

Assessment of Nutrient Loading in ARDA River Catchment

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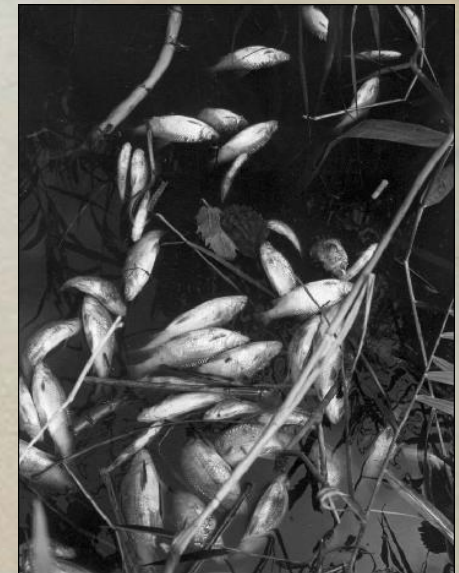
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Nutrient Related WQ Problems

Eutrophication

- Nitrogen and Phosphorus
- Urban and non Urban Sources
- Waste water, Agriculture, Erosion
- Enrichment of ecosystems
 - Change in species composition
- Algal Blooms – Drinking water reservoirs
 - Toxins
 - Smell and odor
 - Clogging of filters
- Oxygen Depletion (Nitrogen)
 - Ammonia
 - Fish Kills
- Down stream loading of Sensitive Areas



River Arda Catchment

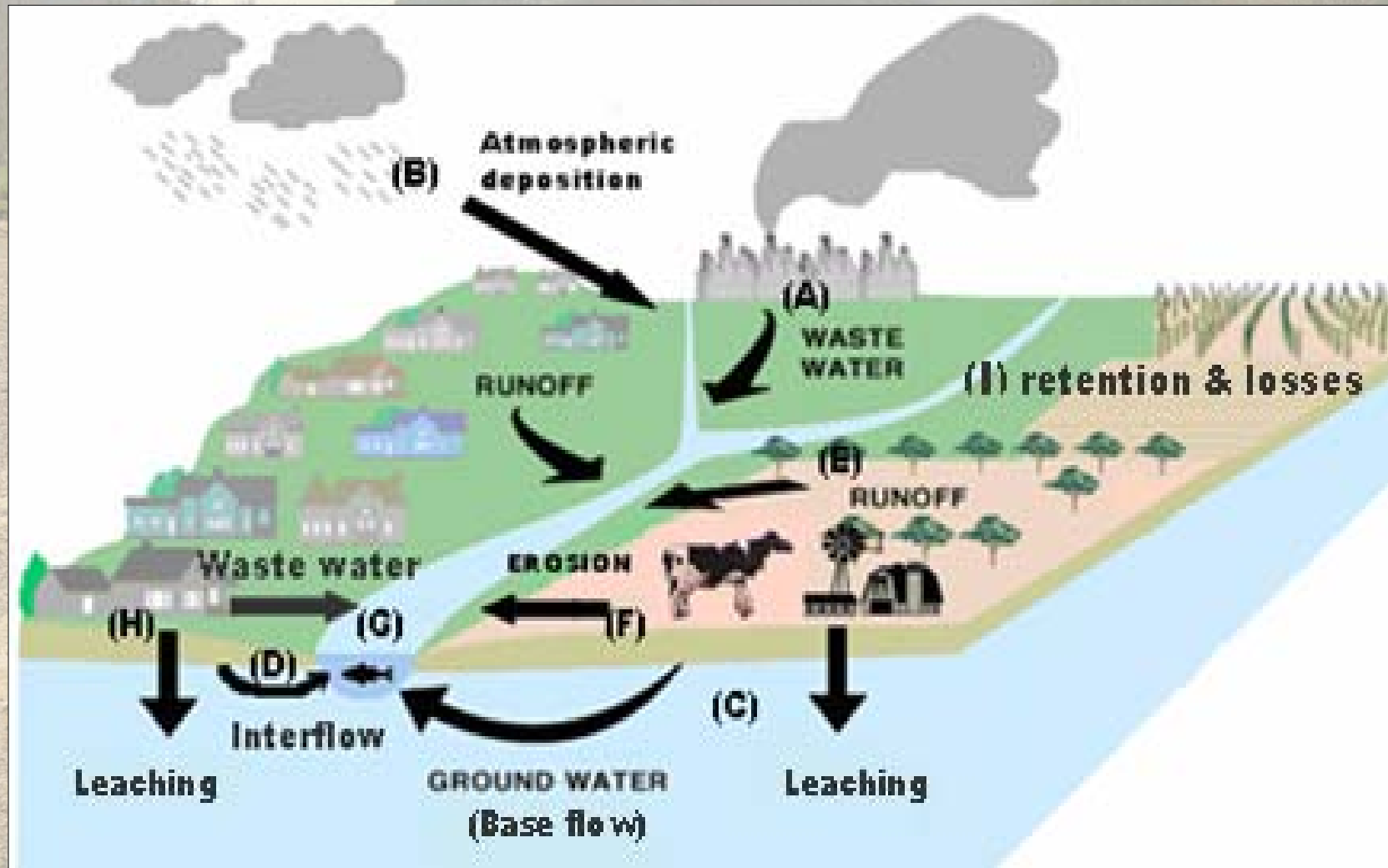
CLASS LIMIT VALUES	DETERMINANTS IN WATER					
		Reference CLASS- high	TV-good	2 x TV	5 x TV	> 5 x TV
	unit	I	II	III	IV	V
Total-N*	mg/l	1.5	4	8	20	>20
Total-P	mg/l	0.1	0.2	0.4	1	>1

