



Invasive ligneous plant species in Danube Delta

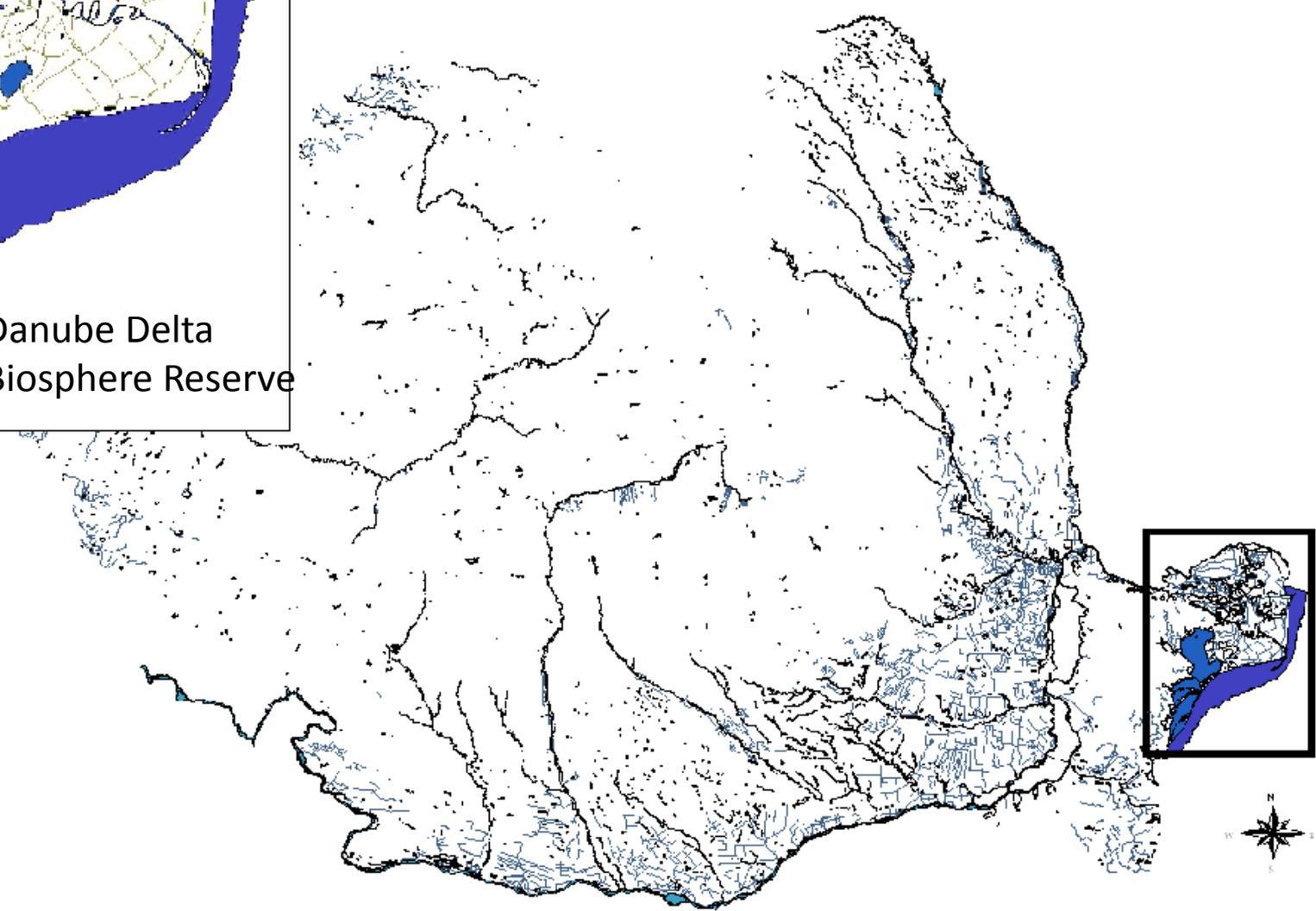
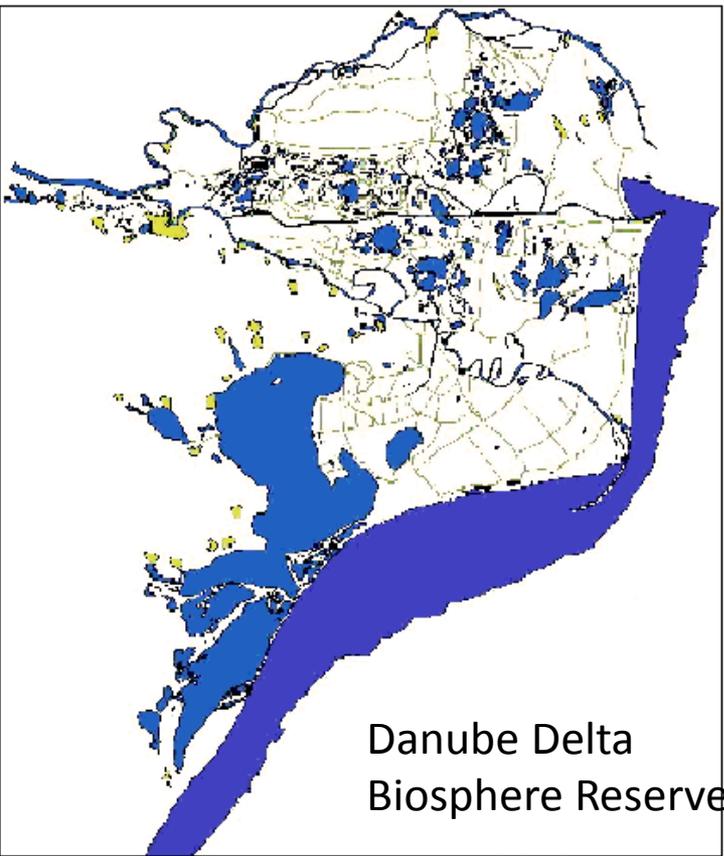
Doroftei Mihai, Covaliov Silviu



OUTLINES

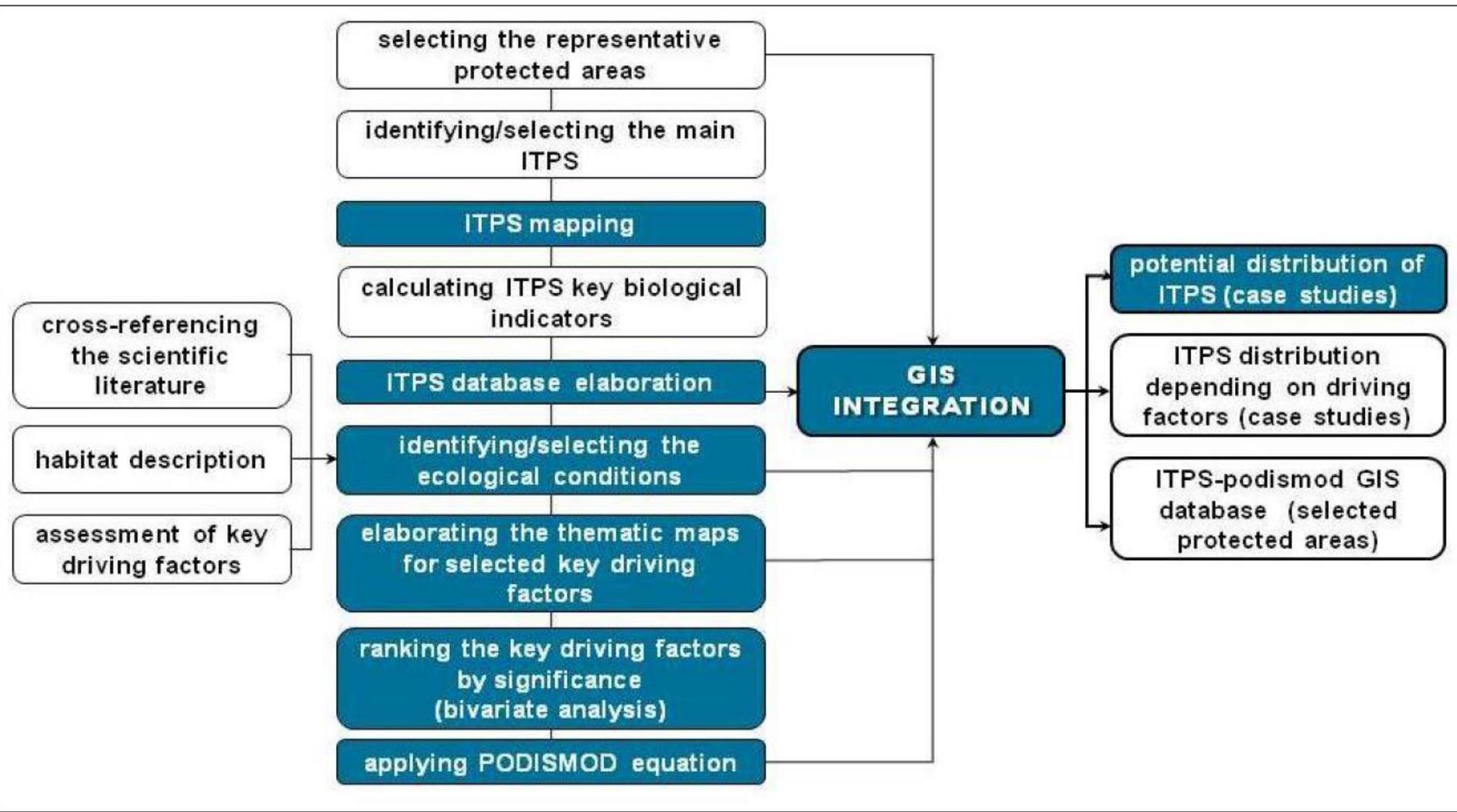
- **METHODOLOGY**
 - **FREQUENCY and ABUNDANCE of SPECIES**
 - **DISTRIBUTION IN DANUBE DELTA BIOSPHERE RESERVE**
 - **ECOLOGICAL THREATS**
 - **MANAGEMENT OPTIONS**
- 

