ARTWEI kick-off meeting
Warnemuende 25th – 27th April 2010

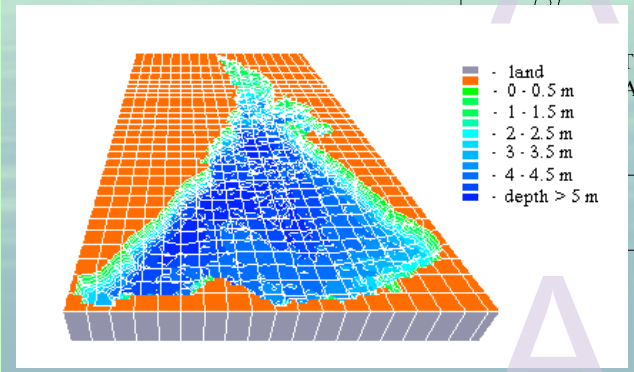
Curonian Lagoon

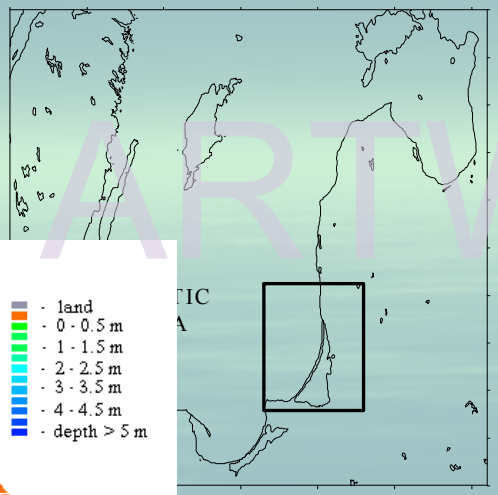
Arturas Razinkovas[1], Boris Chubarenko[2]

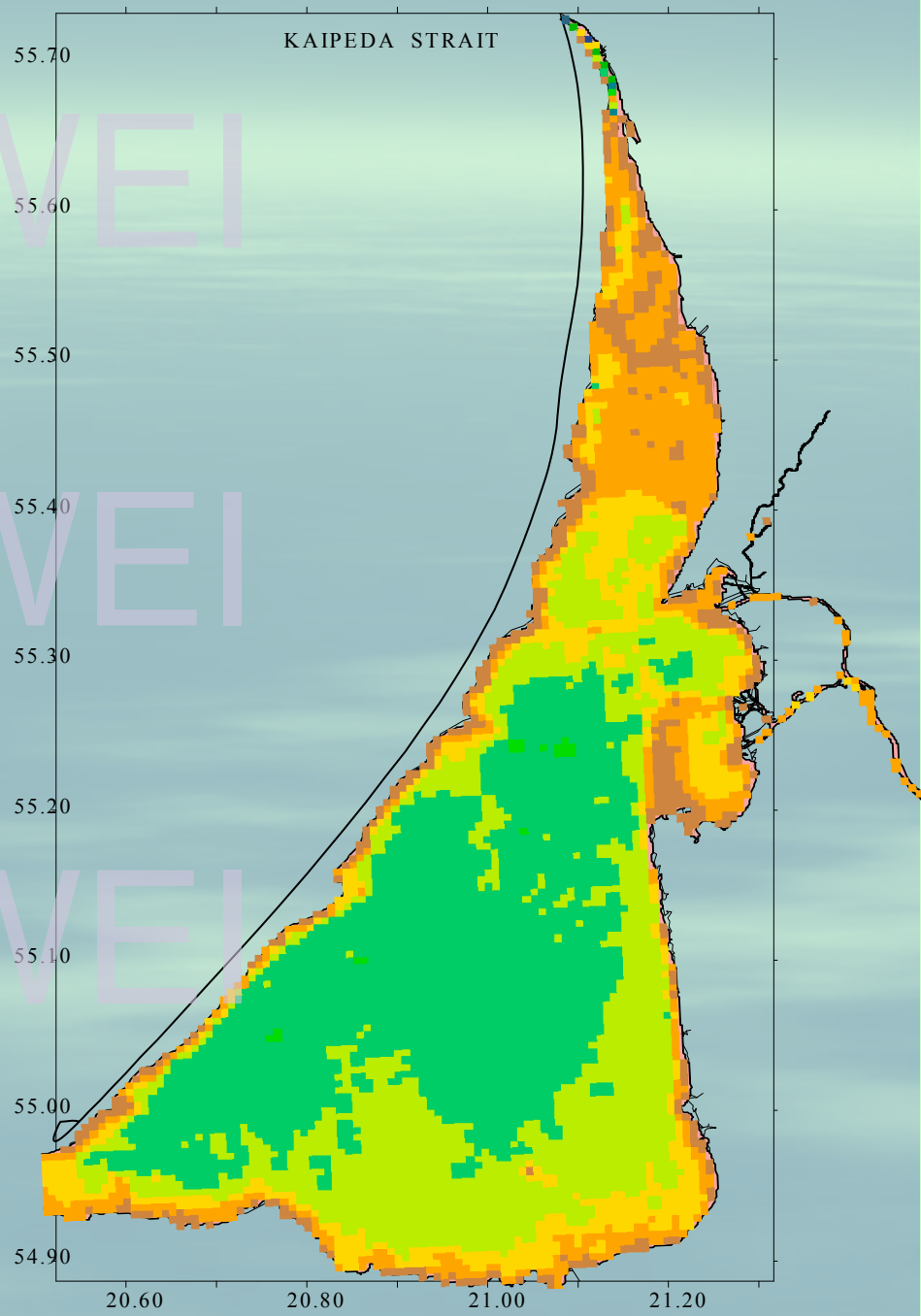
[1]- Coastal Research & Planning Institute, Klaipėda University, Klaipeda, Lithuania
art@corpi.ku.lt

