LATVIJAS VIDES, ĢEOLOĢIJAS UN METEOROLOĢIJAS CENTRS

Interreg Estonia-Latvia
European Regional Development Fund

EUROPEAN UNION

SURFACE WATER QUALITY AND PRESSURE ASSESSMENT IN GAUJA/KOIVA AND SALACA/SALATSI RIVER BASIN, POTENTIAL MEASURES

LINDA FĪBIGA
MARGITA BRUZGO
INETA ARŠAUSKA
JOLANTA JĒKABSONE

FINAL SEMINAR

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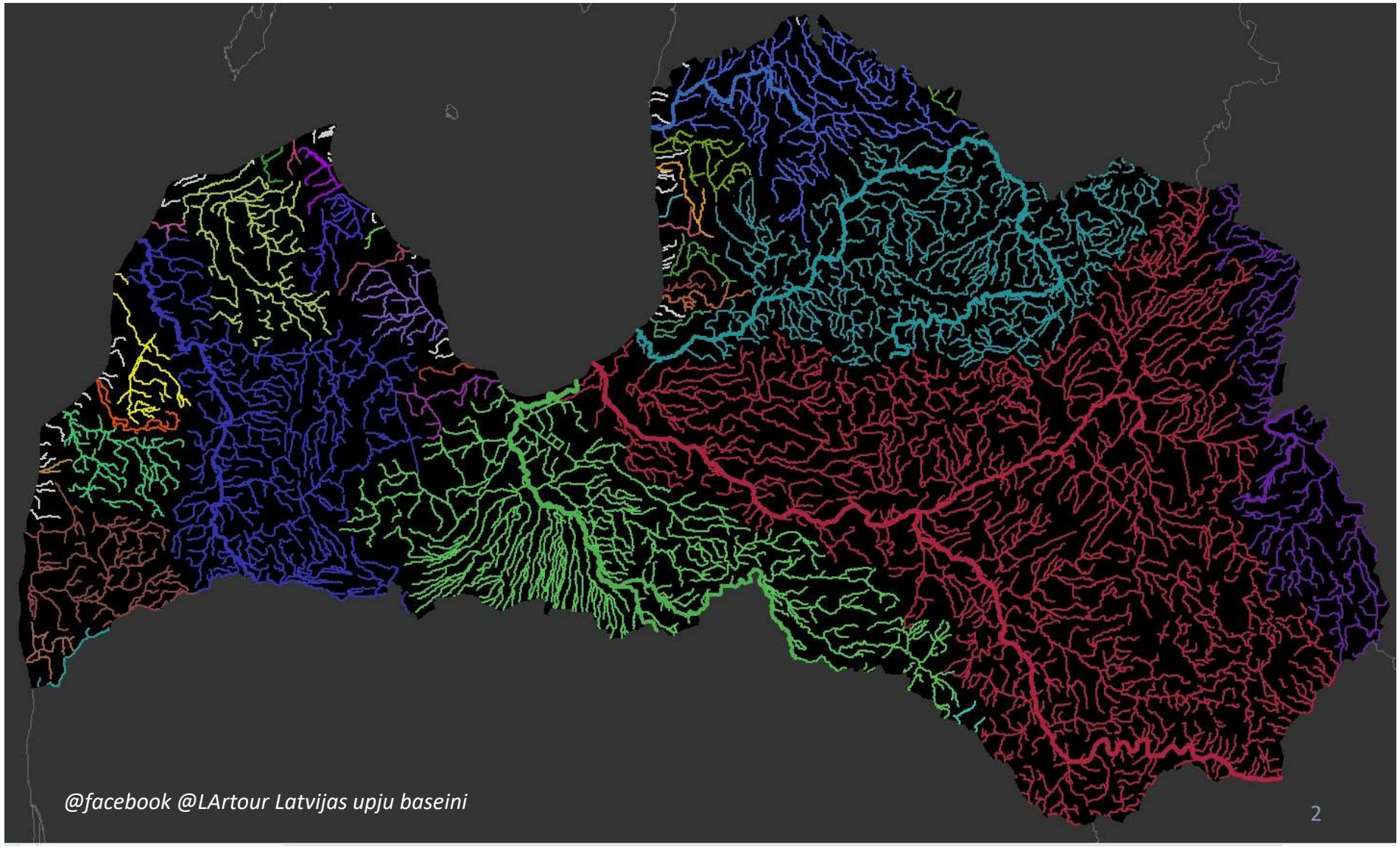
RIVER NETWORK