Study area

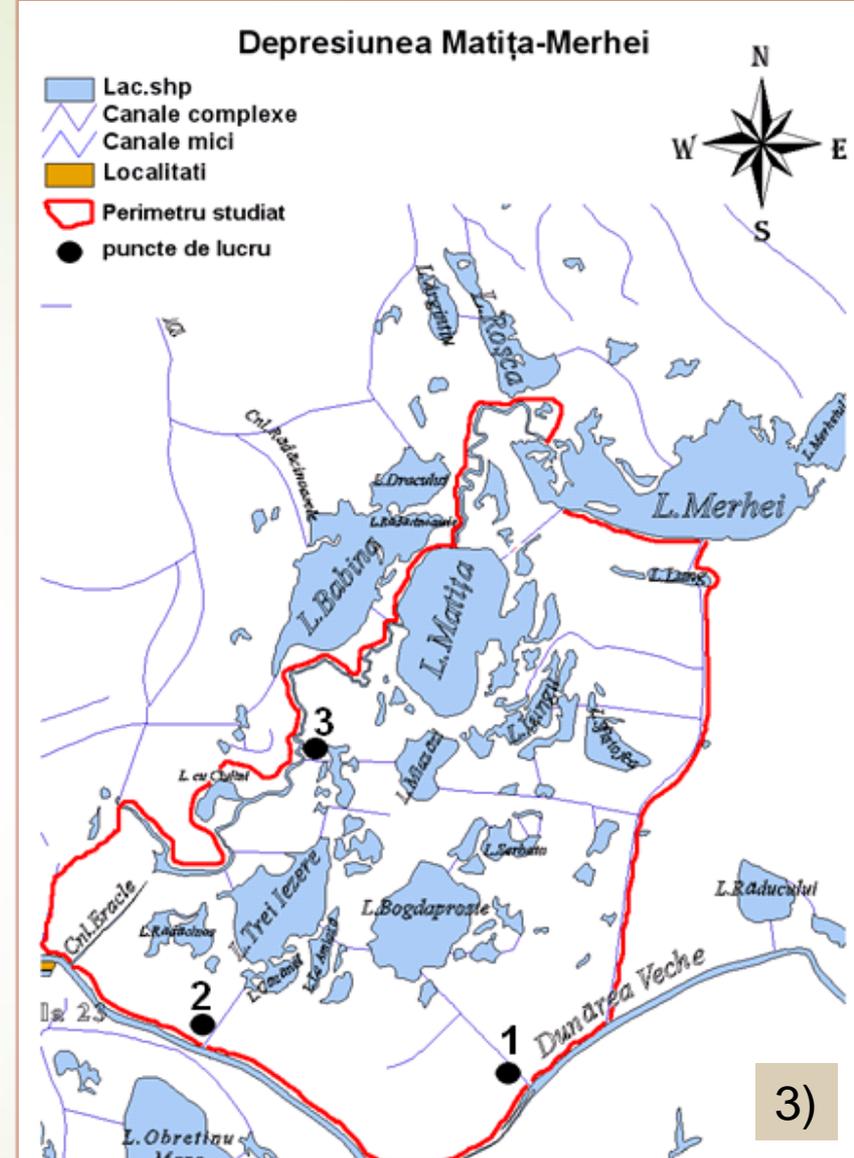


Methodology

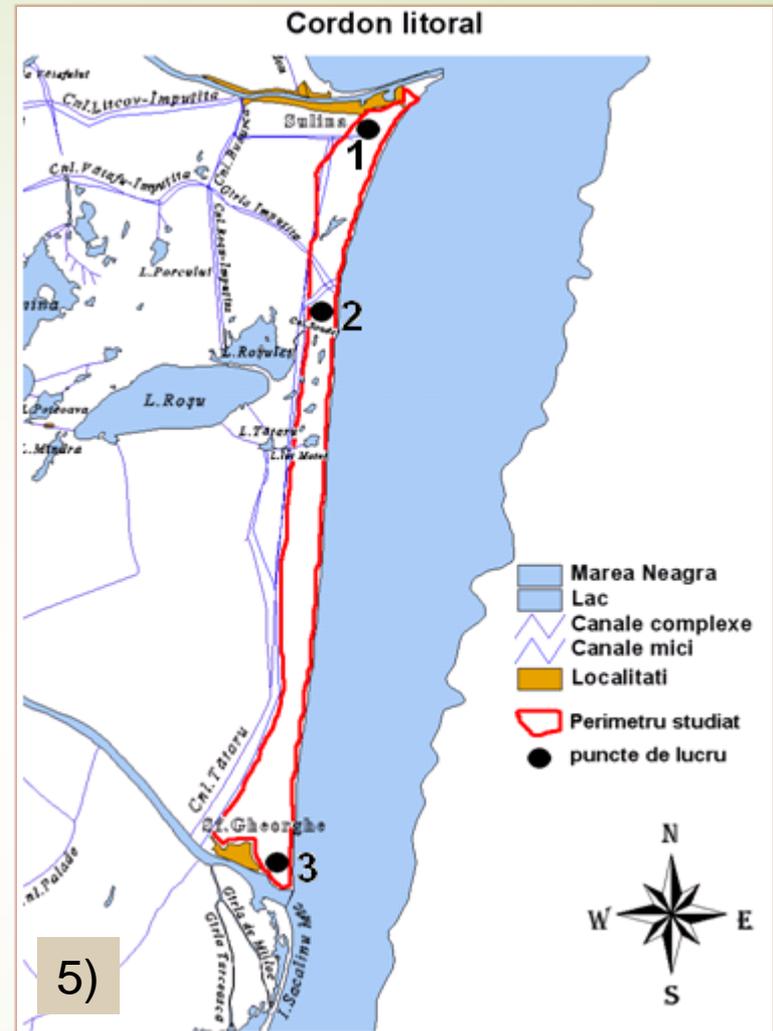
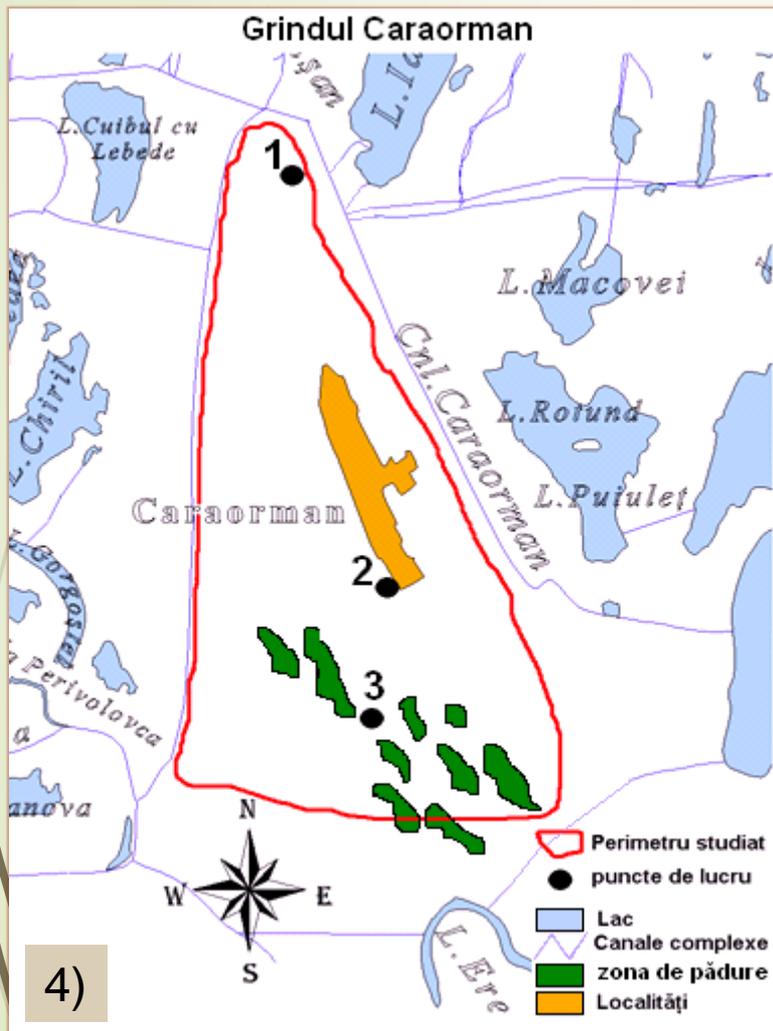
ITPS – *Invasive Terrestrial Plant Species*
PODISMOD – *Potential Distribution Model*



ITPS podismod scheme.

