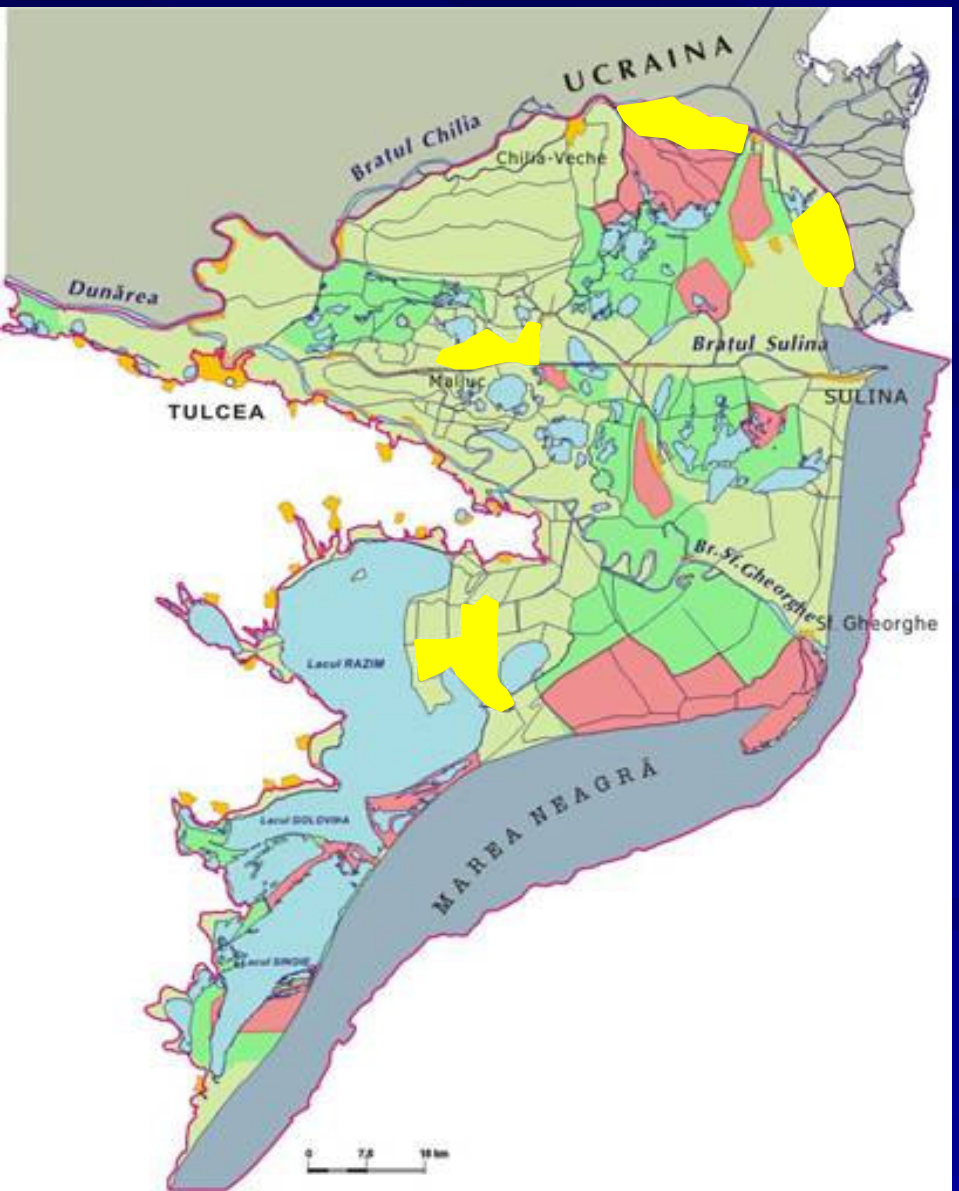
MAB UNESCO

- 1991 - declared RAMSAR site

JUST AND RATIONAL USE OF THE NATURAL RESOURCES

- 1991 - included in the list of world's natural and cultural heritage

1990 - The Danube Delta Biosphere Reserve



- core areas(18), with a total area of 50,600 ha(8,7% of the total)

Three major functions :

- buffer areas with an area of 283,300 ha
  - conservation of natural and cultural diversity
  - the social and economic development
- economic areas, with an area of 306,100 hectares(52,8%)
  - logistic support for the most diverse activities including 11,425 ha for