[2] – Atlantic Branch of P.P.Shirshov Institute of Oceanology of Russian Academy of Sciences, Kaliningrad, Russia
chuboris@mail.ru


Klaipeda
Klaipeda Strait – the single inlet
Curonian Lagoon
Curonian Spit
Nemunas River Delta
Kaliningrad
Deima River
Pregolia River







Area: 1584 km²

Volume: 6.2 km³

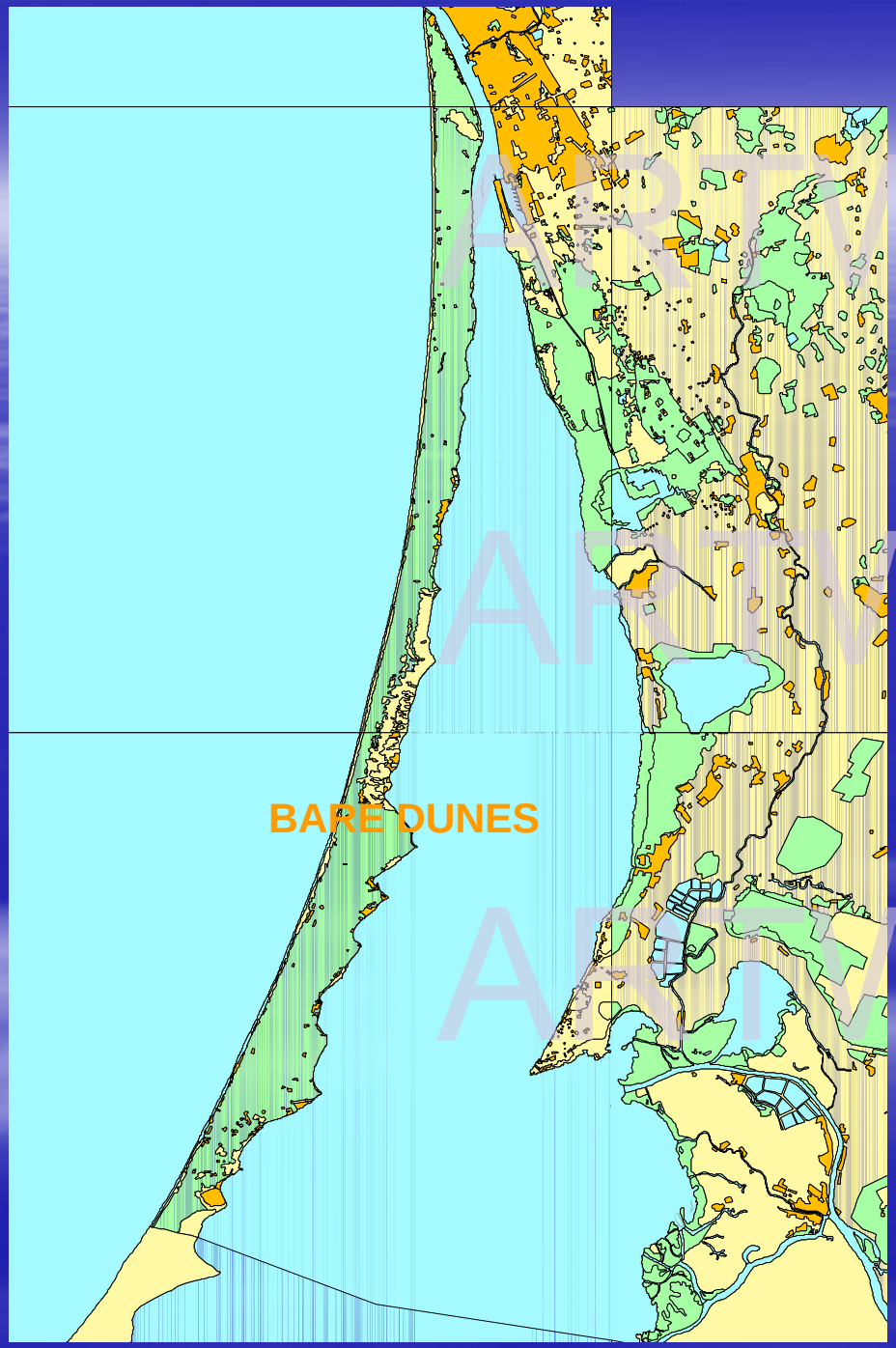