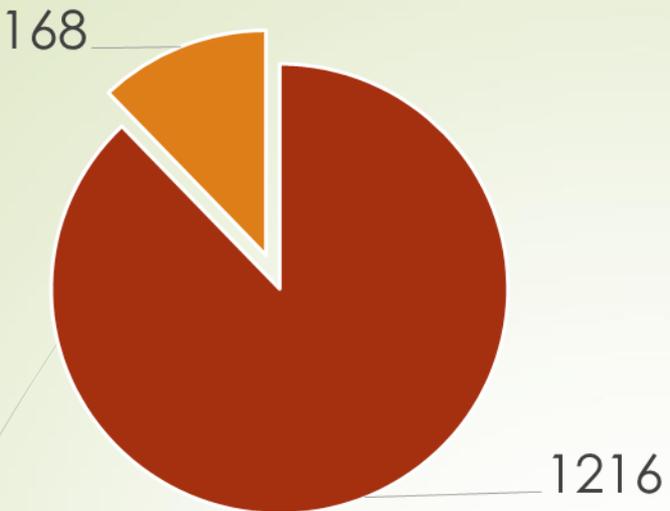


1. Șontea – Fortuna
2. Dunăvăț – Dranov
3. Matița - Merhei

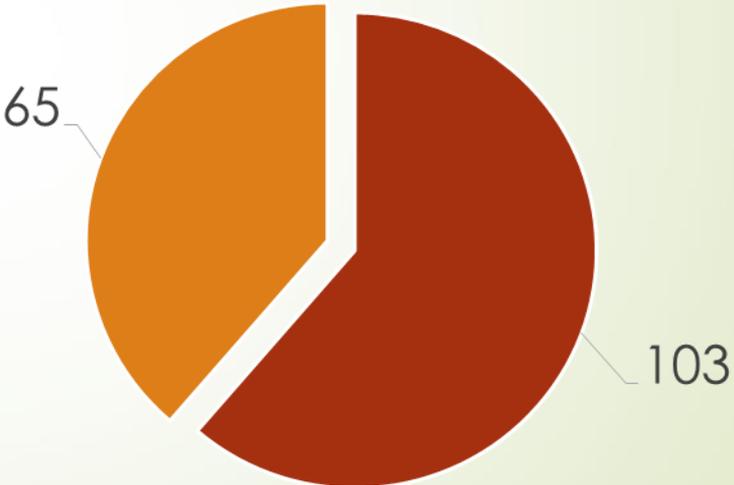


- 4. Caraorman
- 5. Cordon littoral

Flora analysis



- total plant species
- alien plant species



- herbaceous alien plant species
- ligneous alien plant species



**Black list
of plant
species:
selection**

Plant species	Species features	Impact index
<i>Amorpha fruticosa</i> *	30/25	9,12
<i>Gleditsia triacanthos</i>	30/17	7,74
<i>Robinia pseudoacacia</i> **	30/24	8,94
<i>Ailanthus altissima</i> *	30/17	7,74
<i>Lycium barbarum</i> *	30/21	8,56
<i>Acer negundo</i> *	30/17	7,52
<i>Morus alba</i> **	30/19	7,95
<i>Fraxinus pennsylvanica</i> **	30/16	7,30
<i>Elaeagnus angustifolia</i>	30/20	8,16

The evaluation was made according to *Skolka & Gomoiu, 2004*

*species mentioned in Romanian black list as invasive species

** species mentioned in Romanian black list as alien species with invasive potential

a) *Amorpha fruticosa*



b) *Robinia pseudacacia*



c) *Gleditsia triacanthos*



d) *Elaeagnus angustifolia*



e) *Ailanthus altissima*



f) *Acer negundo*



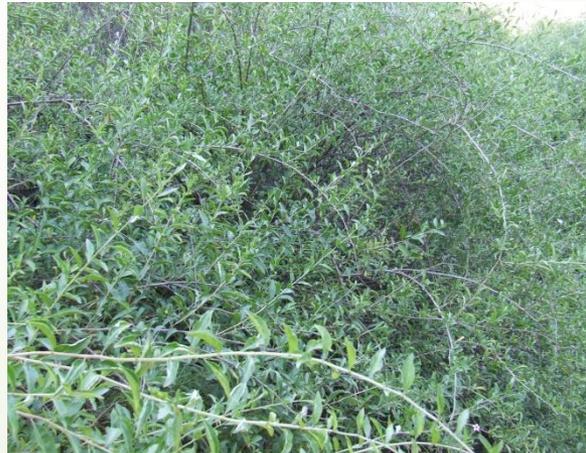
g) *Morus alba*



h) *Lycium barbarum*

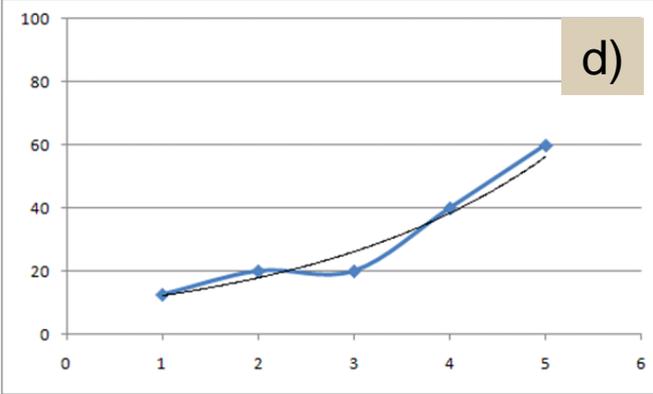
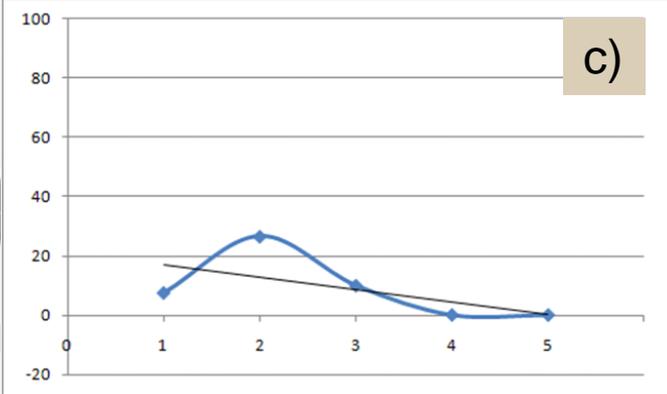
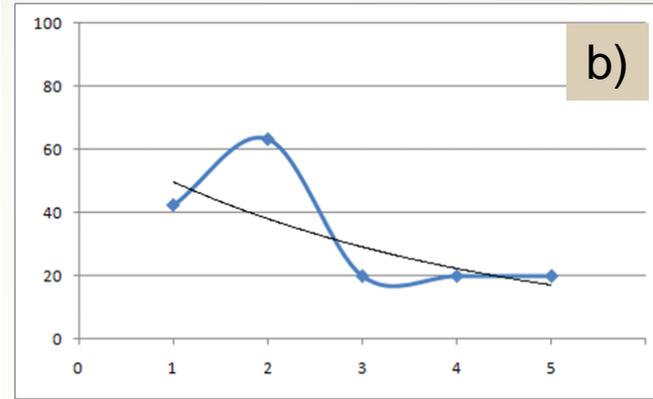
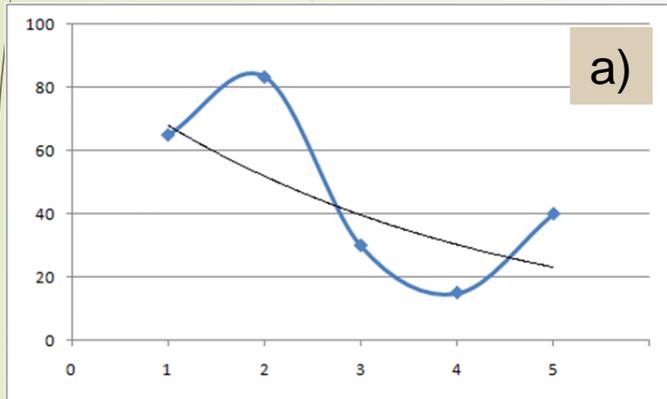


