



Carnegie Mellon University

Future Climate Impacts of CBW BMP Efficiencies

*A Modeling Sensitivity Study for Urban and
Agricultural BMPs*

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Project Overview

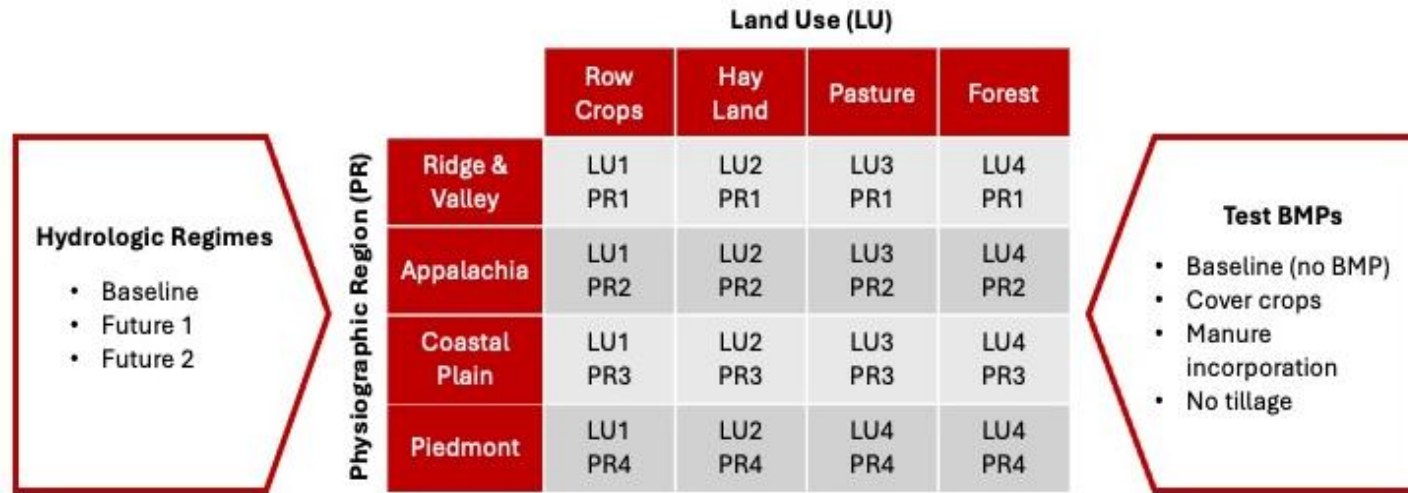
Goal: Quantify the performance of agricultural & urban BMPs in the Chesapeake Bay watershed under current and future climate scenarios

