Delaware River Watershed Initiative

Open-Source Framework for Collaborative Watershed Analysis
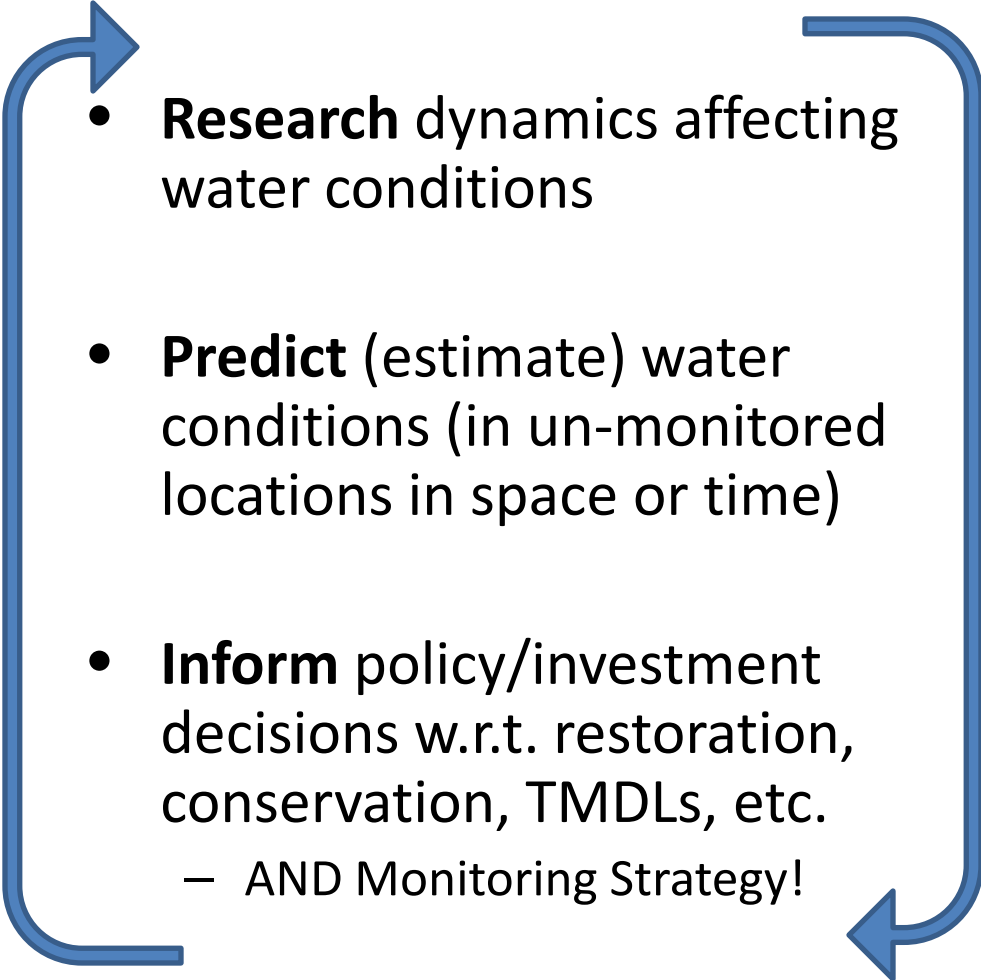
Alex Waldman

Jerry Mead

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Roles of Models in Watershed Analysis

- **Research** dynamics affecting water conditions

- **Predict** (estimate) water conditions (in un-monitored locations in space or time)

- **Inform** policy/investment decisions w.r.t. restoration, conservation, TMDLs, etc.
   - AND Monitoring Strategy!