Quality observations

Tot – N - No problem (1.1 – 1.3 mg/l)

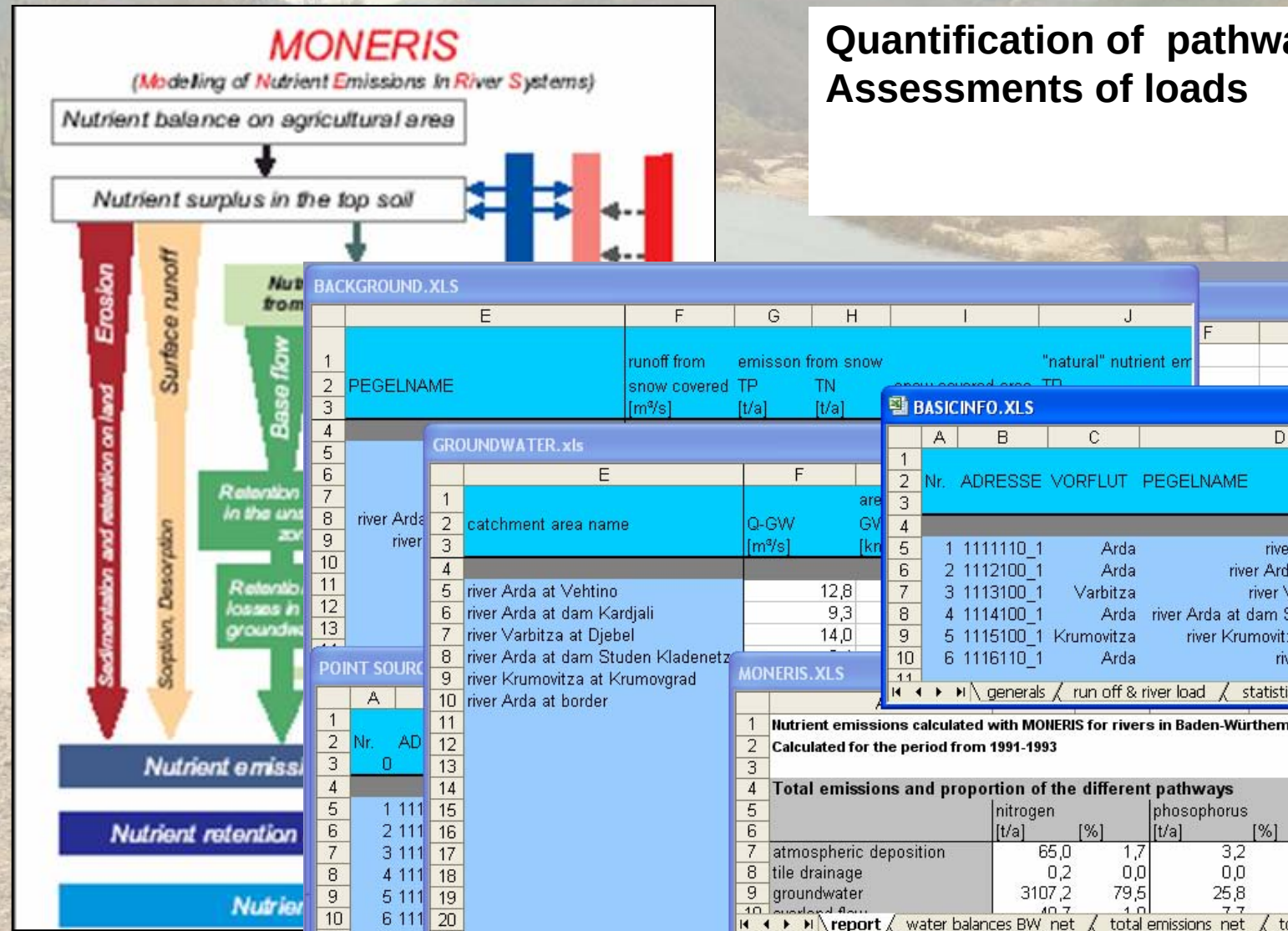
Tot – P - Does not meet Good Quality objective (0.6 – 1.3 mg/l)

