

# CATEGORIZATION OF SMALL CATCHMENTS FOR MODELING THE RESPONSE TO PRECIPITATION

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# MOTIVATION

- CZECH CATCHMENTS ARE ADMINISTRATIVELY CATEGORIZED INTO FOUR LEVELS - FROM THE MAIN RIVER CATCHMENT (I. ORDER) TO SMALL CATCHMENTS (IV. ORDER)
- THERE ARE CONSIDERABLE DIFFERENCES IN THE SIZE OF THE FOURTH CATEGORY CATCHMENTS
- THE DIFFERENT SIZE MAKES THE ANALYSIS OF POTENTIAL HYDROLOGICAL RESPONSE DIFFICULT
- NATIONAL TECHNICAL STANDARDS ALLOW THE USE OF HYDROLOGICAL MODELS FOR DERIVATION OF DESIGN CHARACTERISTICS ( $Q_{\max}$ , VOLUME...) FOR CONSTRUCTIONS AND EROSION CONTROL MEASURES ONLY WHEN THEY'RE LOCATED ASIDE OF THE WATERCOURSES OR ON THE STREAMS WITH BASINS UNDER 5 KM<sup>2</sup>

# GOAL

## DELIMITATION OF:

- SMALL CATCHMENTS OF AREAS UP TO 5 KM<sup>2</sup>
- SIGNIFICANT AREAS OUTSIDE THE WATERCOURSE AND SUBSEQUENT COLLECTION OF SPATIAL DATA THAT CAN INFLUENCE HYDROLOGICAL RESPONSE
- CLASSIFICATION IN TERMS OF POSSIBLE HYDROLOGICAL RESPONSE

# DELIMITATION OF SMALL AREAS

## SOURCE DATA:

- DETAILED DTM WITH 5X5M RESOLUTION
- WATERCOURSE LAYER

ARCGIS TOOLS AND PYTHON SCRIPTING LANGUAGE WERE USED FOR PROCESSING

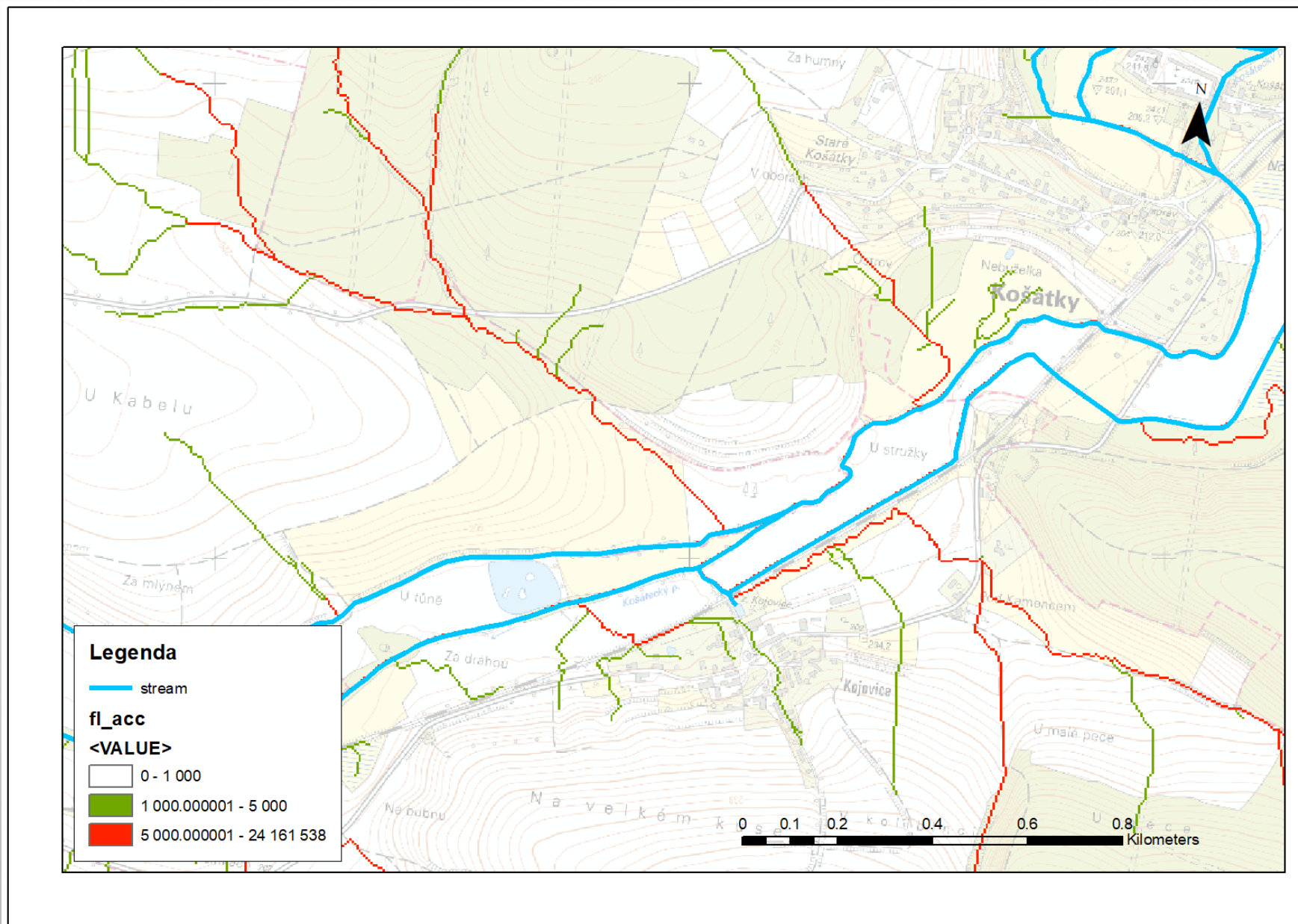
NINE CATEGORIES WERE ESTABLISHED AS AREAS RANGING FROM 0.3 TO 5.5 KM<sup>2</sup> OF CONTRIBUTING AREA

