Carnegie Mellon University

Future Climate Impacts of CBP BMP Efficiencies

A Modeling Sensitivity Study for Urban and Agricultural BMPs

Maya Struzak, David Rounce, Sarah Fakhreddine

Project Overview

Goal: Quantify the performance of agricultural & urban BMPs in the Chesapeake Bay watershed under current and future climate scenarios

Tools: APEX for agricultural, SWMM for urban

Output: Pollutant removal efficiencies for different BMPs

Watershed Settings

- 4 regions
- 4 land uses
- 4 BMPs (so far)
- hydrologic regimes in progress

Hydrologic Regimes

- Baseline
- Future 1
- Future 2

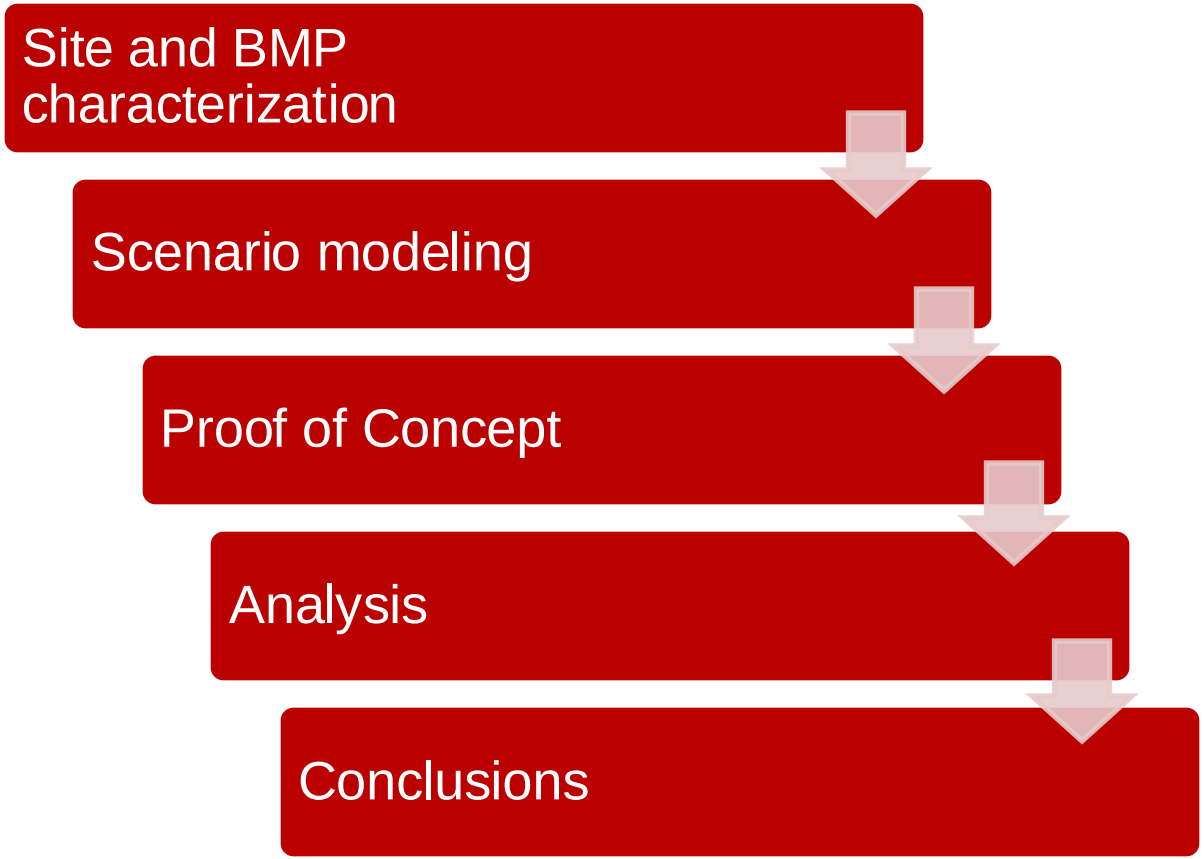
Land Use (LU)

