

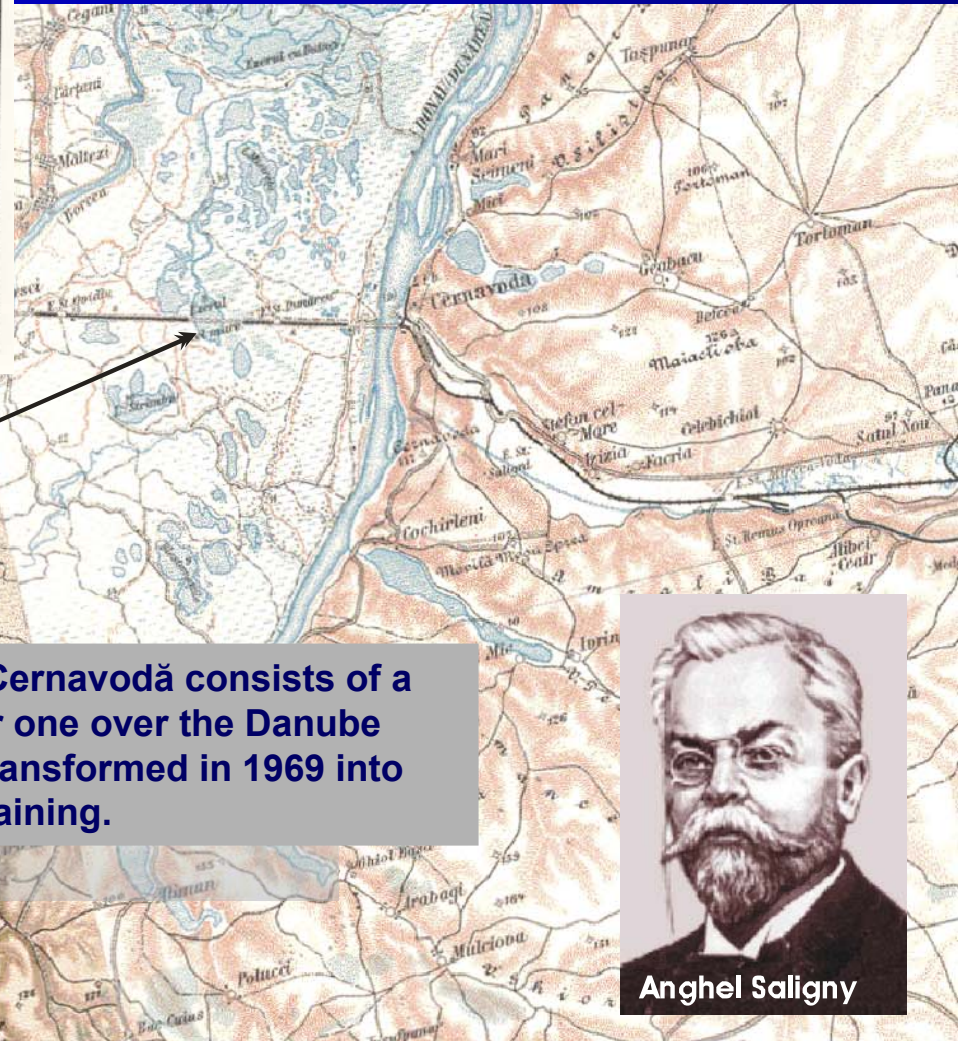
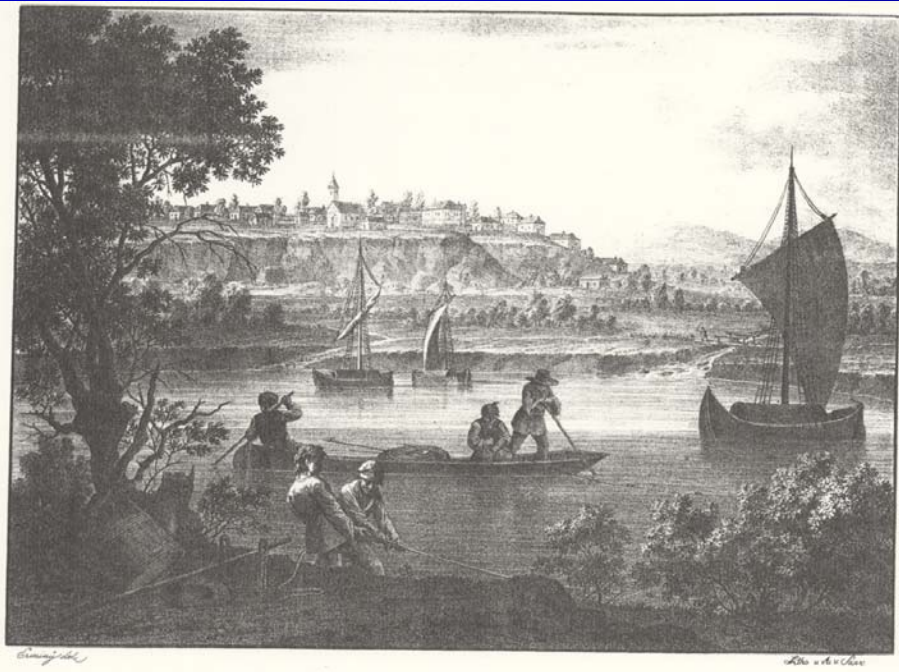
BIOWETMAN – A Science Based Approach to Understand
Biodiversity Driven Functions and Services for Improving Wetland Management
Bucharest, 19th February 2009

Ecological and Economical Restoration of Danube Floodplain

Iulian NICHERSU



Danube Delta National Institute
Tulcea, ROMANIA



The original bridges complex from Cernavodă consists of a bridge over the arm Borcea, another one over the Danube and a viaduct over Balta lezerului, transformed in 1969 into roadbed of embankment through draining.



Anghel Saligny



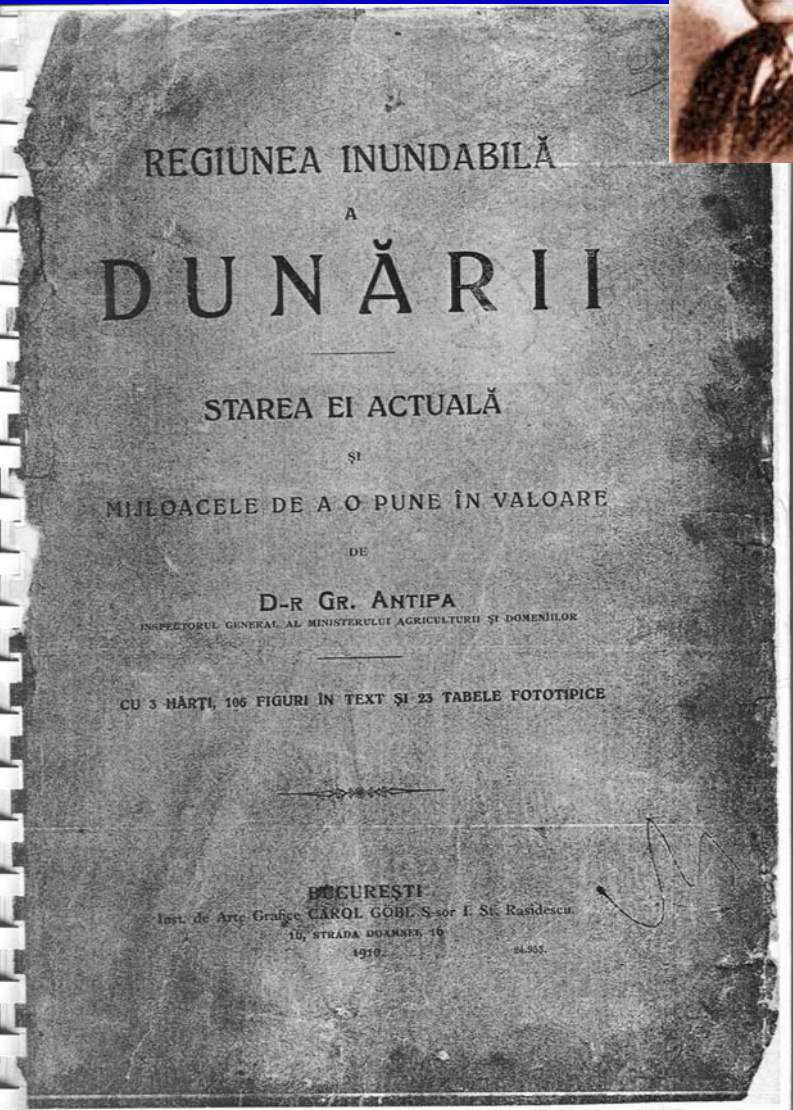
„Băltărețul“¹⁾ dovedește că și-a dat seama de unde-i vin aceste ploii binefăcătoare și ce importanță au bălțile Dunării pentru formarea lor. Și cum să nu-și dea seama când experiența îi arată că dacă în unii ani apele Dunării au fost mici și bălțile au rămas secate, atunci chiar dacă Băltărețul îi aduce nori, el îi vede „împrăștiindu-se de arșița Baraganului“. În acești ani de secetă la baltă apa care „potolește arșița soarelui“ (de oare-ce ea nu se înferbântă atât de ușor și absoarbe căldură multă pentru evaporare) lipsind iar pământul rămânând neacoperit „se înferbântă ca un cuptor“ și trimite în sus coloane de aer ferbinți („dă duhoare din el“) care împrăștie și distrug norii (2).

Ezperiența ne arată că în adevăr așa este și se știe că multe din moșiile de pe malul bălților mari permanente — ca de ex. moșiile din jurul lacului Greaca — nu sufăr de secetă atât de mult, chiar în anii când în restul țării domenește seceta cea mai mare.


Dacă așa se petrec lucrurile dar, numai în anii când Dunărea nu se revarsă pe câmpii, ce ar fi

(1) Prin „Băltărețul“ țaranii nu înțeleg numai vântul SE ci ori și ce vânt care vine dinspre baltă, deci direcția acestui vânt variază după localități și după poziția pe care o are balta față cu acea localitate.

(2) Iată în ce mod descrie celebrul meteorolog *Hann* aceste fenomene: „Je stärker die Ebene sich erwärmt, je mehr sie gegen die Sommermitte hin austrocknet, die Feuchtigkeit der obersten Bodenschichten sich verringert und die Pflanzendecke verwelkt, desto seltener werden die Niederschläge. Die von demerzeten...“







**„ECOLOGICAL AND ECONOMICAL
RESIZING PROGRAM
IN ROMANIANA SECTOR
OF DANUIBE FLOODPLAIN”**

**Program aproved by Romanian Government through the decision
HG 1208 /06.09.2006**



STAGE I
RESEARCH STUDY ELABORATION
ECOLOGICAL AND ECONOMICAL RESIZING
IN ROMANIAN SECTOR
OF DANUBE FLOODPLAIN

BENEFICIARY

**MINISTRY OF ENVIRONMENT AND SUSTAINABLE
DEVELOPMENT**

Performer

Danube Delta National Institute for Research and Development
Tulcea – Romania

Colaborators

INHGA – Bucuresti (RO), ISPIF – Bucuresti (RO)

EnviroScopY SRL (RO)

-ESYCH (CH)

-SINTEGRA (FR)

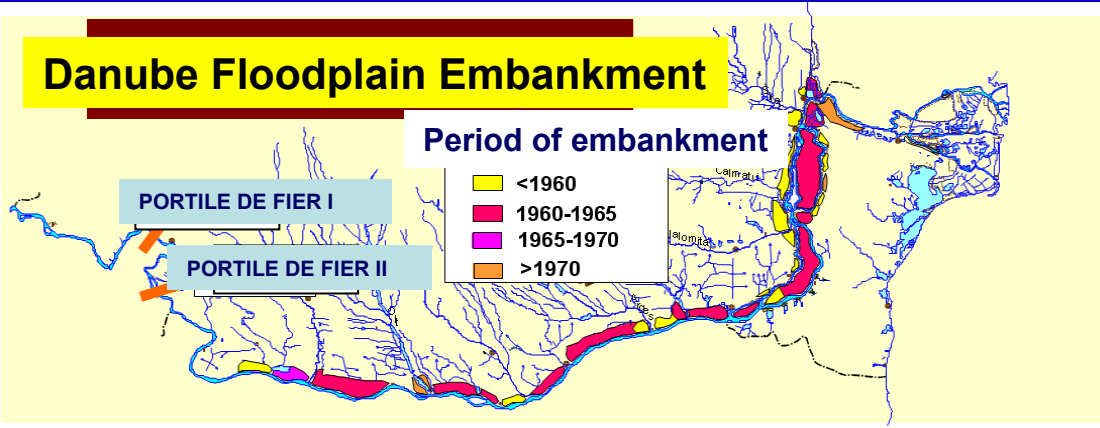
- Univ. Karlsruhe - Institutul de Ecologie a Luncilor, (DE)

AIM

Background of the scientific and technical priorities of the management plan of flood risk in the sector of the Romanian Danube Floodplain.

CURRENT STATUS OF EMBANKMENT PRECINCTS INTO ROMANIAN DANUBE FLOODPLAIN

Danube Floodplain Embankment



ACTUAL STATE

Romanian Danube Floodplain

S = 513.900ha

of which:

EMBANKMENT – *S = 430.000 ha* composed of

53 embankment precincts

with

1.200km dikes

Constructed before 1962

NATURAL - *S = 83.900 ha*

- tributaries influx mouths

- Small Island of Brăila

PRIORITIES

1. Reassessment of settlements defense lines against floods;
2. Polders restoration in order to recover natural functions of wetlands including conservative interest areas (SCI, SAC, SPA, national);
3. Reassessment of economic activities in agriculture/fish polders into a mixed concept economic and room for water.

PRIORITY 1

Reassessment of settlements defense lines against floods

ACTIONS

- **Elaboration of Digital Terrain Model (DTM) for reappraisal of defense lines of settlements against floods** with ring dyke located at the limits statuated in general urban plan (PUG)
- **Elaboration** of floods scenarios based on hydraulic modeling

New defense lines against floods (rings dykes)



Rast Village - 23rd June 2006

PRIORITY 1

Reassessment of settlements defense lines against floods

EXPECTED RESULTS

- **Mapping of hydro-geo-morphological units** on the Danube Floodplain territory based on the 3D DTM.
DTM will be produced using LiDAR Altimetry Data with longitudinal and transversal transects through polders and areas of mouth tributaries due to present of its floods.
Based on hypsometrical support will be elaborate floods scenarios using hydraulic modeling.
- **Hydraulic Model which will be adopted** design, based on 2006 water discharge and levels, different flooding scenarios from which will be selected optimum, in sense of water circulation restoration as possible nearest to the natural status, before damming.
- **Dyke defense Rim Altitude** of villages and ports.

PRIORITY 2

Polders restoration in order to recover natural functions of wetlands including conservative interest areas (SCI, SAC, SPA, national)

ACTIONS

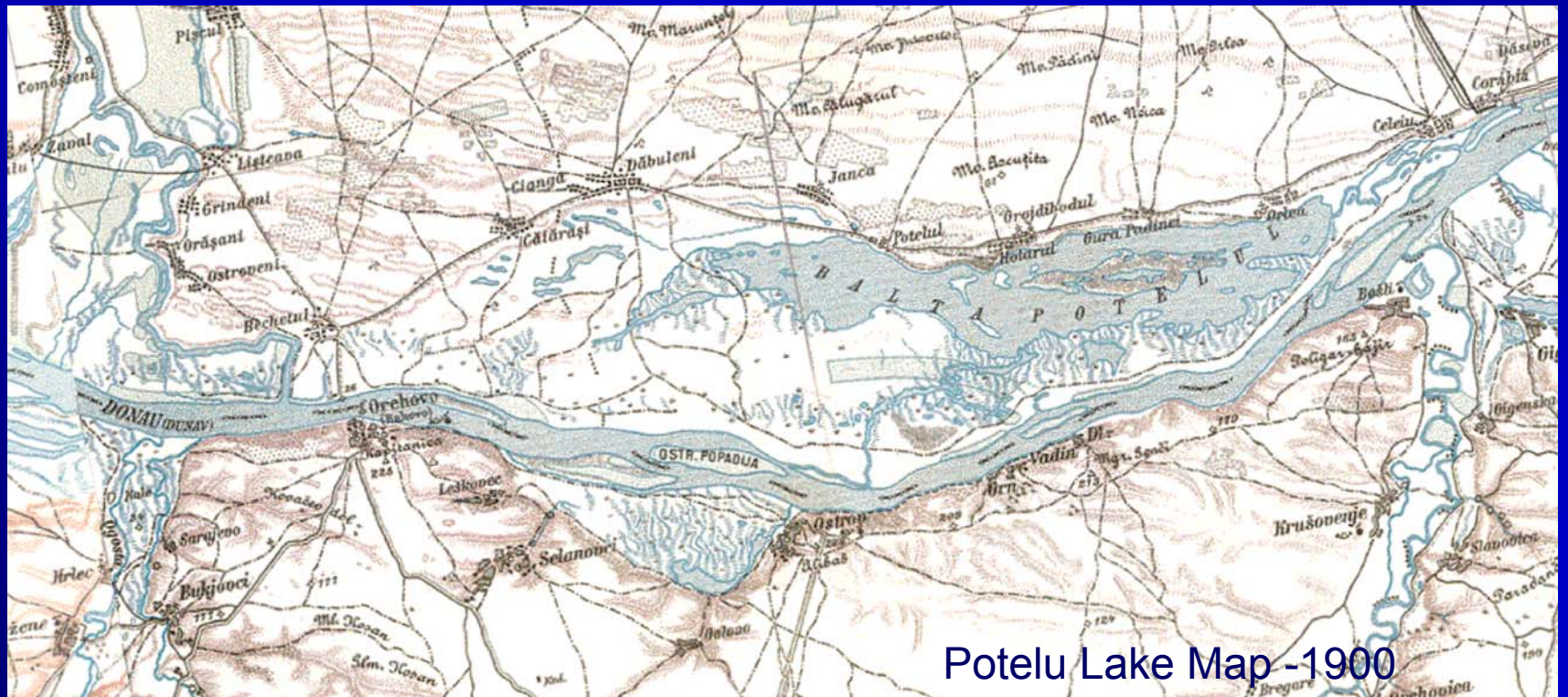
- Establishment of floods and remanence regime of water in polders result through drying of former lakes **Bistreț, Potelu, Suhaia, Greaca, Călărași** etc. due to its renaturation.