@facebook @LArtour Latvijas upju baseini

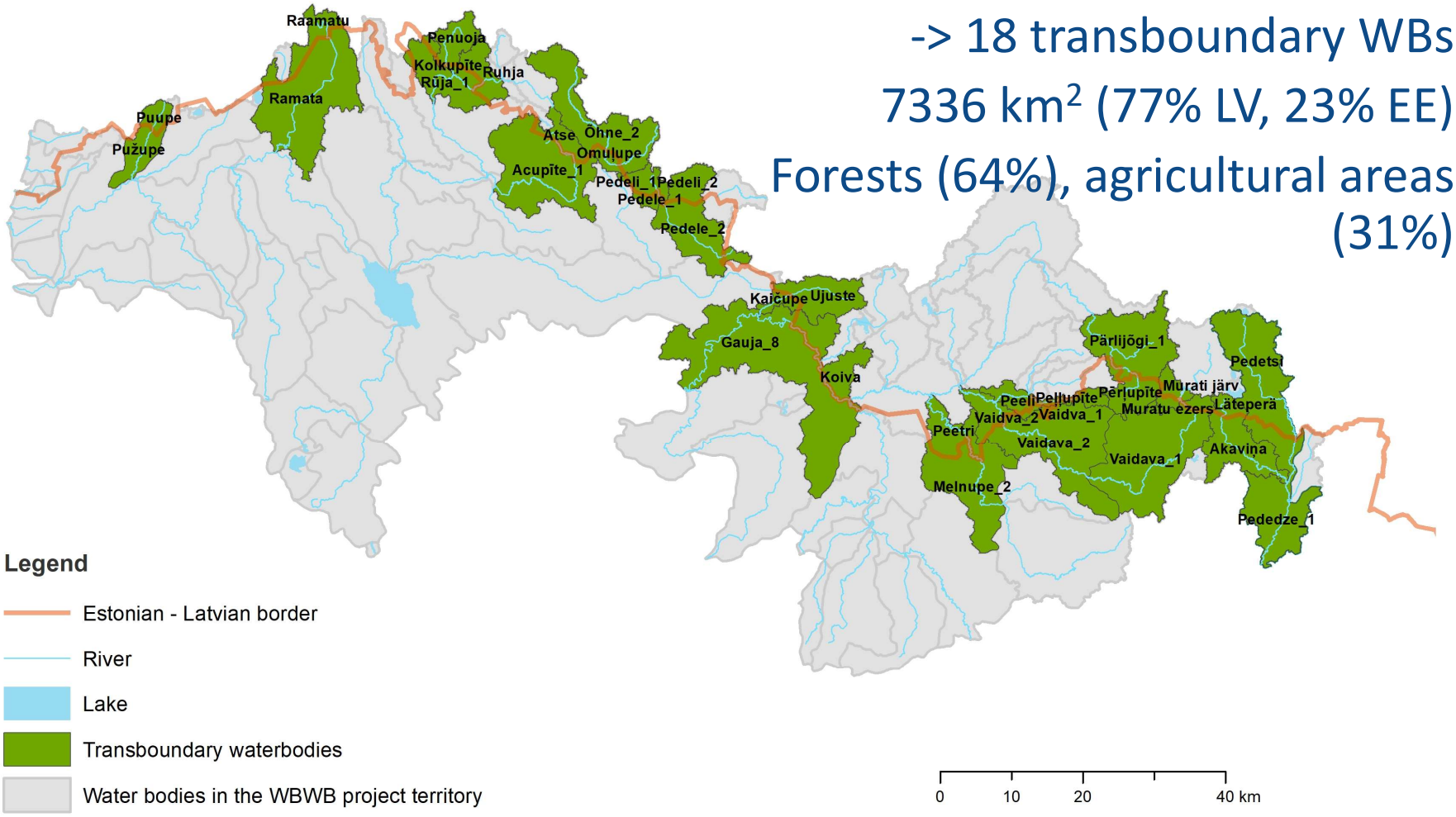
PROJECT AREA

109 WBs (63 in LV, 43 in EE)

-> 18 transboundary WBs

7336 km^2 (77% LV, 23% EE)

Forests (64%), agricultural areas (31%)