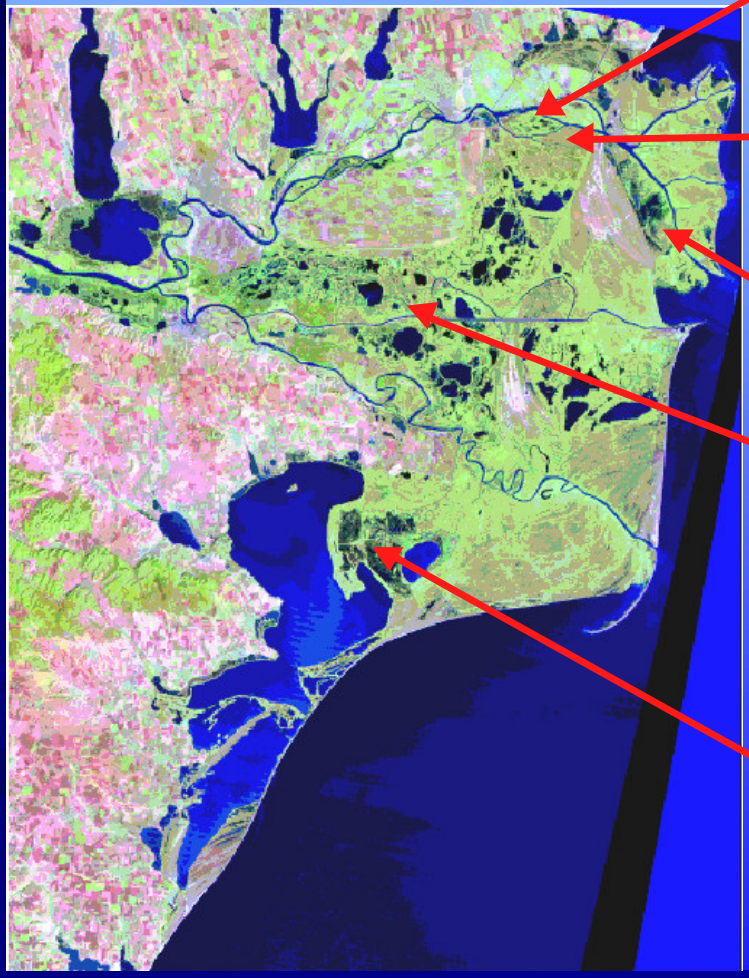
Ecological restoration

- Principles -

- approaching the “philosophy” of deltaic nature, to the initial structure for the ecosystems;
- identification of ecological optimum for every ecological restoration case;
- analyses of every proposed zone for ecological restoration in comparison with the rest of the delta;
- taking into account in all ecological restoration of aquatic systems the important role of the Danube River water quality, resulting the necessity of water quality improvement in whole Danube River basin;

GOMOIU, M.-T., BABOIANU, G. (1992)

Implemented and ongoing Restoration Works in the Danube Delta



- In 1994 Babina (2,100 ha),
  - agricultural polder -
- in 1996 Cernovca(1,580 ha)
  - agricultural polder -
- in 2000 Popina(3,600 ha)
  - fishpond -
- in 2002 Fortuna (2,115 ha) -
  - agricultural polder -

Prospective areas to be restored

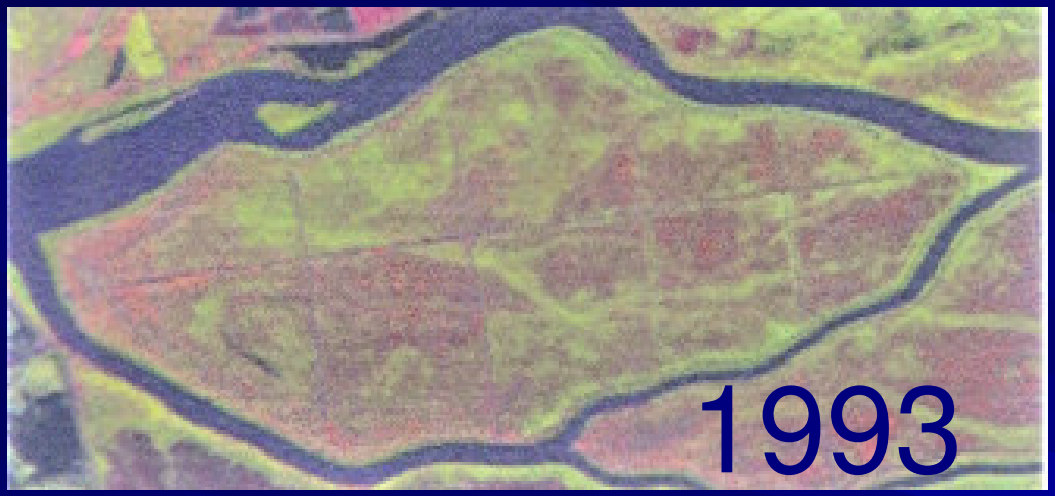
- Holbina - Dunavat(5,630 ha)
  - fishponds -