North-South dimension: 95 km

Max depth: 5.8 m

Mean depth: 3.8 m

Salinity: 0-8 psu

LAND USE

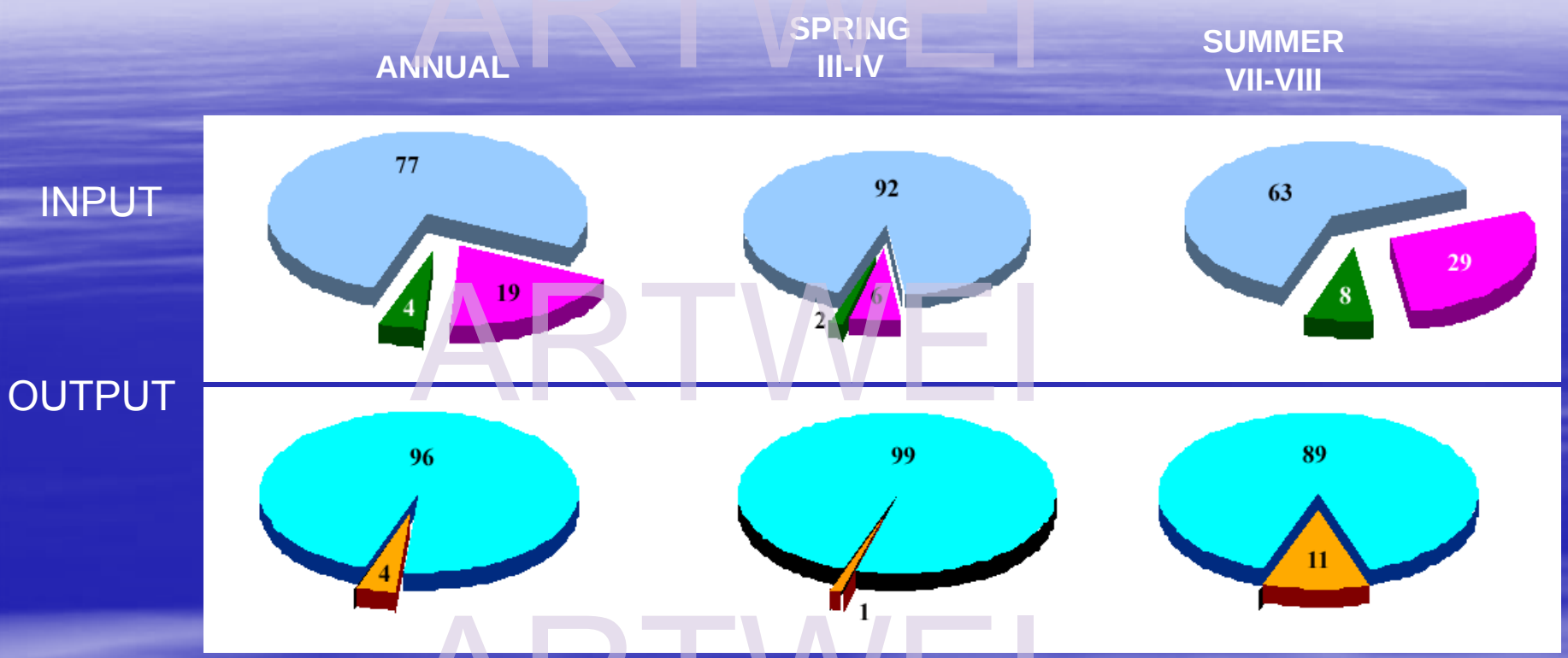


URBAN

GRASSLAND AND FARMLAND

WOODLAND

WATER BUDGET FOR CURONIAN LAGOON



Water gain:

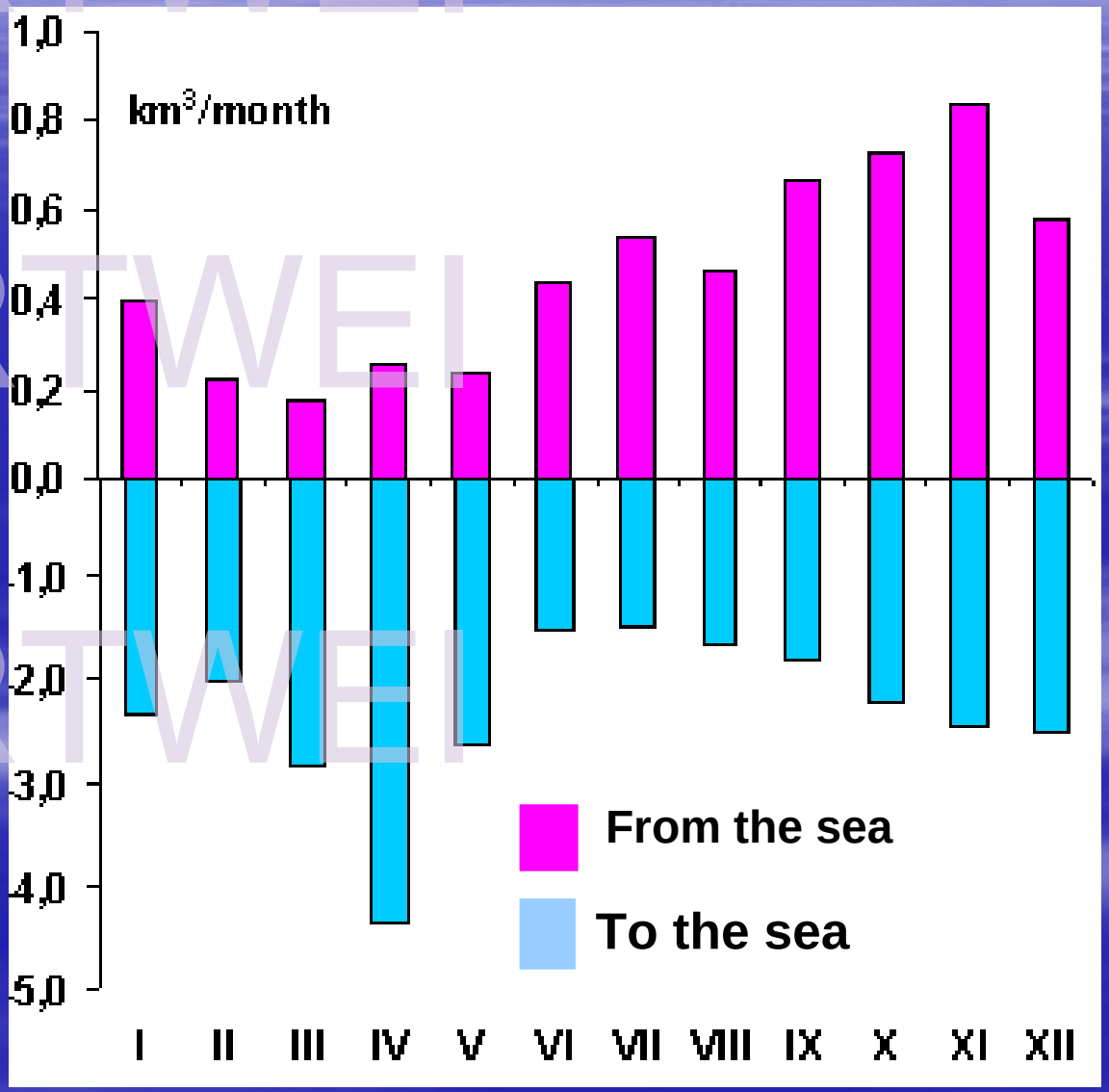
- River runoff - 20.75 km^3/year
- Precipitation - 1.28 km^3/year
- Inflow from the sea - 5.07 km^3/year