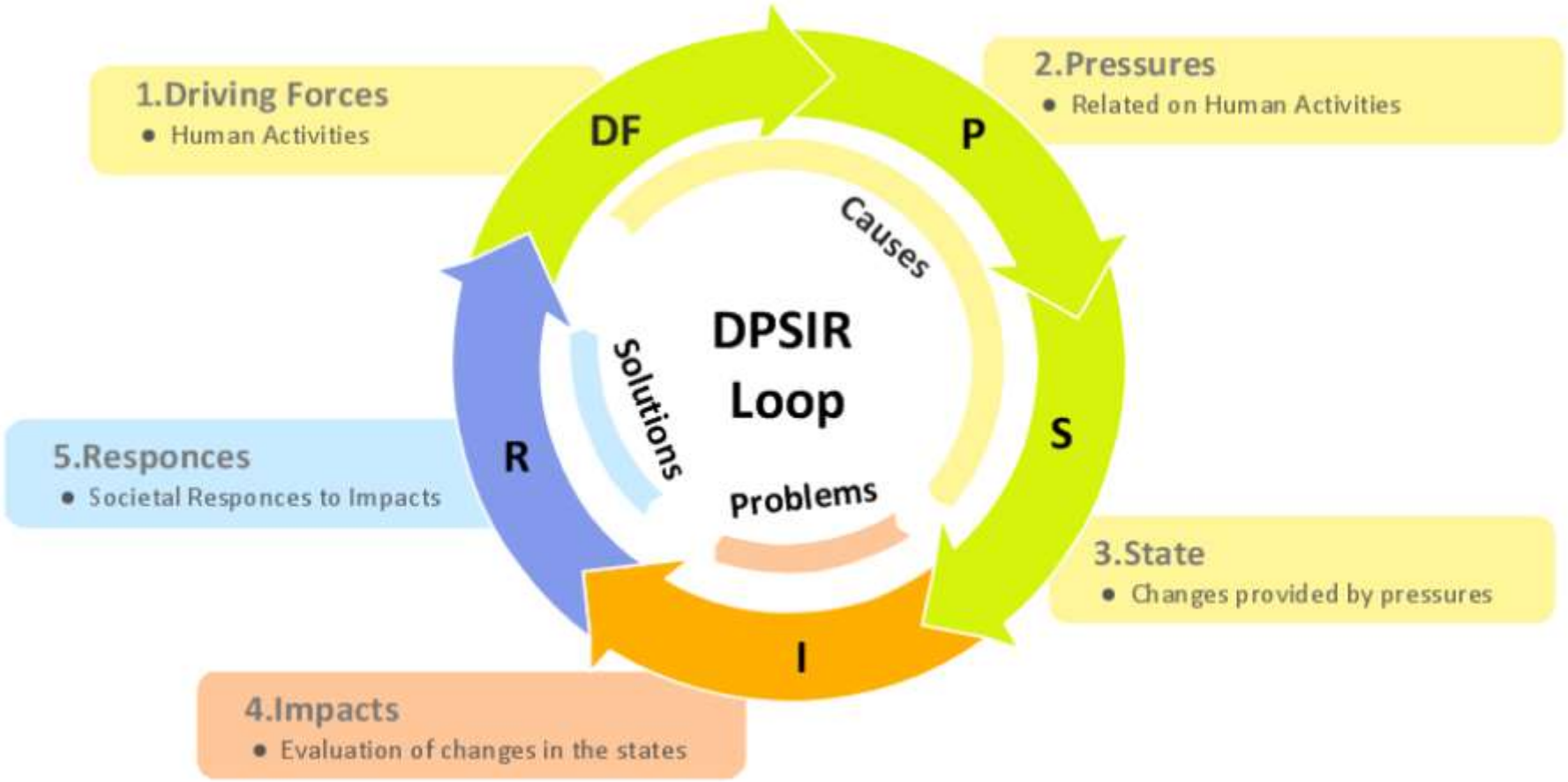


CONTRASTS

Natural, distrophic
Lake Sokas

Hypereutrophic
Lake Burtnieku

DPSIR FRAMEWORK



@ Matta A., Serra M. *A Geodesign Approach for Using Spatial Indicators in Land-Use Planning.* Civil Engineering and Architecture 4(5): 183-192, 2016

DRIVERS – PRESSURES – STATE

- Drivers
  - Households & industry – centralized sewage systems;
  - Industry – individual sewage systems;
  - Households – individual sewage systems;
  - Mining (*not relevant*);
  - Agriculture (water abstraction, nutrients run-off, drainage etc.);
  - Forestry (nutrients run-off, drainage);
  - Hydropower plants (HPP);
  - Flood defence (*not relevant*);
  - other

DRIVERS – **PRESSURES** – STATE

- Pressures
  - On surface water quantity;
  - Point source pollution of nutrients / hazardous & priority substances;
  - Diffuse source pollution of nutrients / hazardous & priority substances;
  - Hydro-morphological pressure;
  - Hydrological pressure (quantity, water flow regime);
  - Morphological pressure