Bistreț Fish Pond - 23rd June 2006



Potelu Polder - 23rd June 2006



Potelu Lake Map - 1900

PRIORITY 2

Polders restoration in order to recover natural functions of wetlands including conservative interest areas (SCI, SAC, SPA, national)

EXPECTED RESULTS

- **Reinstatement in natural hydrological cycle**
- **Wetlands specific natural functions rehabilitation – hidrological, biogeochemical and ecological**
- **Hydrological and ecological equilibrium restoration**
- **Natural habitats extension as breeding areas for fish and birds species**
- **Traditional activities development: fishing, grazing, vegetal resources harvesting, ecotourism**

Rehabilitation Pilot Project of agricultural polders applied in Danube Delta



Abandoned
agricultural
polder



Breach
applied for
flooding



Successful of
reconstruction
works

PRIORITY 3

Reassessment of economic activities in agriculture/fish polders into a mixed concept economic and room for water

ACTIONS

- **Reappraise of Economic activities in polders based on cost/benefit ratio for investments in defense dykes maintaining and other existing hydrotechnical buildings**
- **Establishment of leaded flooding regime at maximum levels of Danube, which threaten defense systems**

PRIORITY 3

Reassessment of economic activities in agriculture/fish polders into a mixed concept economic and room for water

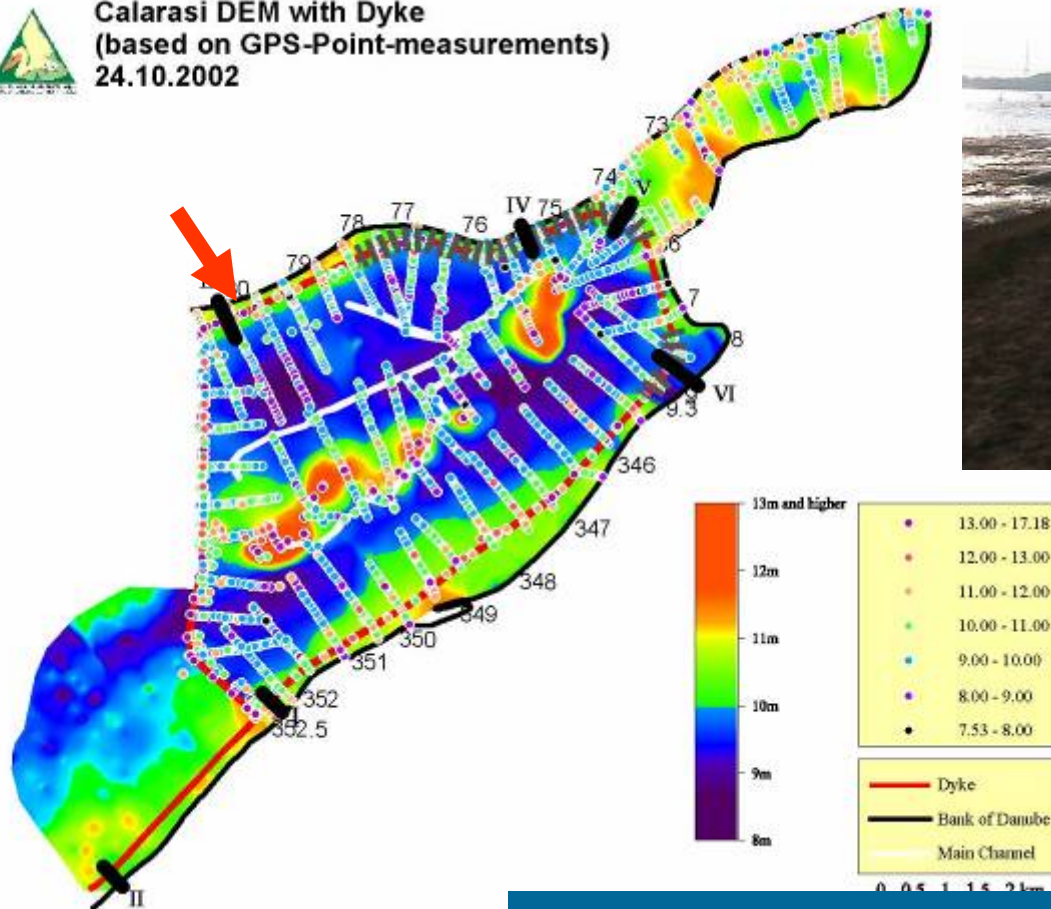
EXPECTED RESULTS

- Limitation of catastrophic floods effects
- Ecosystemic/adaptive Integrated Management

Călărași Răul Islet – april 2006



Calarasi DEM with Dyke
(based on GPS-Point-measurements)
24.10.2002



**Breach of flooding
in leaded regime**

• The first Project of
Ecological Reconstruction
in Danube Floodplain

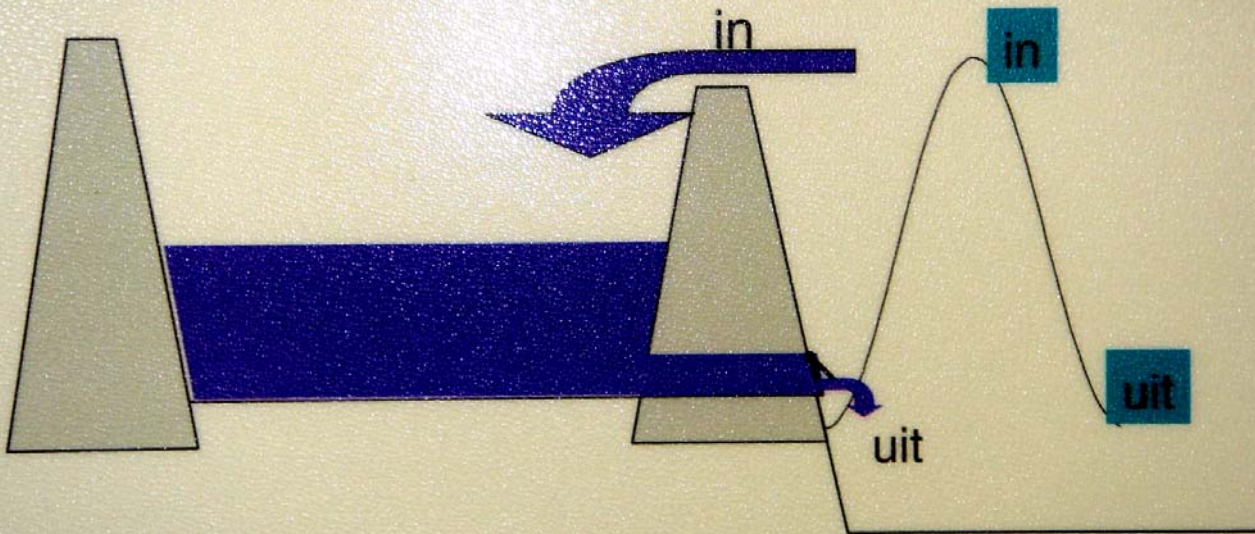


ringdijk

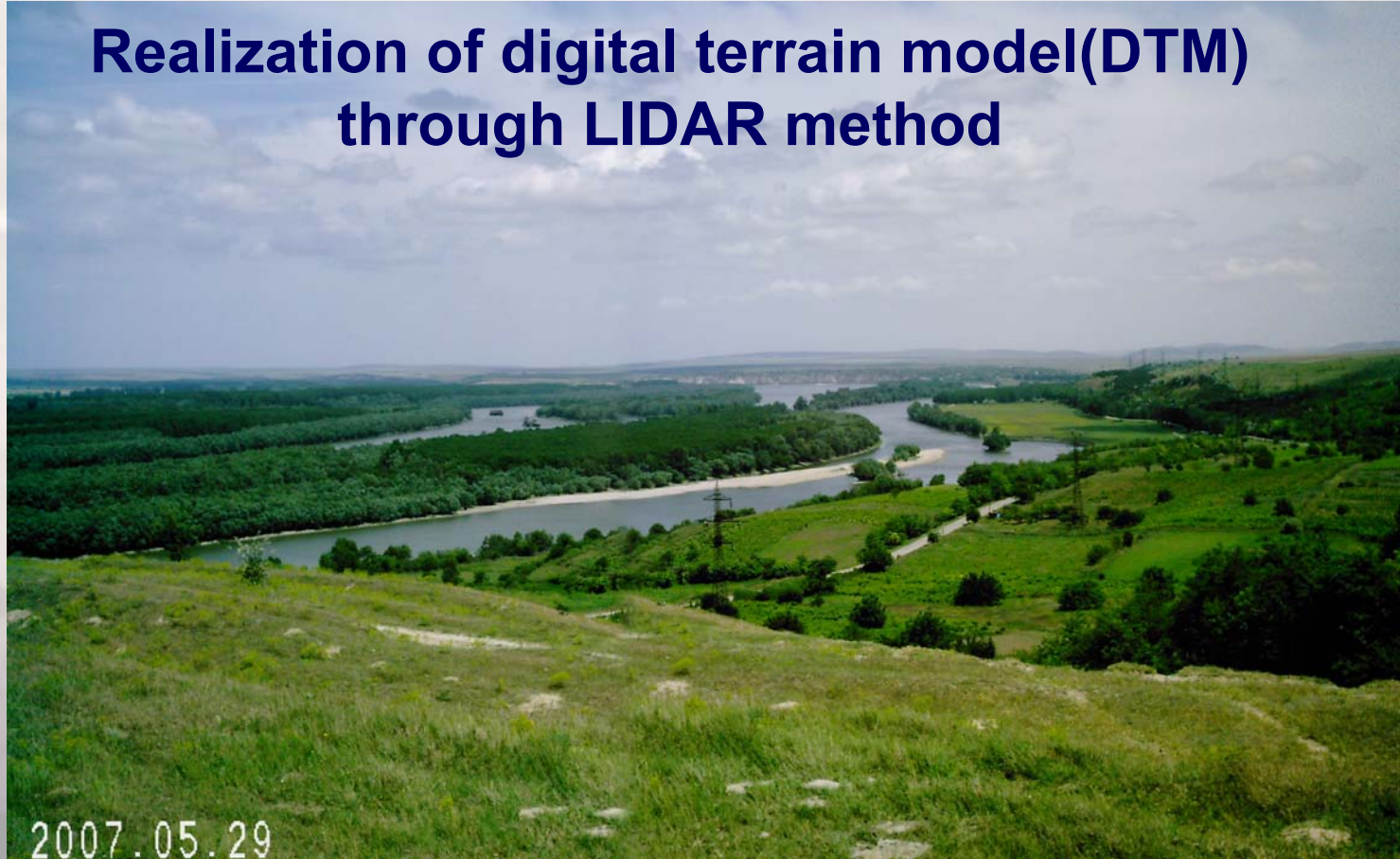
GOG

overloopdijk

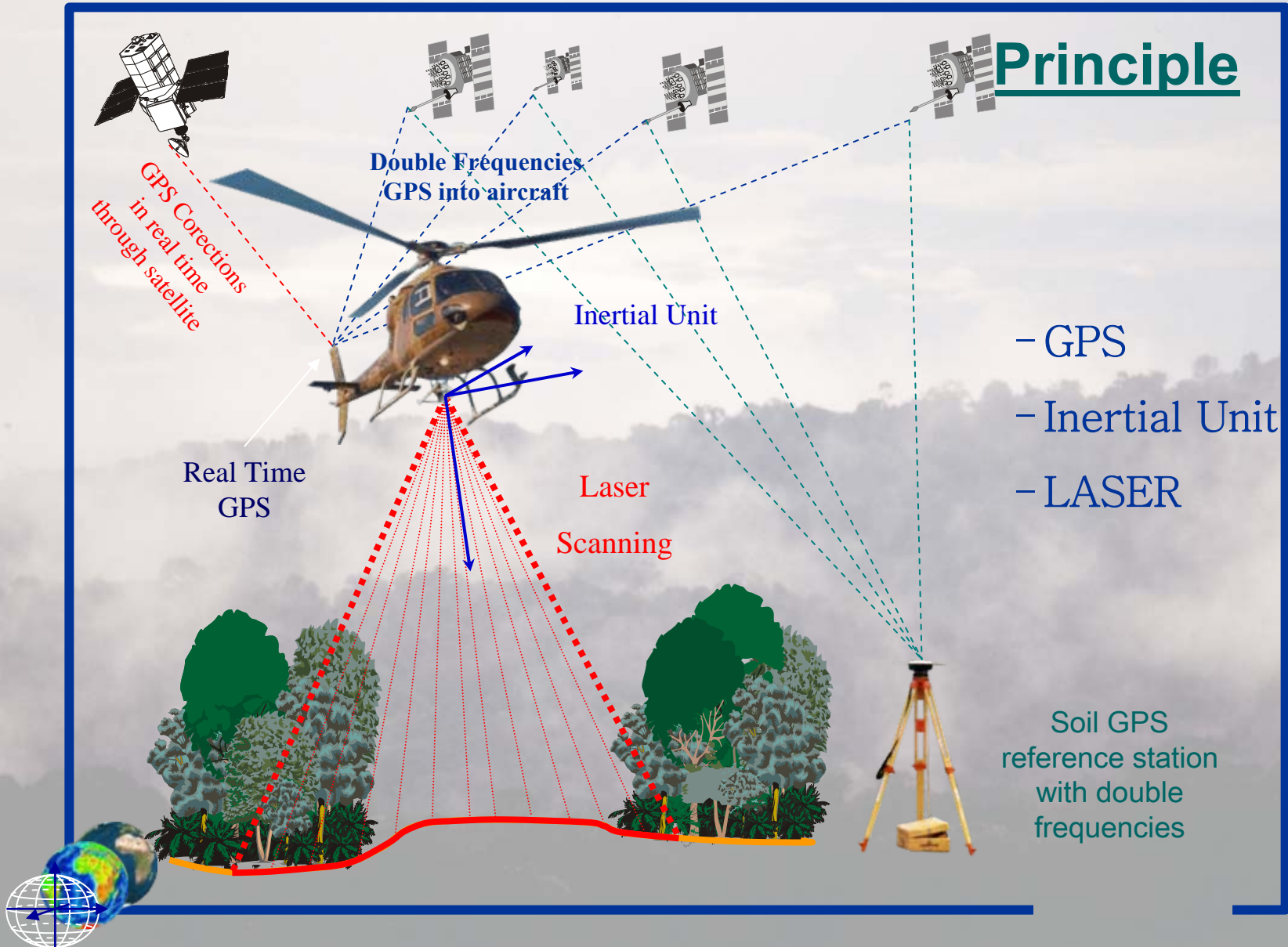
Schelde



Realization of digital terrain model(DTM) through LIDAR method

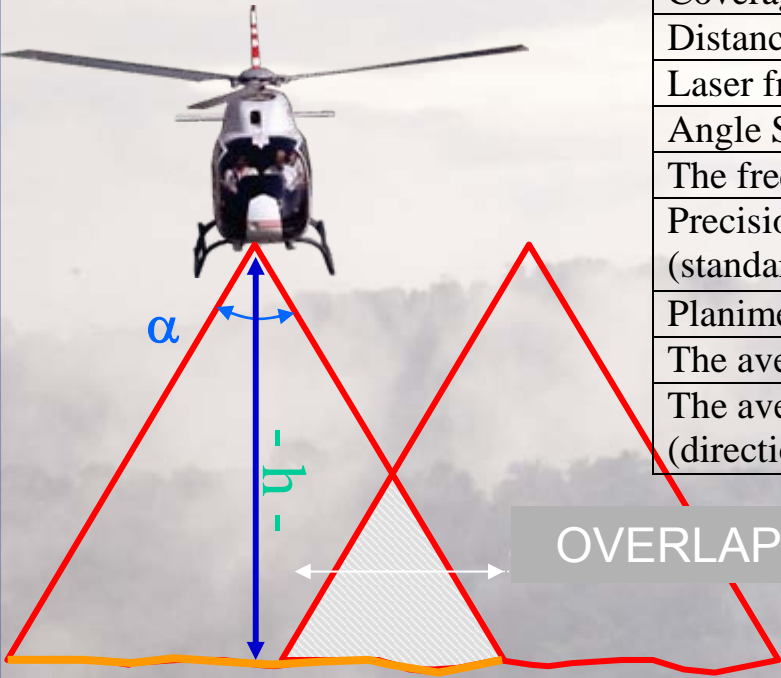


Principle

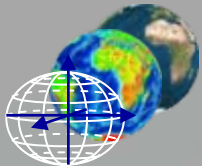


Parameters of flight

LIDAR Parameters	Valoare
Flight Altitude	450-500 m
Speed Flight	45 m/s, 90 kts
Bandwidth	520 m
Coverage side	20%
Distance inter-band	415 m
Laser frequency	65-130? kHz
Angle Scanning	60° (+/- 10°)
The frequency of scan	75 Hz
Precision laser altimetry points measured (standard-deviation)	5 cm
Planimetric precision laser total points measured	20 cm
The average density of laser points	2.8 pts / m ²
The average distance between the laser (direction of flight and vertical)	0,6 m



$$- 2 \times \tan(\alpha/2) \times h -$$

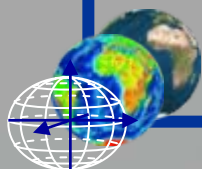
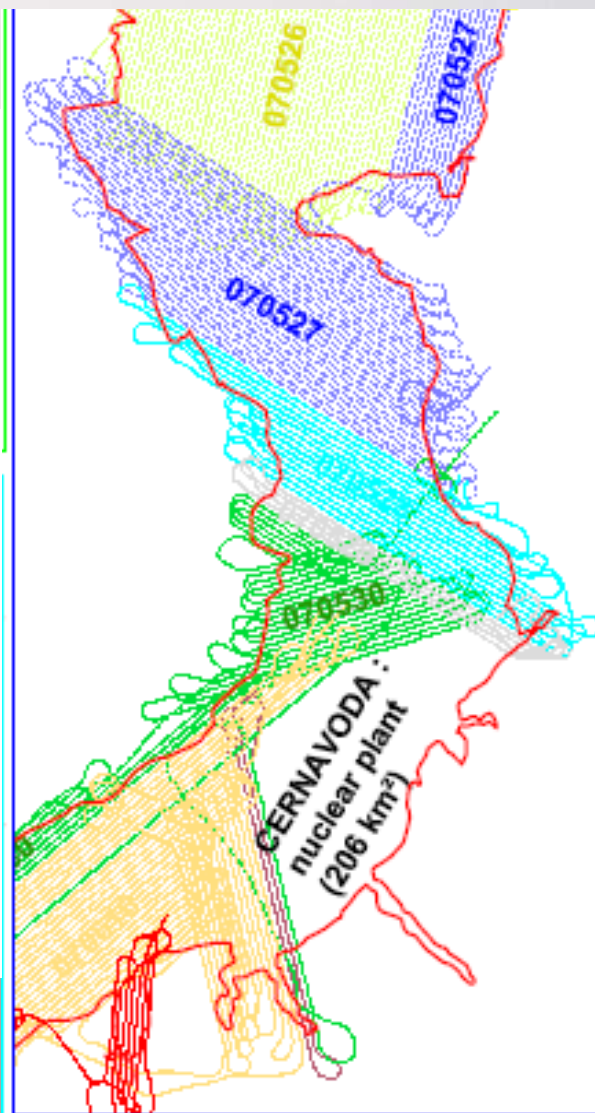
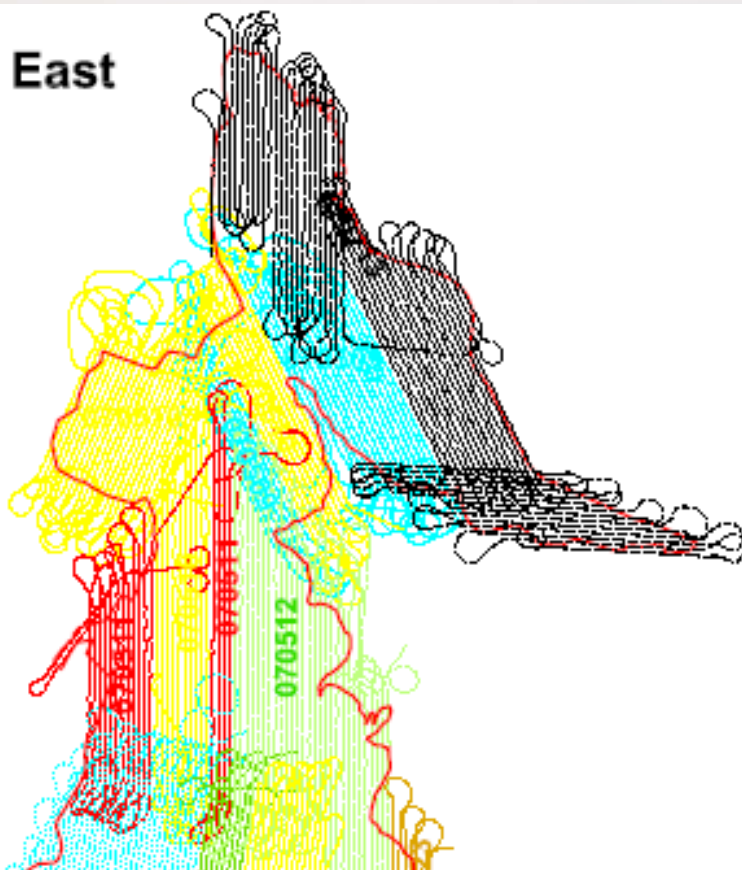


PARTENAVIA P3
 Owner : APEI sa
 Engine : 2 x LYCOMING 180 CV

Parameters of flight

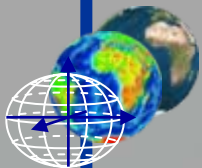
5

East

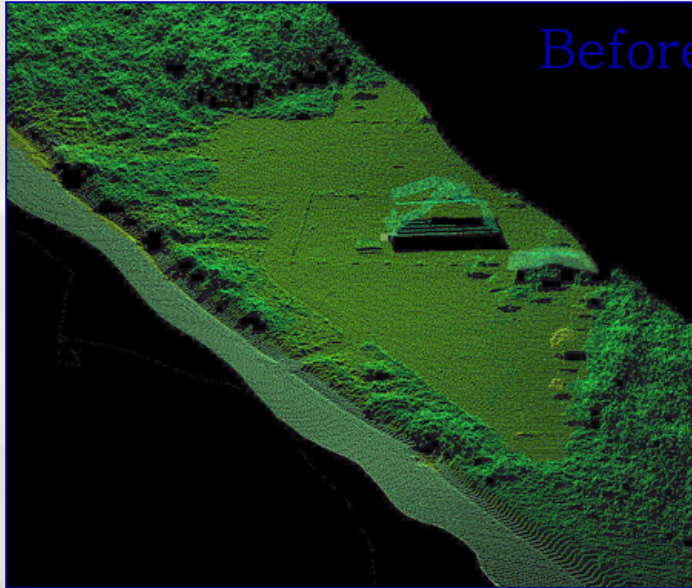


Inventory days of flight

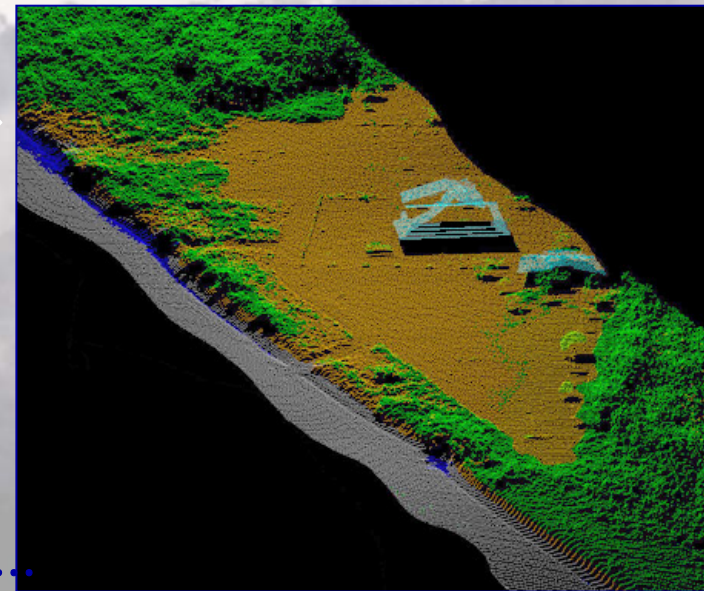
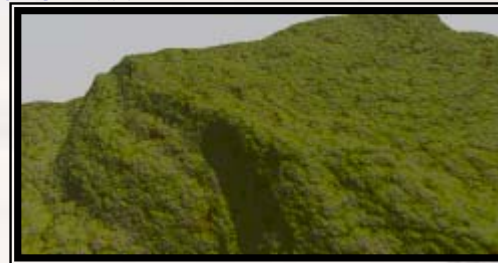
N° de vol	Date	Surface couverte (km ²)
1	070509	150.628
2	070510	255.700
3	070511	110.469
4	070512	216.560
5	070523	8.223
6	070524	102.879
7	070525	349.405
8	070526	347.905
9	070527	372.566
10	070528	114.698
11	070529	41.711
12	070530	139.605
13	070614	286.294
14	070616	329.779
15	070617	267.735
16	070619	246.752
17	070620	258.690
18	070621	277.564
19	070622	293.617
20	070623	155.090
21	070624	208.333
22	070703	220.800
23	070704	250.526
24	070706	318.283
25	070707	206.252
26	070713	289.720
27	070719	111.043
TOTAL :		5931 km²