From [km <sup>2</sup> ]	To [km <sup>2</sup> ]	Class
0,3	0,7	05
0,7	1,3	10
1,3	1,7	15
1,7	2,3	20
2,3	2,7	25
2,7	3,3	30
3,3	3,5	35
3,5	4,5	40
4,5	5,5	50

# PRINCIPAL STEPS OF THE SOLUTION

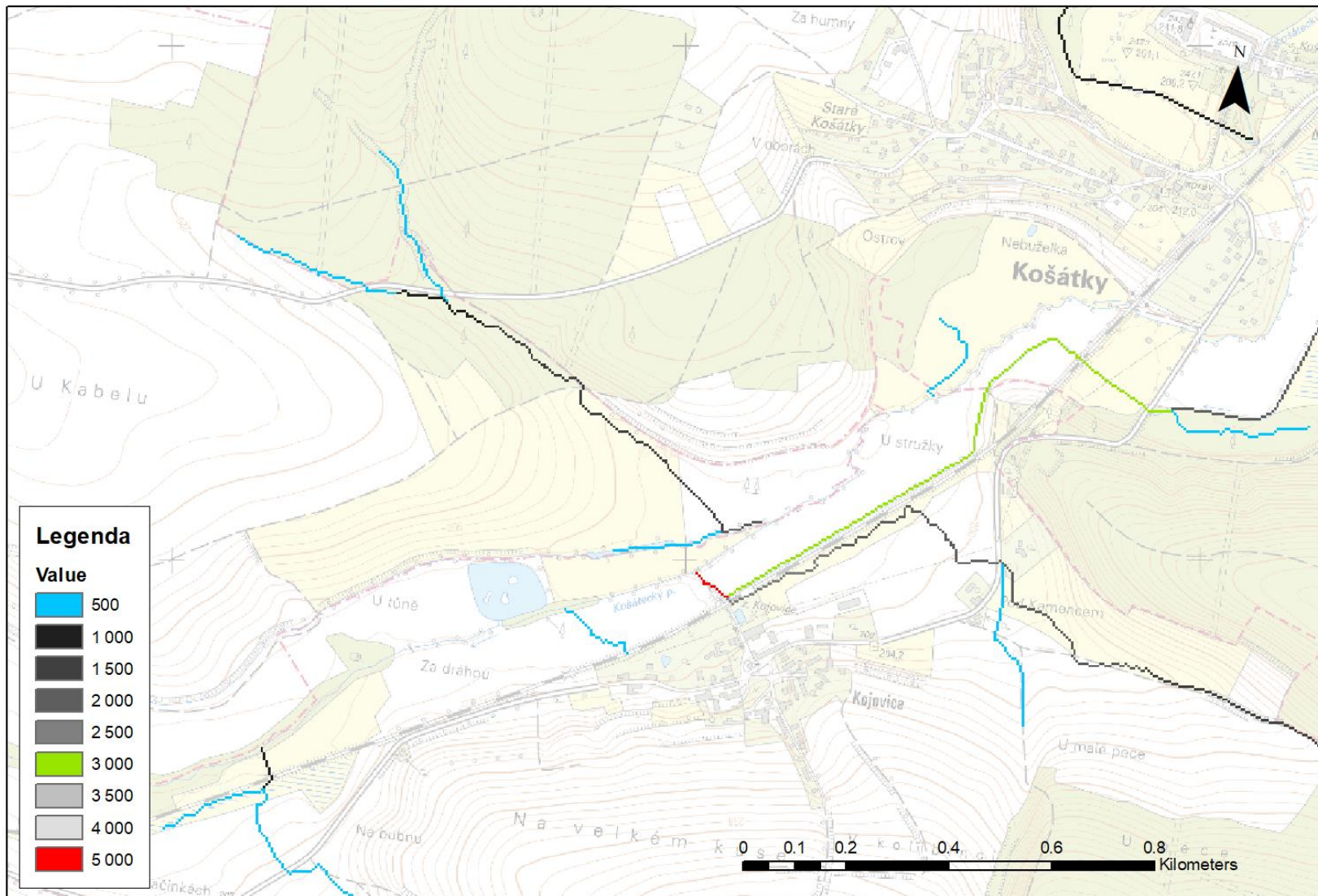
1. DTM WAS MODIFIED - WATER PREFER FLOW IN WATERCOURSES TO DIRECTION BASED ON DTM
2. FLOW DIRECTION AND CONTRIBUTION AREA FOR EACH PIXEL ARE CALCULATED
3. CATCHMENT OUTLETS DEFINITION:
  - RASTER STREAMS GENERATED FROM FLOW ACCUMULATION USING PREDEFINED CLASSIFICATION
  - VECTORIZING STREAMS AND OUTLETS DERIVATION AS ENDPOINTS FOR EACH CLASS SEPARATELY
  - POLYGONS OF CATCHMENTS DERIVED FOR OUTLETS
4. EXCEPTIONS HANDLING
  - CONFLUENCES OF WATERCOURSES
  - ETC.