i) *Fraxinus pennsylvanica*



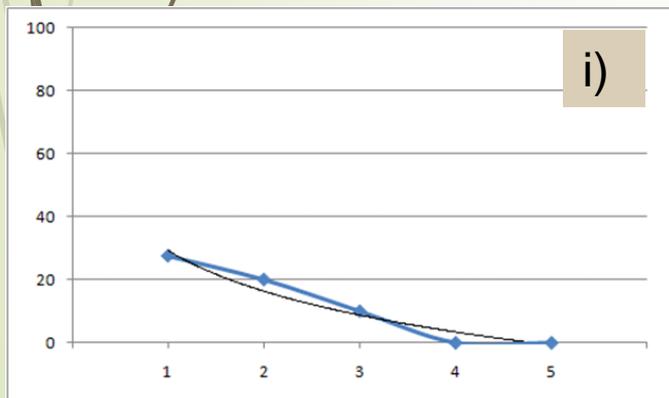
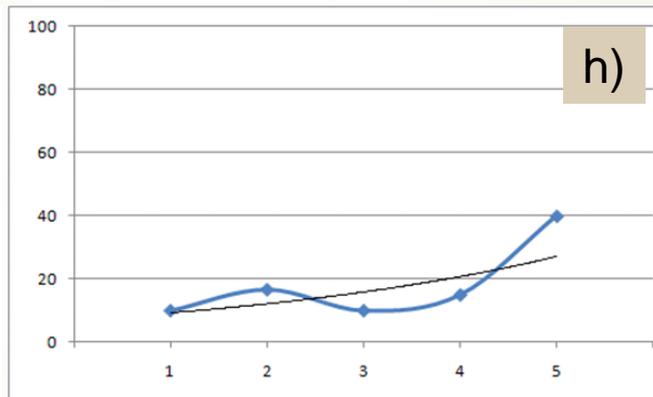
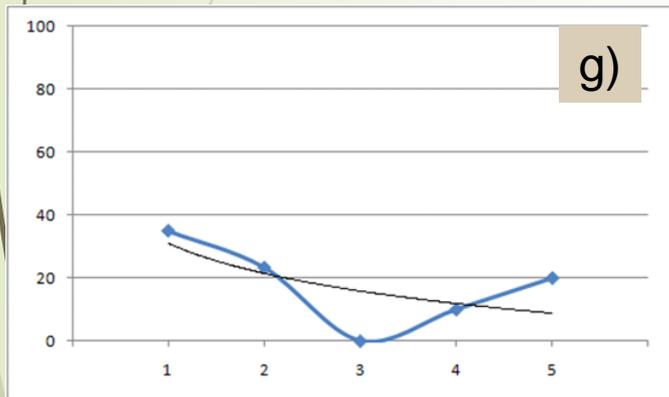
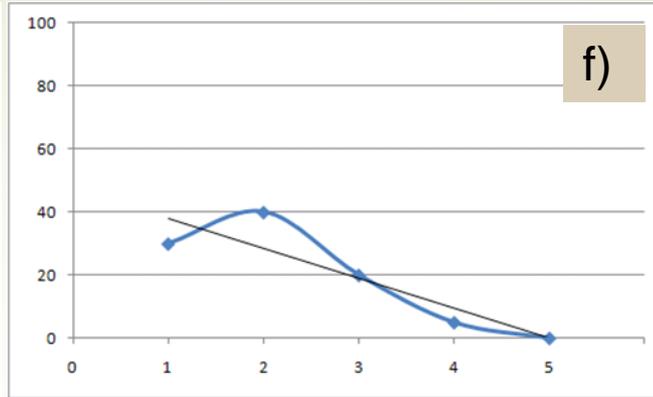
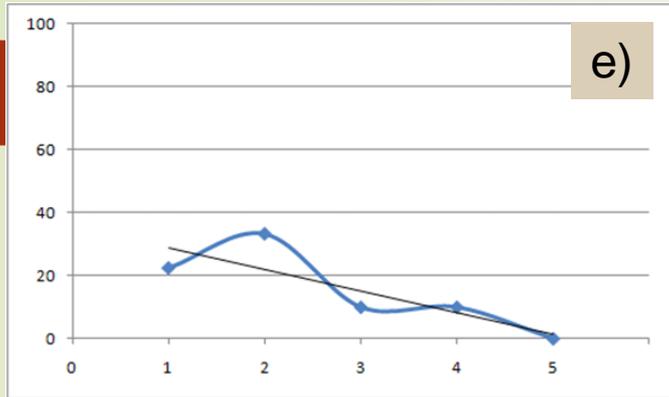
Species Frequency (%)

- a) *Amorpha fruticosa*
- b) *Robinia pseudacacia*
- c) *Gleditsia triacanthos*
- d) *Elaeagnus angustifolia*



- 1 - Şontea - Fortuna
- 2 - Dunăvăţ - Dranov
- 3 - Matiţa - Mehei
- 4 - Caraorman
- 5 - Cordon litoral

Species Frequency (%)

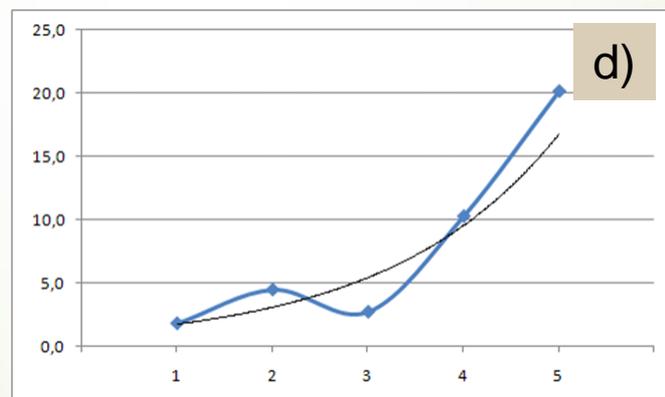
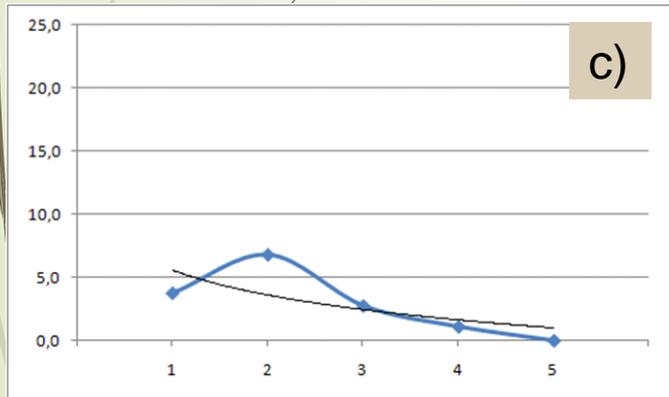
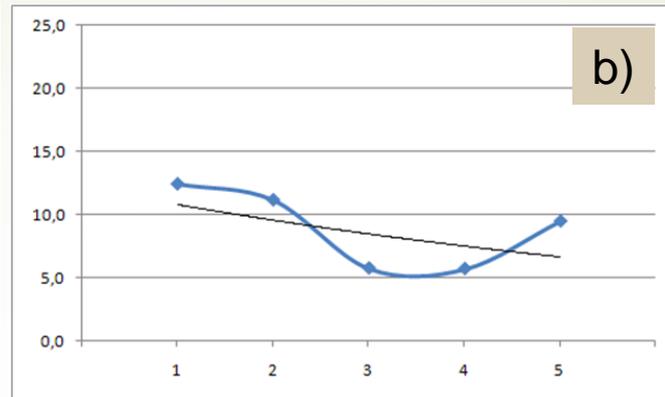
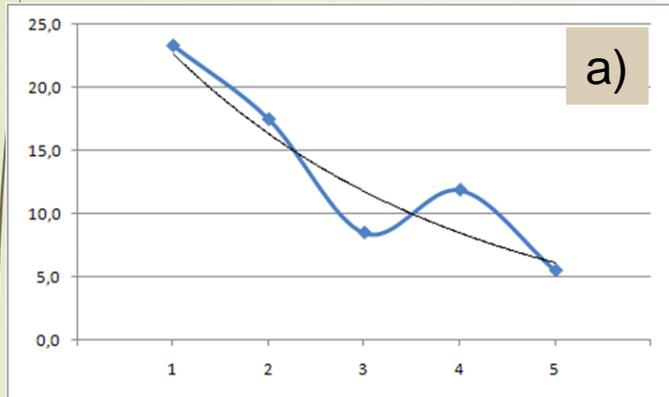


- 1 - Şontea - Fortuna
- 2 - Dunăvăţ - Dranov
- 3 - Matia - Mehei
- 4 - Caraorman
- 5 - Cordon litoral

- e) *Ailanthus altissima*
- f) *Acer negundo*
- g) *Morus alba*
- h) *Lycium barbarum*
- i) *Fraxinus pennsylvanica*

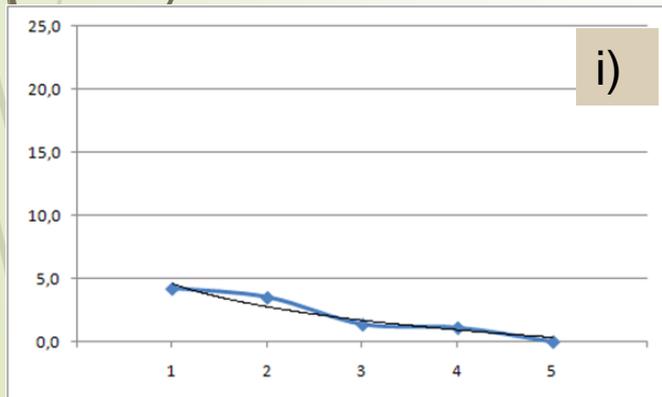
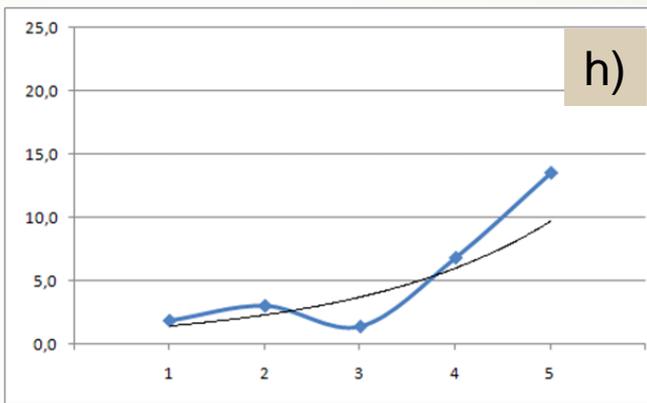
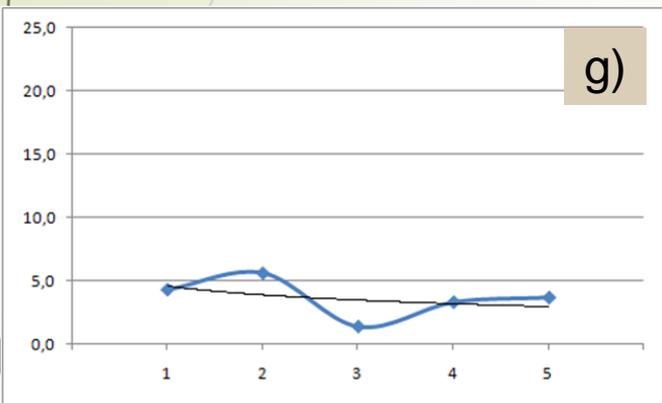
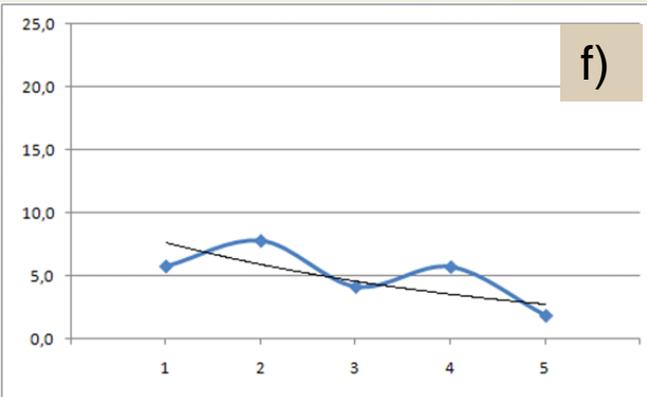
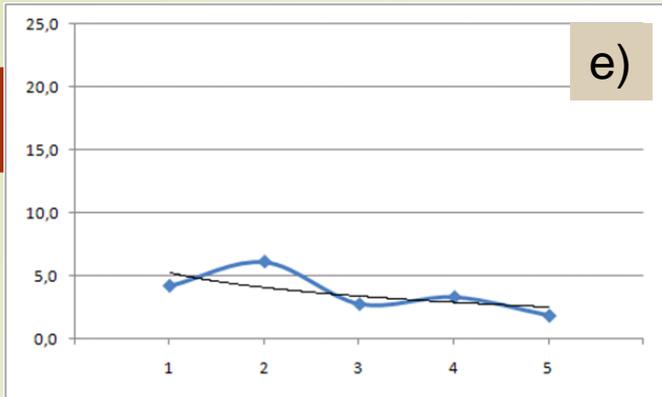
Species Abundance (%)