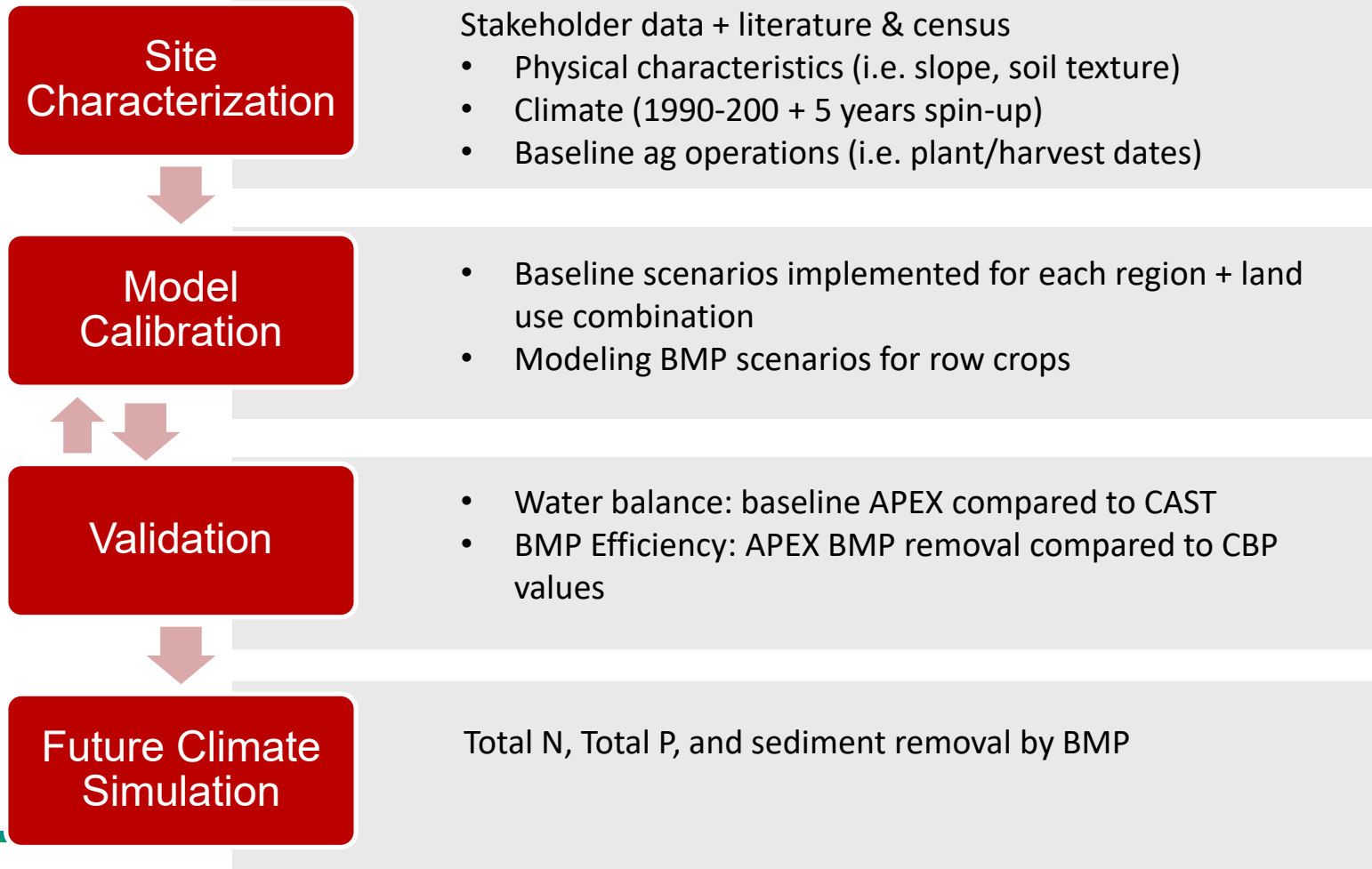
Tools: APEX for agricultural, SWMM for urban