# Flow accumulation and streams

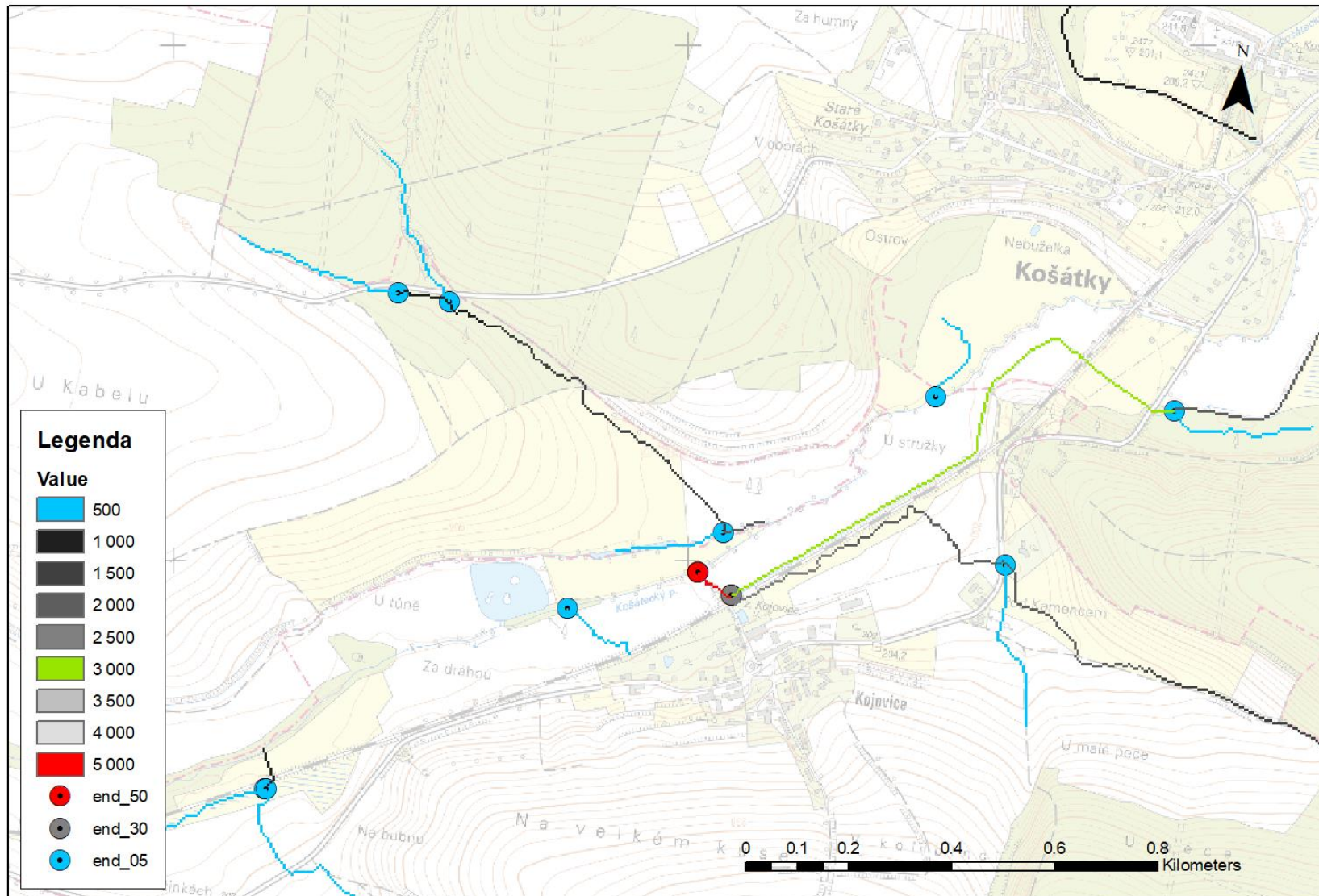




# Streams as reclassified