- a) *Amorpha fruticosa*
- b) *Robinia pseudacacia*
- c) *Gleditsia triacanthos*
- d) *Elaeagnus angustifolia*



- 1 - Şontea - Fortuna
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- 3 - Matiţa - Mehei
- 4 - Caraorman
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Species Abundance (%)

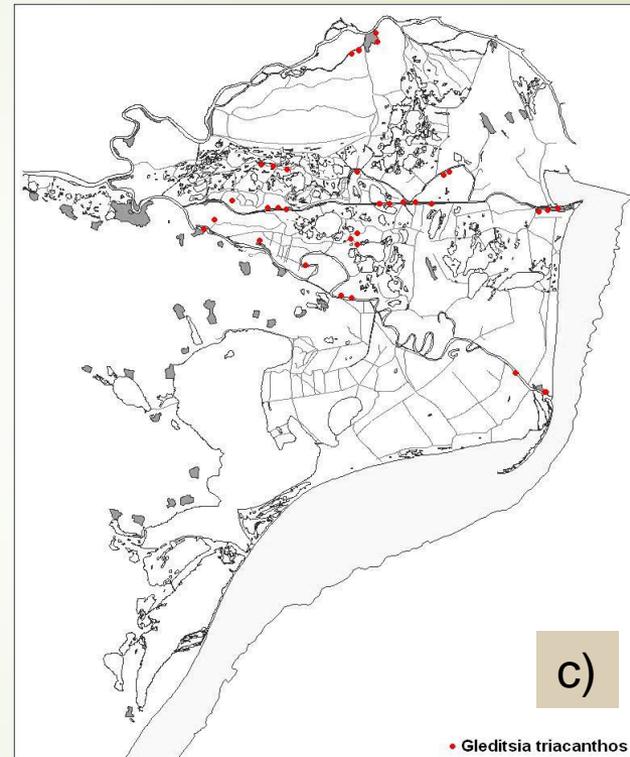
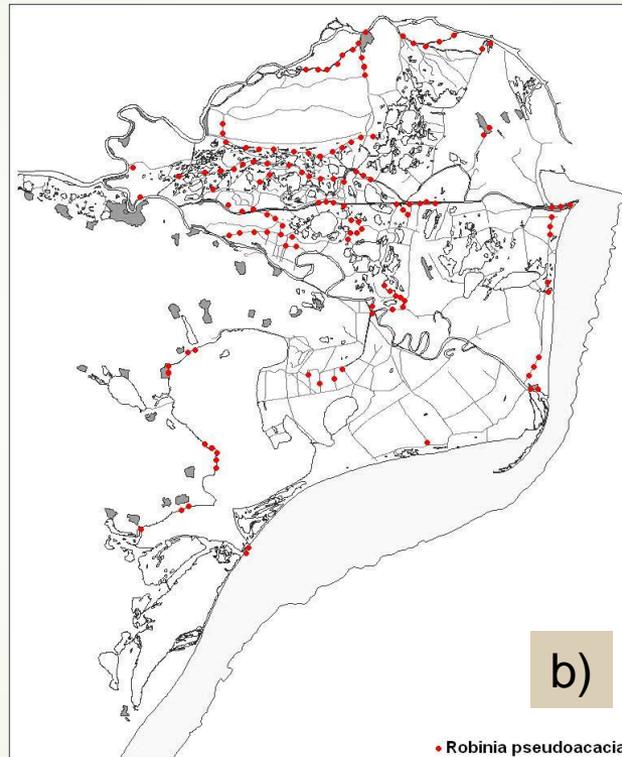
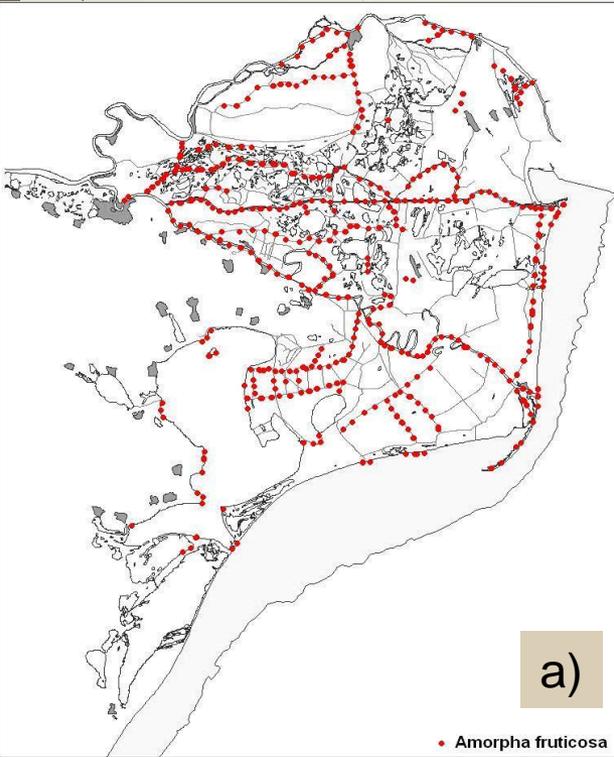


- e) *Ailanthus altissima*
- f) *Acer negundo*
- g) *Morus alba*
- h) *Lycium barbarum*
- i) *Fraxinus pennsylvanica*