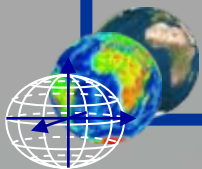
Extracting of topographical surface



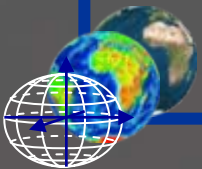
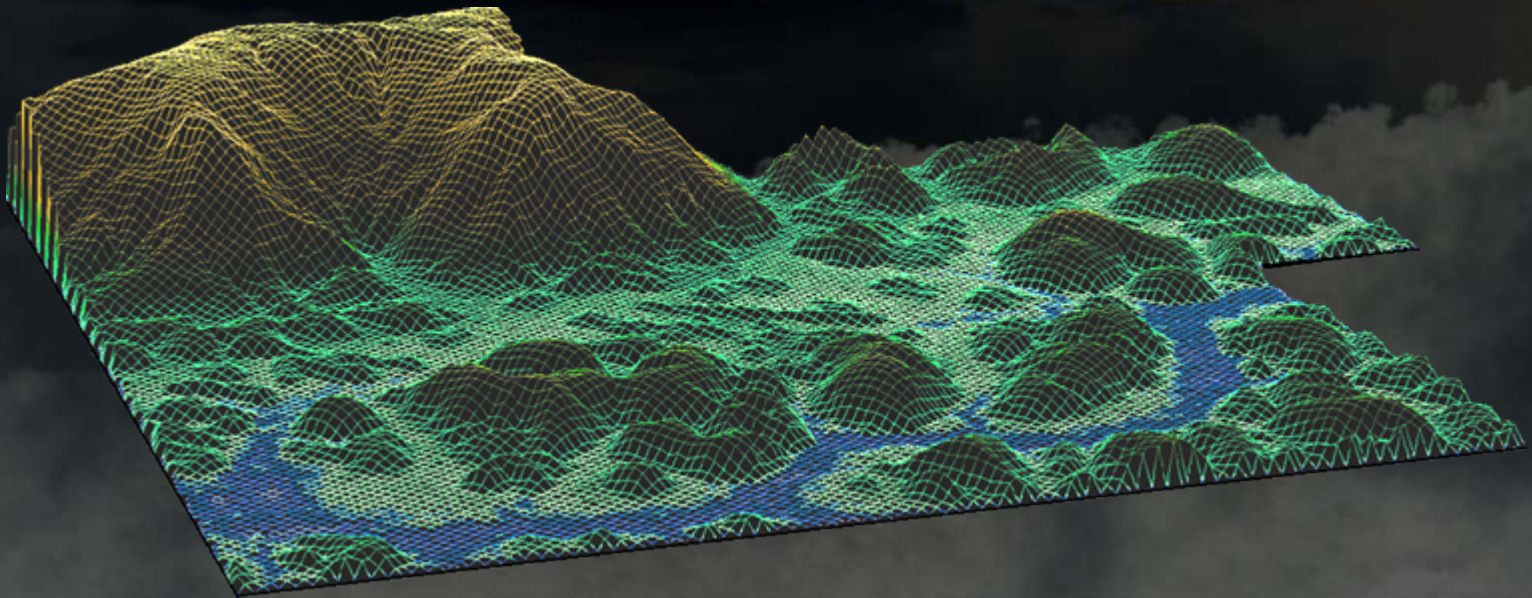
Before filtration...



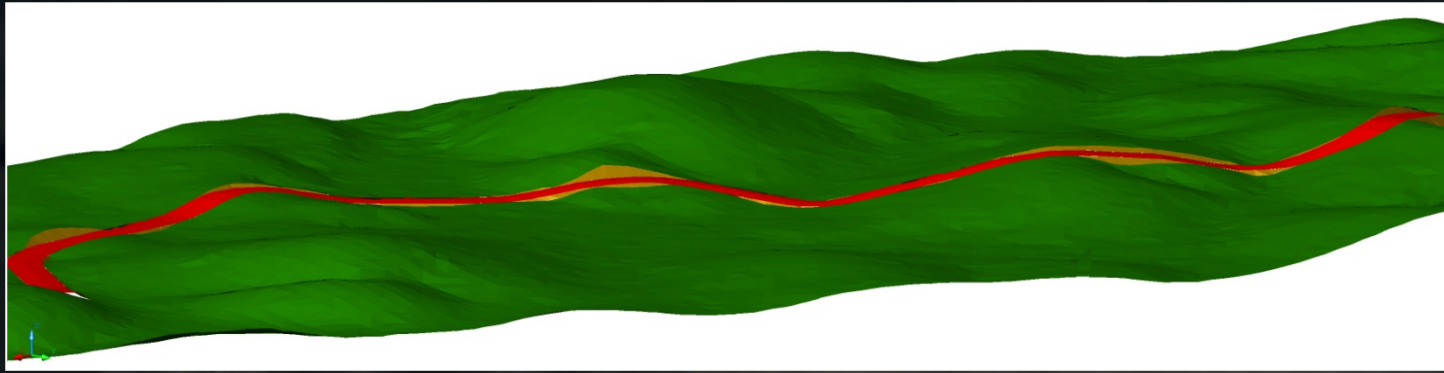
After...



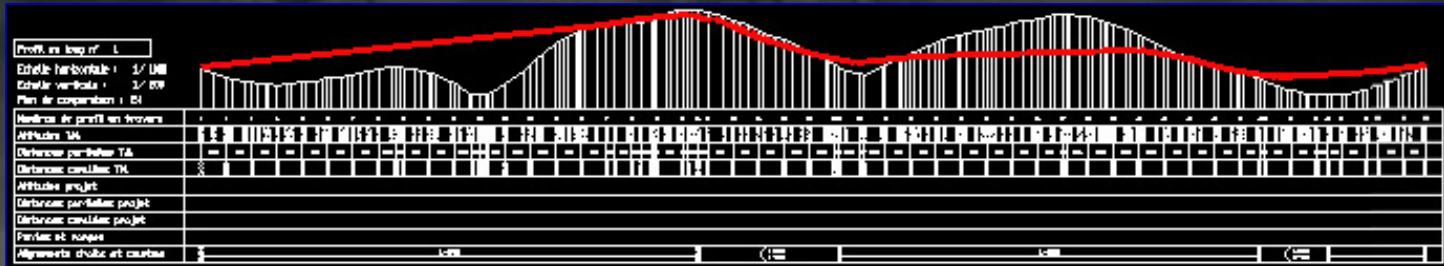
3D Modelling ...



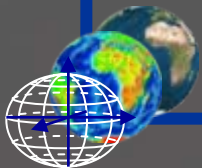
Arrangements Plans



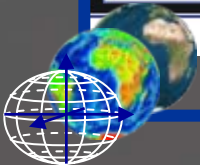
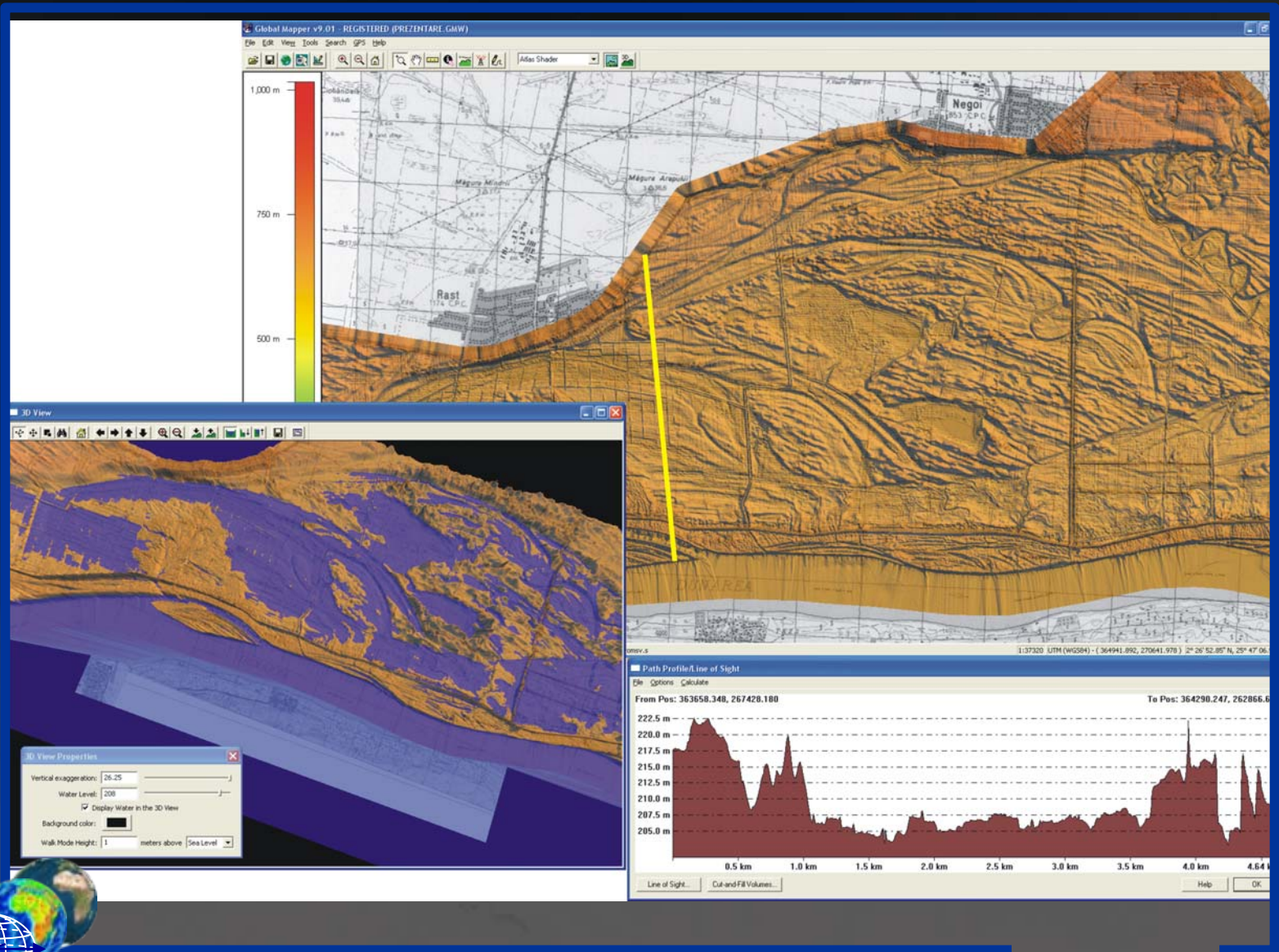
Schedule of linear project



Extracting of the longitudinal and transverse profiles



3D Modelling ...



Aircraft: BEECHCRAFT B200 King Air, APEI SA

Engines : 2 turbo PT6 A42 (potential 2500 h)

Ceiling : 30 000 Ft

Speed : 260 kts

Equipment : FR full/BR nav

– 2 trappes photo

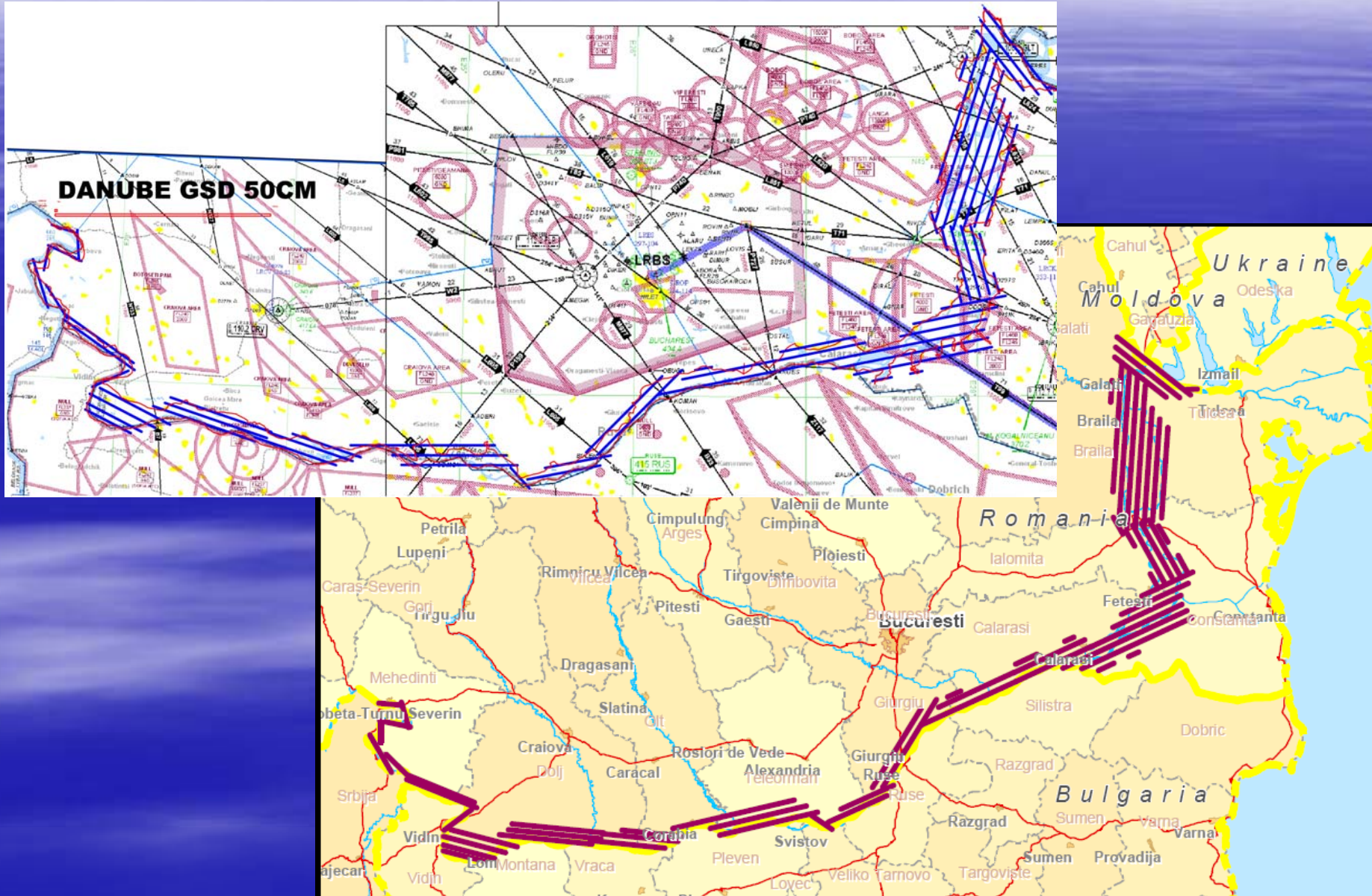
Autonomy : 5h 30 min

Airplane

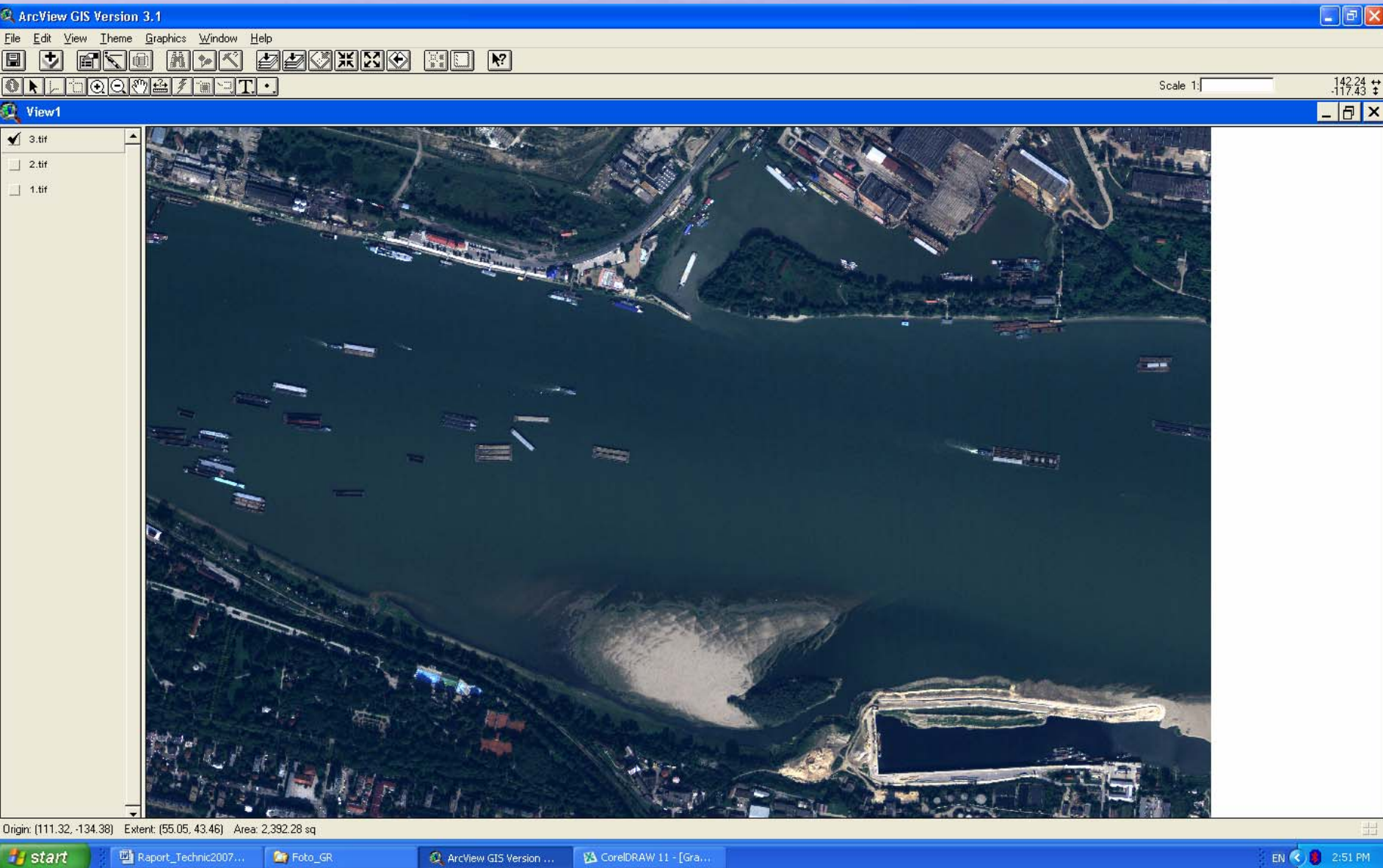
2 seats pilot / 4 seats passengers available-2 operators
in addition - photographic equipment