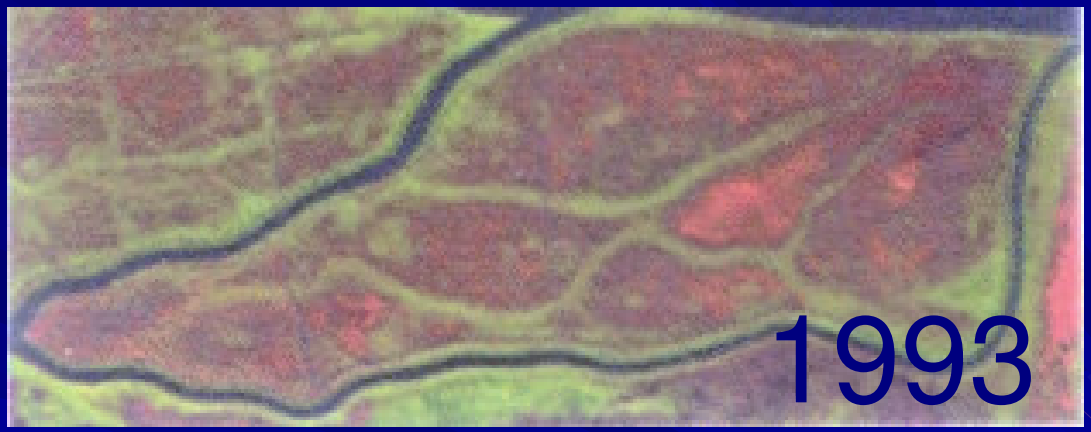
TOTAL: 15,025 ha

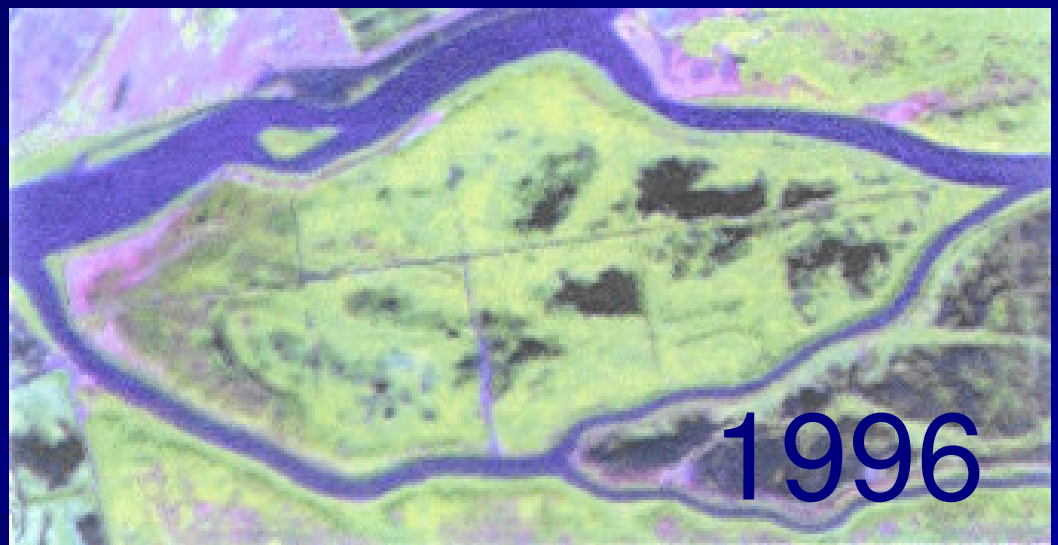
AMENAJARE AGRICOLÃ ABANDONATÃ ÎN DELTA DUNÃRII
Abandoned agricultural polder in the Danube Delta before restoration