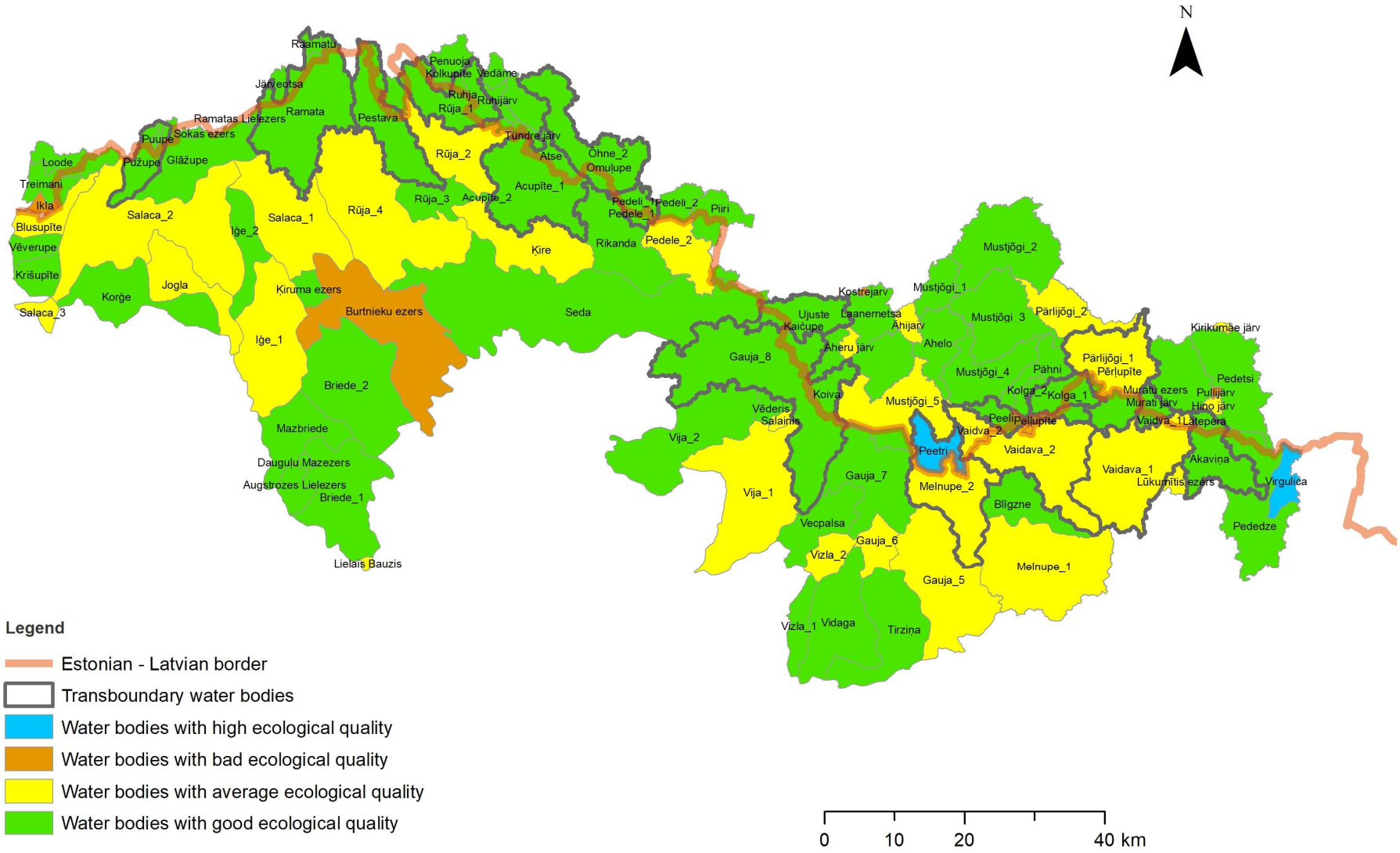
DRIVERS – PRESSURES – **STATE**

Ecological status

- Physico-chemical parameters (Secchi, BOD_5, N, P, O_2..);
- Biological quality elements (macroinvertebrates, fish, macrophytes, phytoplancton..);
- Hydro-morphology (hydrological regime, morphological structure, continuity..)

WB	Biology	Phys-chem	HyMo	ECOLOGICAL QUALITY
G241	3	2	2	3
L109	5	1	3	5
G261SP	2	5	5	3

ECOLOGICAL QUALITY



HARMONISATION OF TRANSBOUNDARY WB

CODE	WB NAME	QUALITY IN LATVIA	QUALITY IN ESTONIA
G319	Acupīte_1	GOOD	GOOD
D565	Akaviņa	GOOD	GOOD
G274	Gauja_8	GOOD	GOOD
G329	Kaičupe	GOOD	GOOD
G331	Kolkupīte	GOOD	GOOD
G233	Melnupe_2	MODERATE	HIGH
E205	Muratu ezers	GOOD	GOOD
G330	Omuļupe	GOOD	GOOD
D450	Pededze_1	GOOD	GOOD
G336	Pedele_1	GOOD	GOOD
G317	Pedele_2	MODERATE	MODERATE
G332	Pellupīte	GOOD	GOOD
G237	Pērļupīte	GOOD	MODERATE
G333	Pužupe	GOOD	GOOD
G307SP	Ramata	GOOD	GOOD
G314	Rūja_1	GOOD	GOOD
G334	Vaidava_1	MODERATE	MODERATE
G235	Vaidava_2	MODERATE	MODERATE

Quality **not harmonized** for *Pērļupīte/ Pärlijõgi_1* (salonid river in EE; too small river, not significant for salmonide fish in LV) and *Peetri/Melnupe _2* (natural in EE, in LV – monitoring station in incorrect site)

Mainly differences in quality assessment - due to different pressures.