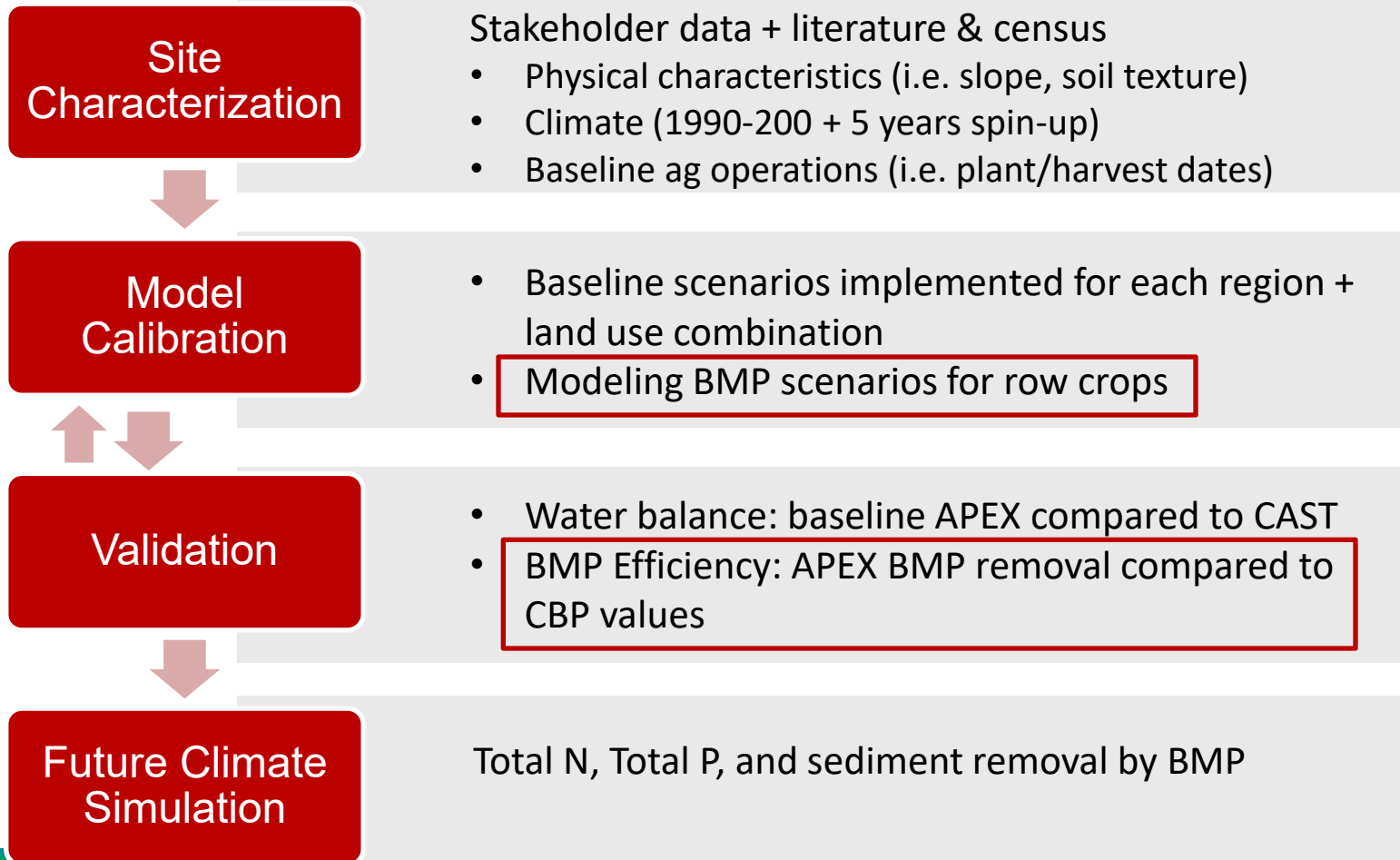
Output: Pollutant removal efficiencies for different BMPs

Watershed Settings

- 4 regions
- 4 land uses
- 4 BMPs (row crops)
- hydrologic regimes in progress








Baseline Files

soybeans



		Land Use (LU)			
		Row Crops	Hay Land	Pasture	Forest
Physiographic Region (PR)	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