flow accumulation

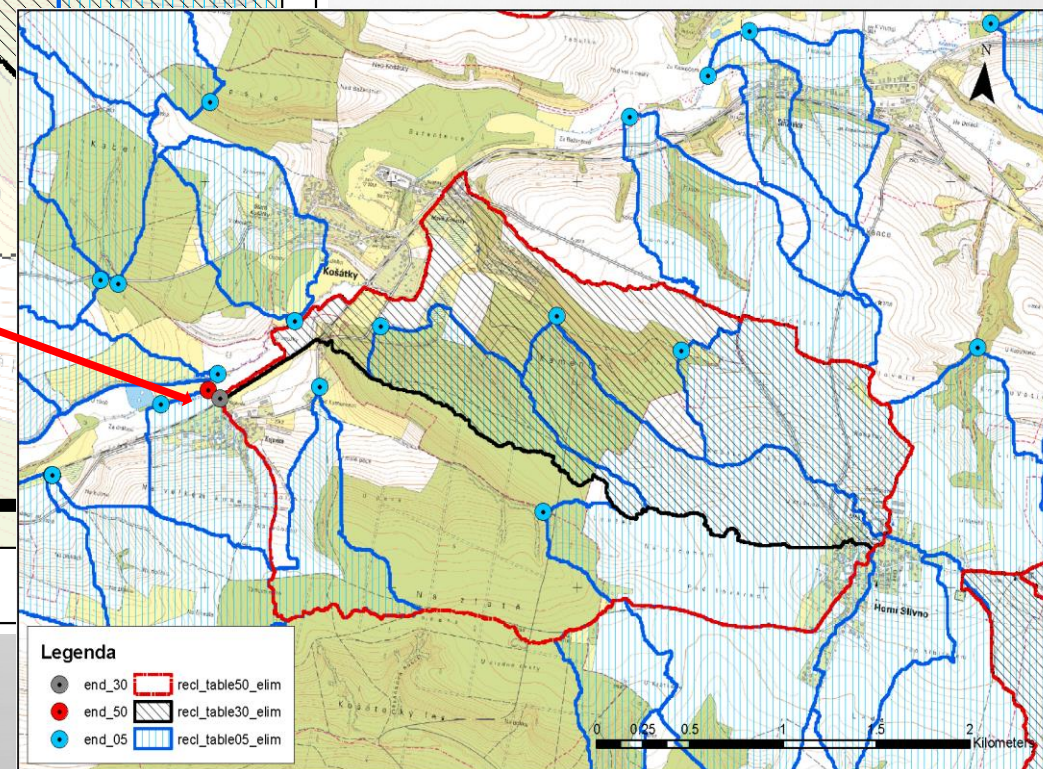
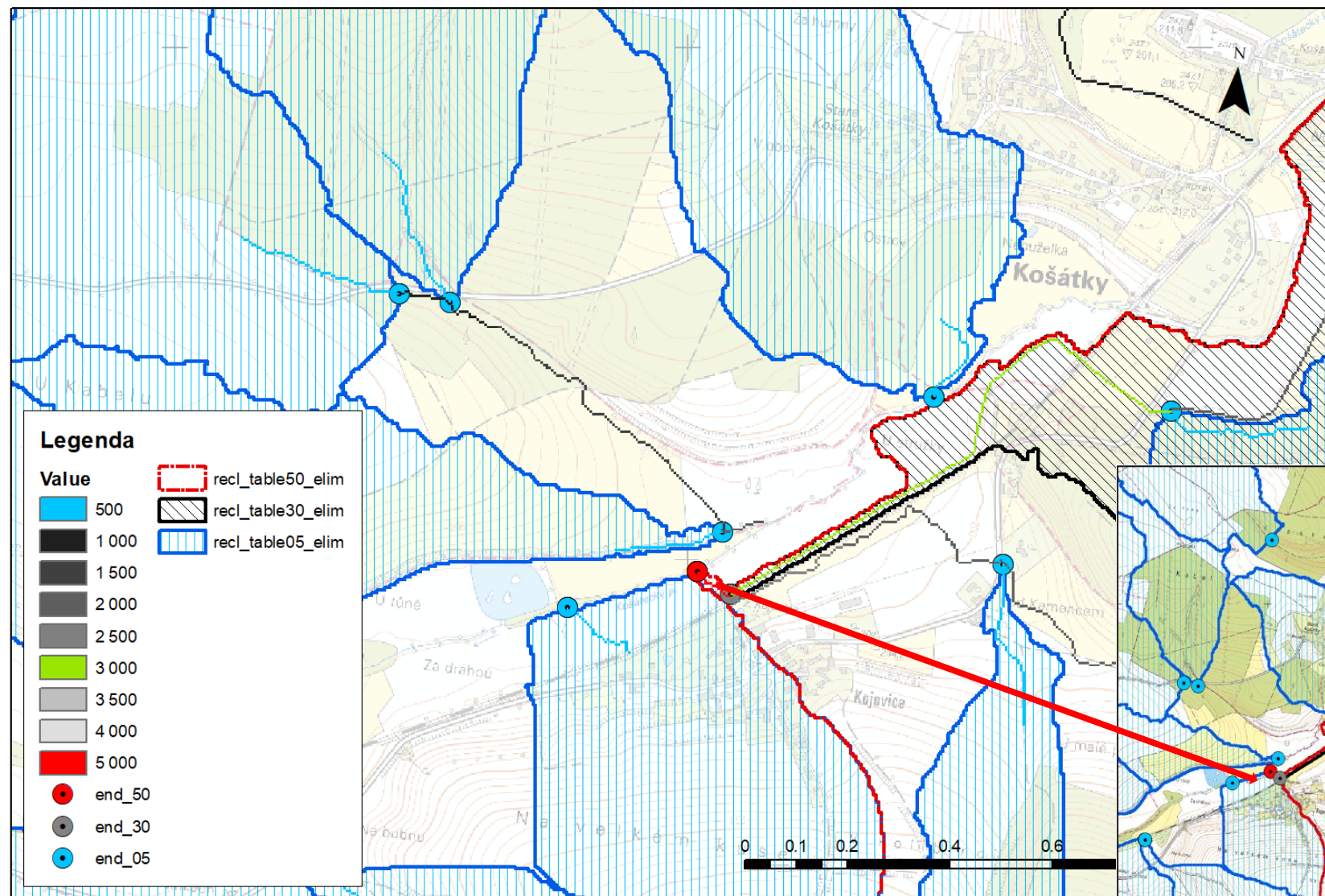