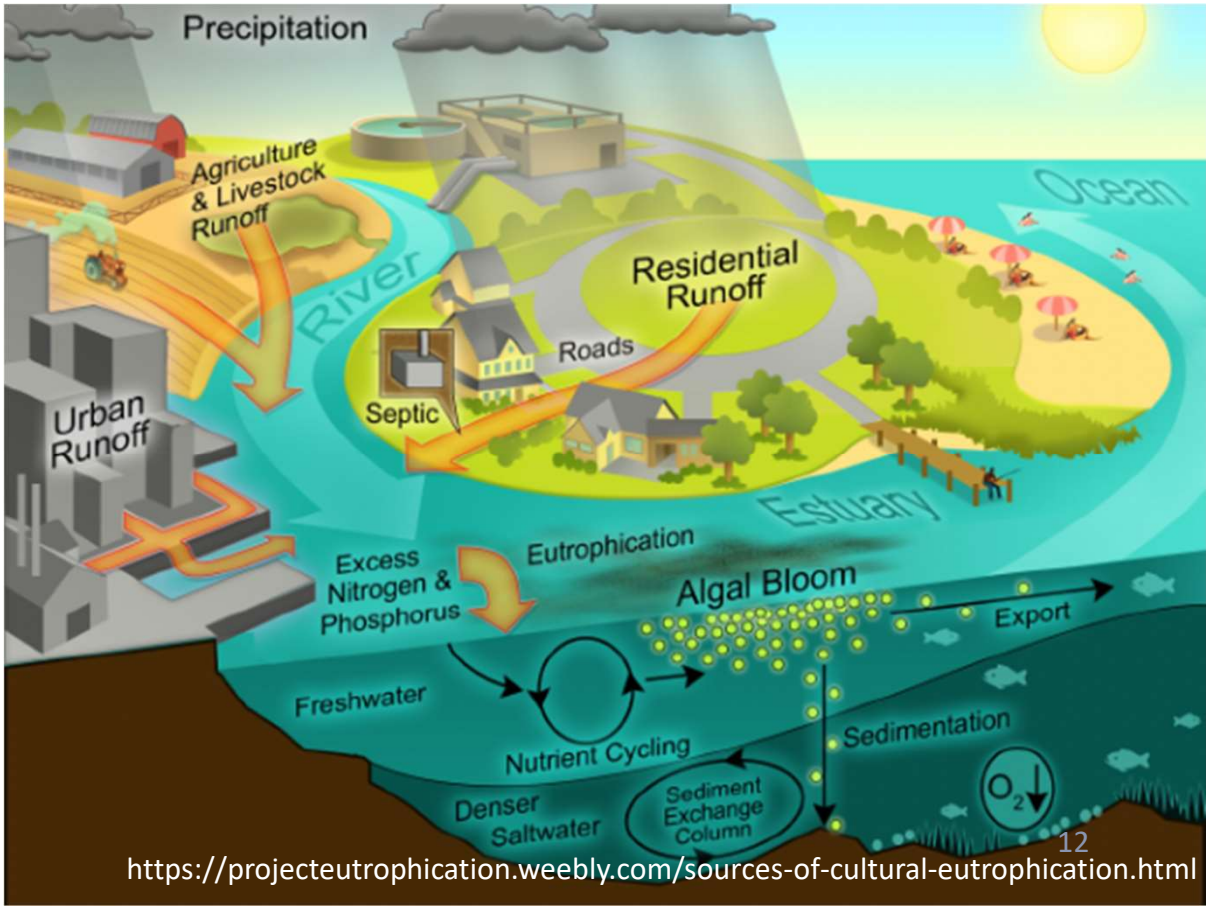
SIGNIFICANT PRESSURES

- Point source impact – wastewater treatment plants;
- Diffuse source impact – agricultural, forestry areas;
- Hydromorphological alterations – small hydropower plants, dams, drainage, culverts

NURIENTS - IMPACT

Eutrophication

- Rapid growth of algae
- Decrease of oxygen
- Decrease of fish
- Decrease of water quality