Coordinated Adaptive Watershed Analysis

- Integrated Research

- Standardized Data

- Automated Analysis

- Open-source collaborative development
    - i.e. standardized component models

- Dynamic user-feedback

A Problem with Scale

- Low-rez Basin-wide vs. high-rez site/micro-shed analysis

- Computational limitations

- Data resolution / uncertainty
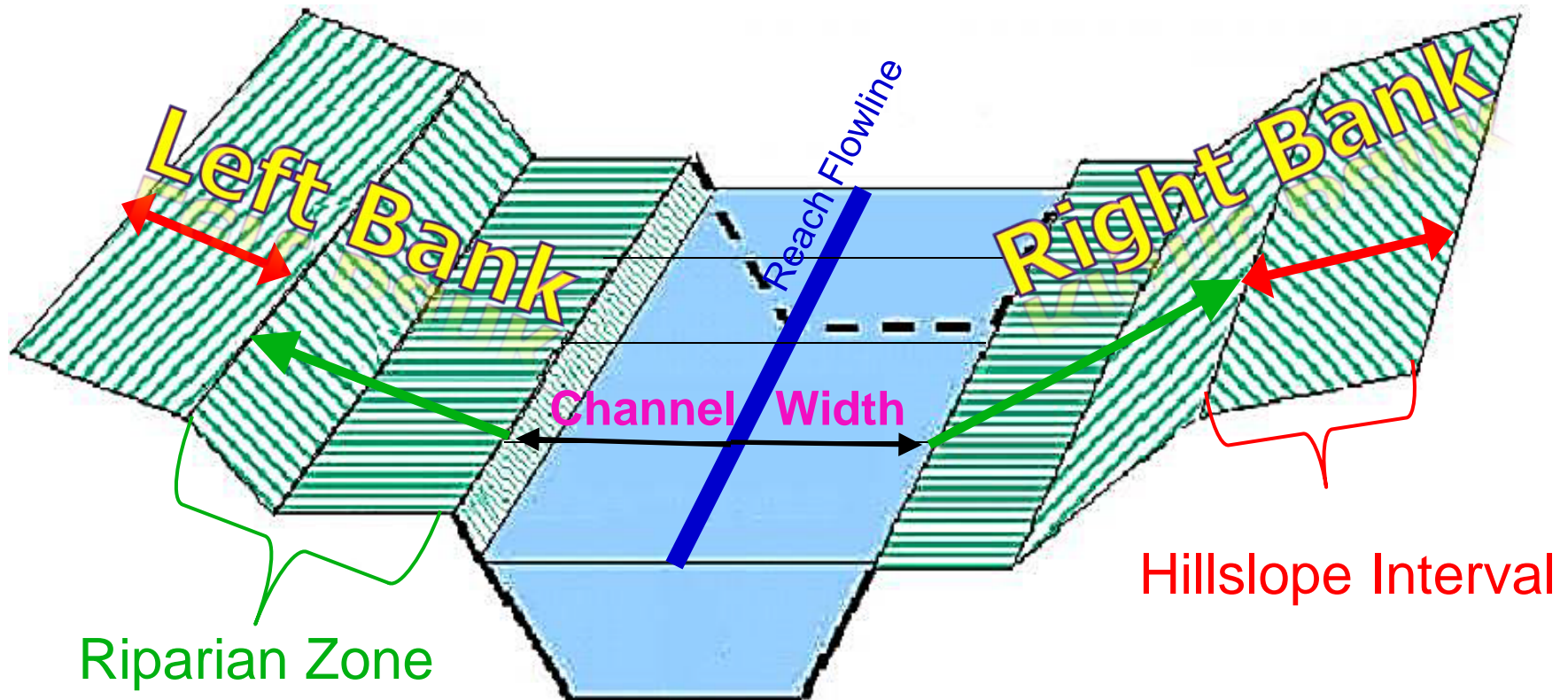
- Know-how

The StreamHiker Approach
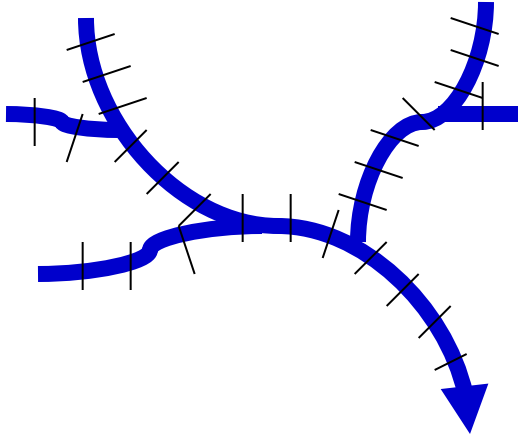
Split into 200 m long reaches