Water loss:

- Evaporation - 0.92 km^3/year
- Outflow to the sea - 26.18 km^3/year

Klaipeda strait

Seasonal volumes (km^3/ month)

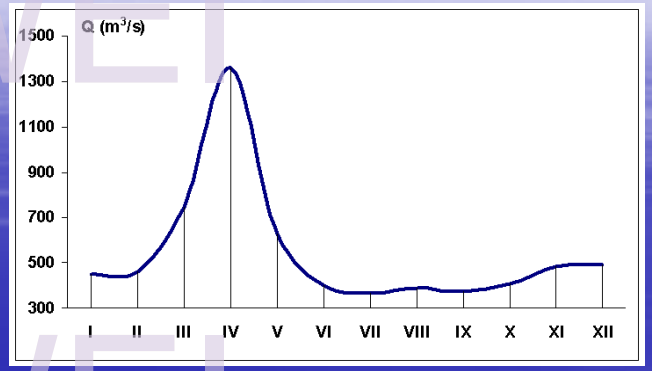


Stream velocity in the straight varies in a range 0.4 - 0.7 m/s, with extremes, 2.0 m/s

FLOODS

MAXIMAL EXTENSION OF THE FLOOD

Typical hydrograph



FLOODED AREAS

Total - 1310 km^2

Lithuanian side - 570 km^2

Curonian lagoon water level raise - 1.64 m

Maximal overflow through Klaipeda Strait – 4500 m^3/ s

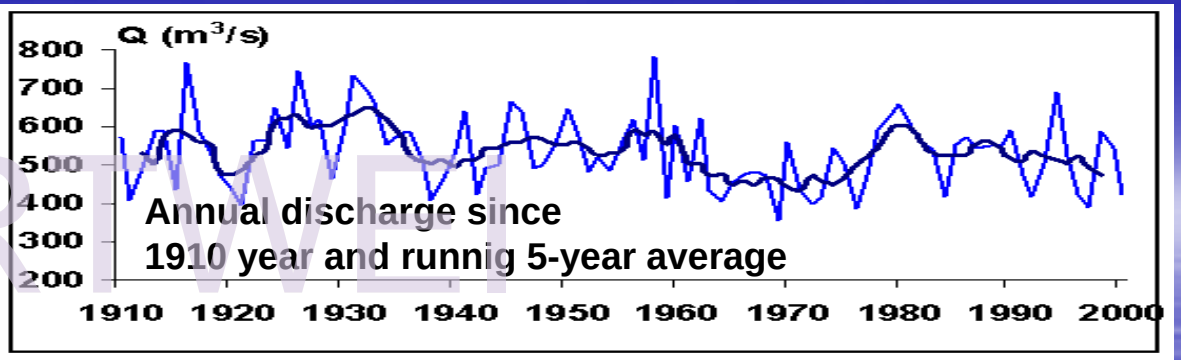
FLOOD RISK AREAS IN NEMUNAS DELTA REGION AND CURONIAN LAGOON LITORAL ZONE

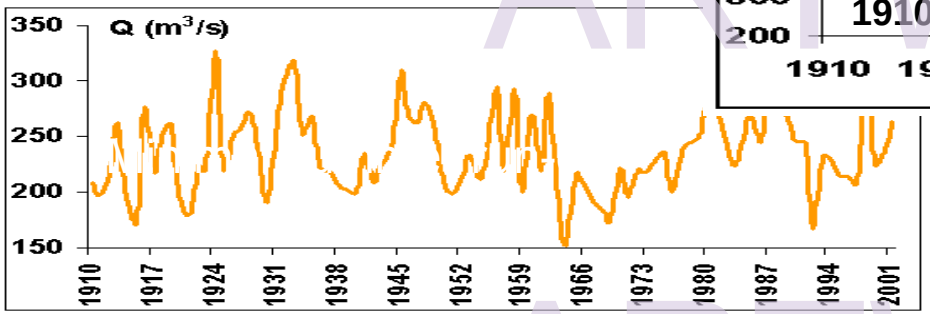
Polder system:

1. Areas protected from 1% probability floods
2. Areas protected from common (10% probability) floods
3. Unprotected areas