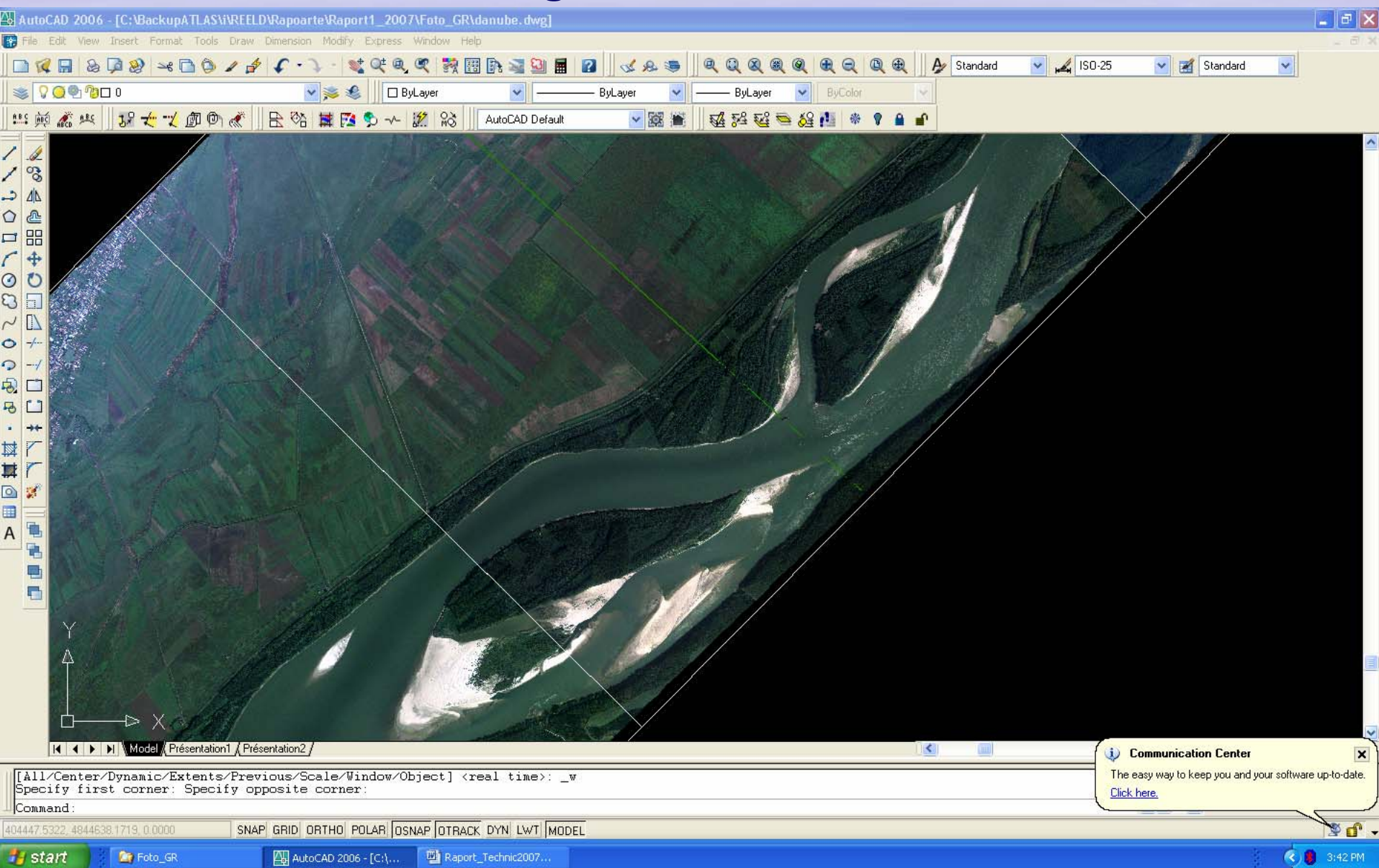
Flight plans along the Romanian sector of the Danube Floodplain



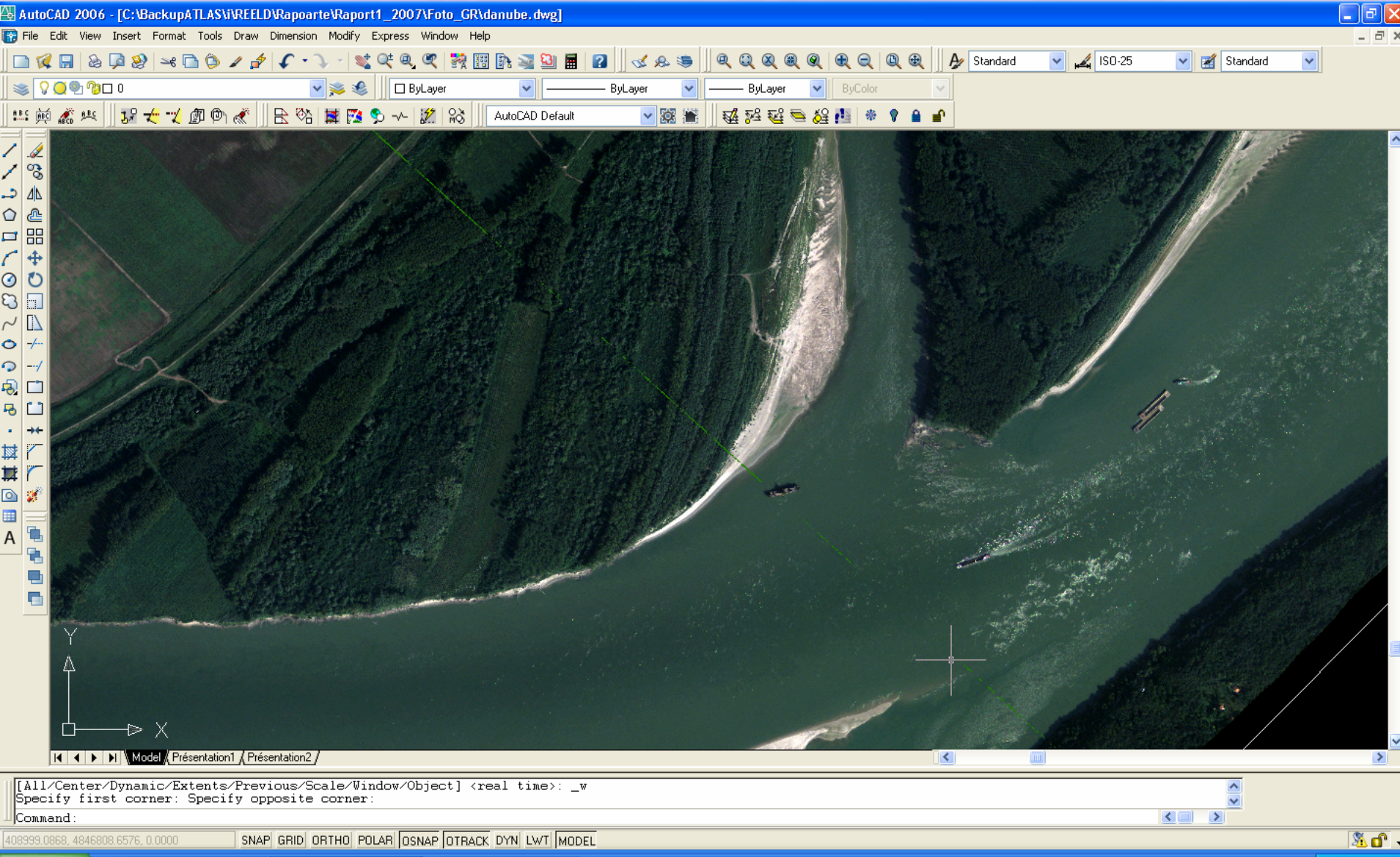
Alluvial deposits in the area of Port Ruse (Bulgaria).



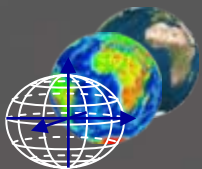
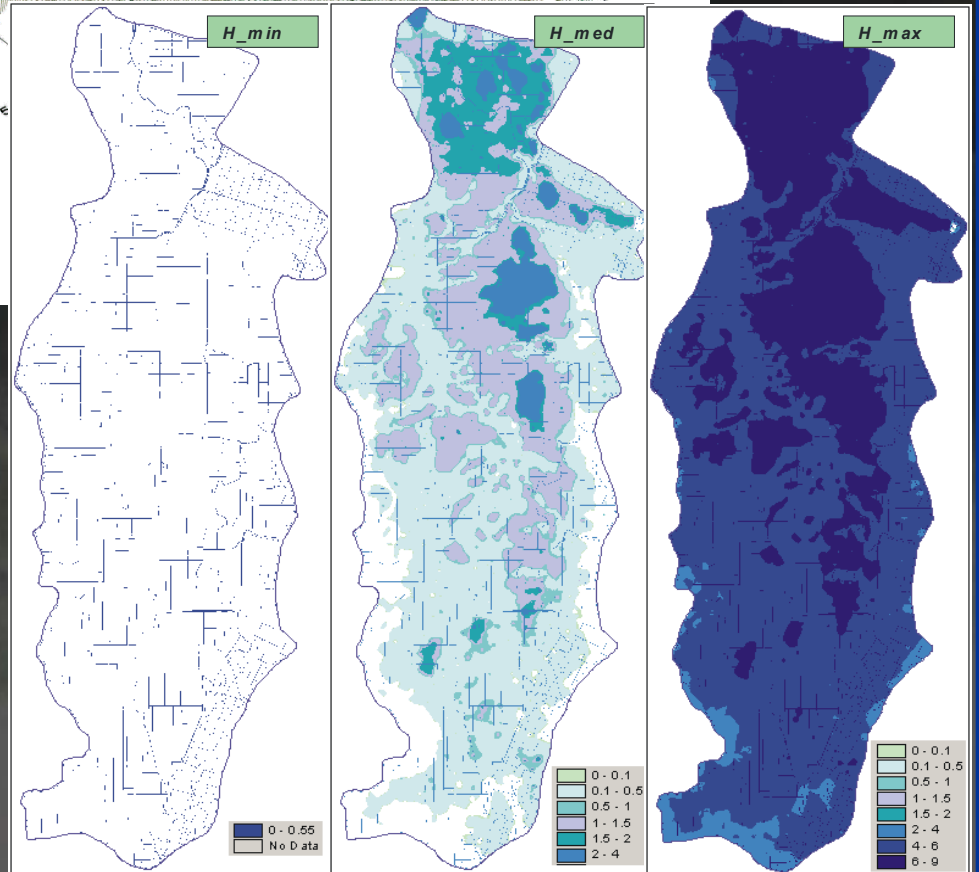
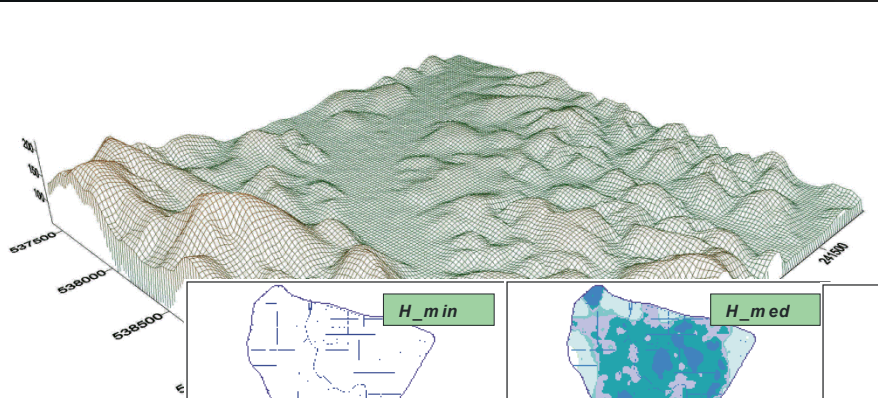
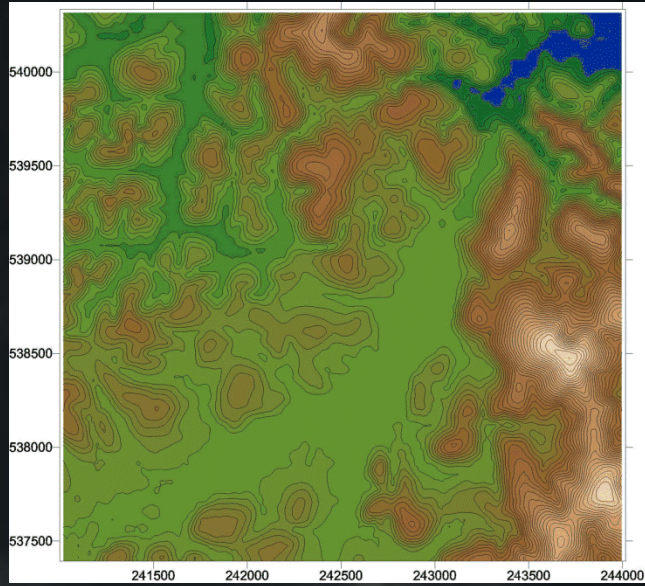
Cama-Dinu area in detail - can be highlighted areas with forest vegetation and land use.



Flights were conducted in September 2007, give the image of land use for this year and in same time the minimum level of water of the Danube and its tributaries in the areas of their influx mouths.



3D/Hydro Simulations



HYDRAULIC SCENARIOS

✓ **Danube Floodplain - Integral Restoration :**

- *flooding in natural regime* of all agricultural precincts;

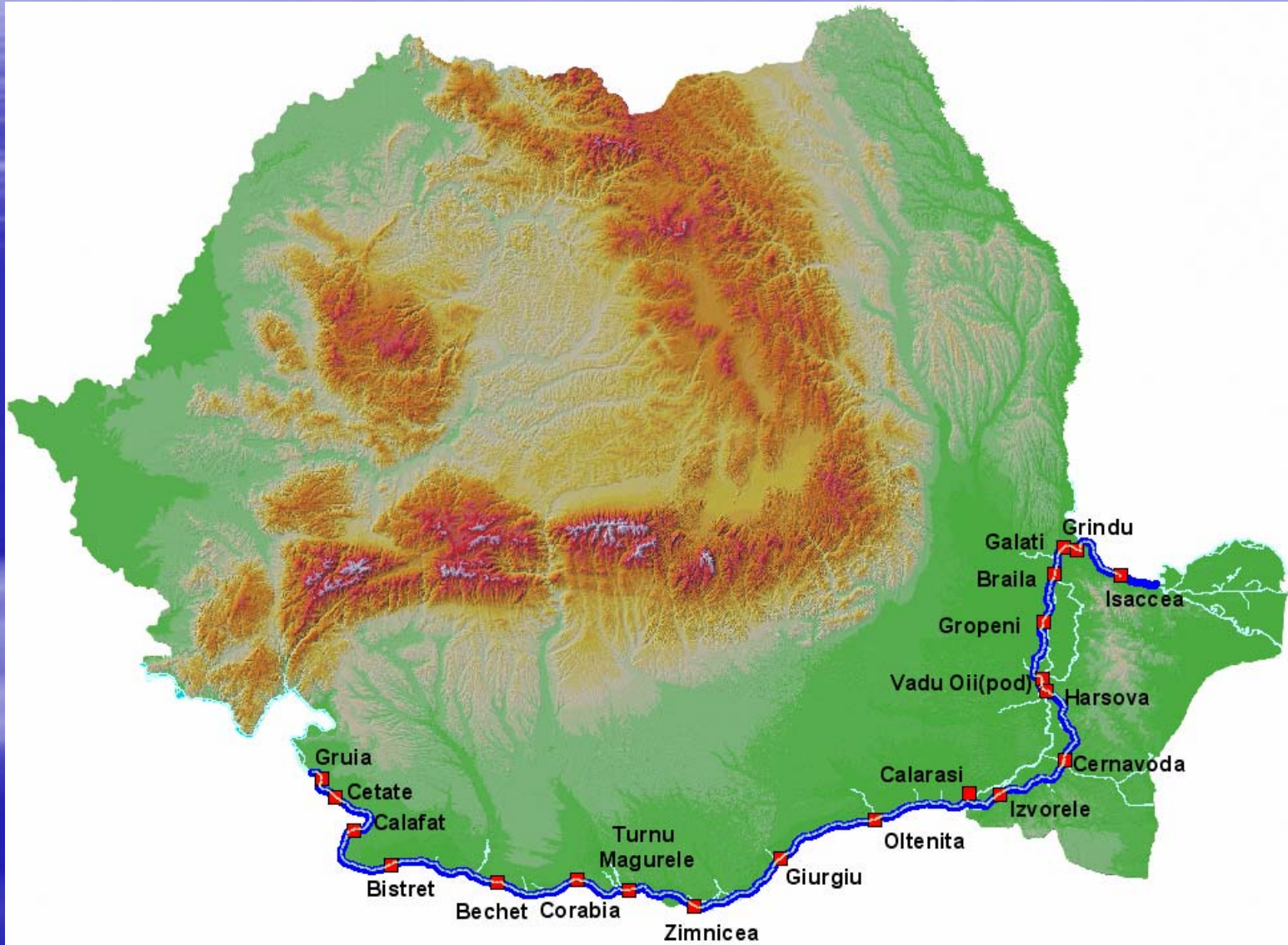
✓ **Combined Scenarios:**

- *restoration* of some agricultural precincts
(reintroduction into flood natural regime);

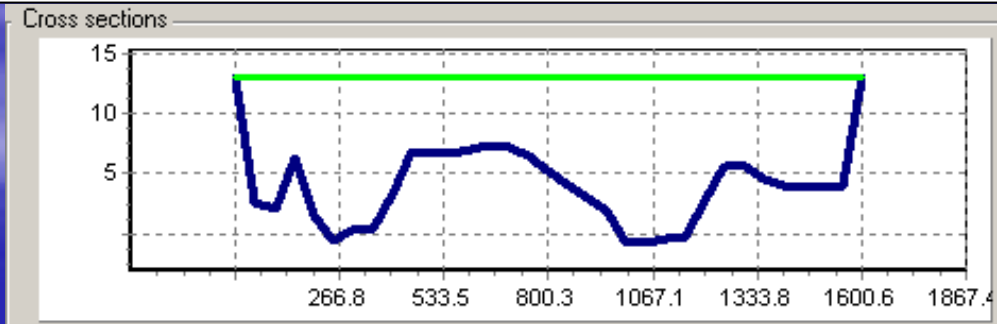
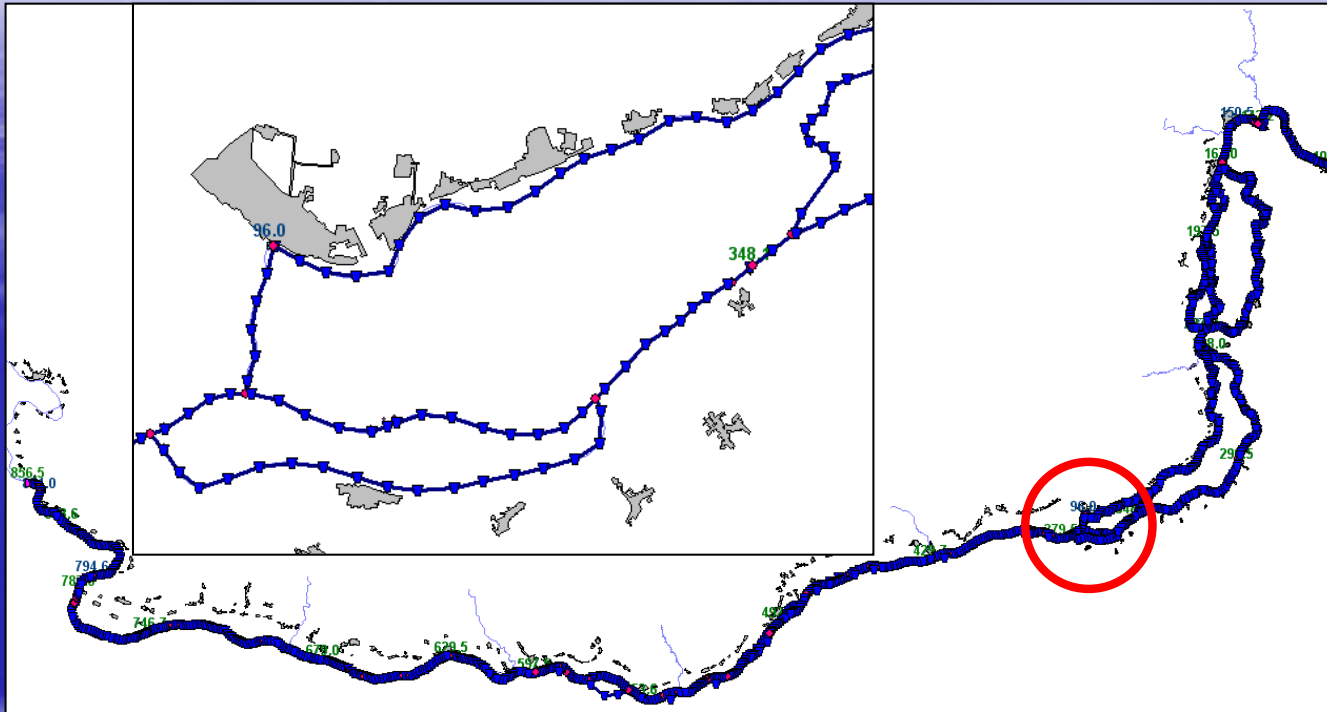
- *water storage* in some precincts for taking higher floods