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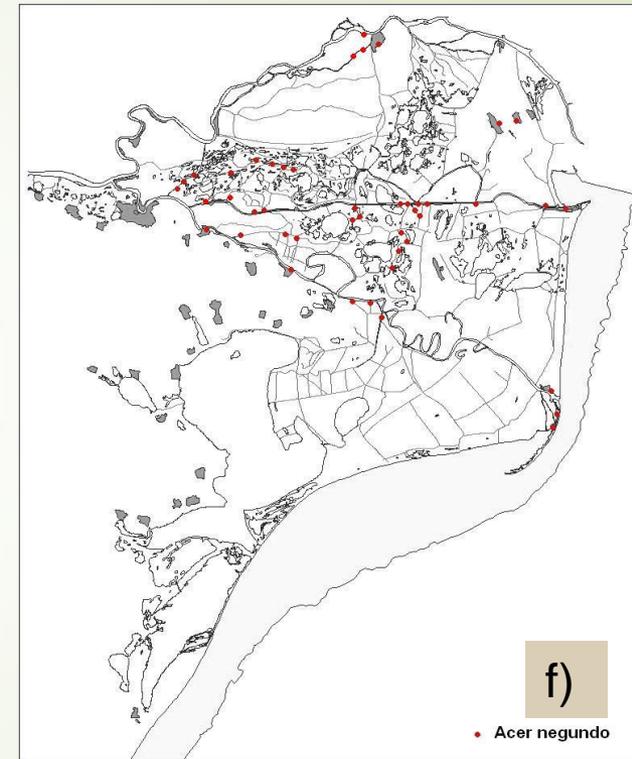
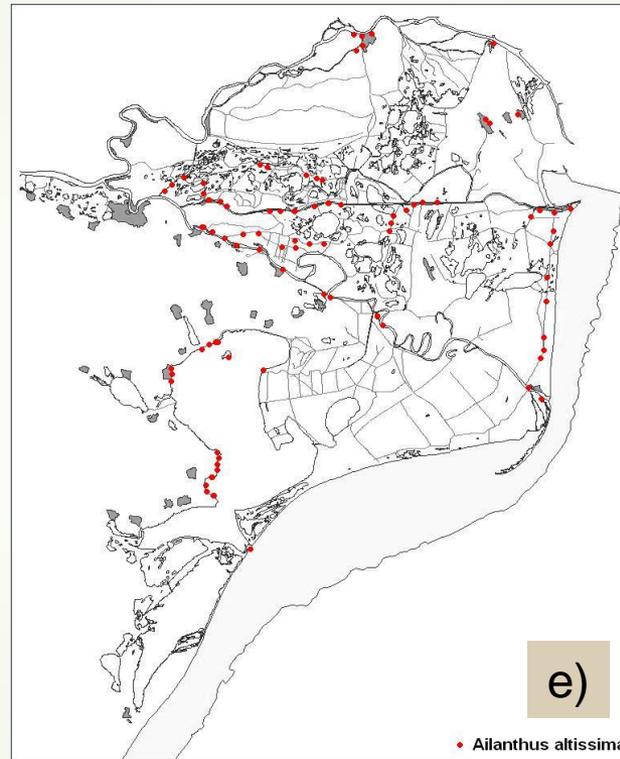
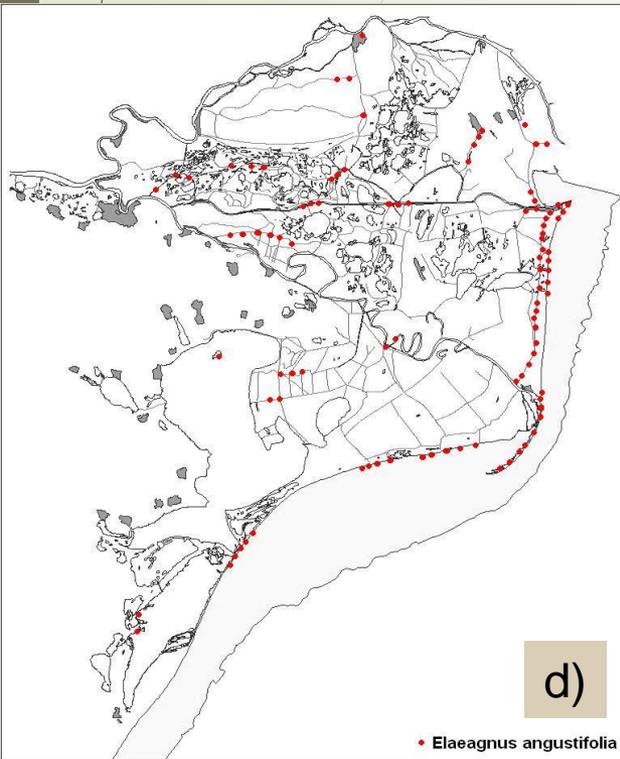
Species distribution:

- a) *Amorpha fruticosa*
- b) *Robinia pseudoacacia*
- c) *Gleditsia triacanthos*



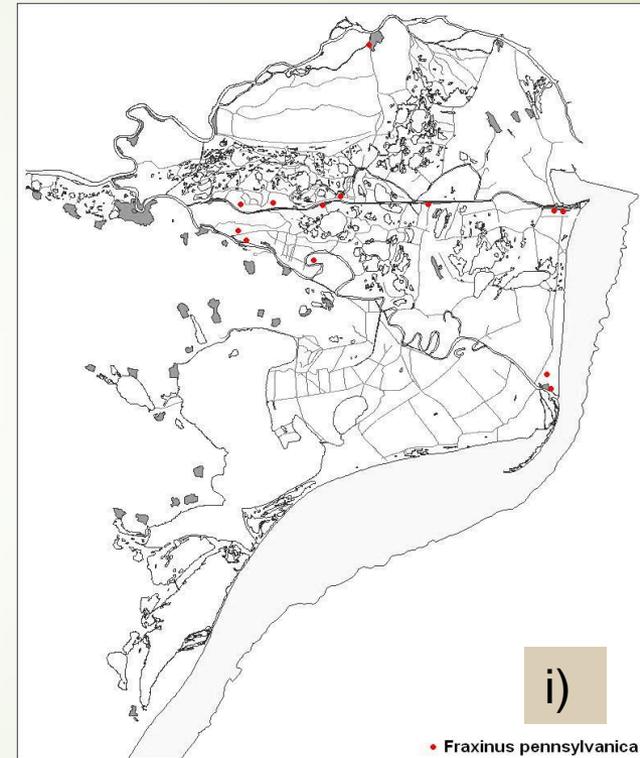
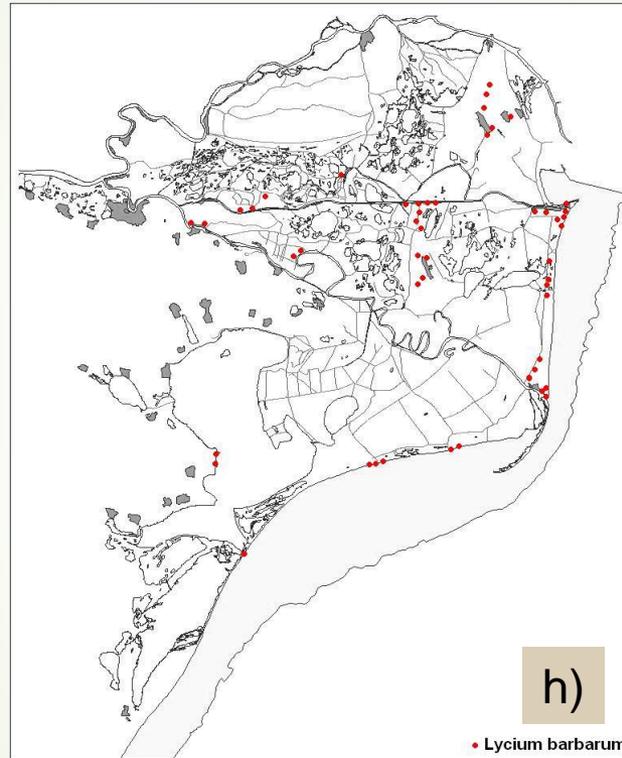
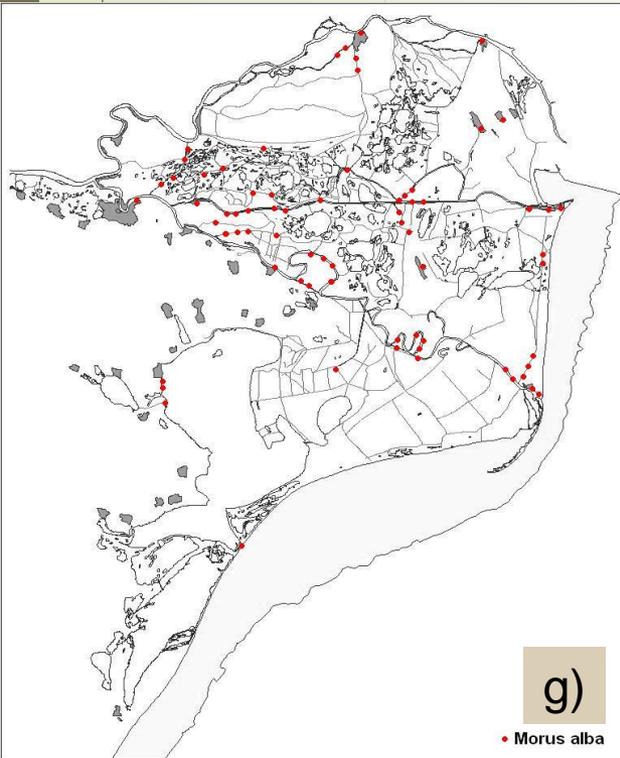
Species distribution:

- d) *Elaeagnus angustifolia*
- e) *Ailanthus altissima*
- f) *Acer negundo*



Species distribution:

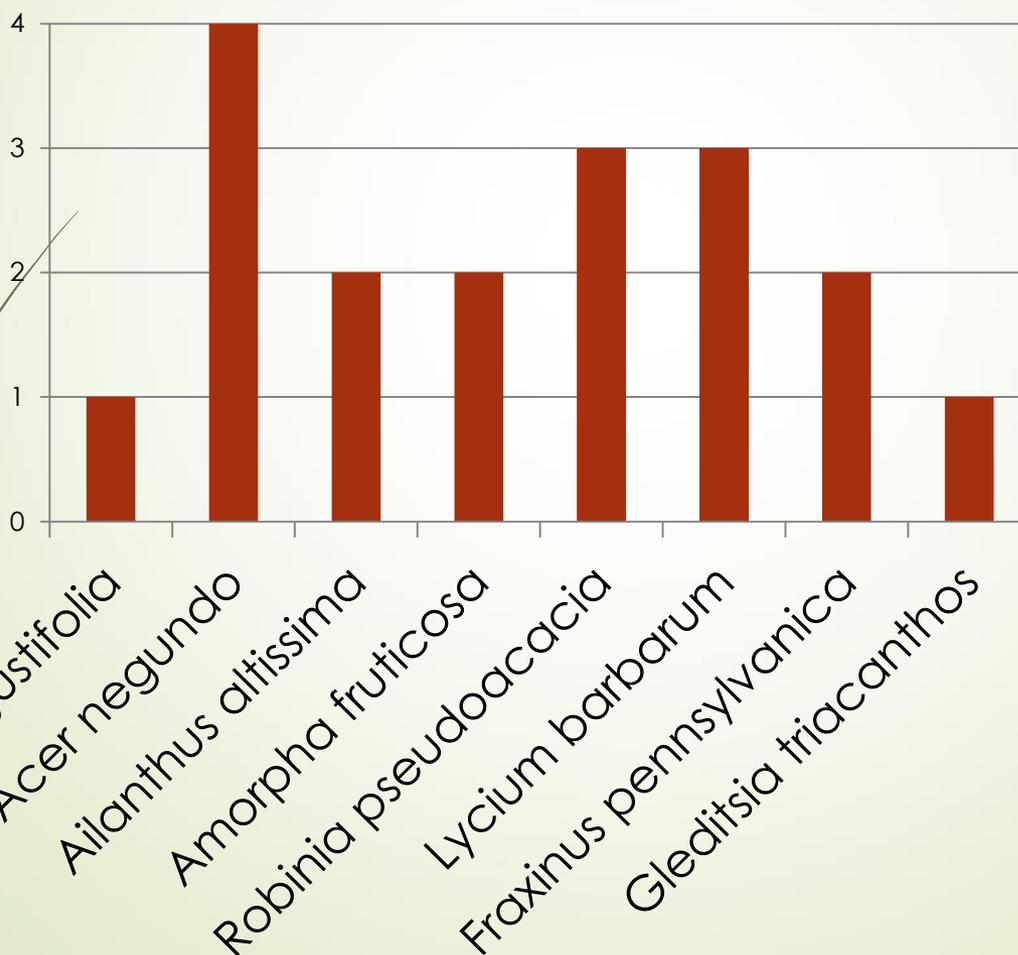
- g) *Morus alba*
- h) *Lycium barbarum*
- i) *Fraxinus pennsylvanica*