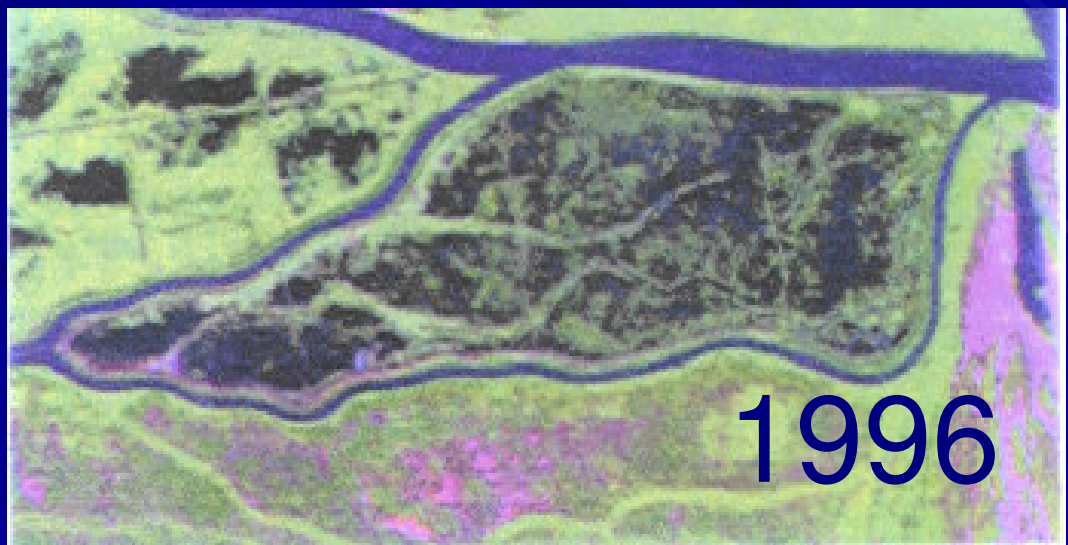
2 YEARS AFTER FLOODING

Babina-Cernovca area
(satellite images)