Danube Hydraulic Model

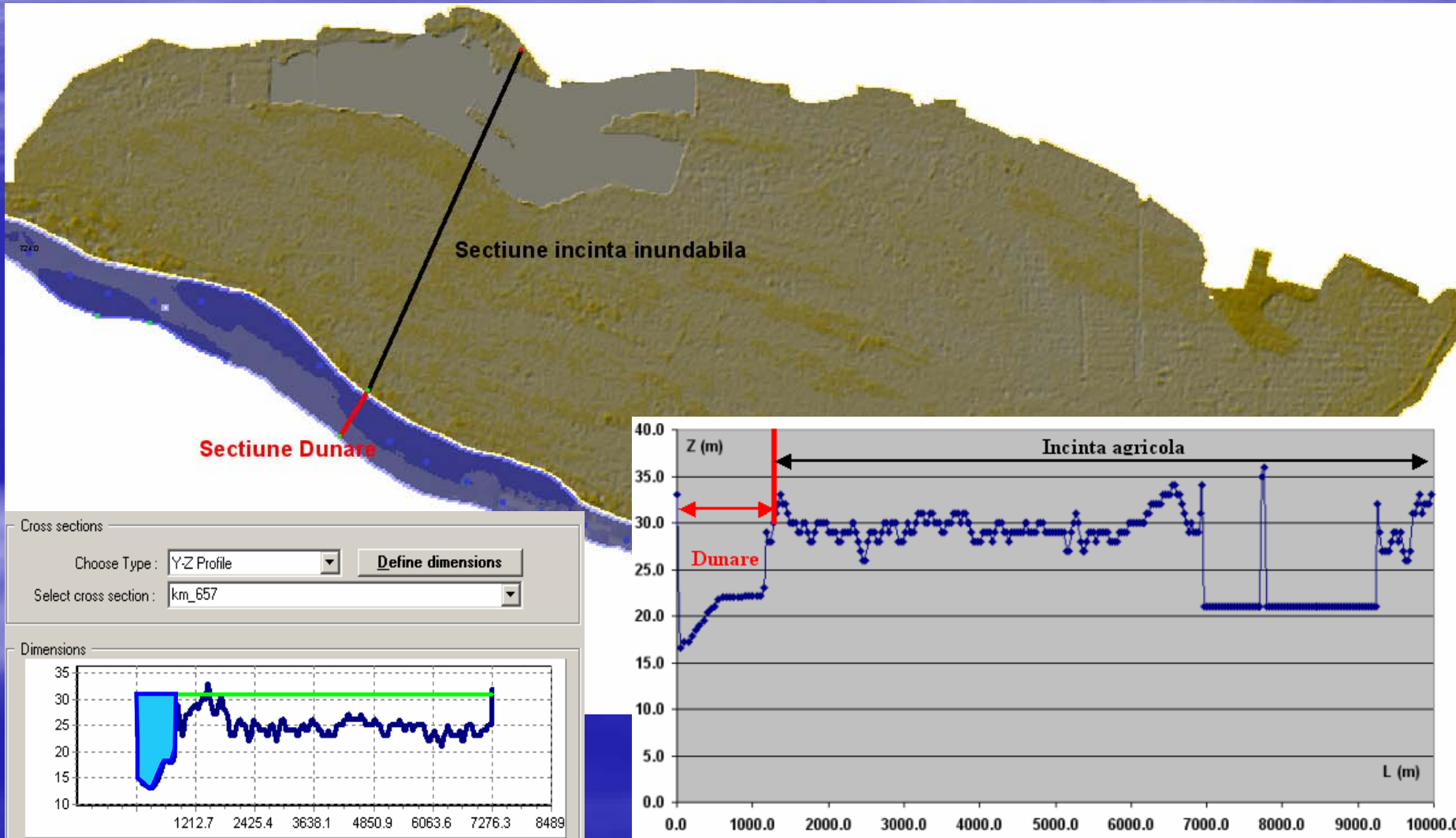
Hydraulic modeling follow the Danube track between
Gruia (km 851) and Isaccea (km 101)



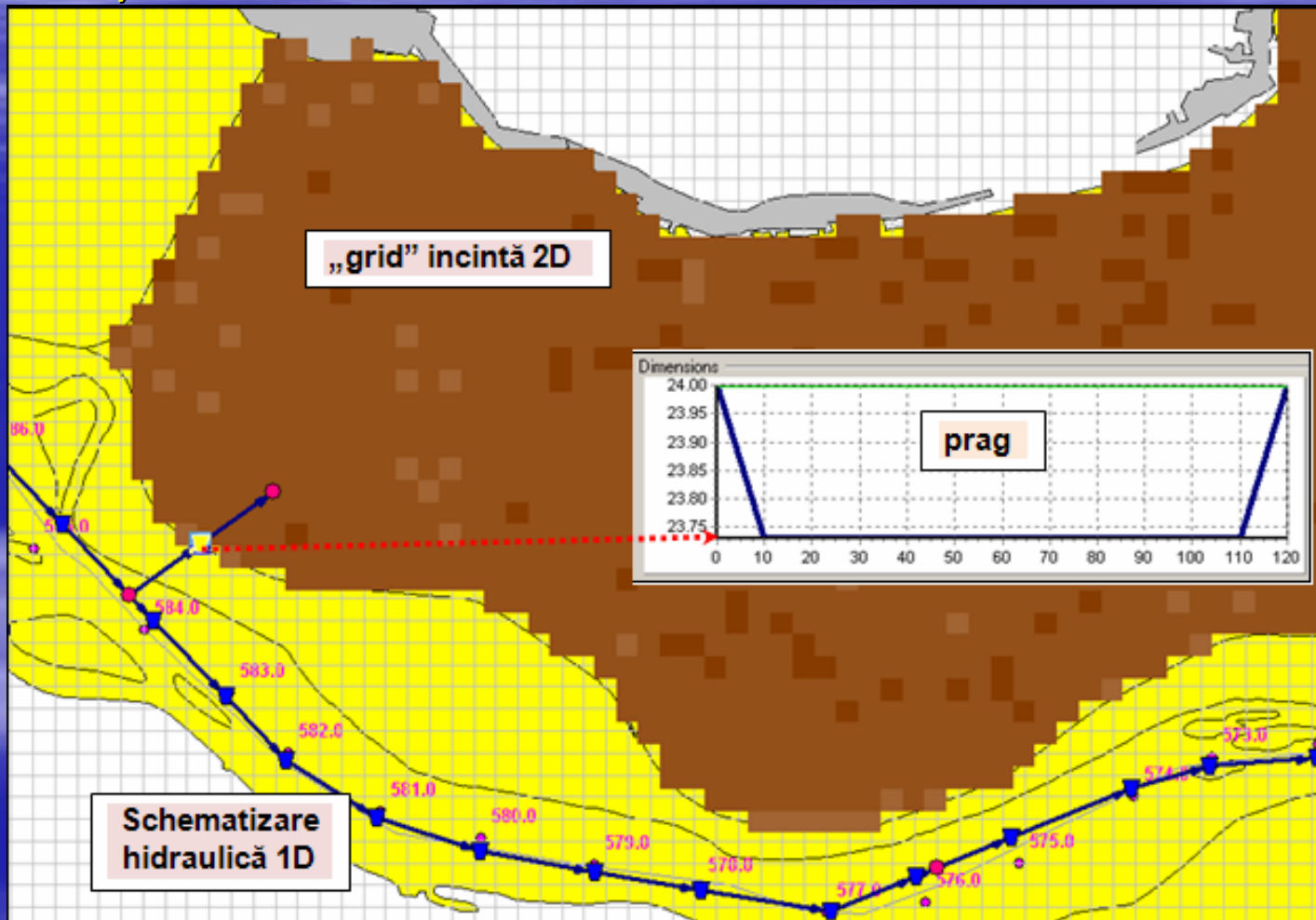
Hydraulic Schematization of Danube (Sobek 1D2D)



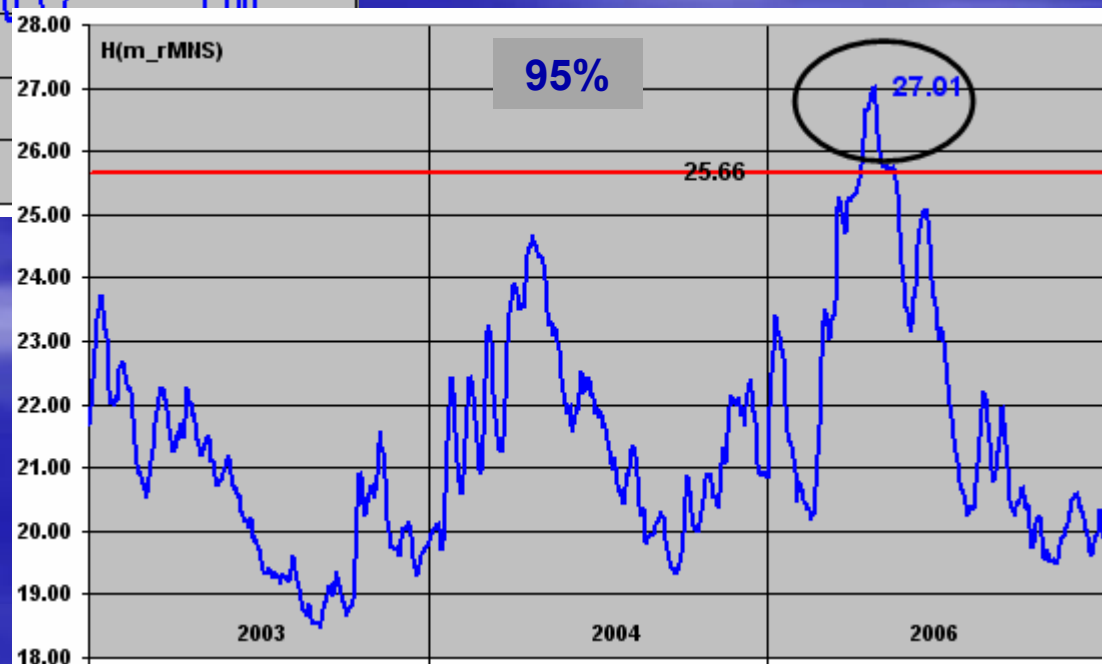
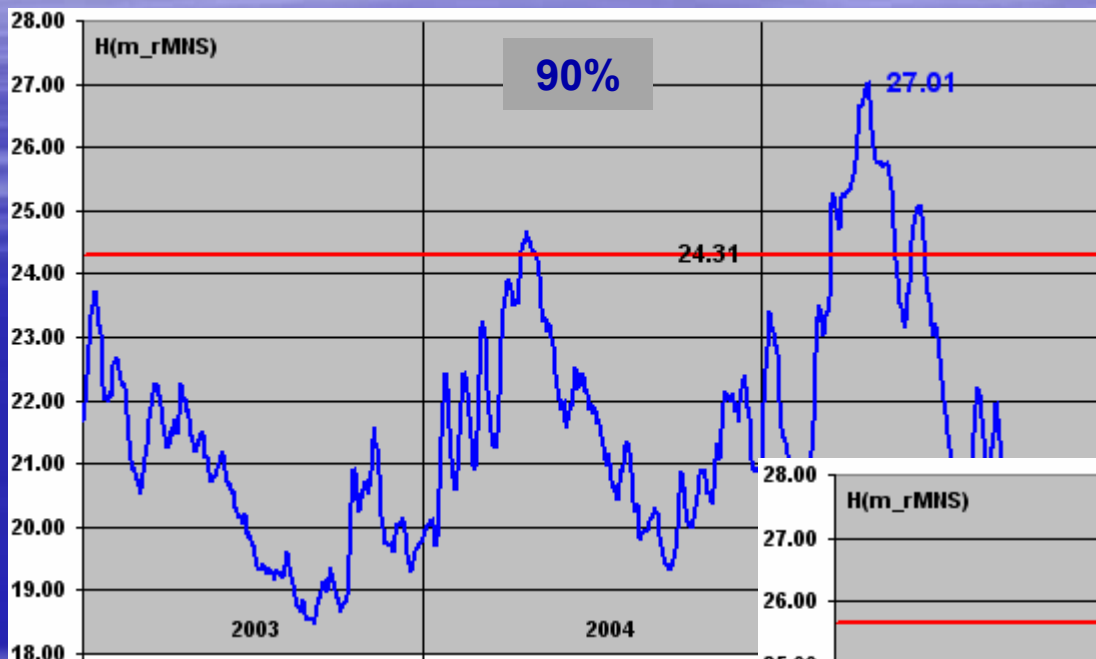
- In case of *natural regime flood*, full or partially, of agricultural precincts, flow section of Danube increase proportionally with agricultural precincts area reintroduced in flood natural regime.



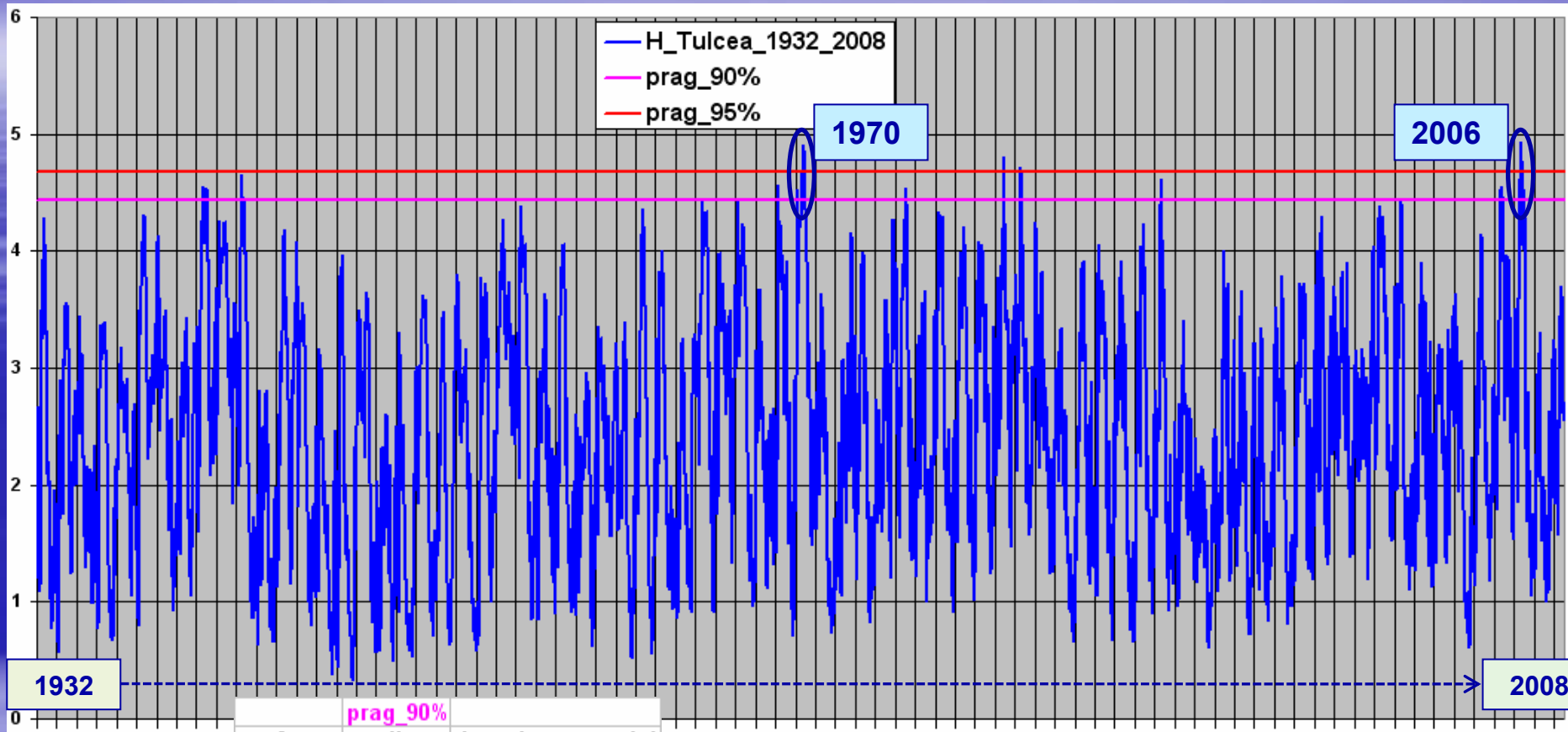
- In *water storage case* in some agricultural precincts for taking the top higher flood, the precinct flooding is made through “threshold” into perimetral dyke that permit precinct flooding when Danube levels exceeds its altitude (hydrological scenarios for altitudes and different sizes of threshold).



Hydrological scenarios were made for different variants of thresholds size, 50m and 100m. The threshold altitude was computed for a value which represent 95% and 90% from maximum value of Danube level in 2006.



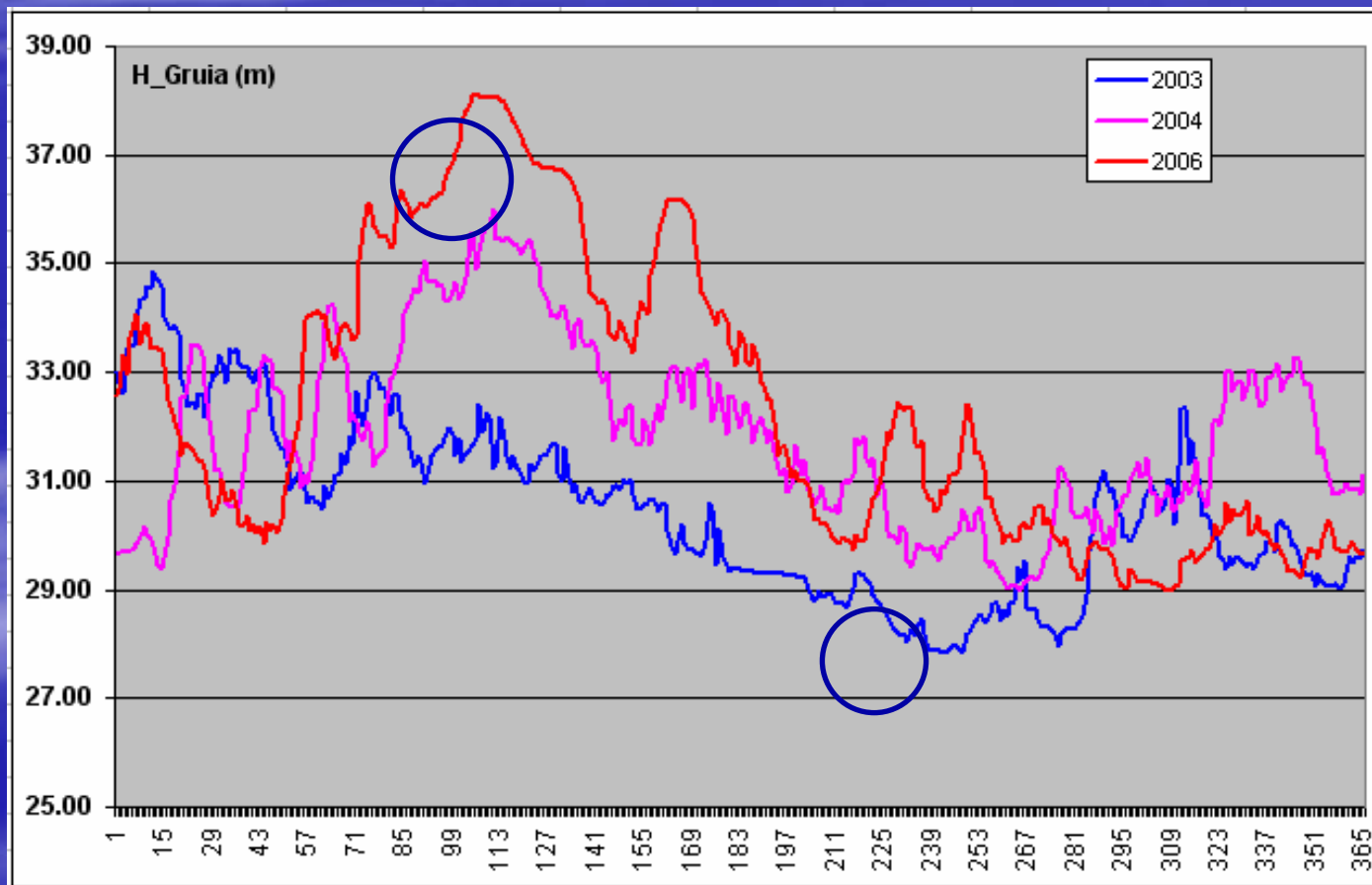
Water Storage into agricultural precincts does not happen every year, but only for the years with an extrem hydrological regime (level) of the Danube.