Lateral Drainage Areas Delineated

Hillslope Spatial Components

Network Tables

File   Edit   View   Tools   Help

100 rows

	reachid integer	reachto integer	numff integer	ff1 integer	ff2 integer	ff3 integer	upjun_rid integer	aggseq_rid integer	upjun_dist_km double precision	reach_length_m double precision
1	1	2	0	0	0	0	1	1	0.135486660752	135.486660752367
2	2	3	2	6	1	0	2	3	0.209231638378	209.231638377853
3	3	4	1	2	0	0	2	4	0.416895623238	207.663984860169
4	4	5	1	3	0	0	2	5	0.625208951446	208.313328208296
5	5	11	1	4	0	0	2	6	0.733934092693	108.725141246483
6	6	2	0	0	0	0	6	2	0.102723493997	102.72349399718
7	7	11	0	0	0	0	7	7	0.175819128275	175.81912827454
8	8	9	0	0	0	0	8	10	0.200094684093	200.094684093183
9	9	10	1	8	0	0	8	11	0.402406365052	202.311680958993
10	10	17	1	9	0	0	8	12	0.590228787825	187.822442773146
11	11	12	2	7	5	0	11	8	0.204528677825	204.528677824803
12	12	15	1	11	0	0	11	9	0.32017377649	115.645098665343
13	13	14	0	0	0	0	13	13	0.207014641512	207.014641512043
14	14	15	1	13	0	0	13	14	0.313522785893	106.508144380673
15	15	16	2	14	12	0	15	15	0.200744027441	200.744027441309
16	16	17	1	15	0	0	15	16	0.276056658584	75.3126311431698
17	17	18	2	16	10	0	17	17	0.20858229503	208.582295029727
18	18	19	1	17	0	0	17	18	0.417164590059	208.582295029727
19	19	20	1	18	0	0	17	19	0.617259274153	200.094684093183
20	20	21	1	19	0	0	17	20	0.822706262147	205.44698799436
21	21	22	1	20	0	0	17	21	1.02815325014	205.44698799436
22	22	26	1	21	0	0	17	22	1.18191381946	153.760569321707
23	23	24	0	0	0	0	23	23	0.20766398486	207.663984860169
24	24	25	1	23	0	0	23	24	0.409975665819	202.311680958993
25	25	26	1	24	0	0	23	25	0.553680970687	143.705304867479
26	26	27	2	25	22	0	26	26	0.20858229503	208.582295029727

Spatial Datasets Overlaid
& Aggregated at Various Scales

- Types of data:
  - Anything with a spatial reference
  - Environmental conditions:
    - Topography
    - Landcover
    - Soils
    - Geology
    - Climate
    - Point sources
  - Monitoring data
  - Model outputs

- Aggregation scales:
  - Drainage area
    - Upstream drainage area
    - Reach lateral drainage area
    - Confluence lateral drainage area
    - Upstream distance interval lateral drainage area
  - Riparian Zone
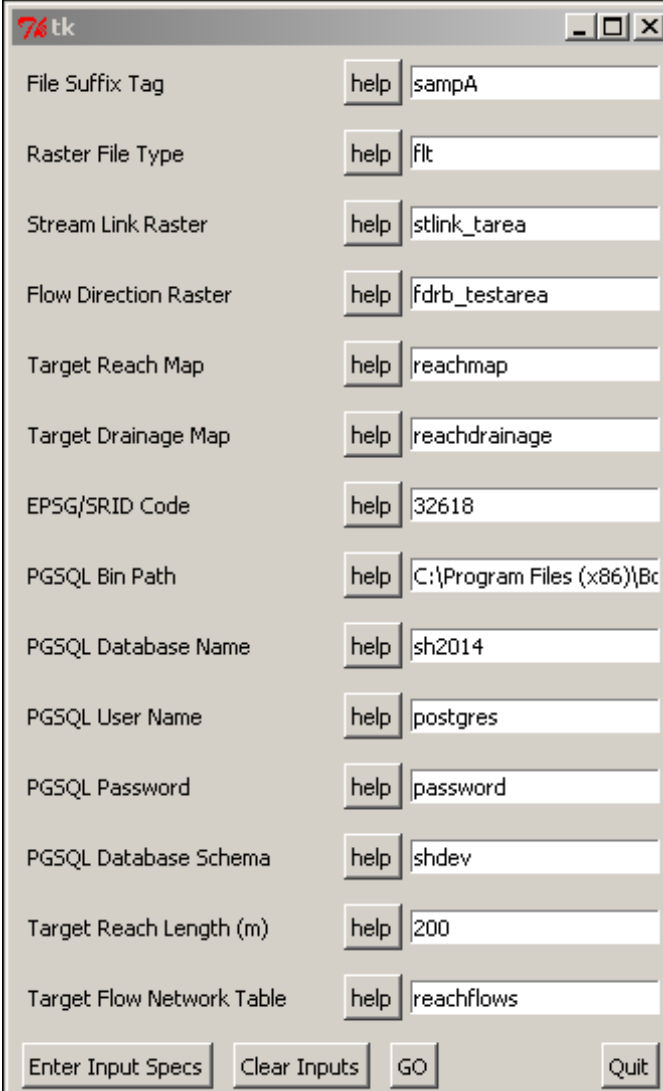 - Hillslope Intervals
  - Left/Right Bank