# Outlets as endpoints (three classes displayed)





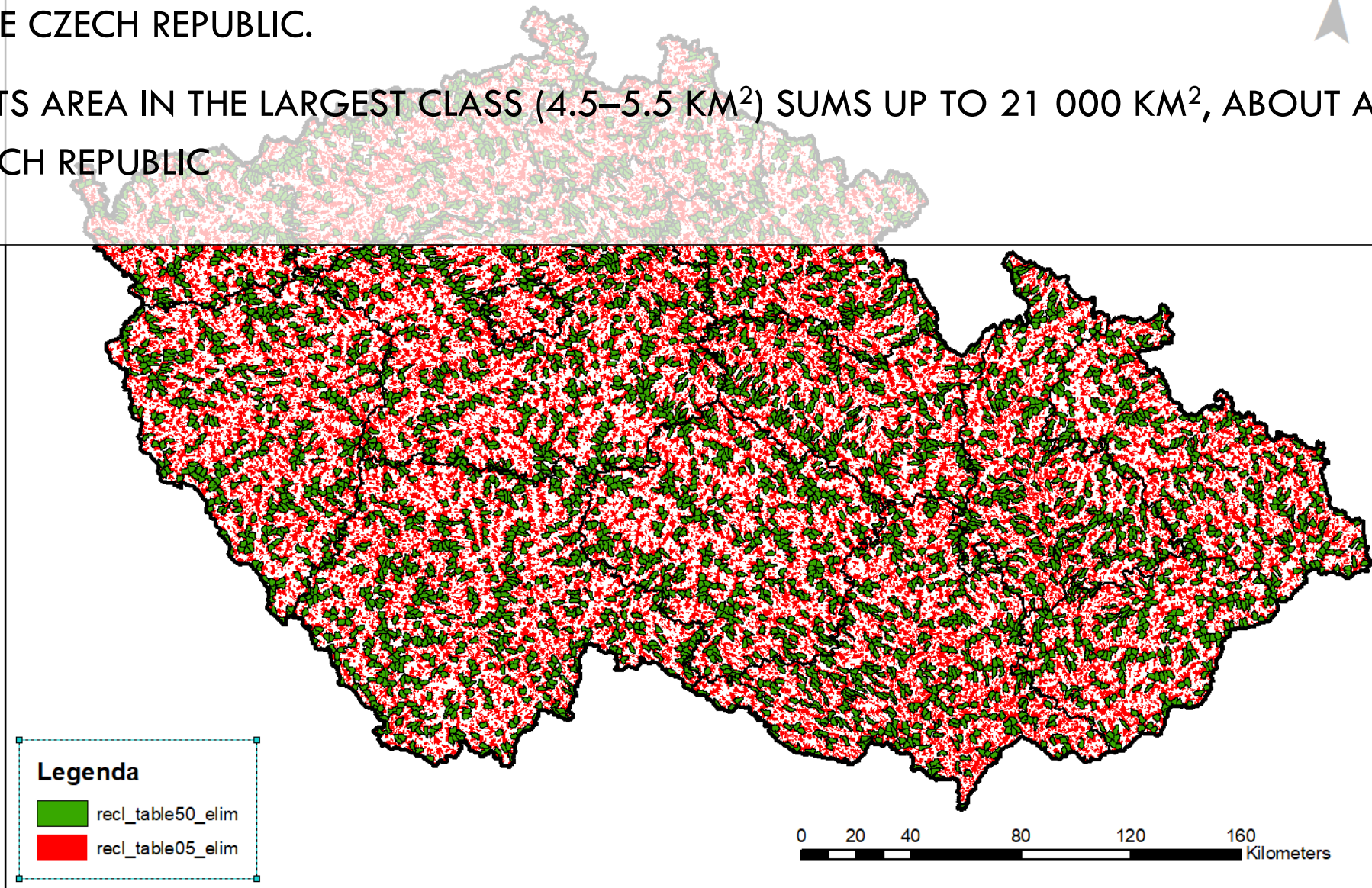
# Watersheds delineation





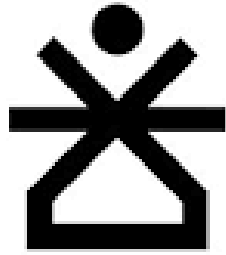
CATCHMENTS IN THE SMALLEST CLASS (UP TO 0.7 KM<sup>2</sup>) TAKE UP A TOTAL AREA OF 38 000 KM<sup>2</sup>,  
HALF OF THE CZECH REPUBLIC.

CATCHMENTS AREA IN THE LARGEST CLASS (4.5–5.5 KM<sup>2</sup>) SUMS UP TO 21 000 KM<sup>2</sup>, ABOUT A QUARTER  
OF THE CZECH REPUBLIC



# NEXT STEPS:

1. COLLECTION OF SPATIAL DATA THAT CAN INFLUENCE HYDROLOGICAL RESPONSE:
  - LAND USE
  - PAVED AREAS
  - SOIL PROPERTIES
  - LONGEST FLOW PATH
  - AVERAGE SLOPE
  - AVERAGE ALTITUDE
  - CATCHMENTS SHAPE INDEX
  - AVERAGE AND MAXIMAL PRECIPITATION
  - ETC.
2. CLASSIFICATION IN TERMS OF POSSIBLE HYDROLOGICAL RESPONSE



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