An	zile	depasirea pragului
1940	25	1 - 11 cm
1942	24	1 - 20 cm
1970	73	1 - 47 cm
1975	5	1 - 10 cm
1980	18	1 - 12 cm
1981	25	1 - 27 cm
1988	18	1 - 18 cm
2005	33	1 - 11 cm
2006	70	1 - 49cm
total	291	

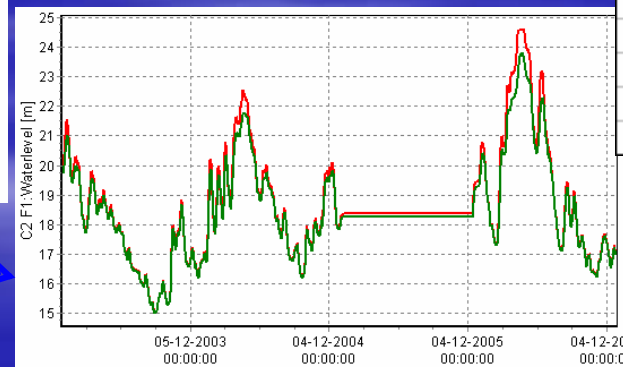
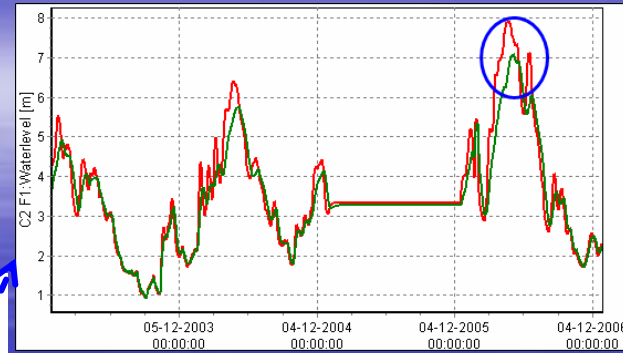
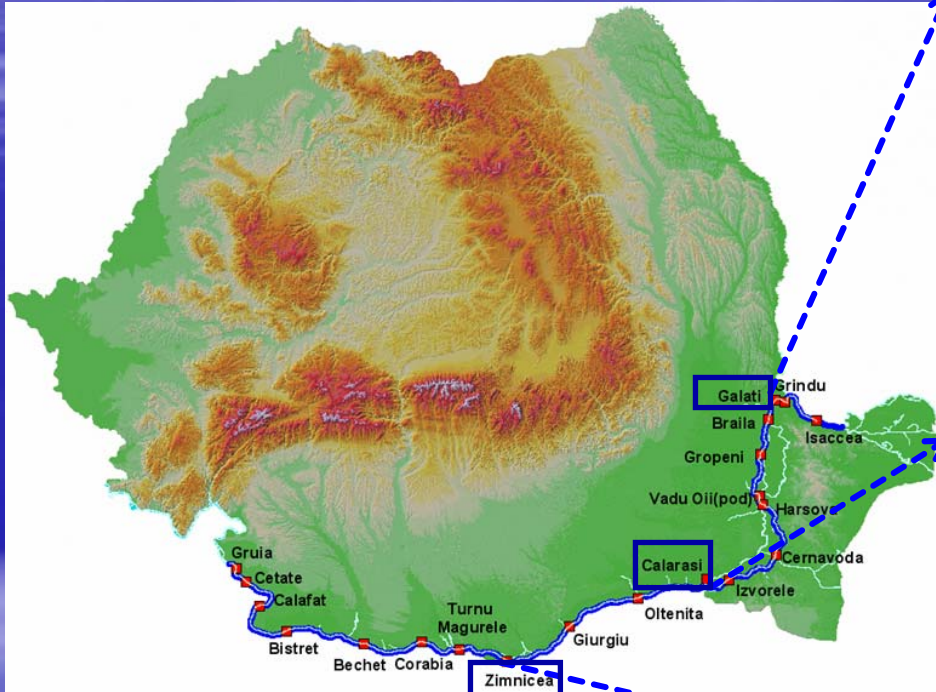
An	zile	depasirea pragului
1970	39	1 - 23 cm
1980	9	1 - 12 cm
1981	6	2 - 3 cm
2006	28	1 - 25 cm
total	82	

- The Hydraulic Model “feeds” at input with the discharge from Gruia Station and at exit follows the water level at Isacceca station;
- The running and calibration of the Hydraulic Model were made for representative hydrological periods: 2003 (minimum levels), 2004 (medium levels) and 2006 (maximum levels);
- The calibration of the Hydraulic Model was made using the series of levels and debits of hydrometric stations between Gruia and Isacceca.



Decreasing of Danube top higher level through flooding in natural regime of agricultural precincts

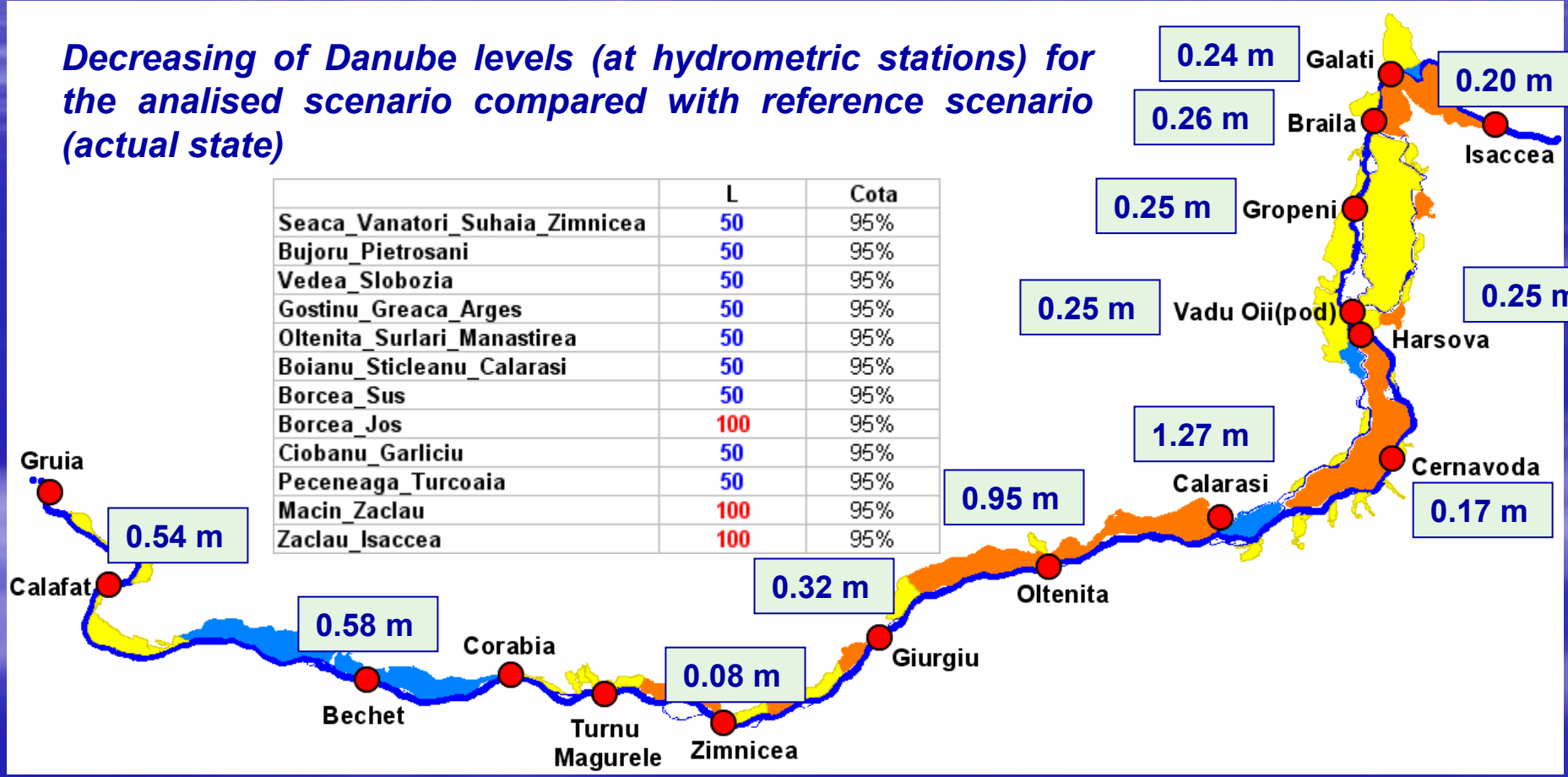
— **Real situation**
 — **Natural flooding**



Calafat	1.41
Bechet	1.44
Corabia	1.01
Tr.Magurele	1.38
Zimnicea	1.52
Giurgiu	2.34
Oltenita	3.13
Calarasi	2.95
Cernavoda	2.72
Vadul Oii	2.31
Gropeni	2.11
Braila	1.81
Galati	1.56
Isaccea	0.61

Decreasing of Danube levels (at hydrometric stations) for the analysed scenario compared with reference scenario (actual state)

	L	Cota
Seaca_Vanatori_Suhaia_Zimnicea	50	95%
Bujoru_Pietrosani	50	95%
Vedea_Slobozia	50	95%
Gostinu_Greaca_Arges	50	95%
Oltenita_Surlari_Manastirea	50	95%
Boianu_Sticleanu_Calarasi	50	95%
Borcea_Sus	50	95%
Borcea_Jos	100	95%
Ciobanu_Garliciu	50	95%
Peceneaga_Turcoaia	50	95%
Macin_Zaclau	100	95%
Zaclau_Isaccea	100	95%

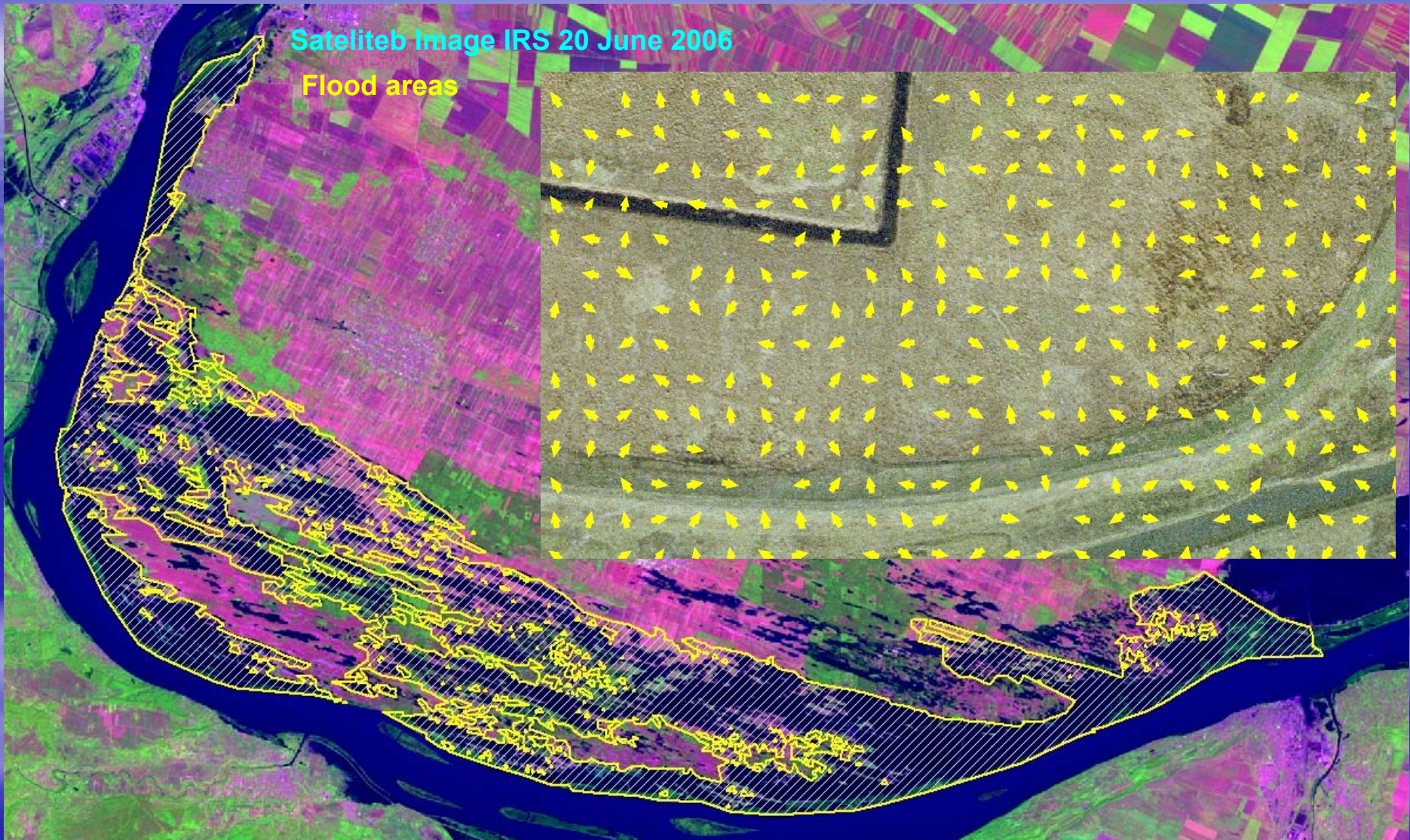


Calafat Area Flooding



Satellite Image IRS 20 June 2006

Flood areas



Suitable precincts flooding for water storage (5 aprilie – 20 mai 2006)



Water
depth (m)

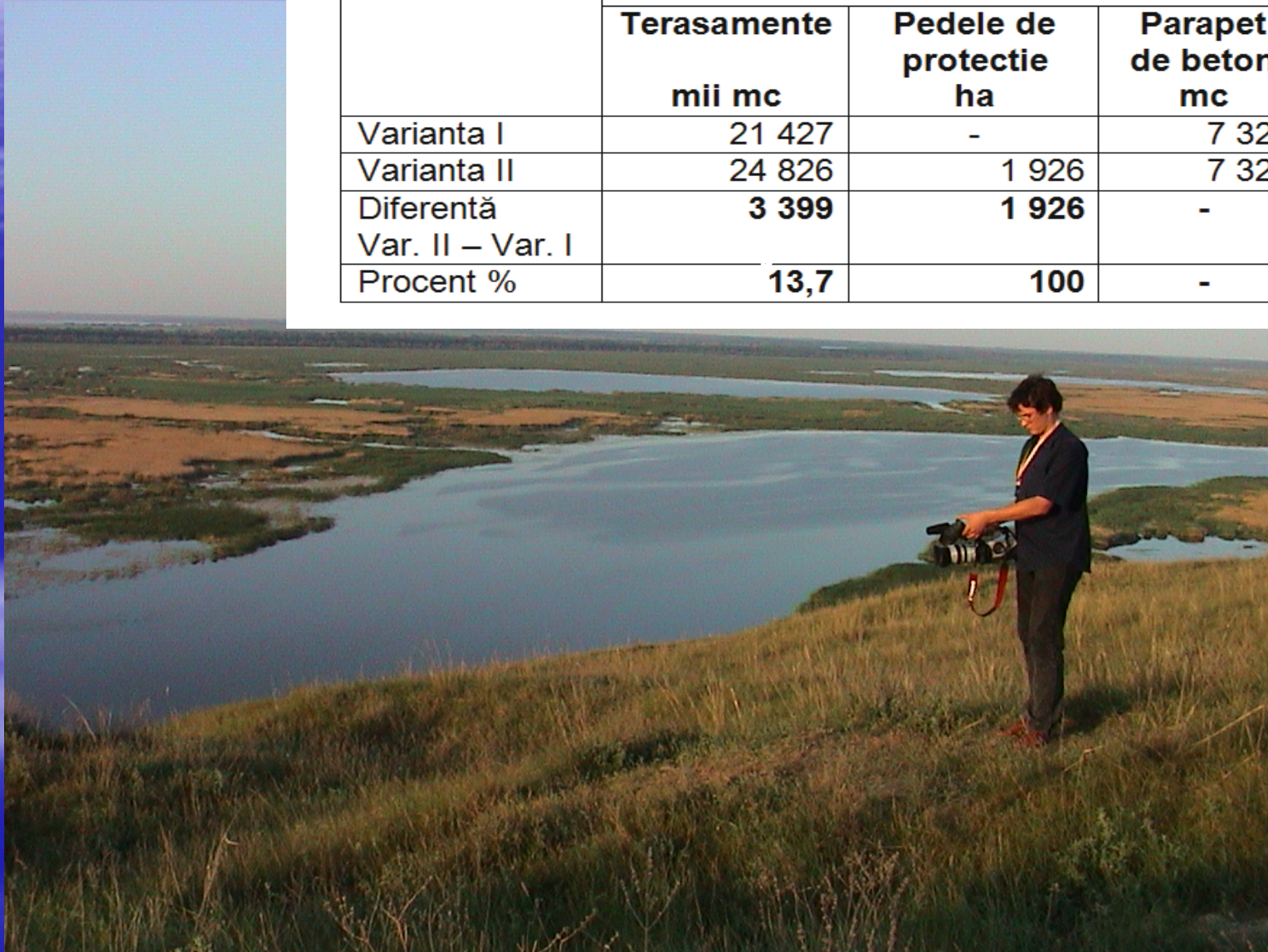
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 1.5
1.5 - 2
2 - 2.5

- **Rethinking the lines of defense**

- **It was analyzed a number of 172 settlements in which 87 are wholly or partly flooded, being located in 26 precincts (7 many precincts have 1%, 2% and 5%, 5 precincts 10% insurance)**
 - **Variants of work:**
 - Variant I - rehabilitation of existing dykes to new insurance**
 - Variant II - defending individual localities by surrounding dykes into head the high terrace or perimeter dykes.**

Comparison table with the volume of works and estimations for Variant I and Variant II

Varianta	Volum de lucrări			Evaluări mii lei
	Terasamente mii mc	Pedele de protecție ha	Parapet de beton mc	
Varianta I	21 427	-	7 320	369 789
Varianta II	24 826	1 926	7 320	847 144
Diferență Var. II – Var. I	3 399	1 926	-	447 355
Procent %	13,7	100	-	52,8



Multicriterial model of socio-economic analysis

- **The general framework of socio-economic analysis**
 - The current level of economic and social welfare
 - Pressures on natural capital
 - Forecast level of economic and social welfare
 - Courses of action to achieve the target of economic and social welfare

- **Specific framework of socio-economic analyze**
 - The resources provided by Danube Floodplain
 - The elasticity of economic and social welfare in light of the resources provided by Danube Floodplain
 - Projects necessary to achieve a certain level of economic well-being
 - Cost – Benefit Analyze.

- **Spatial scale analysis**
 - Homogeneous areas of economic point of view and also pressure on natural capital

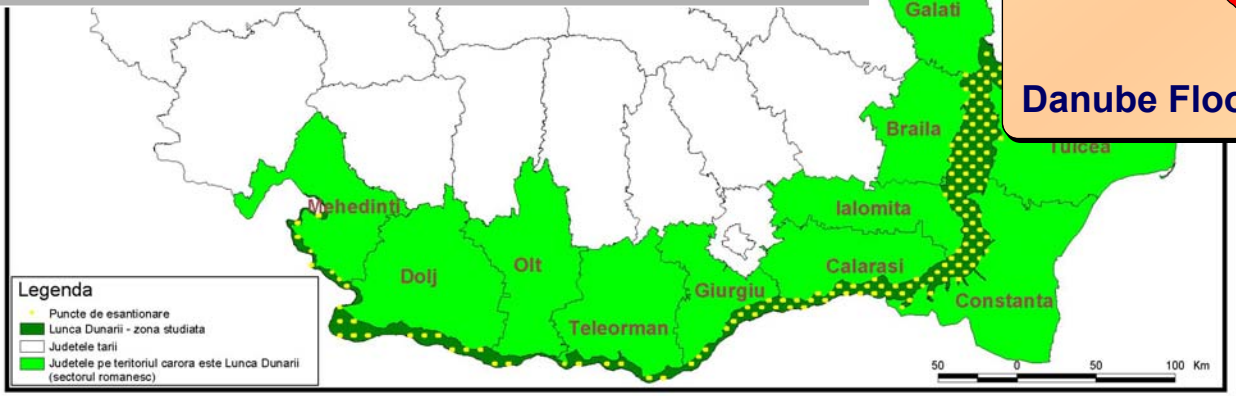
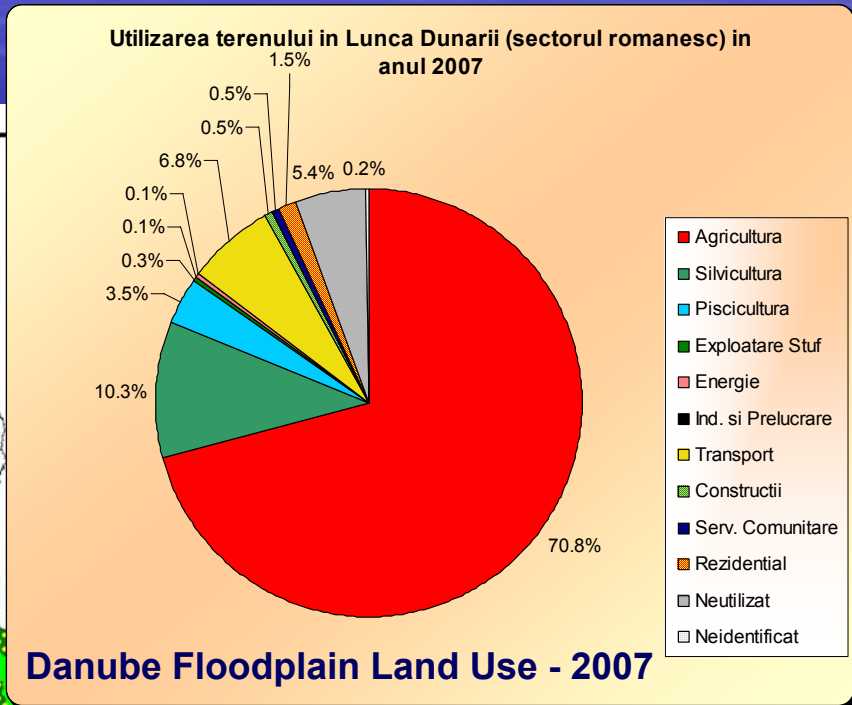
- **Motivations:**
 - possibilities of information
 - Establishing the criteria in relation to the horizon for the elaboration of scenarios

- **Objectives of socio-economic analyze**
 - Overall Objective: the integration of Danube Floodplain policy in the area of development strategy
 - Specific Objectives
 - Assessing of the social and economic activities performance
 - Request assessing of resources provided by Danube Floodplain
 - Measuring of social and economic welfare

- **Socio-economic analysis content**
 - Analysis of socio-economic structures
 - Analysis of socio-economic system metabolism
 - Analysis of efforts to conserve Danube Floodplain.