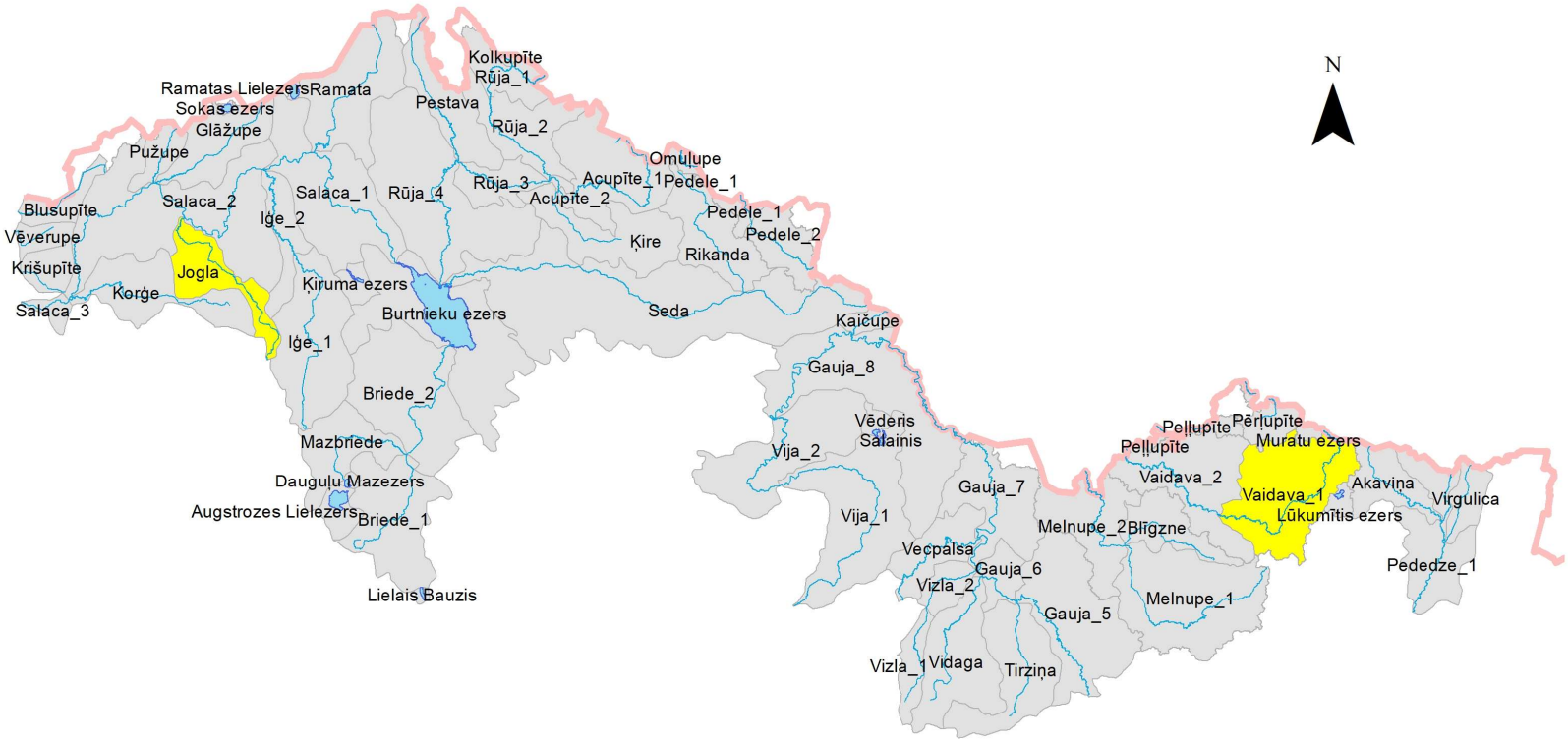


https://projecteutrophication.weebly.com/sources-of-cultural-eutrophication.html

POINT SOURCE PRESSURES - LATVIA

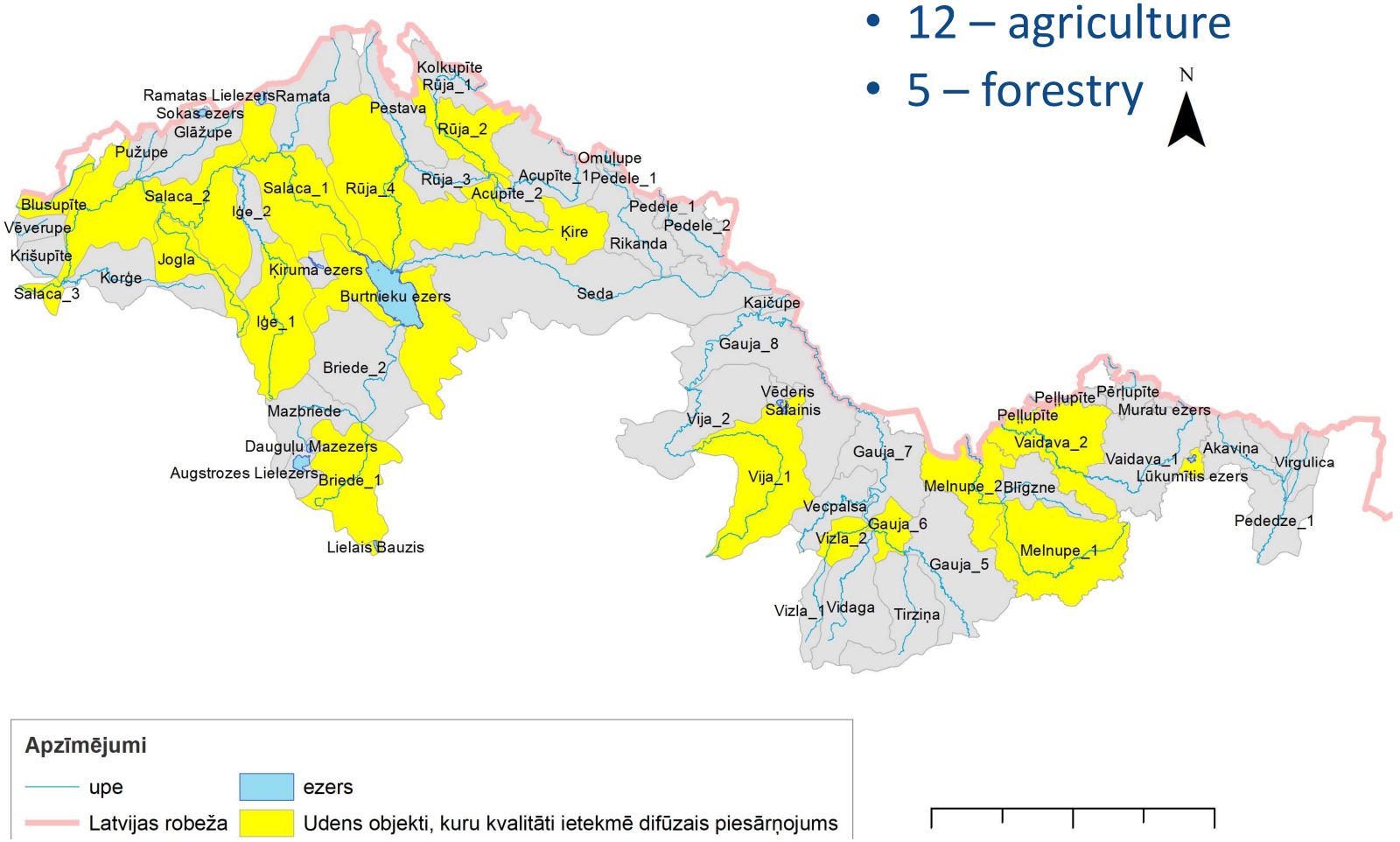
- Significance criteria (statystical analysis)
- Trend analysis
- Contaminated sites

- **G308 *Jogla*** – WWTP industry
- **G334 *Vaidava_1*** – WWTP municipal



DIFFUSE SOURCE PRESSURES - LATVIA

- Modelling with FyrisNP – nutrients
- Significant impact - 14 WBs (LV)
  - 12 – agriculture
  - 5 – forestry