Sources and Pathways



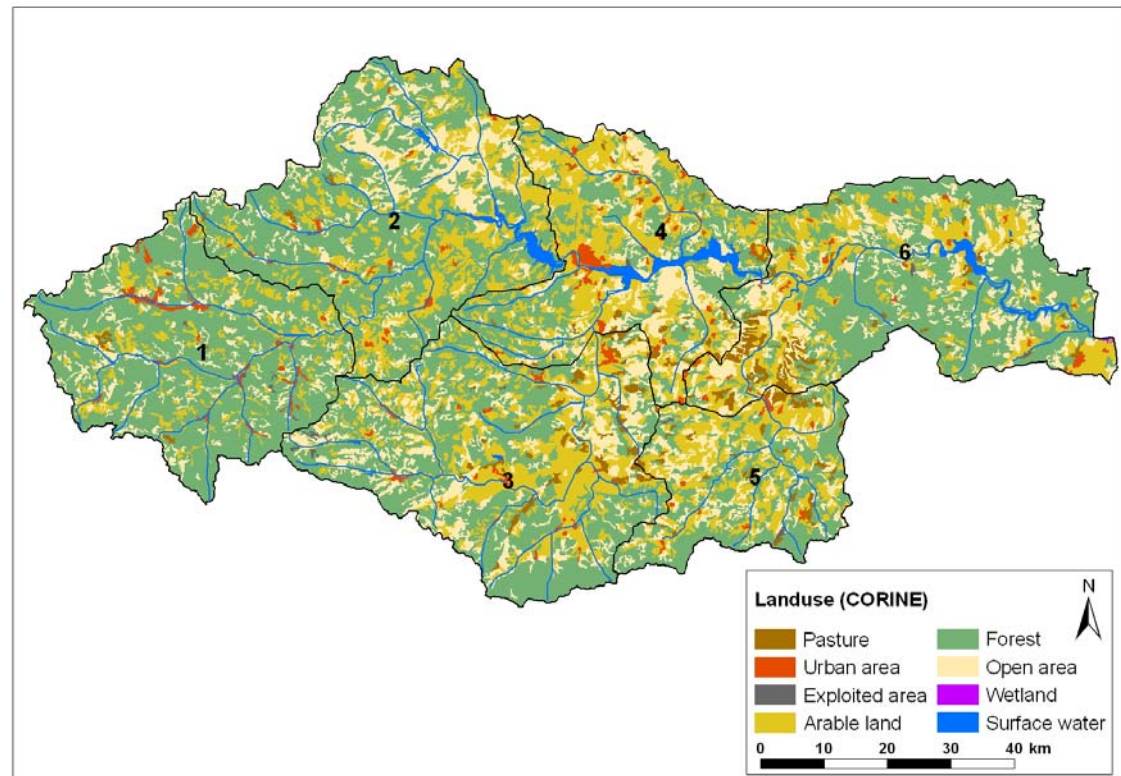
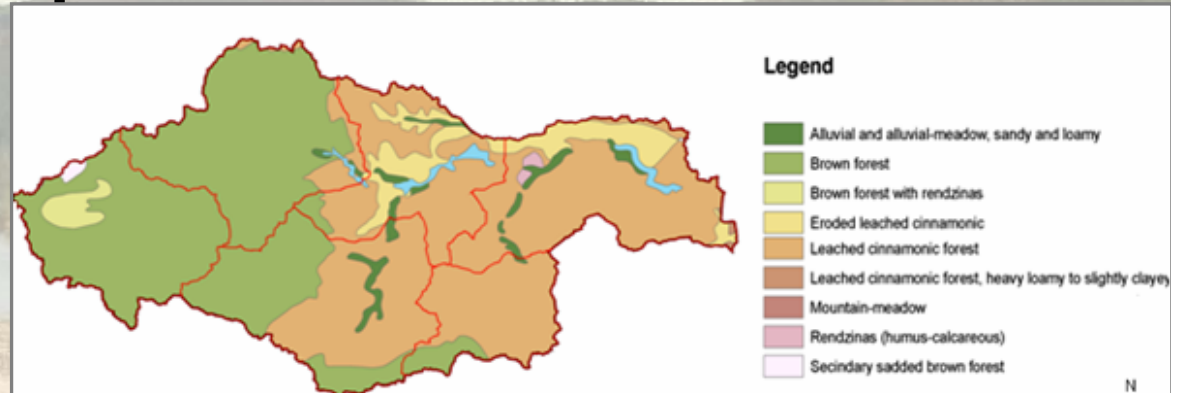
Moneris Model Approach