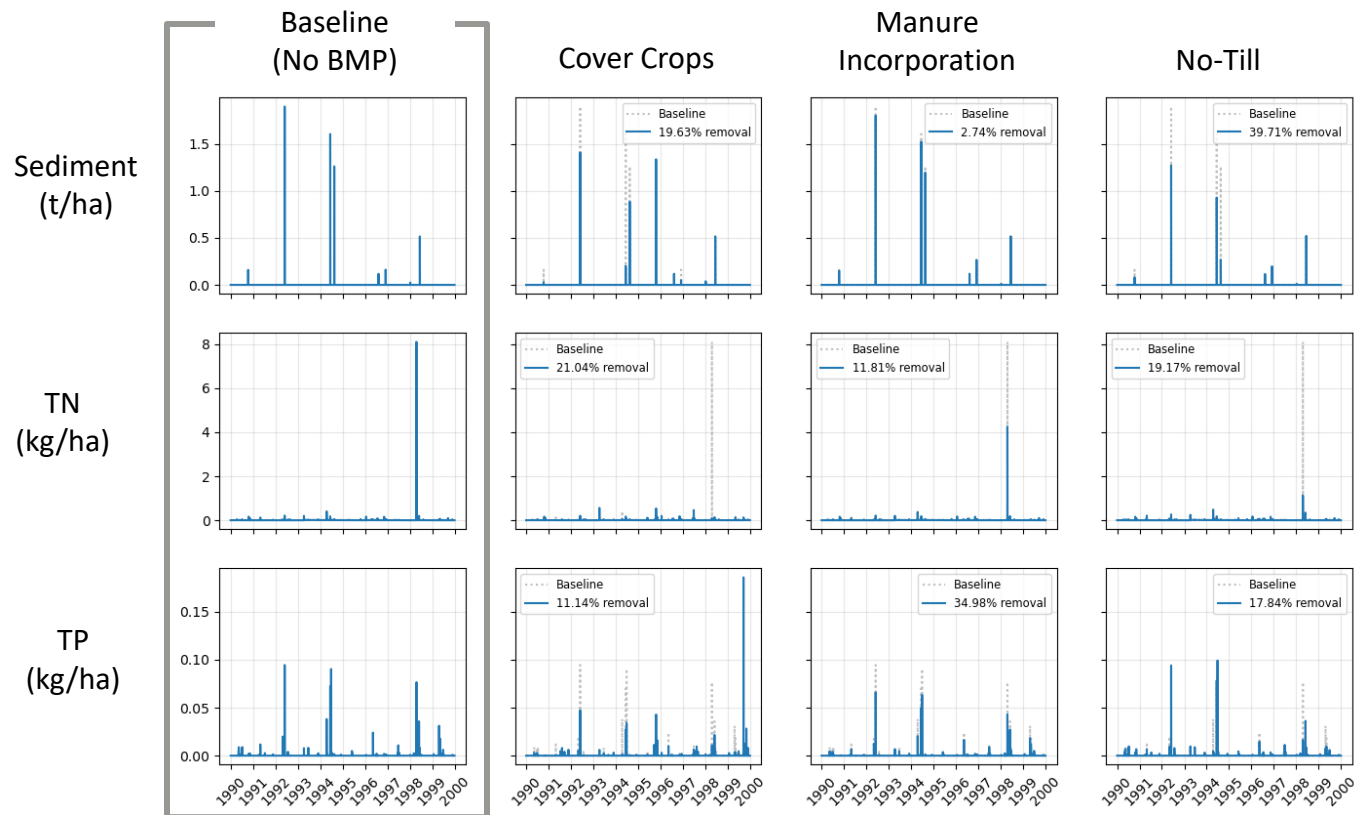
CBP Suggestion:

		Land Use (LU)			
		Row Crops (Soy)	Row Crops (Corn)	Row Crops (Small Grain)	Hay Land
Physiographic Region (PR)	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	LU3 PR4	LU4 PR4

Water Balance Validation: Appalachia (no BMP)

LU	APEX Runoff	CAST Runoff	APEX ET	CAST ET	
Forest	48%	42-59	53%	41-59	✓
Hayland	45%	44-59	41%	41-57	✓
Pasture	46%	44-59	41%	41-57	✓
Row Crops	52%	45-60	41%	40-55	✓

Preliminary Results (Appalachia soy)



Efficiency Validation: Appalachia Soy

BMP	TSS Removal Efficiency (%)			TN Removal Efficiency (%)			TP Removal Efficiency (%)		
	CAST	APEX	diff	CAST	APEX	diff	CAST	APEX	diff
Cover Crops	0	19.6	19.6	22-29	21	1	0	11.1	11.1
Manure Incorporation	0	2.7	2.7	8	11.8	3.8	12-24	35	10
No Till	41	39.7	1.3	10	19.2	9.2	17-27	17.8	0

Current Phase

- Continued validation
- BMP modeling
- Post-processing

Next Steps

- Removal efficiency analysis
- Future weather climate modeling