Physiographic Region (PR)	Row Crops	Hay Land	Pasture	Forest
Ridge & Valley	LU1 PR1	LU2 PR1	LU3 PR1	LU4 PR1
Appalachia	LU1 PR2	LU2 PR2	LU3 PR2	LU4 PR2
Coastal Plain	LU1 PR3	LU2 PR3	LU3 PR3	LU4 PR3
Piedmont	LU1 PR4	LU2 PR4	LU4 PR4	LU4 PR4

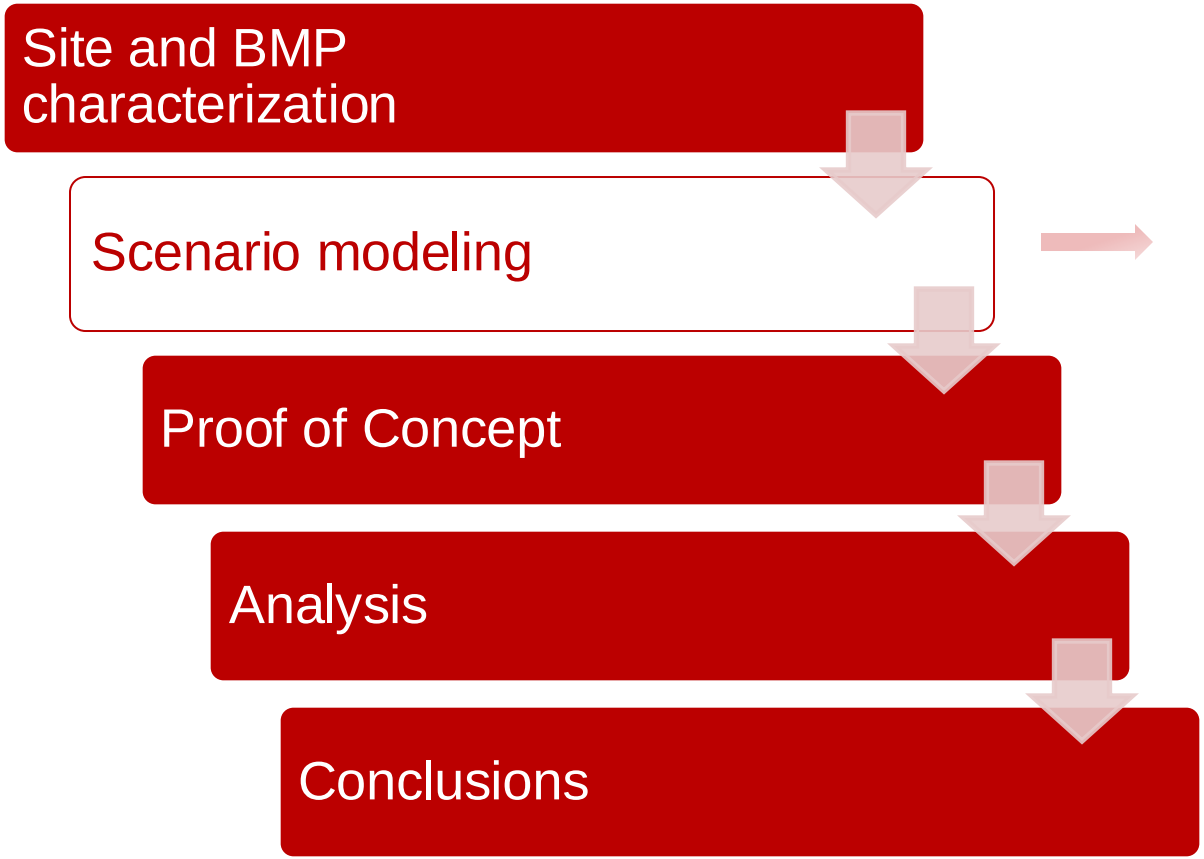
Test BMPs

- Baseline (no BMP)
- Cover crops
- Manure incorporation
- No tillage

Carnegie Mellon University



Carnegie Mellon University



Preliminary results for Appalachian row crops

Carnegie Mellon University

Preliminary Outputs: Row crops, base climate

Baseline (no BMP)