Quantification of pathways
Assessments of loads

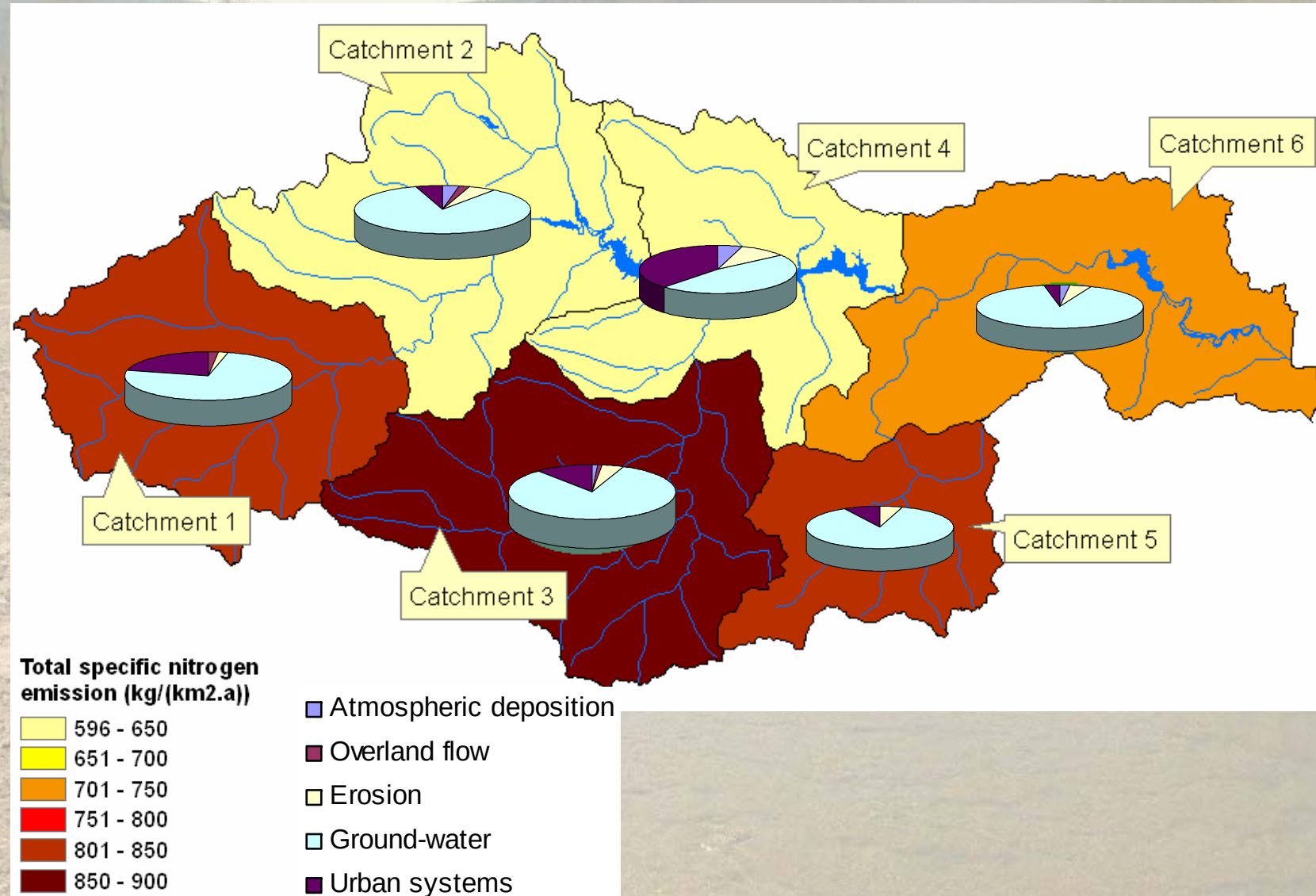


Input data