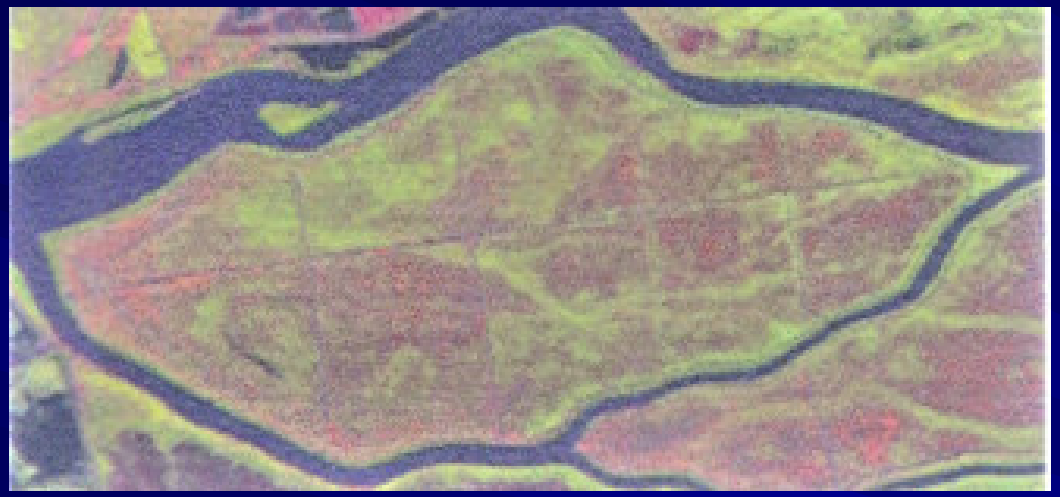


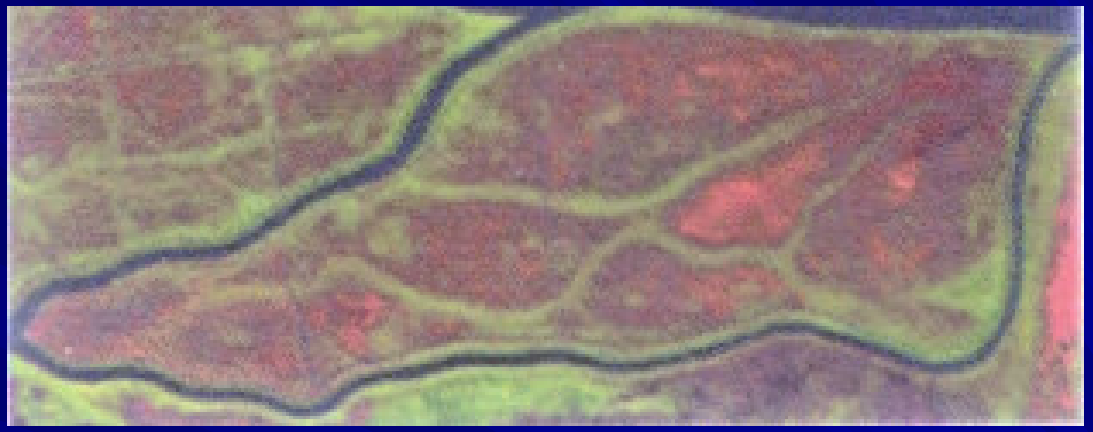


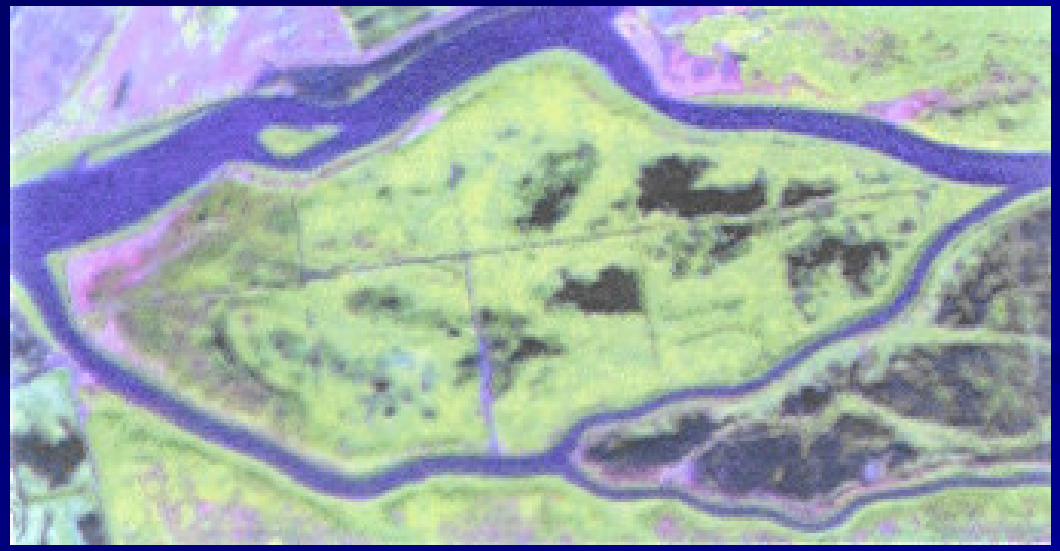


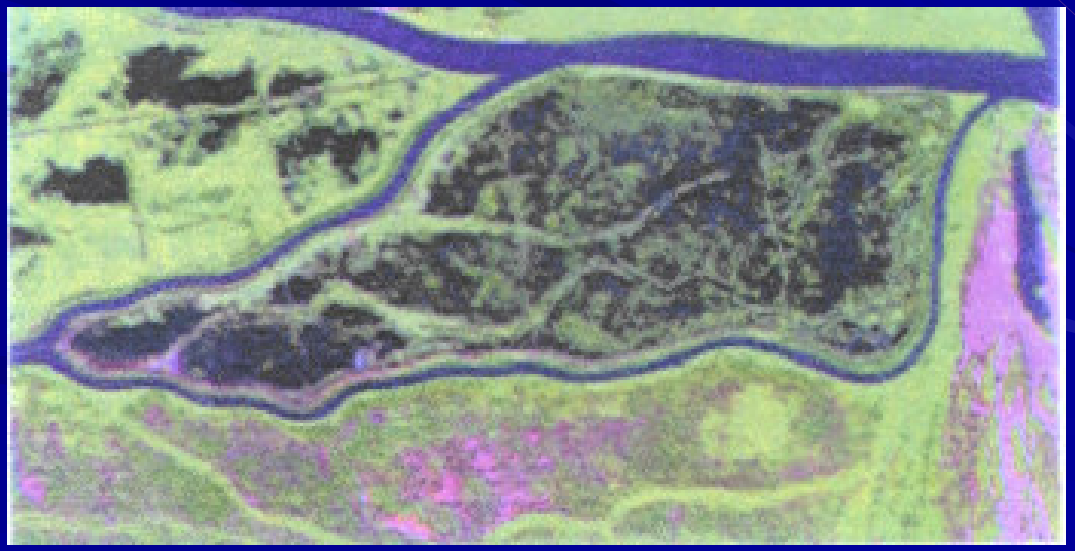


Babina-Cernovca area
(satellite images)