Land Use Analyze through LUCAS method (EuroSTAT) – Statistical survey regarding Land Use in Romanian Sector of Danube Floodplain

Use	2006		2007	
	TOTAL (Ha)	%	TOTAL (Ha)	%
Agriculture	442986	70.88	442784	70.85
Forestry	63024	10.08	64640	10.34
Fishculture	22018	3.52	22018	3.52
Reed Harvesting	2020	0.32	2020	0.32
Energy	808	0.13	808	0.13
Industries	404	0.06	404	0.06
Transport	43834	7.01	42218	6.76
Civil Engineering	3232	0.52	3232	0.52
Social Services	2828	0.45	2828	0.45
Residential	8484	1.36	9292	1.49
Nonuse	29290	4.69	33532	5.37
Unidentified	6060	0.97	1212	0.19
TOTAL	624988	100	624988	100



Defining of indices for evaluating the status of riparian landscapes in Danube Floodplain

LAND SEGREGATION INDEX

Județele din Lunca Dunării	Ag=Suprafața agricolă (ha) cu care intră în Lunca Dunării	A=Suprafața acvatică (ha) cu care intră în Lunca Dunării	P=populația totală estimată pentru suprafața din Lunca Dunării	Ag/P=ha agr./pers.	A/P=ha acvatic/pers.	I _{sf} =Ag/P-A/P
Braila	86052	13736	2543,4	33,83	5,40	28,43
Calarasi	81608	8484	9066,6	9,00	0,94	8,07
Constanta	4040	17776	1582,9	2,55	11,23	-8,68
Dolj	33936	6464	6271,7	5,41	1,03	4,38
Galati	3636	4266	20624,5	0,18	0,21	-0,03
Giurgiu	31512	2020	4972,3	6,34	0,41	5,93
Ialomita	36360	8888	3334	10,91	2,67	8,24
Mehedinti	9292	10504	2448,5	3,79	4,29	-0,49
Olt	15352	4923	854,6	17,96	5,76	12,20
Teleorman	22624	4444	1273,1	17,77	3,49	14,28
Tulcea	27876	9696	2206,8	12,63	4,39	8,24
Total Lunca Dunării	352288	82012	55178,4	10,94	3,08	7,87
Total România	9286671	915981	21680974	0,4	0,04	0,39

- $I_{sf} = Ag/P - A/P$,
 I_{sf} = Land Segregation Index,
 Ag = Agricultural Land Surface (ha)
 A = Aquatic area (ha)
 P = Total Population

Defining of indices for evaluating the status of riparian landscapes in Danube Floodplain

PRODUCTIVITY INDEX

K=cultivated agriculture surface

Y=Total Production (RON)

Productivity INDEX (RON/ha)

Județele din Lunca Dunării	K= suprafața agricolă cultivată	Y=producția totală (RON)	Indicele de productivitate (RON/ha)
Brăila	80190	206827722	2579,2
Călărași	66420	74742988	1125,3
Constanța	1620	1369575	845,4
Dolj	15390	19771785	1284,7
Galați	3645	4562838	1251,8
Giurgiu	26730	50631939	1894,2
Ialomița	30780	56392893	1832,1
Mehedinți	6885	7587000	1102,0
Teleorman	15795	23303070	1475,3
Tulcea	25920	31289301	1207,1
Total Lunca Dunării	25920	31289301	1207,1
Total România	5994125	11841464562	1975,5

- Agricultural productivity = Y/K**
 Y = total production (expressed in RON)
 K (capital) = agricultural area as a space dimension (expressed în ha)

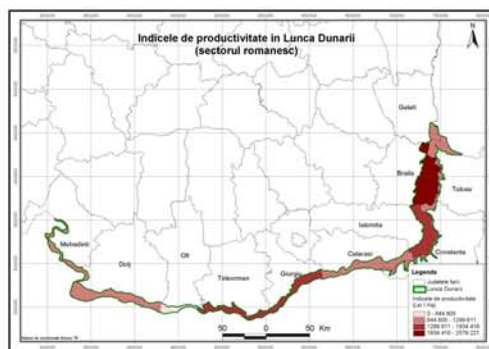
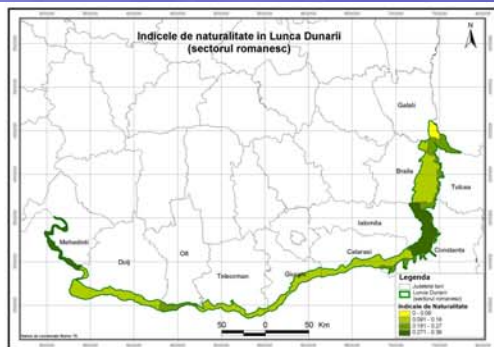
Balance and economic-ecological efficiency (energetic) of Socio-Economic Systems from the Danube Floodplain

The net result of the compared designed situation– Insula Mare a Brăilei

1	Indicators	Units	Multifunctional (Wetland)			Monofunctional (agroecosystem)
			min	med	max	
1	Flooding degree		min	med	max	-
2	Average of water depth	m	0,30	0,88	5,8	-
3	Retain of Water volume	Mil m ³	7,2	544,5	4205	-
4	Economical Value	Euro/ha funciar	625,8	1250,7	1365	755,3
5	Expenses	Euro/ha funciar	1363,1	210,8	-	1124,2
	- for production		264,6	40,9	-	218,2
	- cancel advantages		1098,5	169,9	-	906
6	Net results		-737,3	+1039,9	+1365	-368,9

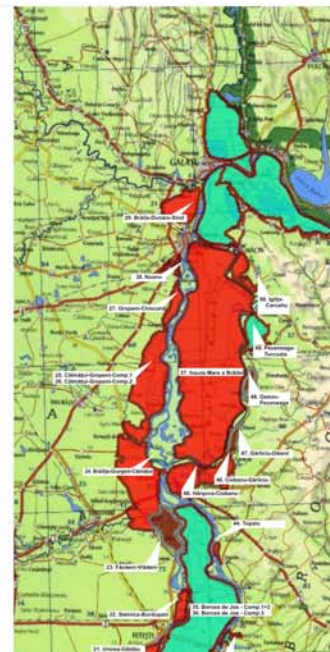
Economic and ecological criteria should be supplemented with socio-political criteria

Pretability Map of embankment precincts for economical activities in Romanian Sector of Danube Floodplain



Pretabilitatea incintelor amenajate ca incinte mixte (agricole, piscicole/poldere pentru stocare de apă)

Nr. crt.	Incinta	Categorie
1	Oholez - Fieni - Bistret	2
2	Bistret - Nisicla - Jiu	2
3	Jiu - Bistret	2
4	Bistret - Dabuleni	2
5	Dabuleni - Corabia	2
6	Slaz - Moldoveni	1
7	Lila - Beciu	1
8	Lila - Oit - Siasa	1
9	Siasa - Sursas - Zimnicea	3
10	Zimnicea - Năchireu	1
11	Bujoru - Piebrosari	1
12	Piebrosari - Vedea	1
13	Vedea - Sibcozia	3
14	Malu Roșu - Doștinu	1
15	Doștinu - Frâncu - Oreața	3
16	Chimogi - Arges	1
17	Ollantă - Iașna	3
18	Talina - Surlui	1
19	Surlui - Kirovobaz	2
20	Boianu - Sticleanu - Călarasi	3
21	Urniș - Olăduș	1
22	Șibotca - Borsani	1
23	Faceni - Vlădeni	2
24	Brăila - Oțergeni - Cămașa	1
25	Cămașa - Oțergeni I	1
26	Cămașa - Oțergeni II	1
27	Oțergeni - Chiscani	1
28	Noianu	1
29	Brăila - Dunare - Simit	3
30	Brăteju de Jos	3
31	Sornova	2
32	Calanag - Malu	2
33	Borcea de Sus comp. I	3
34	Borcea de Sus comp. II-III	3
35	Borcea de Jos (Malu)	3
36	Borcea de Jos (Malu)	3
37	Insula Mare a Brăilei	1
38	Băbușa - Buceag	3
39	Clina	3
40	Vila - Dunareni	3
41	Baciu - Vederoasa	3
42	Cocșeni	3
43	Semeni	3
44	Topalu	1
45	Hirova - Cărbunari	1
46	Cărbunari - Orlacu	3
47	Orlacu - Dăeni	3
48	Ostrov - Peșeneaga	3
49	Peșeneaga - Tarcova	3
50	Iglia - Carcalu	3
51	Carcalu - Macin	3
52	Macin - IC Brăila	3
53	IC Brăila - Isaccea	3



HARTA PRETABILITĂȚII INCINTELOR AMENAJATE CA INCINTE MIXTE (AGRICOLE, PISCICOLE/ POLDERE PENTRU STOCARE DE APĂ)

Legenda

- 1 INCINTE AGRICOLE PRETABILE
- 2 INCINTE VULNERABILE LA INUNDATII
- 3 INCINTE MIXTE (AGRICOLE, PISCICOLE / POLDERE PENTRU STOCARE DE APA)



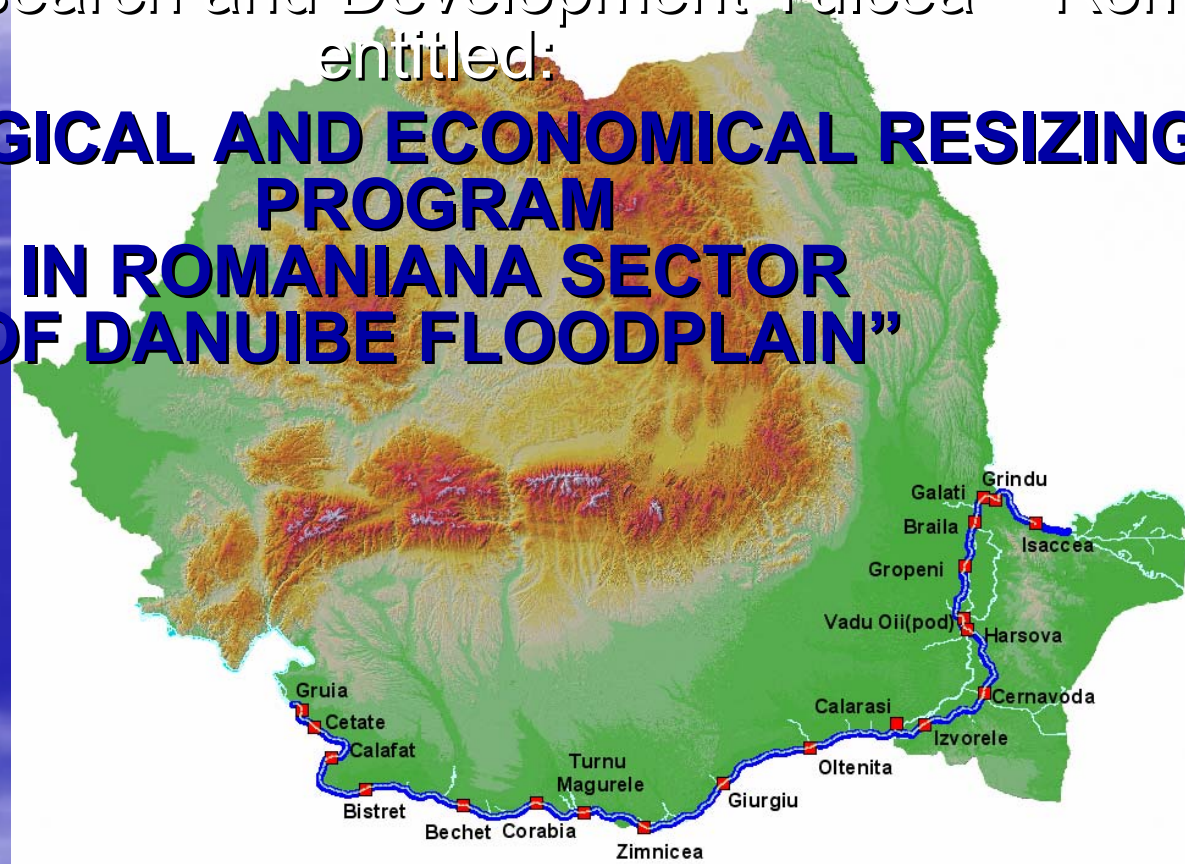
Pretability assessment of arranged precincts for economic activities in order to resizing their premises as mixed (agricultural / polder for water storage)

- Before concluding this study on Danube Floodplain, resulted from a complex analysis of field data and their interpretation in the present state of knowledge, must be highlighted some basic issues to facilitate such future studies more detailed:
 - Danube Floodplain is a individualized hidrogeomorphological complex, which operates as a unit
 - The track character or broad depression is give of Danube activity, whose action takes place combined with the whole hydrographic network
 - Morfographic and morphometric, Danube Floodplain is deeply fragmented, with polilevels lacustrine depressions, actual meadows until terraces, which requires multifunctionality in the use of these lands
 - Danube Floodplain region is the key to solving the problem of flood risk localities adjacent to the Danube

CONCLUSIONS

of research study prepared by Danube Delta National Institute for Research and Development Tulcea – Romania, entitled:

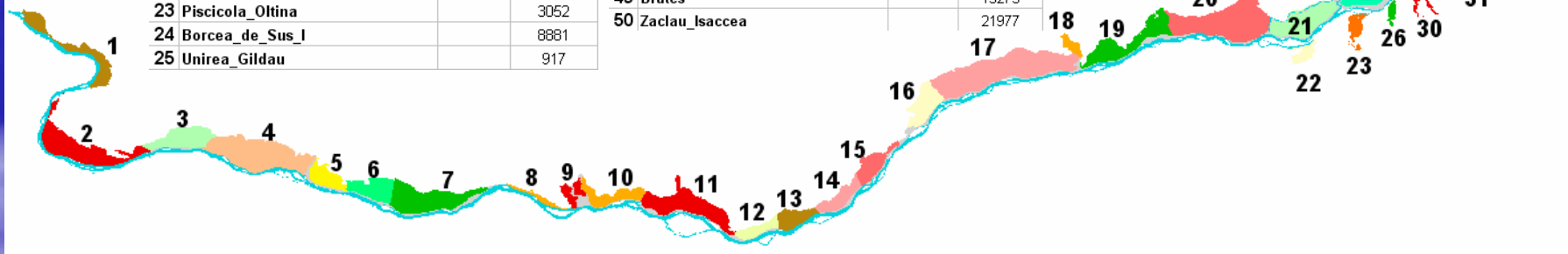
■ „**ECOLOGICAL AND ECONOMICAL RESIZING PROGRAM IN ROMANIANA SECTOR OF DANUBE FLOODPLAIN**”



The Ecological and economical resizing Program, approved by Government Decision no. 1208 / 6 sept.2006, is the strategy for sustainable development and re-line of defense strategy against floods in the settlements located in Danube River Floodplain - strategy based on evaluation of various scenarios of pretability to flooding and the public decision.

The present premises of Danube Floodplain precincts

NR	DENUMIRE	S(ha)			
1	Salcia	8949	26	Viile_Dunareni	1295
2	Calafat_Ghidici	15571	27	Borcea_de_Jos_I_II_III	50399
3	Ghidici_Rast_Bistret	9085	28	Borcea_Festesti	1557
4	Bistret_Nedeia_Jiu	21894	29	Stelnica_Bordusani	1787
5	Jiu_Bechet	5148	30	Baciu_Vederoasa	1916
6	Bechet_Dabuleni	6940	31	Cochirleni	613
7	Dabuleni_Potelu_Corabia	14666	32	Seimeni	798
8	Balta_Geraiului	1818	33	Topalu	374
9	Islaz_Moldoveni	2957	34	Facaeni_Vladeni	4957
10	Lita_Olt_Flamanda_Seaca	6211	35	Brailita_Giurgeni_Calmatui	16506
11	Seaca_Vanatori_Suhaia_Zimnicea	14161	36	Harsova_Ciobanu	4944
12	Zimnicea_Nasturelu	3722	37	Ciobanu_Garliciu	3939
13	Bujoru_Pietrosani	4891	38	Ciobanu_Daeni	1376
14	Pietrosani_Arsache	5325	39	Insula_Mare_a_Brailei	72518
15	Vedea_Slobozia	5718	40	Calmatui_Gropeni	15086
16	Remus_Gostinu_Baneasa	7496	41	Gropeni_Chiscani	2140
17	Gostinu_Greaca_Arges	29370	42	Noianu	723
18	Chirnogi_Arges	1966	43	Ostrov_Pecineaga	1438
19	Oltenita_Surlari_Manastirea	12581	44	Peceneaga_Turcoaia	3934
20	Boianu_Sticleanu_Calarasi	23452	45	Iglita_Carcaliu_Macin	2629
21	Borcea_Rau	11156	46	Macin_Zaclau	13808
22	Bugeag	2625	47	Braila_Dunare_Siret	5422
23	Piscicola_Oltina	3052	48	Badalan	1593
24	Borcea_de_Sus_I	8881	49	Brates	13275
25	Unirea_Gildau	917	50	Zaclau_Isaccea	21977



The program established as an instrument for decision makers, is structured in three levels - the identification, evaluation and pretability, and pursued 3 objectives:

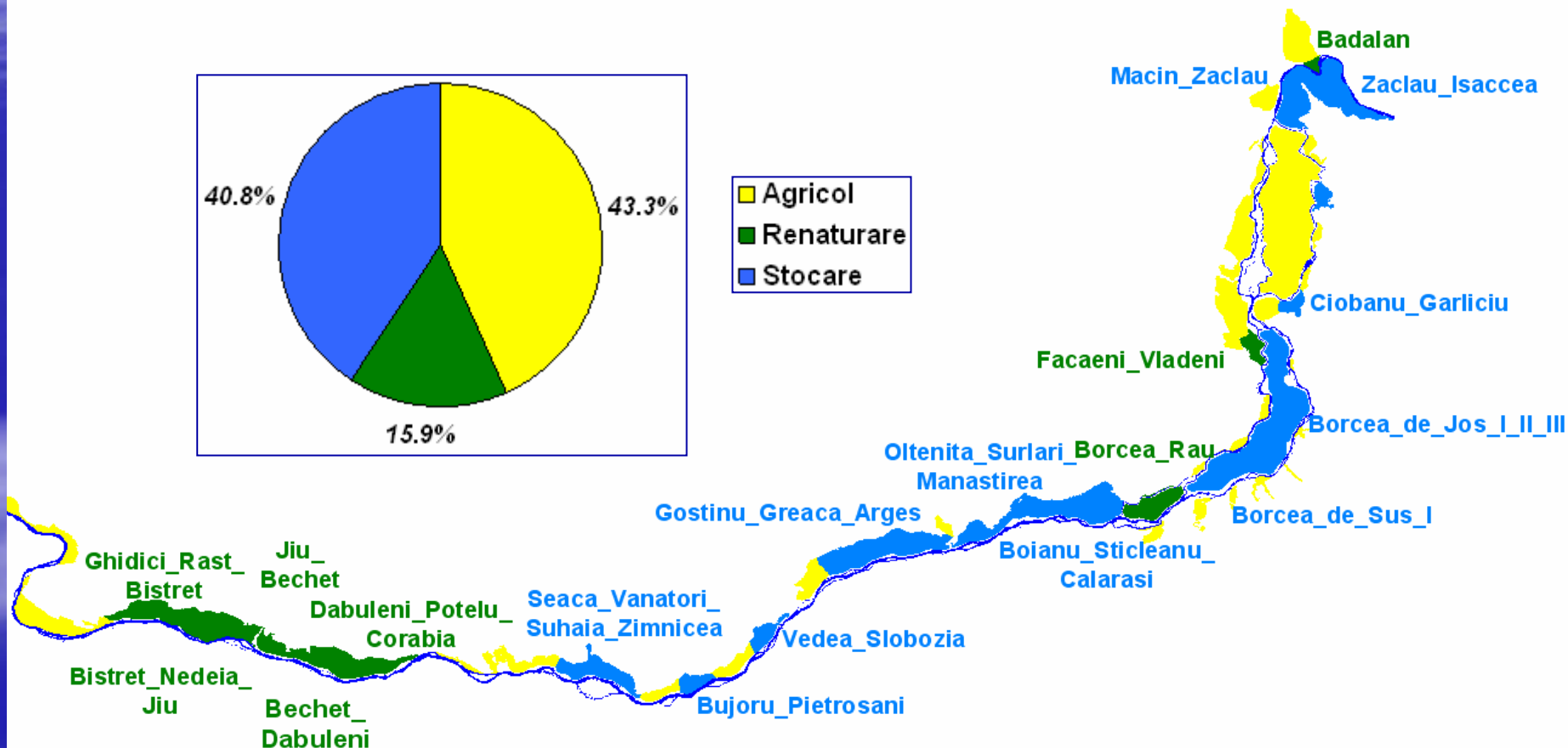
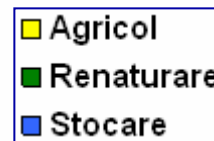
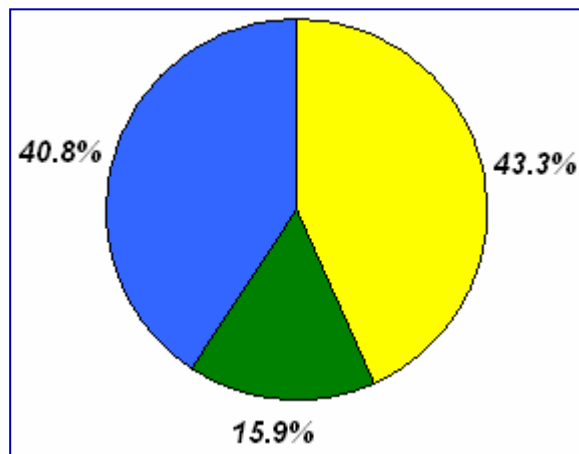
1. Rethinking of defense lines against floods localities;
2. Assessing of economic activities pretability in the premises of embanked precincts resizing with a view to their premises as mixed (agricultural / polders and water storage)
3. Renaturation of embanked precincts to create wetlands areas of conservative interest (example: SCI and SPA)

According to existing data and hydraulic scenarios drawn up on the surface of the total embanked precincts of the Danube Floodplain - 445,000 ha, results 3 categories of use in the future:

43.3% for the remaining precincts for **agriculture**;

40.8% areas used as **mixed (agricultural / polders and water storage)**;

15.9% areas for renaturation to create **wetlands**.