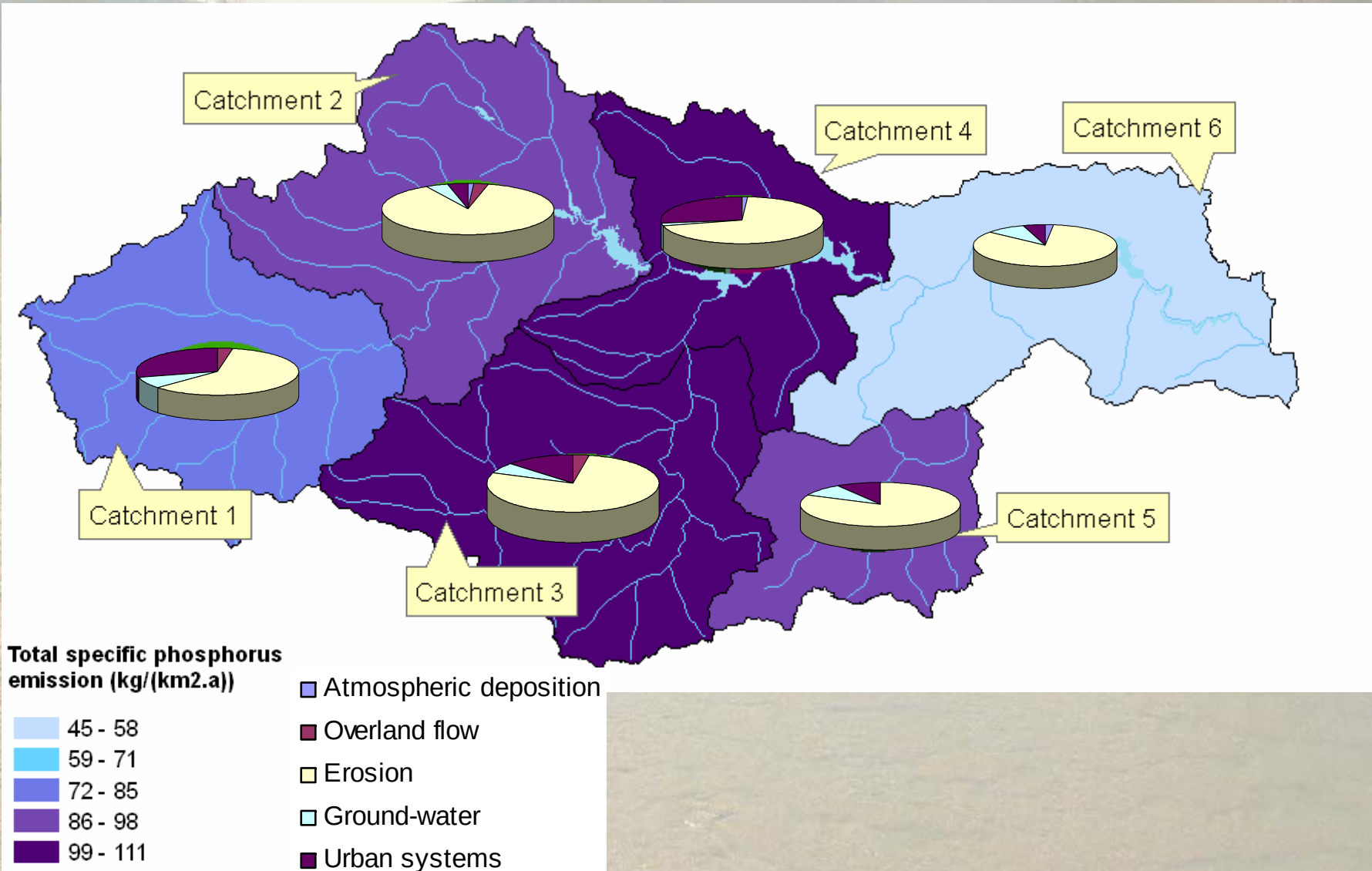
- Soil type
- Land use
- Point sources
- Population
- Meteo data
- Hydrological data