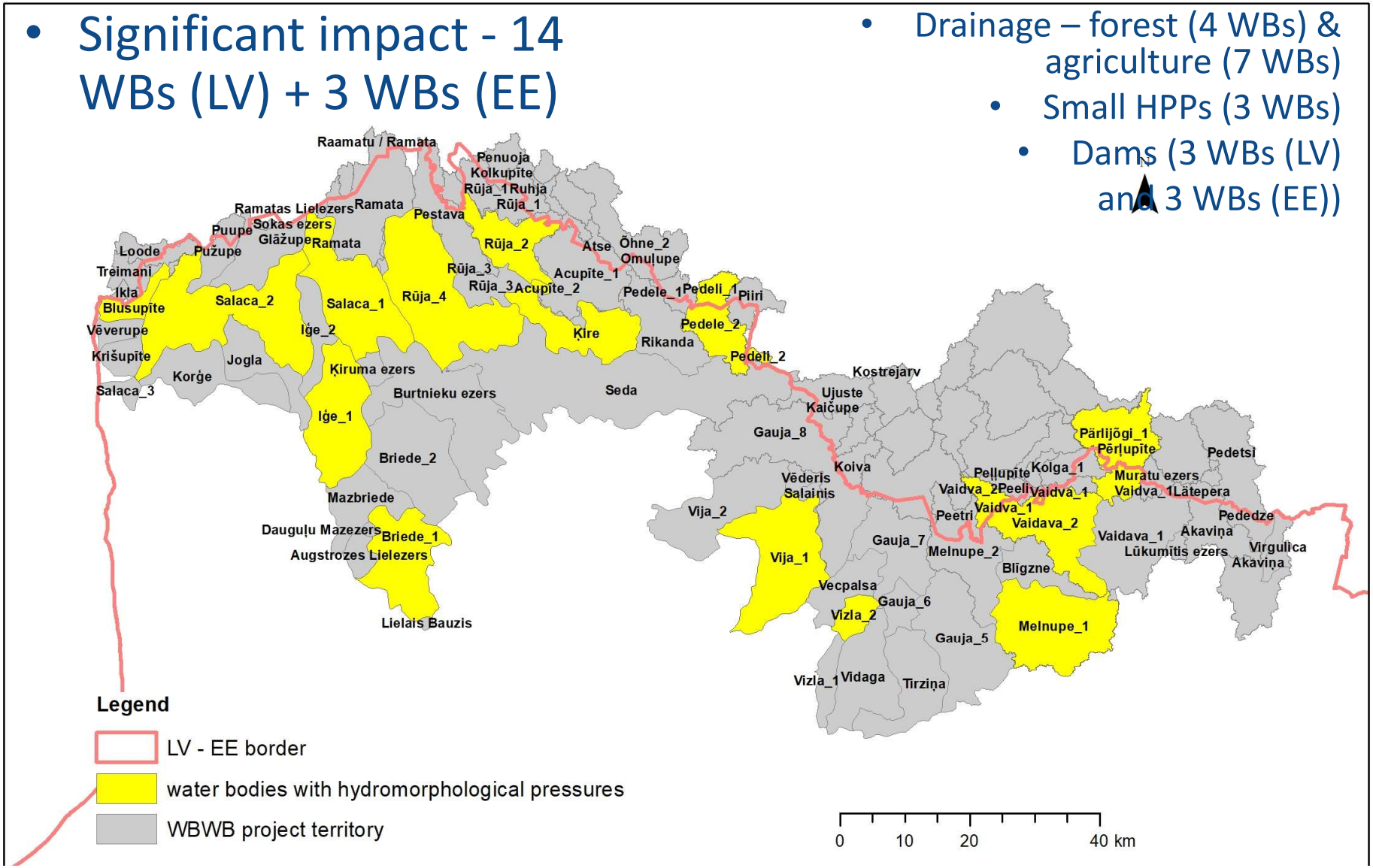
HY-MO ALTERATIONS - IMPACT

- Changes in natural flow regime;
- Interruption of river continuity;
- Decrease of water quality status;
- Disturbs fish migration, spawning, decrease available biotopes for fish;
- Decrease biological diversity;
- Decrease area of valuable biotopes.

http://www.riverrestoration.com/tag/sediment-transport-continuity/

HYDRO-MORPHOLOGICAL ALTERATIONS

- Significant impact - 14 WBs (LV) + 3 WBs (EE)
- Drainage – forest (4 WBs) & agriculture (7 WBs)
- Small HPPs (3 WBs)
- Dams (3 WBs (LV) and 3 WBs (EE))



TRANSBOUNDARY WATER BODIES

- EELV1004 Peetri/Melnupe_2 (G233)
  - diffuse pollution (nutrients – agriculture in LV)
- LVEE1008 Vaidava_2/Vaidva_2 (G235)
  - hydromorphology (small HPPs in LV + dams in EE)
- LVEE1016 Pedele_2/Pedeli_2 (G317)
  - hydromorphology (small HPPs in LV + dams in EE)
- EELV1007 Vaidva_1/Vaidava_1 (G334)
  - point source pollution (municipal WWTP in LV)
- LVEE1005 Pērļupīte/Pärlijõgi_1
  - hydromorphology (dams in EE)

MEASURES FOR HYMO

Parameters for measuring «gap»:

Small HPPs:

- (P1) Obstacle for fish migration, disruption of river continuity (as indicator under WFD);
- (P2) Rapids with suitable conditions for fish;
- (P3) Ecological flow (enough water in a river during different fish bio-periods).