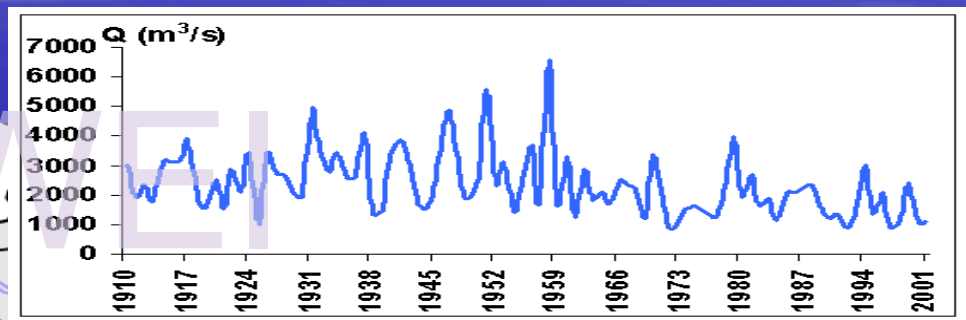
Areas of seasonal flood risk - 570 km^2

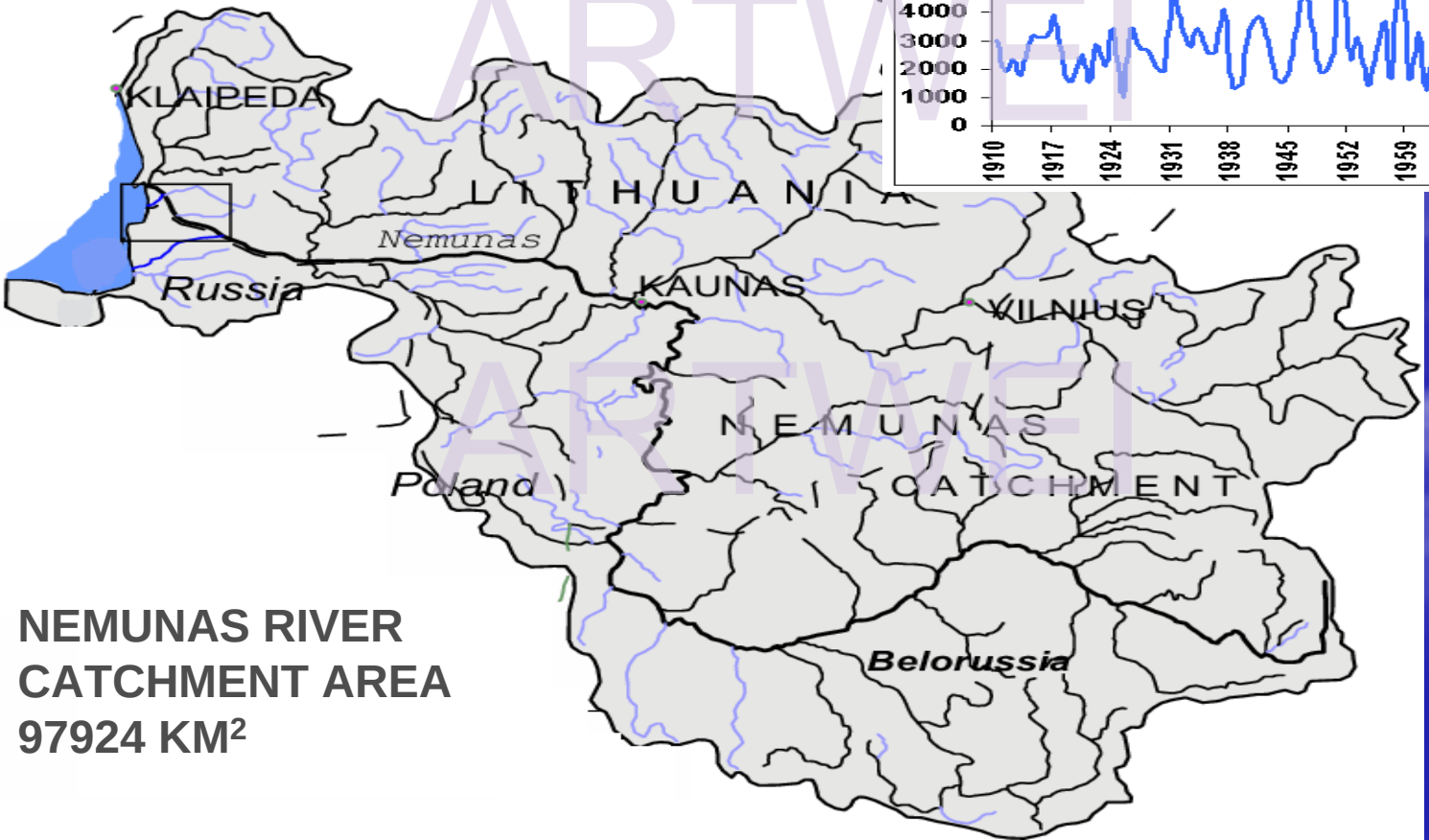
NEMUNAS CATCHEMENT BASIN & RUNOFF





Maximal run-off