Ecological significance (W): Localities

Abundance – coverage scale according to Braun – Blanquet system (Cristea *et al.*, 2004) and the ecological significance index values

Class	Coverage interval (%)	Class value (%)	Ecological significance index (%)	
5	75–100	87.5	>2	characteristic
4	50–75	62.5	10–20	complementary
3	25–50	37.5	5–10	associate
2	10–25	17.5	1–5	accessory
1	1–10	5.5	0,1–1	accidental

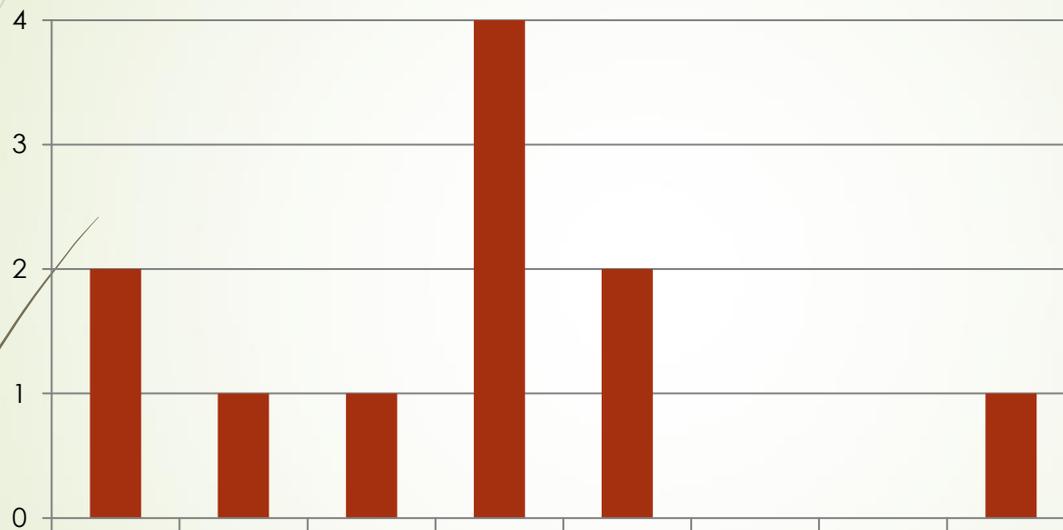


Ecological significance (W): Fluvial delta

Abundance – coverage scale according to Braun – Blanquet system (Cristea *et al.*, 2004) and the ecological significance index values

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W



Elaeagnus angustifolia

Acer negundo

Ailanthus altissima

Amorpha fruticosa

Robinia pseudoacacia

Lycium barbarum

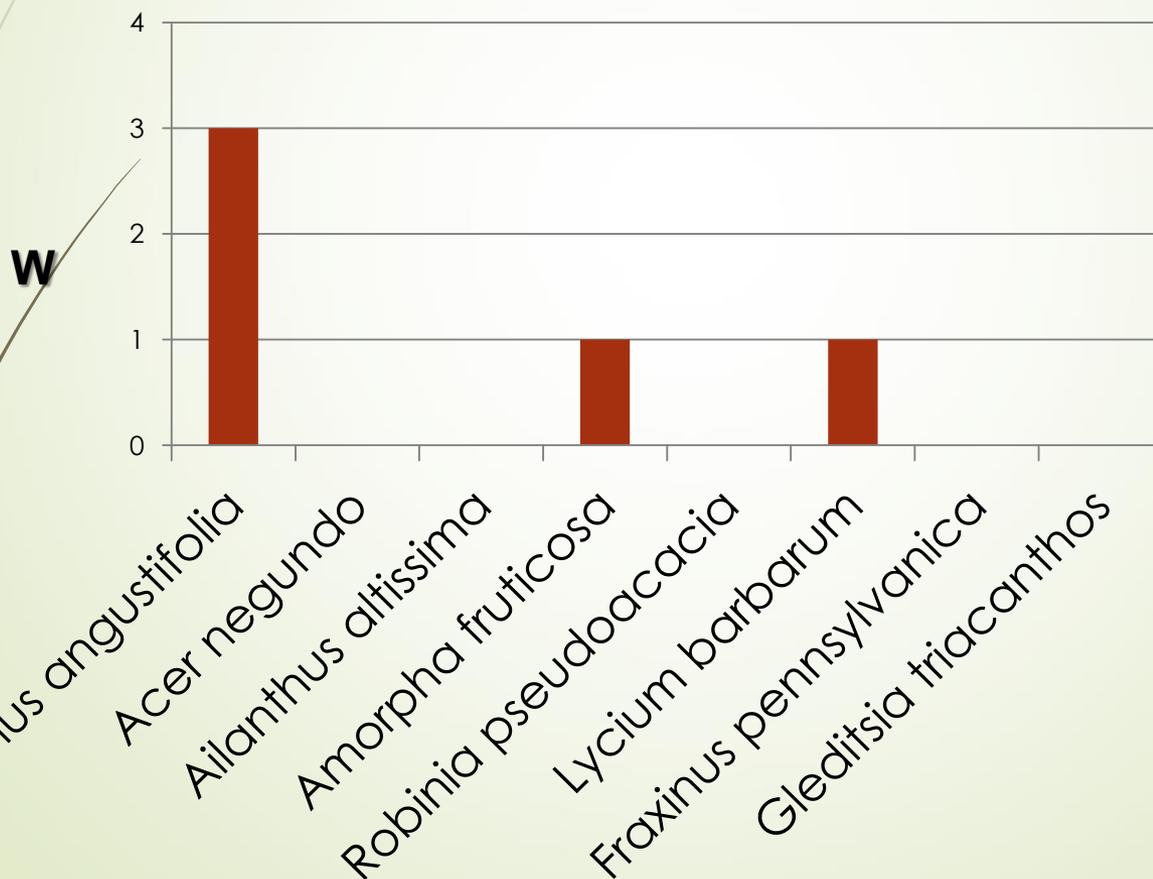
Fraxinus pennsylvanica

Gleditsia triacanthos

Ecological significance (W): Fluvial – maritime delta

Abundance – coverage scale according to Braun – Blanquet system (Cristea *et al.*, 2004) and the ecological significance index values

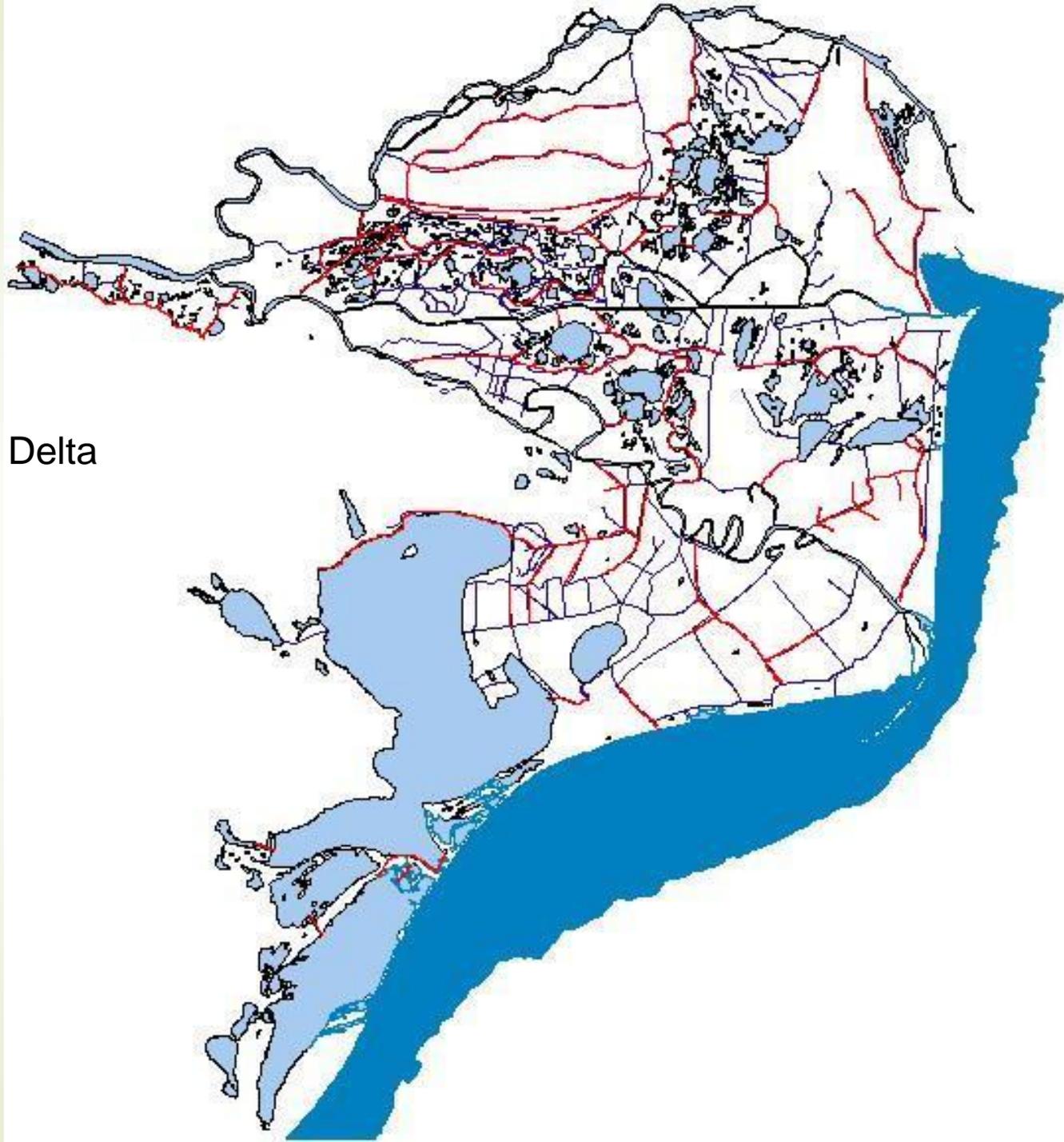
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2	10–25	17.5	1–5	accessory
1	1–10	5.5	0,1–1	accidental