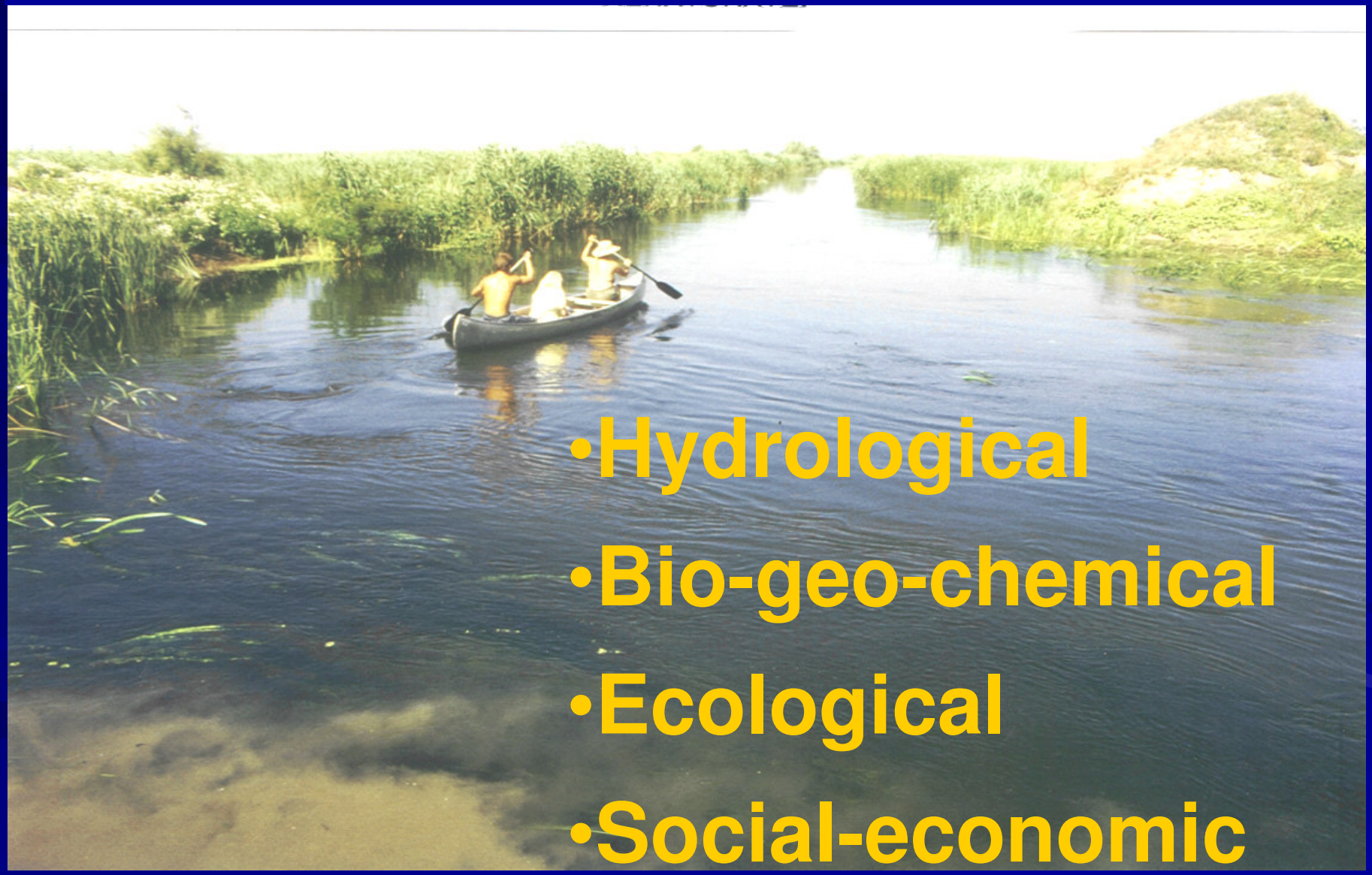








RECOVERY OF THE NATURAL FUNCTIONS OF WETLANDS



- Hydrological
- Bio-geo-chemical
- Ecological
- Social-economic

COST-BENEFIT ANALISYS

Fish (3,000 ha): 50,000 Euro/year

Reed (3,000 ha): 45,000 Euro/year