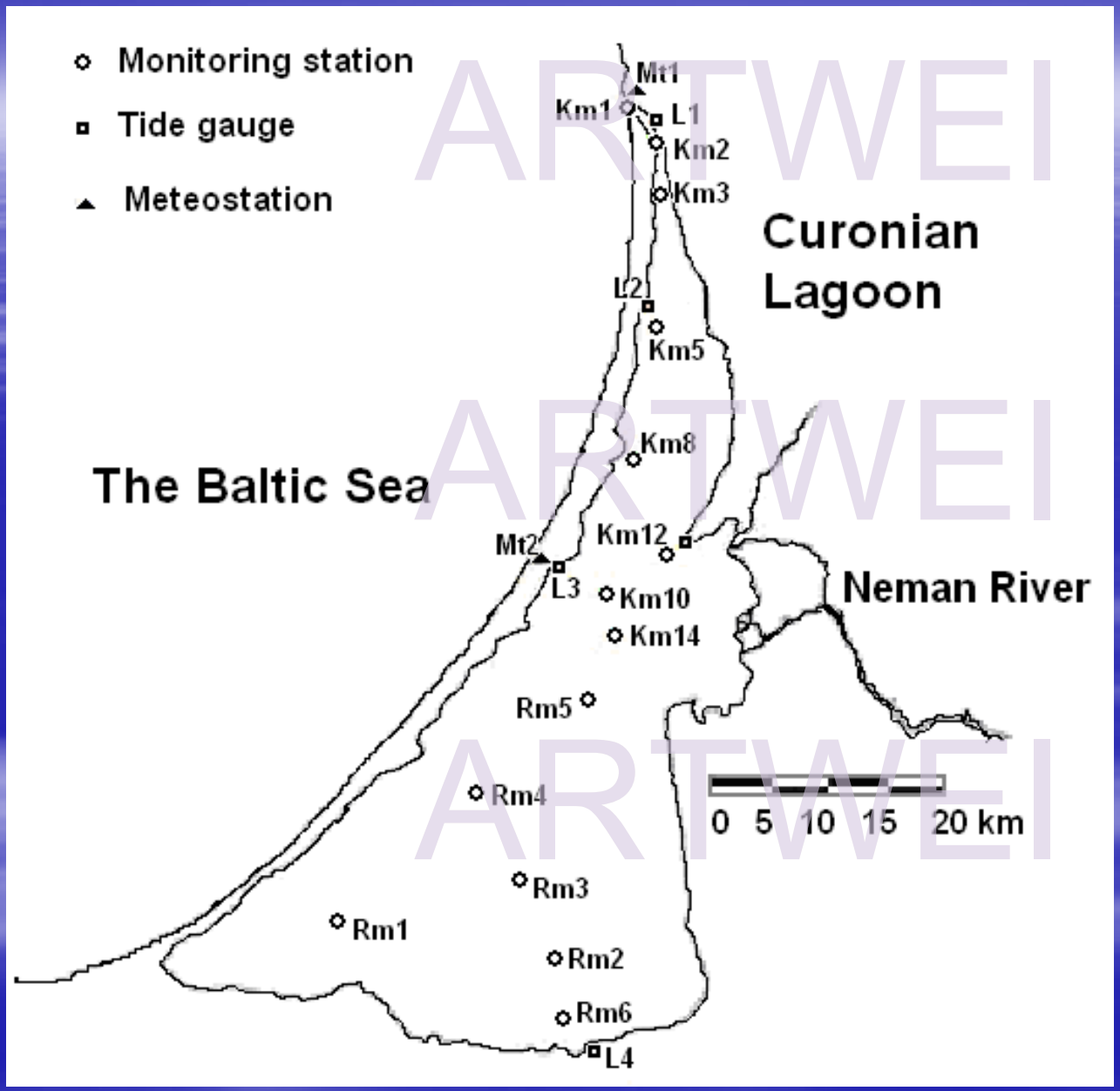




NEMUNAS RIVER CATCHMENT AREA 97924 KM²

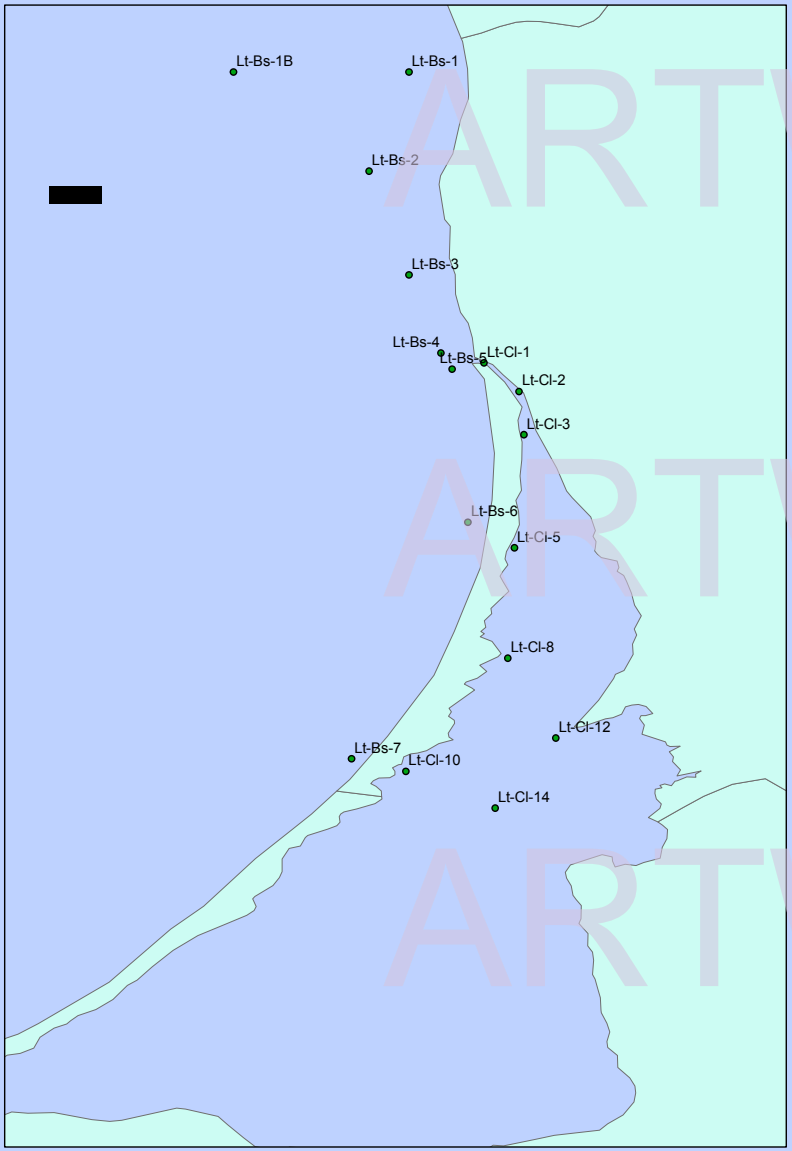
MEAN MAXIMAL SNOW WATER EQUIVALENT (mm)