Total Nitrogen



Total Phosphorus



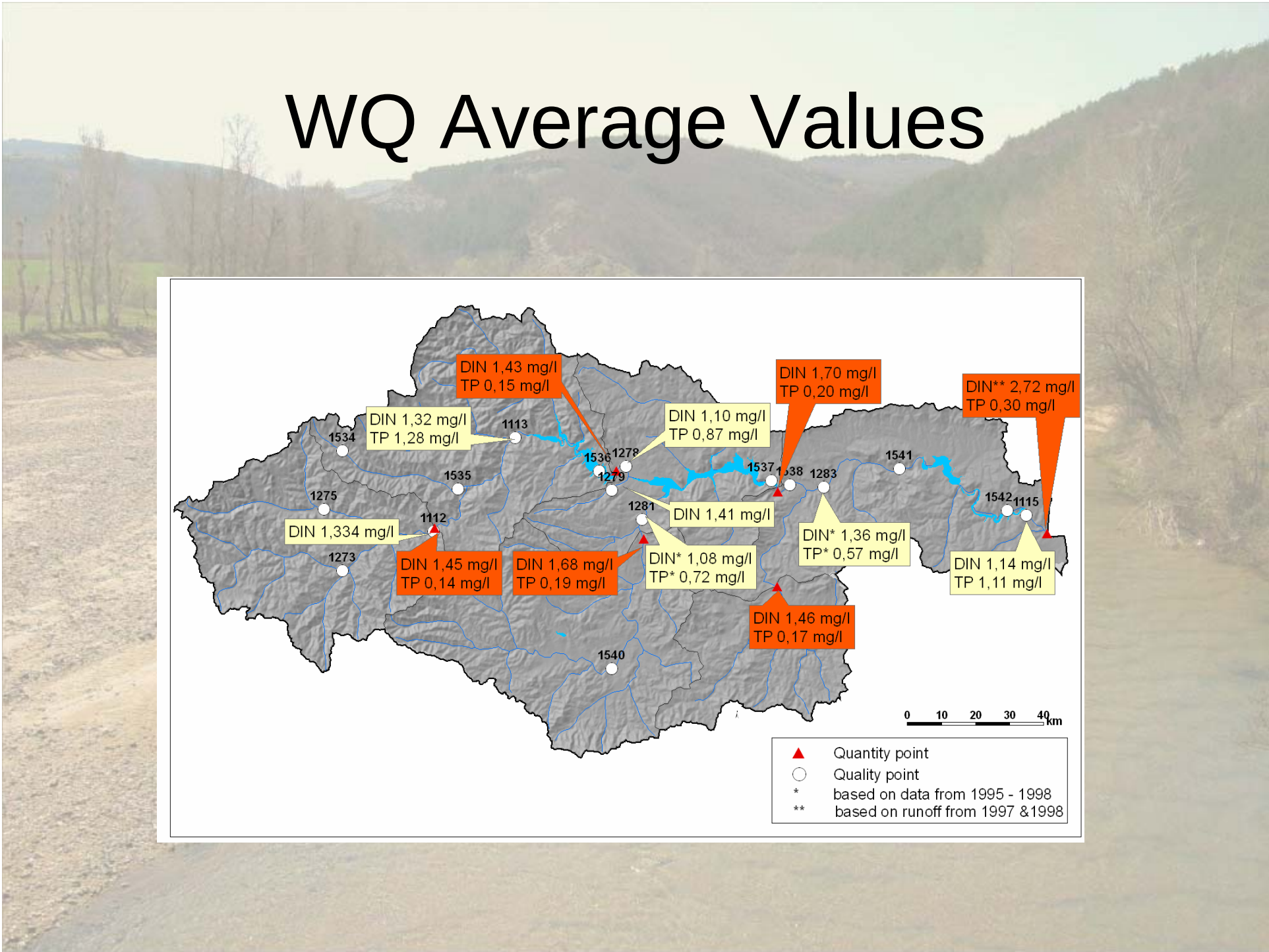
WQ Average Values

The map displays the Danube River basin with various sampling points. Points are marked with red triangles for quantity and white circles for quality. Data labels indicate DIN and TP concentrations in mg/l. A scale bar shows distances from 0 to 40 km. A legend explains the symbols and data sources.

Point Type	DIN (mg/l)	TP (mg/l)	Notes
Quantity (Red Triangle)	1.43	0.15	
Quality (White Circle)	1.32	1.28	
Quantity (Red Triangle)	1.45	0.14	
Quantity (Red Triangle)	1.68	0.19	
Quantity (Red Triangle)	1.41		
Quantity (Red Triangle)	1.08	0.72	*
Quantity (Red Triangle)	1.70	0.20	
Quantity (Red Triangle)	1.36	0.57	*
Quantity (Red Triangle)	1.46	0.17	
Quantity (Red Triangle)	2.72	0.30	**
Quality (White Circle)	1.14	1.11	

Legend:

- ▲ Quantity point
- Quality point
- * based on data from 1995 - 1998
- ** based on runoff from 1997 & 1998



Conclusion

- Nitrogen – No problem
 - Main path – Groundwater
 - Main Source – Non point sources (urban)
- Phosphorus - Doesn't meet standards
 - Main path and source Erosion
 - and direct waste water discharge

Effective Measures :

- WWTP, Sewerage
- Erosion prevention