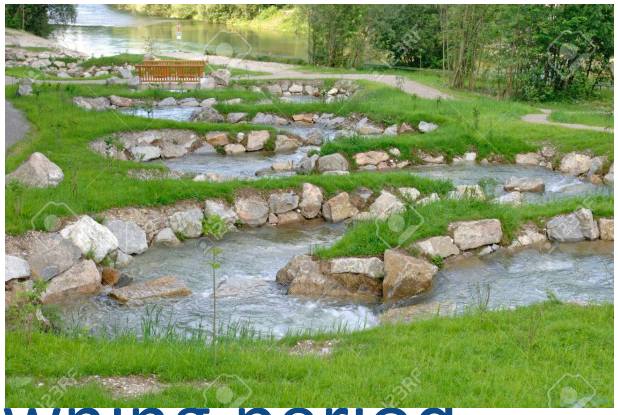
Obstacles/dams:

- (P1) Obstacle for fish migration, disruption of river continuity (as indicator under WFD);
- (P2) Rapids with suitable conditions for fish.

MEASURES FOR HYMO

(P1) obstacle
(P2) rapids
(P3) E-flow

- Demolishing of dam
- Building of a fish pass
- Reconstruction or improvement of an existing fish pass
- Maintenance of an existing fish pass
- Environmentally friendly turbine
- Implementation of ecological flow
- Permanently lowering a dam
- Opening migration way during spawning period



https://www.123rf.com/photo_97646113_fish-ladder-at-river-isar-in-bavaria-germany.html

MEASURES FOR LAKES

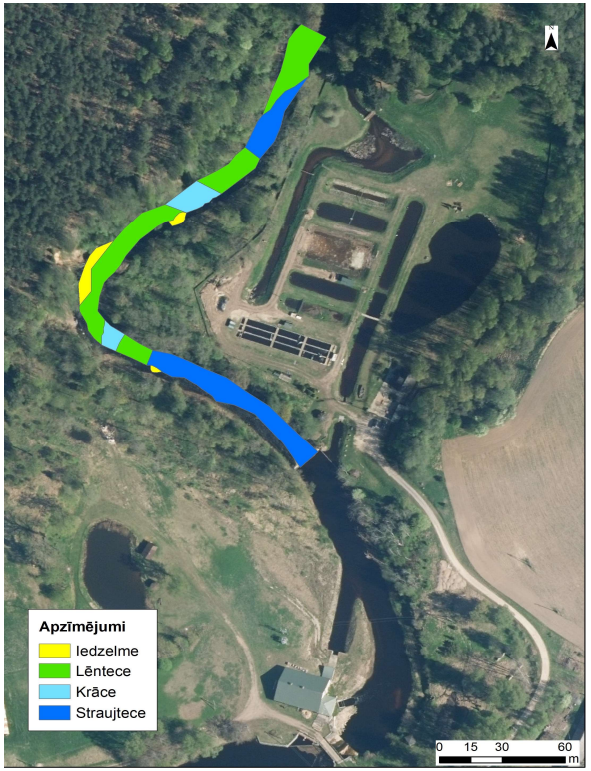
Lakes with accumulated nutrient pollution in sediments:

- Parameters for measuring «gap»:
  - (P1) Phosphorus amount (concentration) in water
- Measures:
  - Sediment dredging
  - Removal of macrophytes
  - Immobilization of phosphorus using chemical treatment
  - Artificial aeration and mixing
  - Biomanipulation
  - Hypolimnetic withdrawal
  - Artificial floating wetlands

https://www.ventspils.lv/lat/pilseta/102379-notiek-niedru-plausanas-darbi-vidumupite?&&

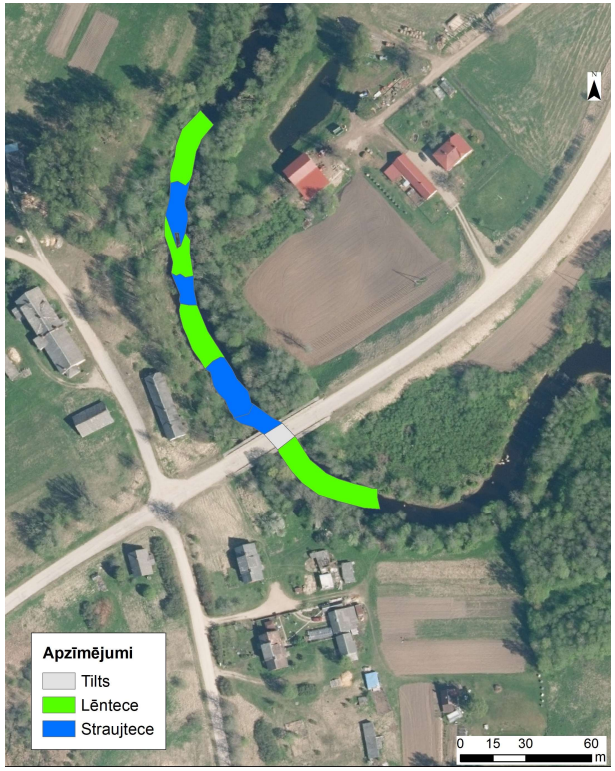
ECOLOGICAL FLOW ESTIMATION

- According to WFD CIS Guidance No.31 – ecological flow estimation.
- Vaidava river mapped below Karva HPP and Grūbe HPP.
- Field works



Grūbe HPP

Karva HPP




THANK YOU FOR YOUR
ATTENTION!