Monitoring



Monitoring stations in the Curonian Lagoon, which belong to national hydrometeorological agencies. Km* and Rm* - are stations of Lithuanian and Russian monitoring networks respectively. Water level variations are measured in four points: L1 (Klaipeda), L2 (Preila), L3 (Nida) and L4 (Polessk). Meteorological stations are located in Klaipeda (Mt1) and Nida (Mt2).

Chubarenko B.V., Umgiesser, G., Chubarenko, I., Davulienė, L., Razinkovas, A., Feike, M. Numerical modeling of the Curonian and Vistula lagoons revisited. / Transboundary waters and basins in the South-Eastern Baltic. Chubarenko B.V. (Ed.). – Kaliningrad: Terra Baltica, 2008.- Pp. 177-192.



Lithuanian state monitoring stations

- Zooplankton (species, abundance)
- Phytoplankton (species, abundance)
- Chlorophyll A
- Bacterioplankton (abundance, biomass, production)
- Zoobenthos (species, abundance)
- Primary production (CL-10, BS-4 and BS-7 stations only)
- BOD_7 (Curonian lagoon only)
- Macrophytes (surveys, Curonian lagoon only)

Fish monitoring

- Abundance and biomass (Curonian lagoon & Coastal zone)
- Migrations (Klaipeda port area)

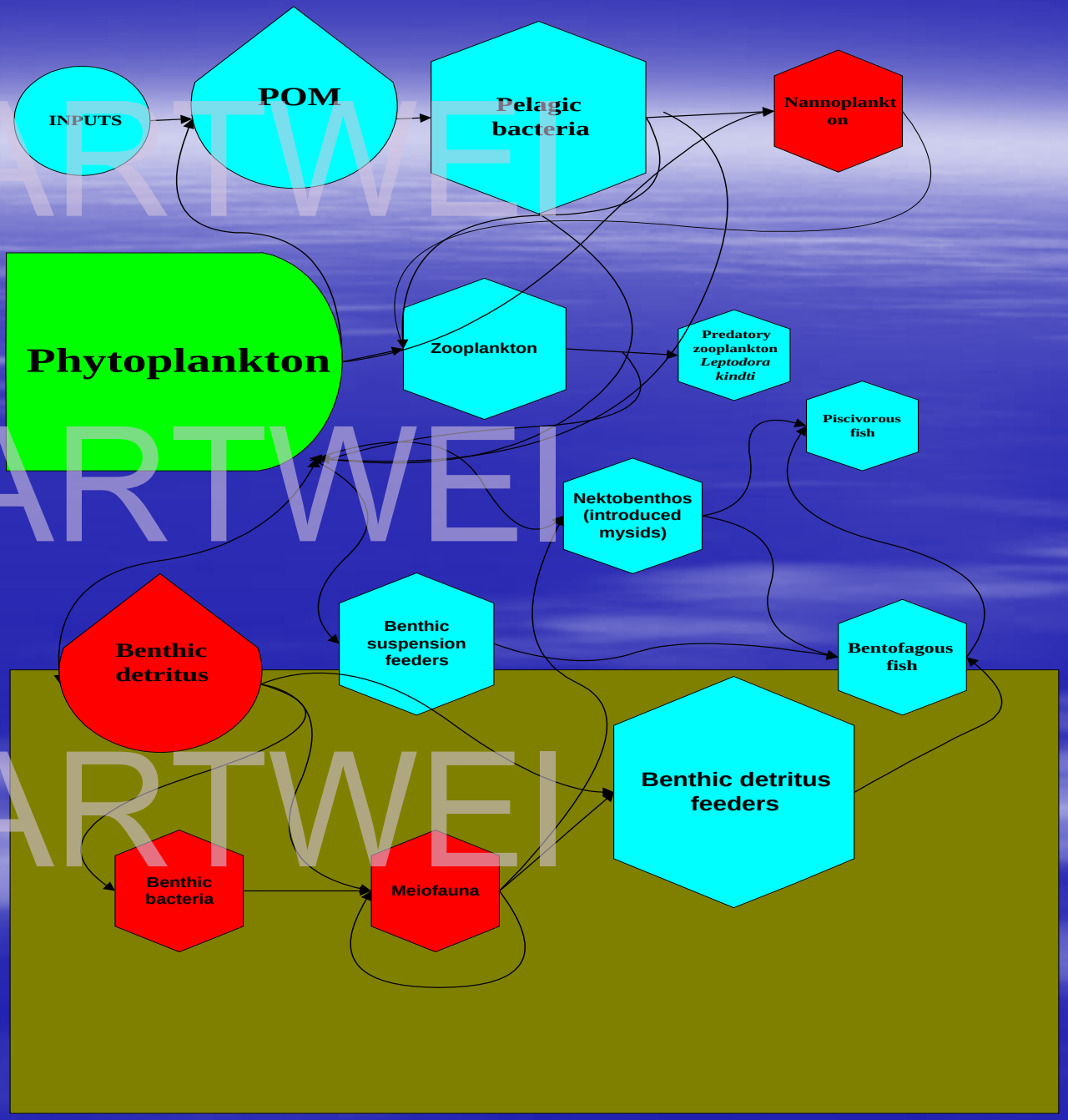
Bird and mammal monitoring

- Wintering birds (abundance)
- Nesting birds (abundance)