Cover Crops

Manure Incorporation

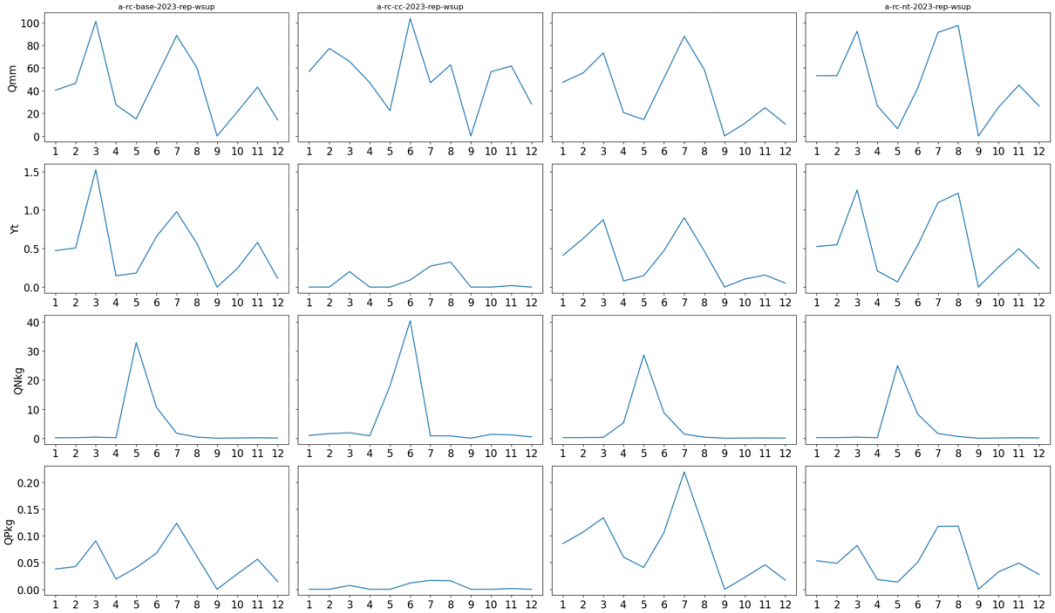
No Tillage

Runoff (mm)

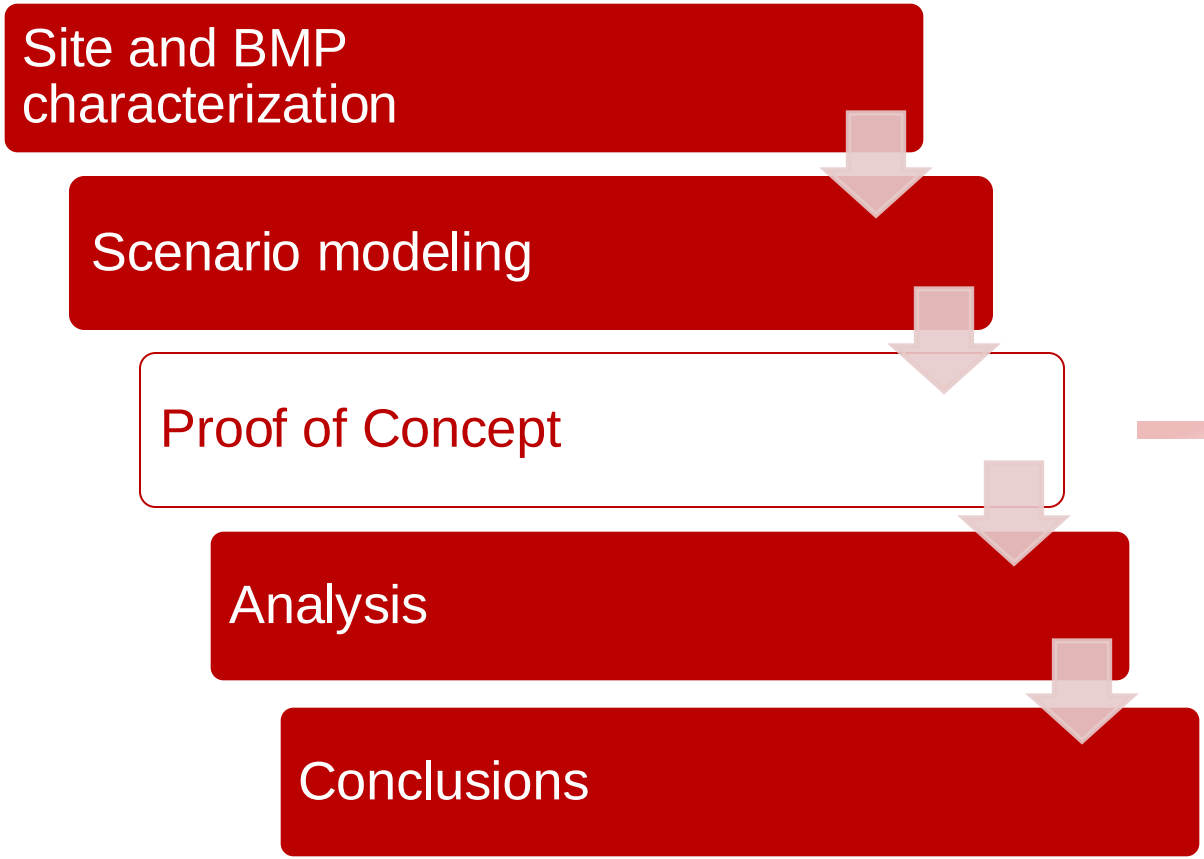
Sediment (t/ha)