Cow meat (100 ha): 10,000 Euro/year

Tourism: 30,000 Euro

TOTAL ECONOMIC BENEFITS: about 135,000 Euro/year

Plus additional non-use values

TOTAL REHABILITATION COSTS: 100,000 Euro

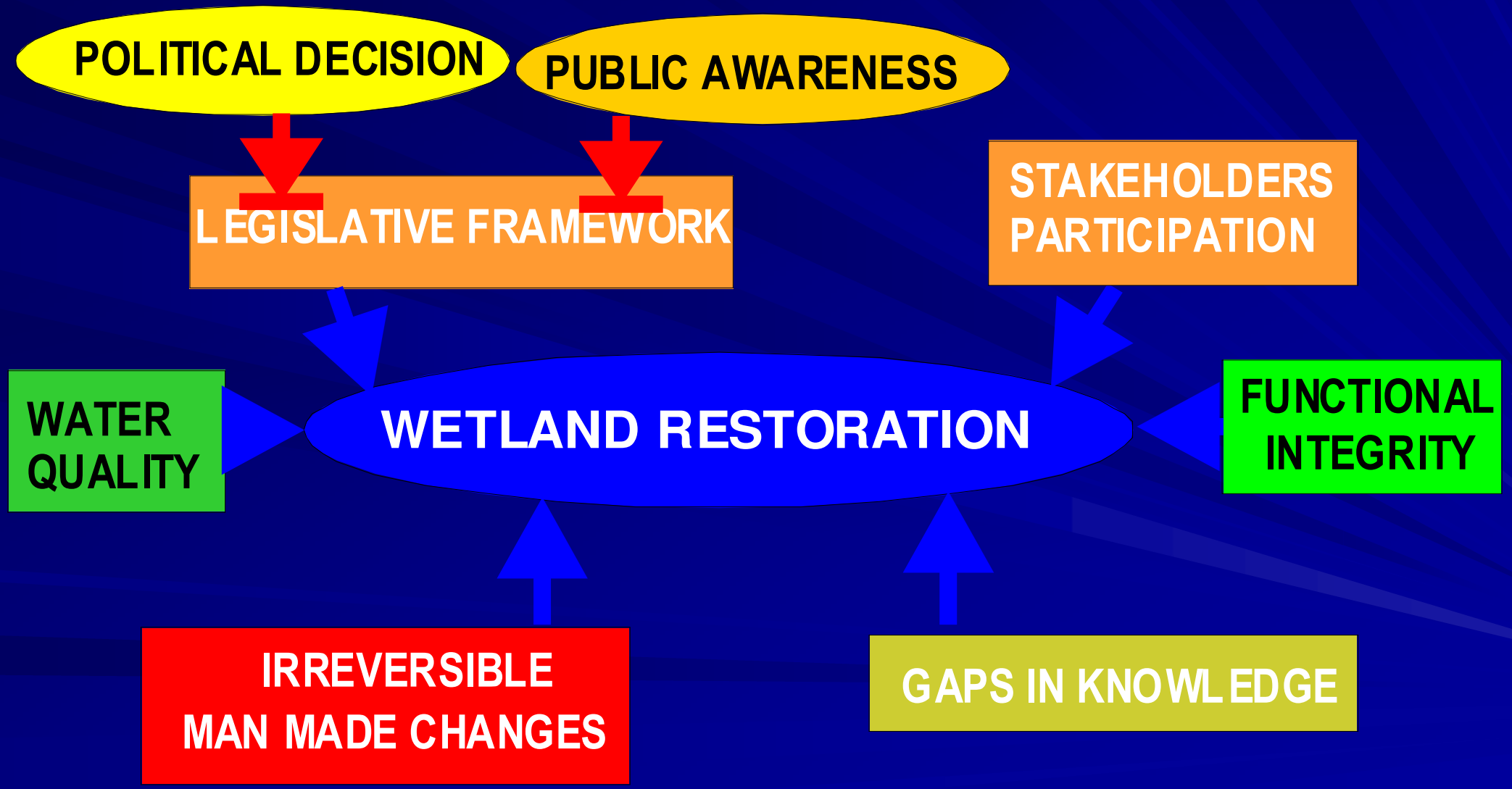
BUT….