CASE STUDIES & OTHER MONITORING PROGRAMMES

- Klaipeda port environmental monitoring programme
- Butinge oil terminal monitoring programme
- NATO CCMS Curonian Lagoon study
- Institutional research programmes

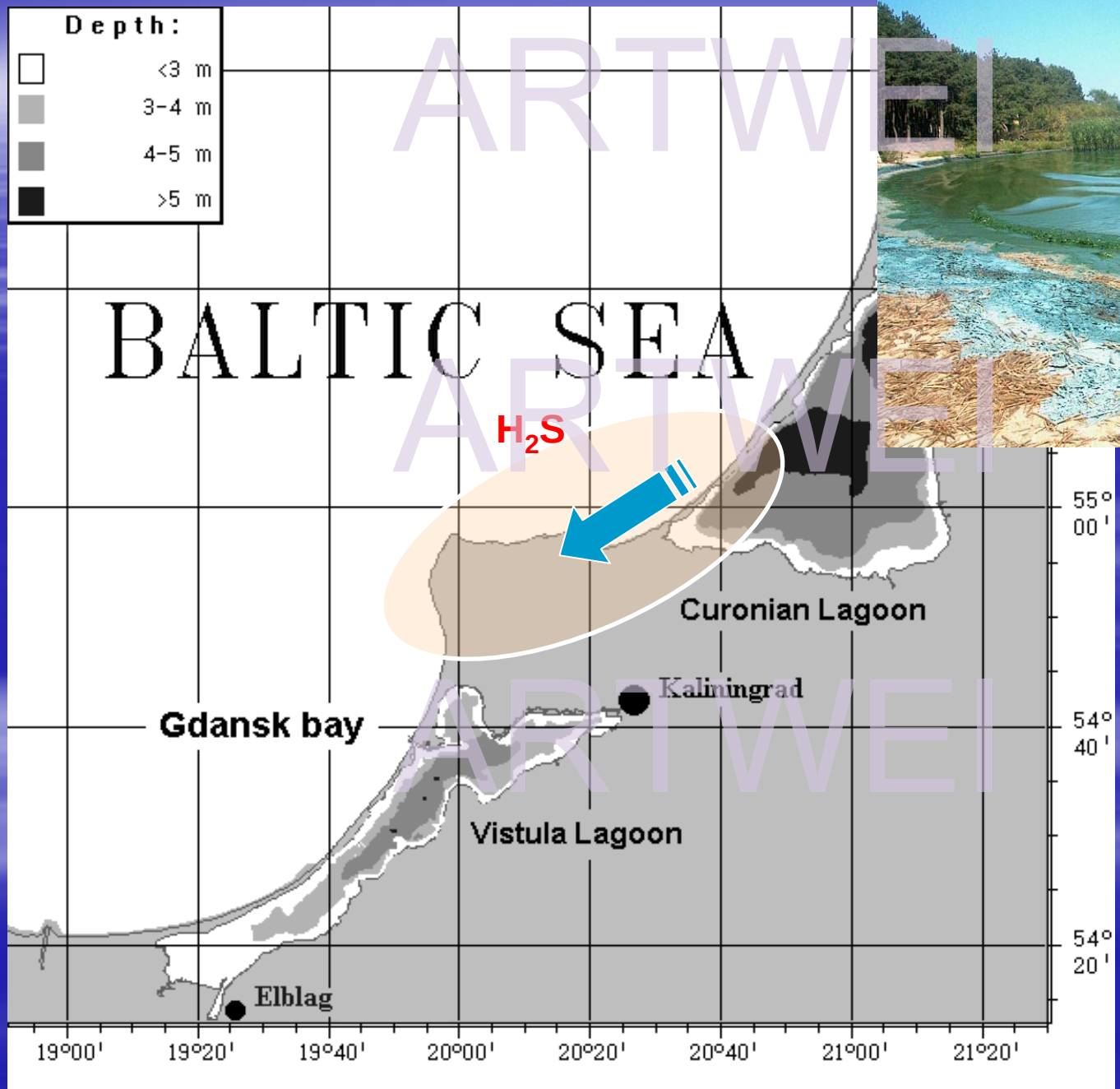
Curonian lagoon, principal food chains



Main problem - euthrophication !!!

The riverine load of N to the lagoon is composed of 85-90% ammonia and the other 10-15 % are other forms (inorganic). Stankevicius (1995) estimated the average total riverine N load to the lagoon in 4.6x104 tons/y (period 1985-1992).

Photo – B. Chubarenko



Summer problems with H_2S release and influence on recreational areas

Cyanobacteria blooms

- Phytoplankton biomass up to 260 mg/l
- Total N up to 450 µmol/l
- Total P up to 20 µmol/l
- Chlorophyll a up to 460 µg/l
- Recreation & commercial fishing are the key business of the local population
- **Water quality issues & fish kills during anoxia events !!!**

Sectorial conflics

- Bird protection vs. fishery
- Recreation vs nature protection
- Oil drilling vs recreation

Climate changes

Probable synergetic effect may bring an abnormal response !!! `

Sea

Estuary or Lagoon

Land

Anthropogenic influences

THANK YOU !

Photo – B. Chubarenko

Photo – B. Chubarenko