Nitrogen (kg/ha)

Phosphorus (kg/ha)

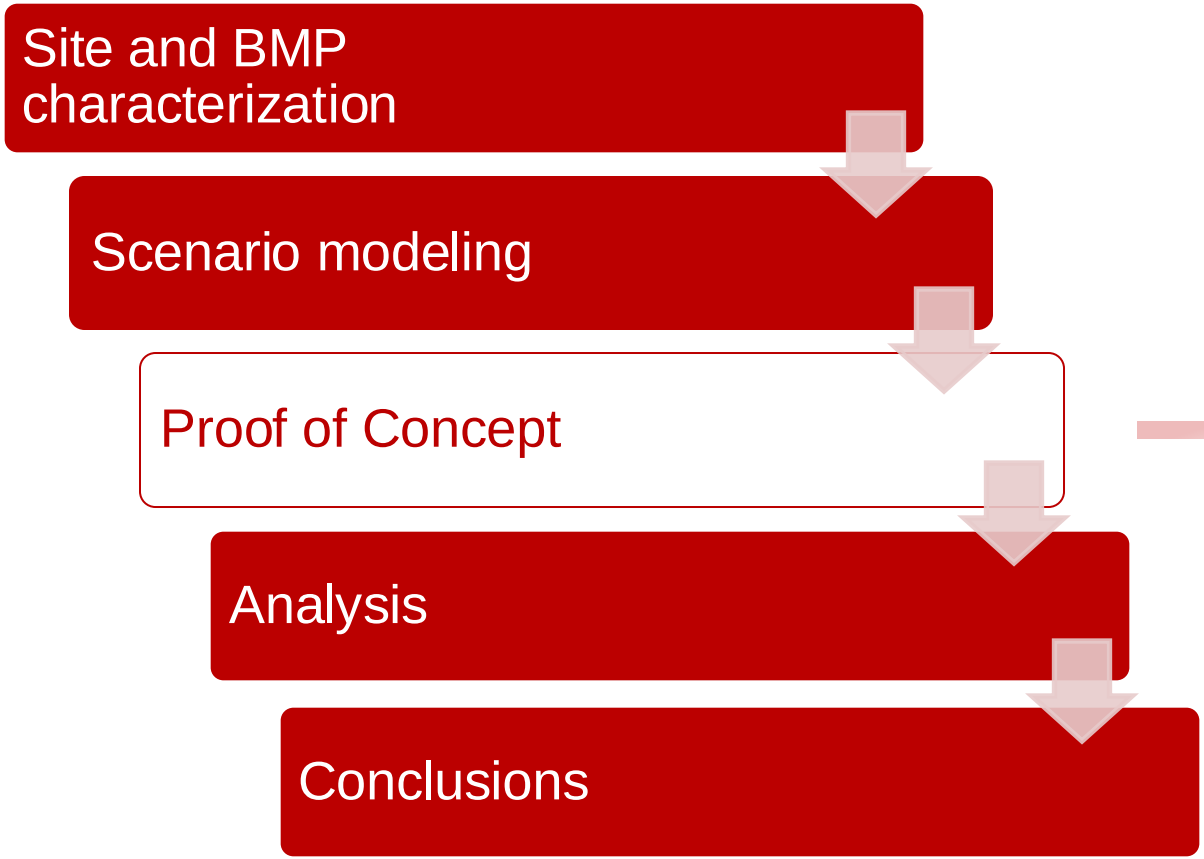


Carnegie Mellon University



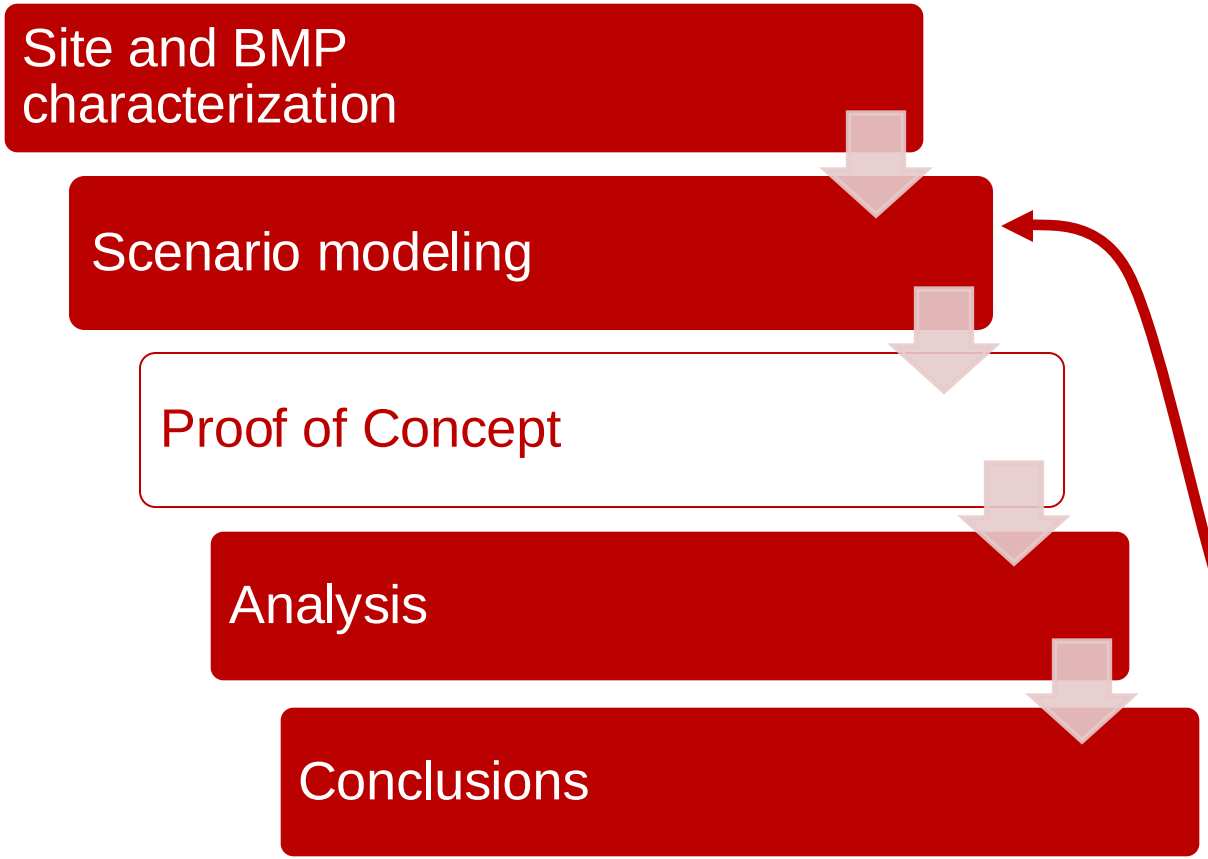
- Checking hydrologic balance

Carnegie Mellon University



- ❑ Checking hydrologic balance
- ❑ Post-processing outputs

Carnegie Mellon University



- ❑ Checking hydrologic balance
- ❑ Post-processing outputs
- ❑ Revising model

Carnegie Mellon University

Current Phase: Proof of Concept

- Checks and balances
- Revisions as needed

Next step: Analysis

- Processing removal efficiencies
- Comparing results to Chesapeake Bay Program Model
- Organizing and comparing results

Urban Application

- Expect to begin Aug/Sep 2025

Carnegie Mellon University