~ 200m Reach Lateral Drainage Areas
arranged by Upstream Junction
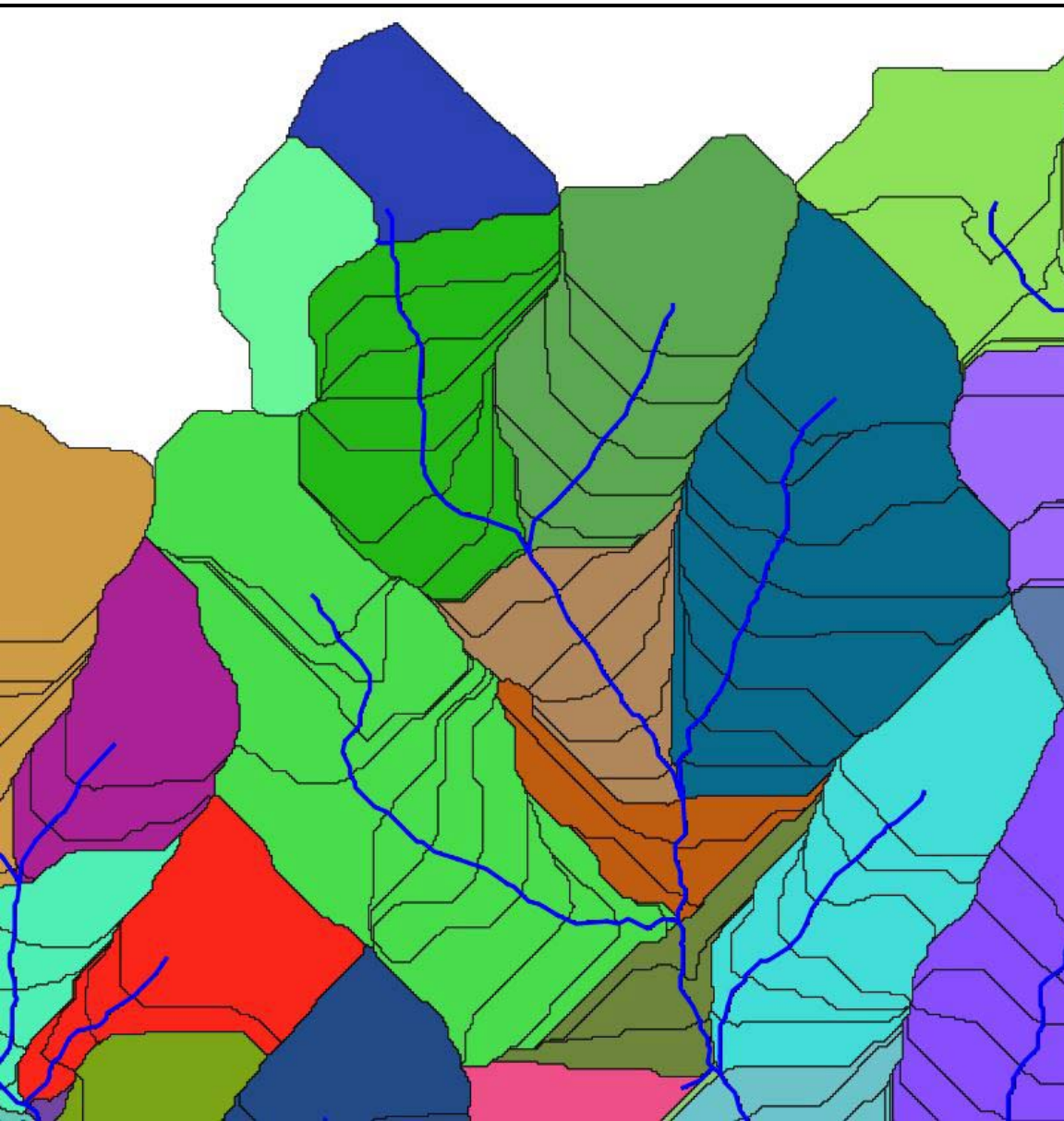