- **The system is not self sustaining.**

- **Additional works and costs are needed periodically to maintain the connectivity with Danube River**

- **Filtering role of the wetlands should not be exaggerated. The recent initiatives and programs for rehabilitation of the Danube floodplain would not solve the problem of pollution of the Danube and Black Sea**

ENCOUNTERED CONSTRAINTS

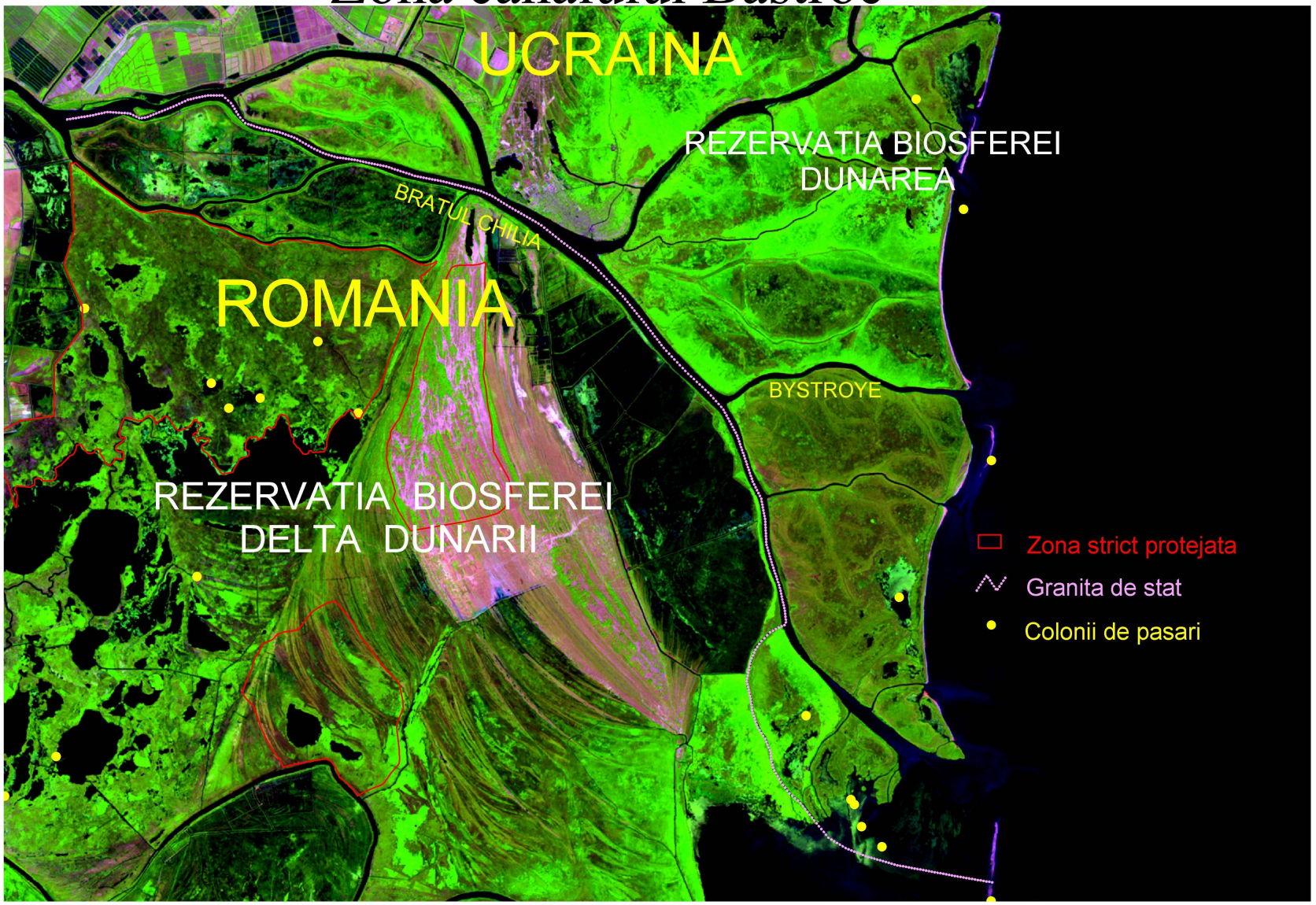


SUCCESS VS. FAILURE

Problem data:

- "SUCCESS is an imprecise term that means different things in different situations and to different people" (Kentula, 2000)
- Success means "achieving established goals" , idealy as specified in quantifiable criteria(Lewis, 1990)
- "A project's success can be defined more detailed by distinguishing between compliance and functional success" (Quammen, 1986)
- "Ecological restoration is still very much in the hands of managers and is moving only very slowly into the realm of restoration ecolog"(Allen, 1997)
- Danube Delta 2003 is a still natural area with a great restoration potential

Zona canalului Bâstroe



DANUBE DELTA 2000

QUO VADIS DANUBE DELTA?

QUO VADIS DANUBE DELTA?

EXPLOITATION ?

RESTORATION ?

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