Hydrotechnical works



Hydrotechnical works
developed in Danube Delta
Biosphere Reserve
between 1980 - 2014



Amorpha fruticosa on river banks in Danube Delta



ECOLOGICAL THREATS to Natura 2000 endangered habitats

1210 - Annual vegetation of drift-lines

1410 - Mediterranean salt meadows (*Juncetalia maritimi*)

1530* Pannonic salt-steppes and salt-marshes

2110 - Embryonic shifting dunes

2130* - Fixed coastal dunes with herbaceous vegetation (grey dunes)

2160 - Dunes with *Hippophaë rhamnoides*

91E0* - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

92A0 - *Salix alba* and *Populus alba* galleries

GENERAL MANAGEMENT OPTIONS

Steps to be followed:

- Prepare an inventory of existing invasive species problems and their known environmental and economic impacts locally, and also impacts reported elsewhere

Vegetation type	Alien species	%
Forest/bush vegetation of flood lands		54,45
Natural flood plain forest	a, b, c, d, e, f, g, i	42,66
Planted flood plain forest	a, b, g, h	9,58
Seashore vegetation	a, d, f, h	2,21
Marshy vegetation		20
Tall reed vegetation on mineral soils	a	17,87
Reed vegetation and bushes on floating reed beds	a	2,13
River levee grassland		7,07
Grassland on medium high river levee	a, b, d, h	3,87
Grassland on high river levee	a, b, e, f,	3,20
Beach/sea dune vegetation		2,40
Vegetation on flat marine / alluvial deposits slightly salinised	a, b, d	1,33
Coastal low dune (0,5 – 1 m) vegetation	b, d, e, h	1,07
Miscellaneous		6,74
Agricultural polder	a, b, c, d, e, f, g, h	6,74

Establishment site potential of invasive species in DDBR habitats according to G.P.S. points

Steps to be followed:

- Pay attention to ecosystems that are particularly vulnerable and to endangered species and their habitats

Survey units	Șontea - Fortuna	Matia - Merhei	Dunăvăț - Dranov	Grindul Caraorman	Cordon littoral
Human land use (%)					
Settlements	1,97	-	-	2,97	-
Fish ponds	1,20	0,01	0,22	0,24	-
Agriculture areas	20,35	-	-	-	-
Planted flood plain forest	9,47	0,07	-	0,96	4,51
Natural land cover (%)					
Natural flood plain forest	15,78	1,02	0,31	0,78	-
Natural dune forest	-	-	-	5,62	-
Marshy vegetation	33,88	76,42	74,05	51,06	8,5
Lakes	13,20	21	21,73	0,07	1,39
Sea dunes	-	-	0,92	6,57	85,6
Steppe/dry areas	-	-	0,14	31,57	-
Grasslands	4,15	1,48	2,63	0,16	-

Land use/cover units of the 5 sites

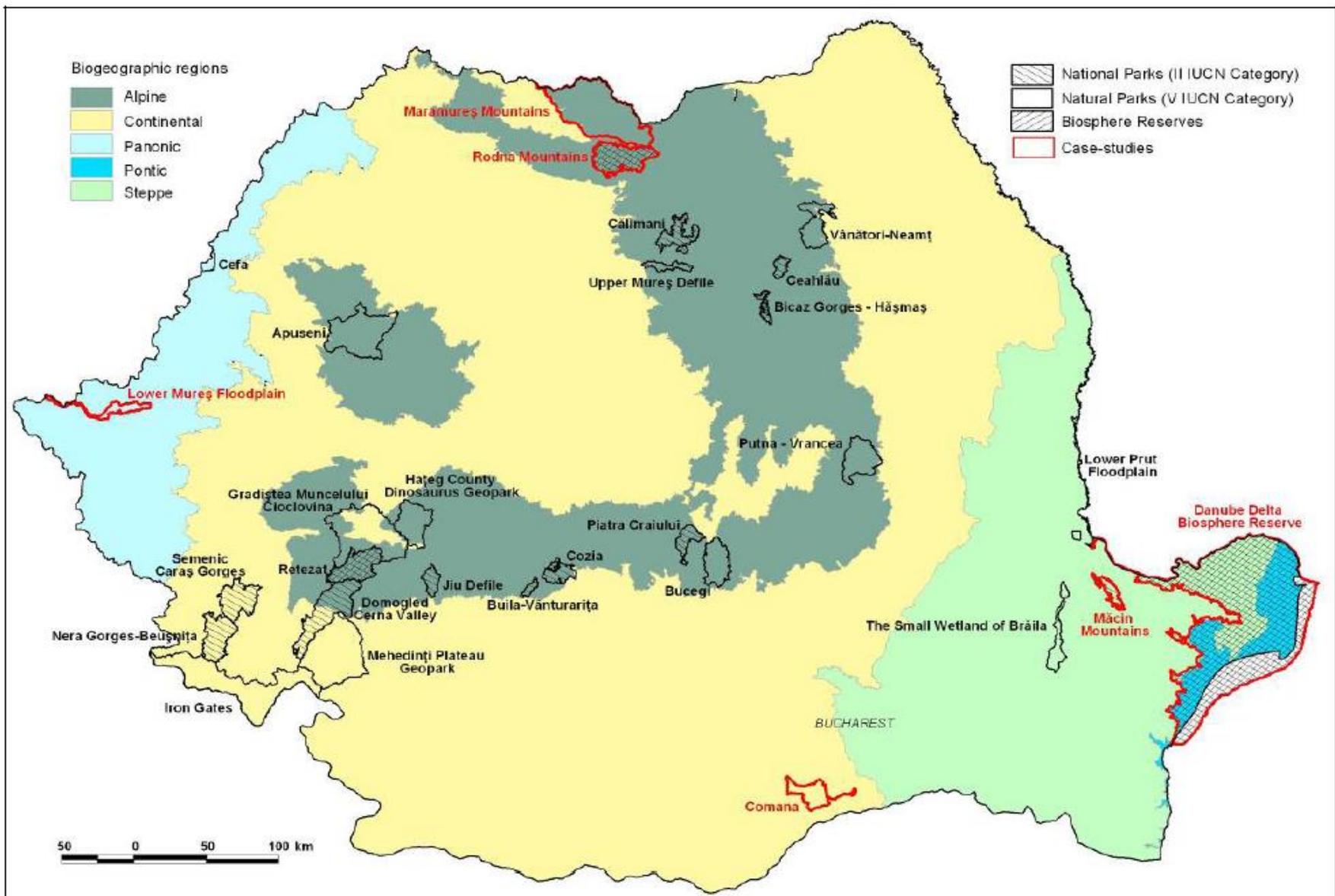
SPECIFIC MANAGEMENT OPTIONS

ONE EXPERIMENT for *Amorpha fruticosa*: 5 sites for wood harvesting rotation (1 site per year)

1. Șonțea-Fortuna; 2. Dunăvăț - Dranov; 3. Matîța-Merhei; 4. Caraorman;
5. Cordon littoral

The results indicate that:

- *Amorpha fruticosa* can be controlled by using mechanical controls, chemical controls are excluded;
- Amorfa shrub can be cut at ground level with power or manual saws. Cutting is most effective when plants have begun to flower to prevent seed production;
- Following these measures, rapidly-growing indigene trees species should be planted in order to prevent its reappearing;
- On the other hand we can monitor the surfaces without *Amorpha fruticosa* mainly the protected areas and if *Amorpha fruticosa* shrub appears we simply eradicate the species, thus controlling its spreading.



Selected case-studies in the Romanian natural protected areas.



**Thank you for your
attention!**

mihai.doroftei@ddni.ro
silviu.covaliov@ddni.ro

Acknowledgements

These data were collected under contact : PN 06 – 22.01.08 funded by the Romanian Ministry of Environment and Sustainable Development.