- Relatable to confluence-scale data / models, i.e.
  - EPA SPARROW
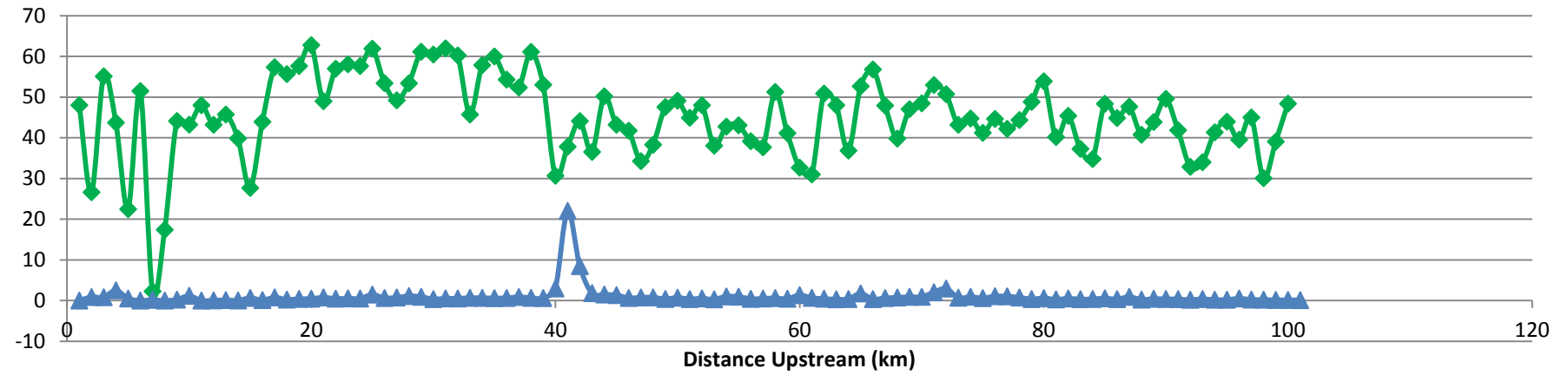 - NHD Plus, etc.