Distribution of existing precincts on the 3 use categories results from study

Agriculture -

Renaturation

Mixed (agricultural / polders and water storage)

Incinta_agricol	S(ha)
Balta_Geraiului	1818
Borcea_Fetesti	1557
Braila_Dunare_Siret	5422
Brailita_Giurgeni_Calmatui	16506
Calafat_Ghidici	15571
Calmatui_Gropeni	15086
Chirnogi_Arges	1966
Gropeni_Chiscani	2140
Harsova_Ciobanu	4944
Insula_Mare_a_Brailei	72518
Islaz_Moldoveni	2957
Lita_Olt_Flamanda_Seaca	6211
Noianu	723
Pietrosani_Arsache	5325
Remus_Gostinu_Baneasa	7496
Salcia	8949
Stelnica_Bordusani	1787
Topalu	374
Unirea_Gildau	917
Zimnicea_Nasturelu	3722
Total	175990

Incinta_renaturare	S(ha)
Badalan	1593
Bechet_Dabuleni	6940
Bistret_Nedeia_Jiu	21894
Borcea_Rau	11156
Dabuleni_Potelu_Corabia	14666
Facaeni_Vladeni	4957
Ghidici_Rast_Bistret	9085
Jiu_Bechet	5148
Total	75439

Incinta_stocare	S(ha)
Baciu_Vederoasa	1916
Boianu_Sticleanu_Calarasi	23452
Borcea_de_Jos_I_II_III	50399
Borcea_de_Sus_I	8881
Brates	13275
Bugeag	2625
Bujoru_Pietrosani	4891
Ciobanu_Daeni	1376
Ciobanu_Garliciu	3939
Cochirleni	613
Gostinu_Greaca_Arges	29370
Iglita_Carcaliu_Macin	2629
Macin_Zaclau	13808
Oltenita_Surlari_Manastirea	12581
Ostrov_Pecineaga	1438
Peceneaga_Turcoaia	3934
Piscicola_Oltina	3052
Seaca_Vanatori_Suhaia_Zimnicea	14161
Seimeni	798
Vedea_Slobozia	5718
Viile_Dunareni	1295
Zaclau_Isaccea	21977
Total	222128

Before all, must seek, through our work to be able to put a value of this area as more of this land and not leave areas so large between bank and dyke, to be condemned to remain unproductive, except of course the areas that are strictly necessary for water flow during large flood.



REGIUNEA INUNDABILĂ
A
DUNĂRII

STAREA EI ACTUALĂ

ȘI

MIJLOACELE DE A O PUNE ÎN VALOARE

DE

D-R GR. ANTIPA

INSPECTORUL GENERAL AL MINISTERULUI AGRICULTURII ȘI DOMENILOR

CU 3 HĂRȚI, 106 FIGURI ÎN TEXT ȘI 23 TABELE FOTOTIPICE

BUCUREȘTI
Inst. de Arte Grafice CAROL GOBIȘOR I. St. Rasidescu
10, STRADA DOAMNEI 10
1910

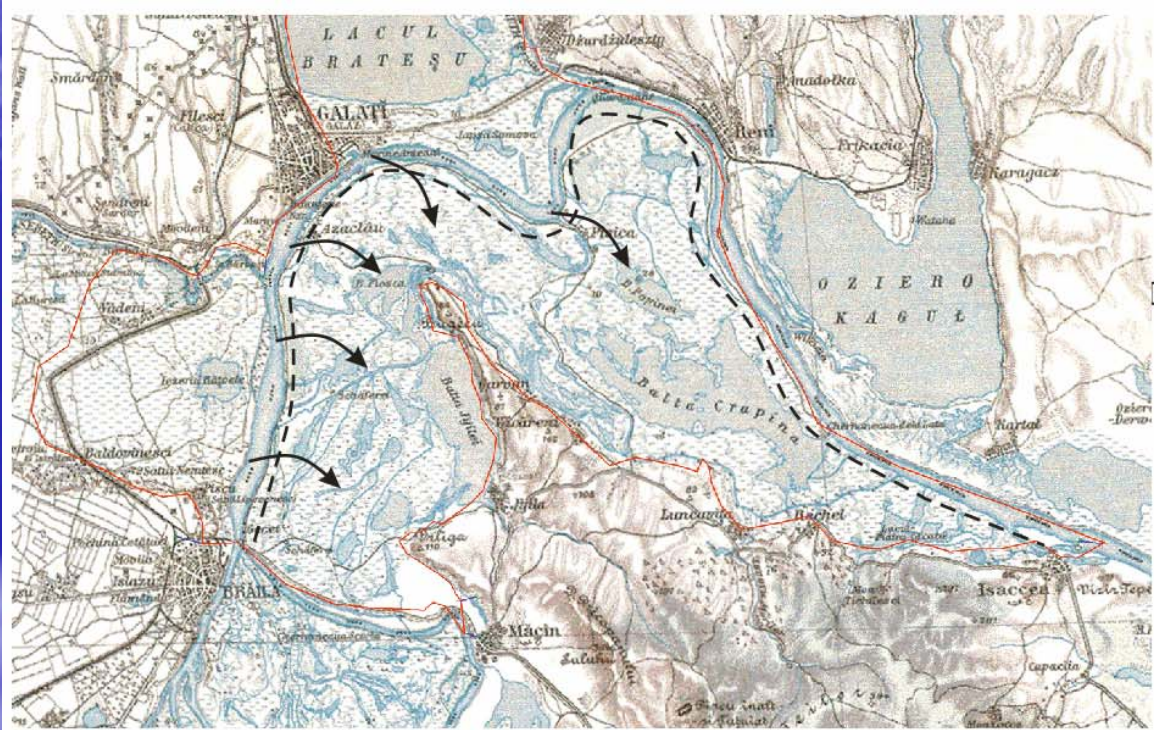
lata, după părerea mea, în linii cu totul
dificile și rentabilitate și totodată să nu
o vătămare cursului regulat al fluviului și navigațiunii
precum și terenurilor și bălților din aval.

1) Înainte de toate trebuie să căutăm ca prin
lucrările noastre să fim în stare a pune în valoare
o suprafață cât mai mare din aceste terenuri și să
nu mai lăsăm între mal și dig suprafețe atât de întinse,
care să fie condamnate a rămâne neproductive,
afară bine înțeles de suprafețele strict necesare pen-
tru apele mari în curgere.

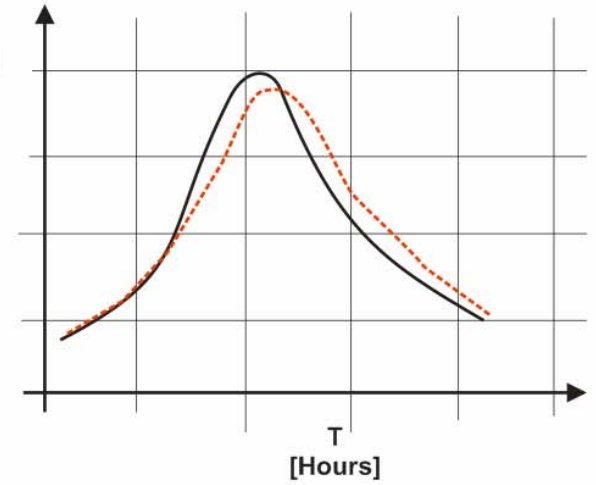
Aceasta nu se poate realiza însă în alt mod decât
creind pe marginea fluviului din distanță în distanță
o serie de bazine — în afara de bălțile permanente
care am arătat că trebuie conservate și amenajate —
care să alterneze cu terenurile rezervate pentru
agricultură și în care să se poată revărsa apele
fluviului.

This can not be achieved, in another way than creating in the edge of the river from a distance to distance a series of basins, besides permanent wetlands, that we have shown that preserved and arranged, which alternate with land reserved for agriculture and were the river water can flood.

Water Storage Basin – Cat's Bend Area



Q
[cm/s]



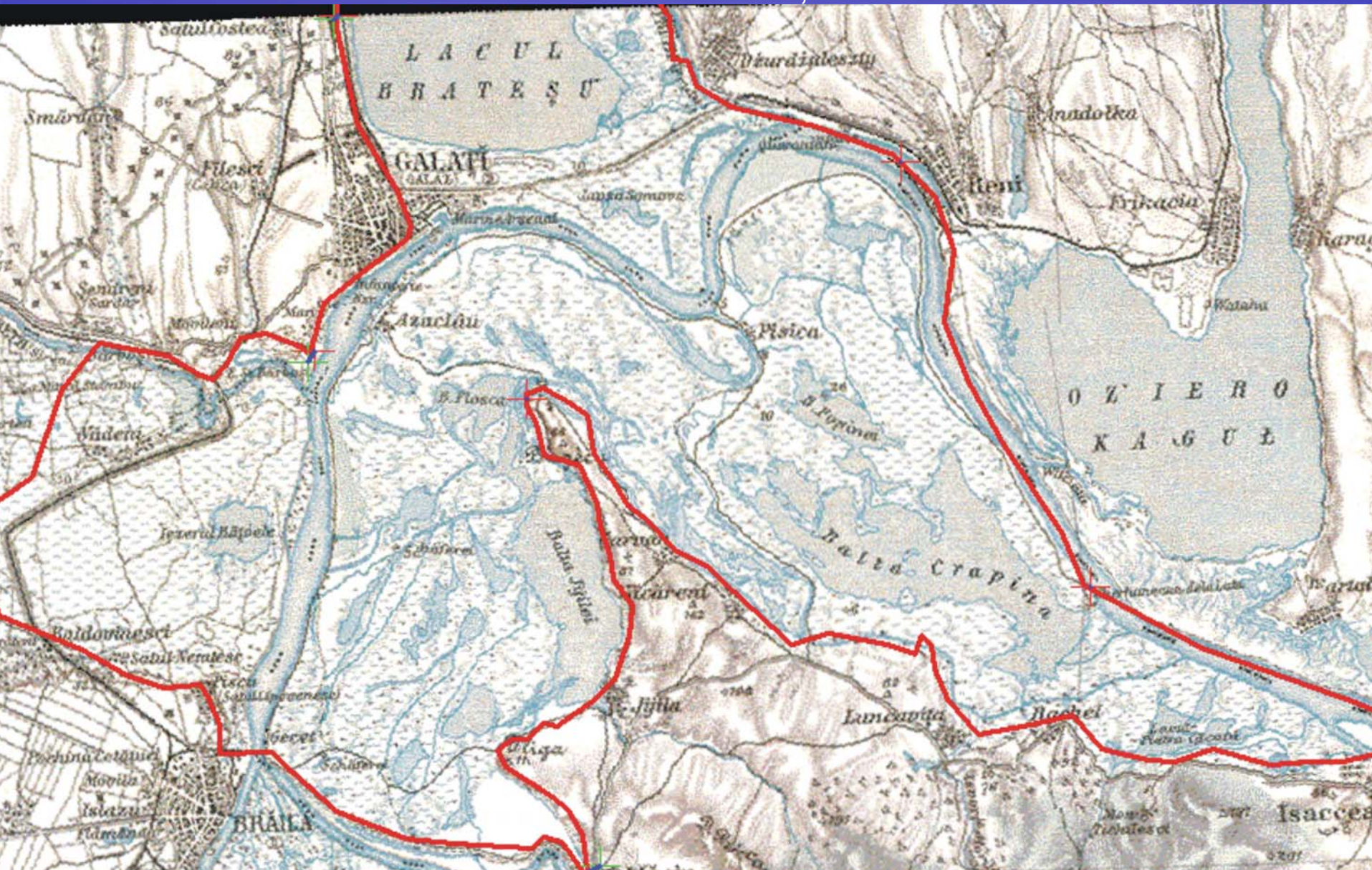
**Programul de redimensionare ecologică și economică în sectorul românesc
al Lunzii Dunării și finanțarea acestuia**

Etapa	Termen de finalizare	Acțiuni necesare	Obiective urmărite	Costuri -mii lei-	Surse de finanțare
I. – Elaborarea Studiului complex privind redimensionarea ecologică și economică în sect. românesc al Lunzii Dunării – Faza I	Dec. 2006	I a. Reconsiderarea liniilor de apărare a localităților din Lunca Dunării împotriva inundațiilor	-stabilirea unor noi linii de apărare care să asigure protecția optimă a localităților cu costuri minime.	1.200	Bugetul MMGA aprobat pentru anul 2006
II. -Elaborarea Studiului complex privind redimensionarea ecologica si economica in sectorul romanesc al Lunzii Dunarii – Fazele a II. a si II.b	Dec. 2007	II.a. Elaborarea modelului digital al terenurilor pentru fundamentarea conceptului de apărare a localităților	- realizarea unui model hidraulic tridimensional care să permită simularea diverselor scenarii de inundare, precum și stabilirea cotei coronamentului noilor diguri de apărare a localităților din Lunca Dunării.	4.800	Bugetul de stat prin bugetul MMGA pe anul 2007
		II. b. Evaluarea pretabilității incintelor amenajate pentru activități economice, în vederea redimensionării și refacerii acestora ca incinte mixte (agricole/poldere)	-reconsiderarea activităților economice din incintele îndiguite în funcție de raportul cost total/beneficiu - stabilirea regimului de inundare dirijată în vederea stocării de apă în perioadele de niveluri maxime pe Dunăre - stabilirea regimului de inundare și reamanență a apei în incintele îndiguite prin desecarea fostelor lacuri, în vederea renaturării acestora.		
III.Implementarea rezultatelor studiului	2008-2010	Renaturarea unor incinte îndiguite în vederea creării de zone umede	- reintegrarea în circuitul hidrologic natural - restaurarea echilibrului hidrologic și ecologic și a funcțiilor naturale specifice zonelor umede - extinderea habitatelor naturale - dezvoltarea activităților tradiționale: pescuit, pășunat, ecoturism	Conform estimărilor din studiu	Bugetul de stat prin bugetul MMGA, fonduri externe

*) Anexa este reprodusă în facsimil.

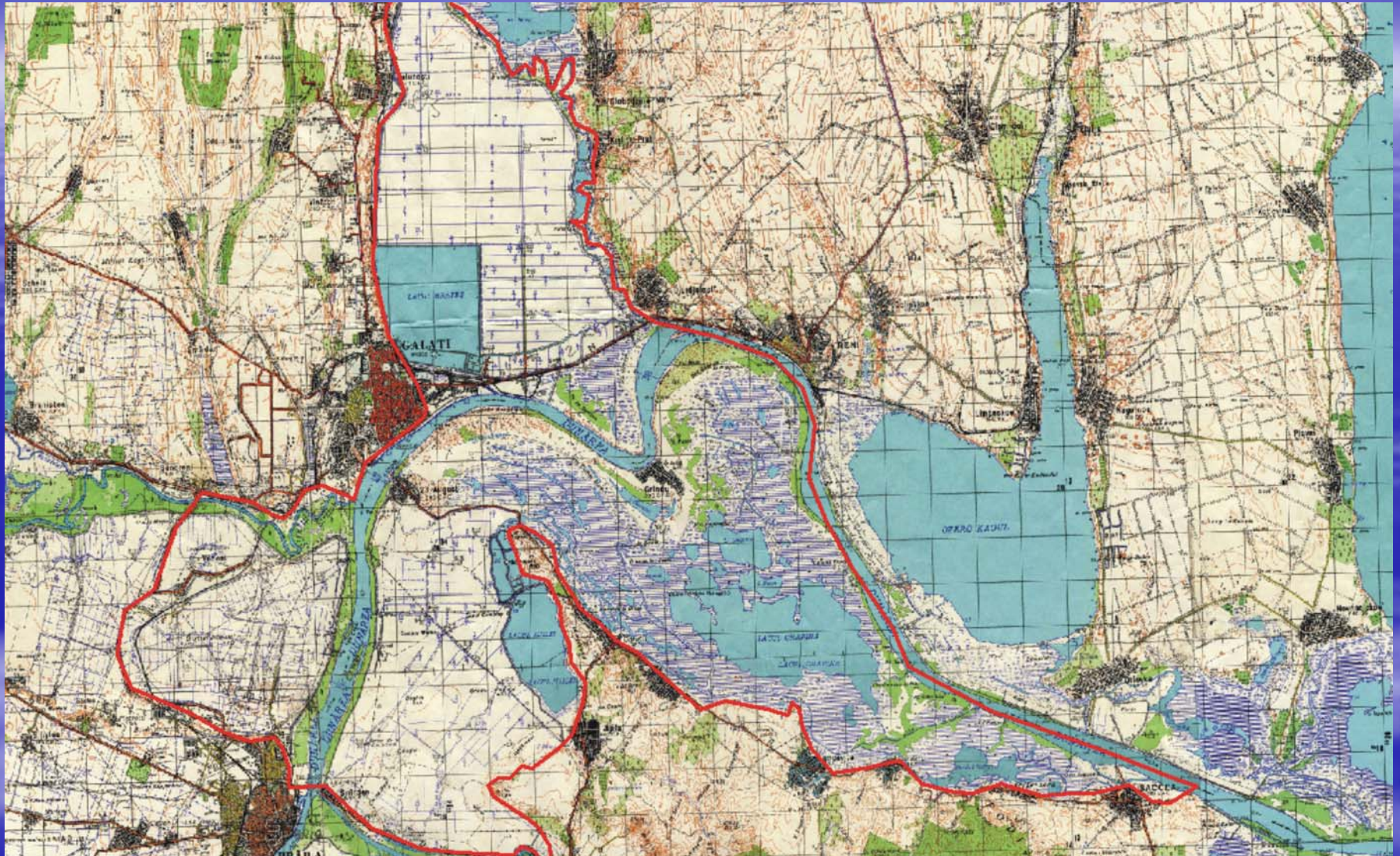
**Implementation of Study results – 2008/2010 –
Renaturation of embankment precincts in view of wetlands**

ROOM FOR THE RIVER IN THE CAT'S BEND, ROMANIA



Topographical Map 1900

ROOM FOR THE RIVER IN THE CAT'S BEND, ROMANIA



Topographical Map 1985

ROOM FOR THE RIVER IN THE CAT'S BEND, ROMANIA



Satellite Image 2000



Thank you!

Vă mulțumim pentru atenție !