Open-source: Hosted on GitHub
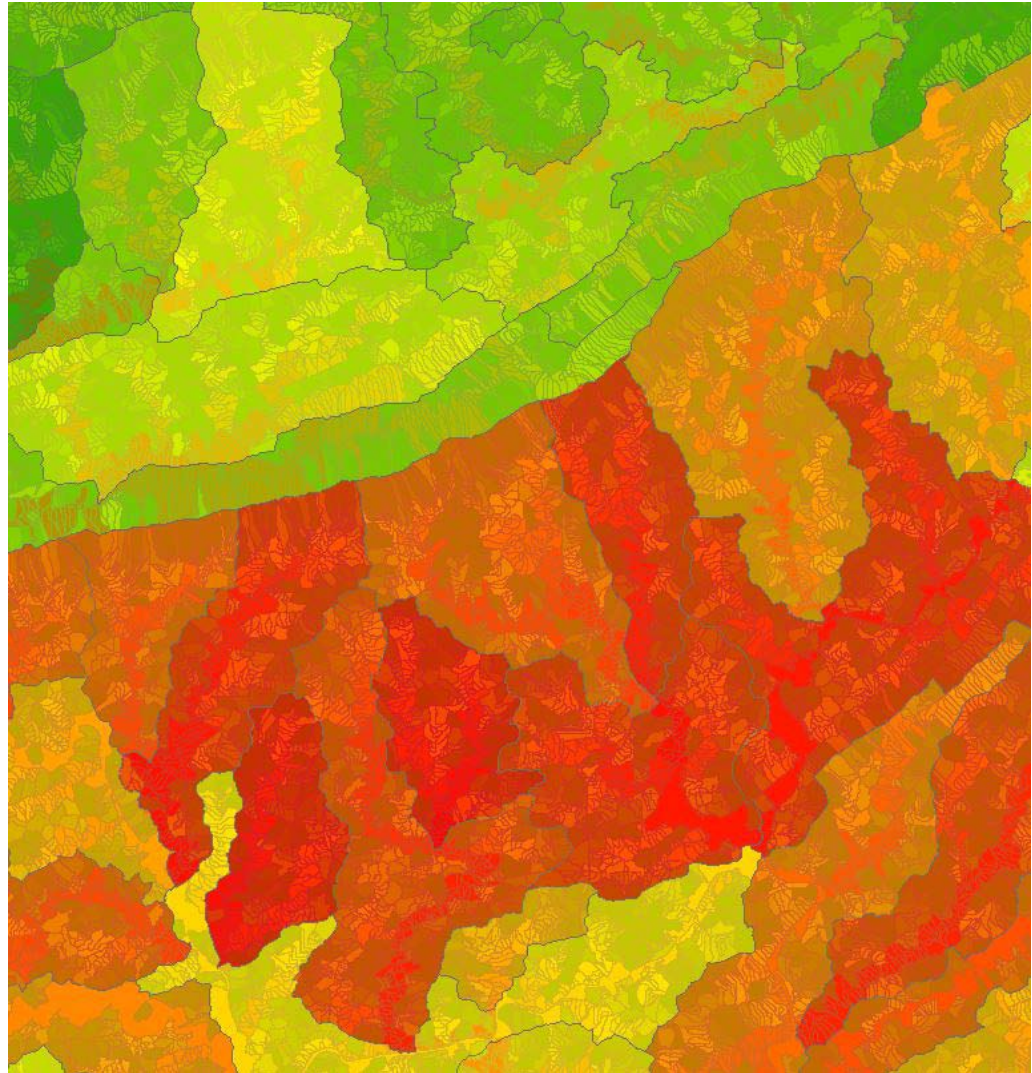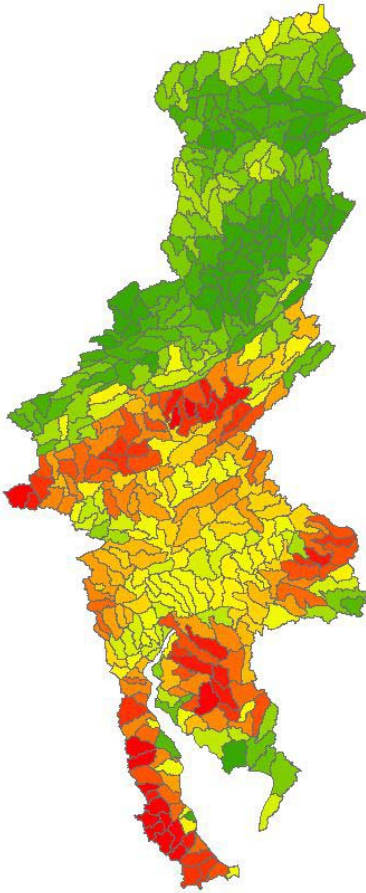
Canopy Cover within Riparian Zone

USGS Gauge # 1417500 @ EAST BR DELAWARE RIVER AT HARVARD NY

— % Canopy Cover in Riparian Zone
— % Impervious Surface in Riparian Zone

Nutrient Load Estimates (MapShed) at HUC-12 Scale
~Extrapolated to Reach Scale

Next Steps

- Continue packaging StreamHiker tools as stand-alone package hosted on GitHub

- Incorporate into ANSDU data management system (develop interactive mapping and data access tools)

- Statistical models
  - i.e. Stream temperature
  - Decay functions w.r.t. upstream distance
  - Cascading downstream models (i.e. SPARROW)

- Facilitate usage/get feedback from project partners

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GitHub page: http://ansdu-patrick-center.github.io/

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