

Functioning Floodplains and Basin Resilience to Extreme Events





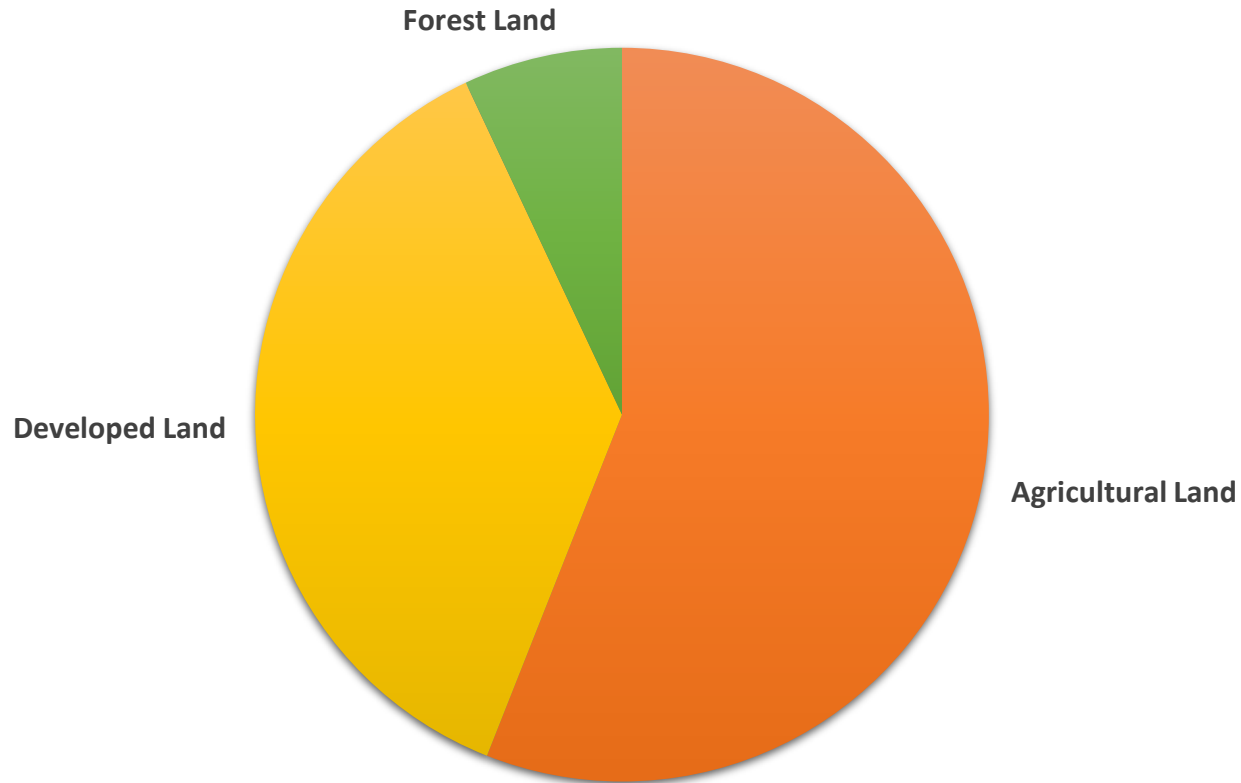
Channelization = Steep/Incised,
Erosion-Prone, and Transport-
Dominated Streams

- Deforestation
- Dams and diversions
- Ditching and snagging
- Dredging and windrowing
- Straightening & Encroachment
- Berming and armoring

Stream Bank
Erosion is a
Nonpoint Source



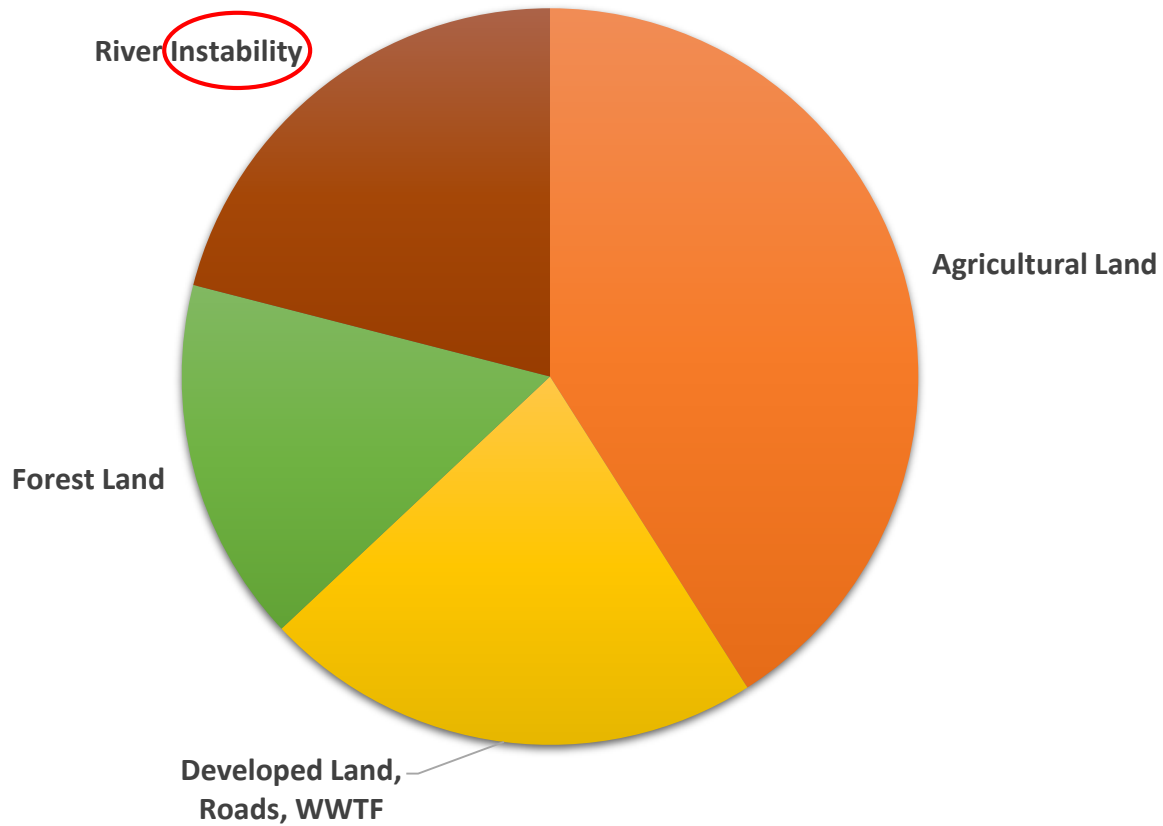
Nonpoint (+) Sources Phosphorus Load



A spirited debate led to the recognition of stream erosion as a source of sediment and nutrient loading into Lake Champlain.

2002 LC TMDL
Hegman et al. (1999)
LCBP Tech. Rep. No. 31

VT Sources of Phosphorus Loading to Lake Champlain



2016 LC TMDL
Tetra Tech (2015)
EPA

Instability: before or after the rip-rap?

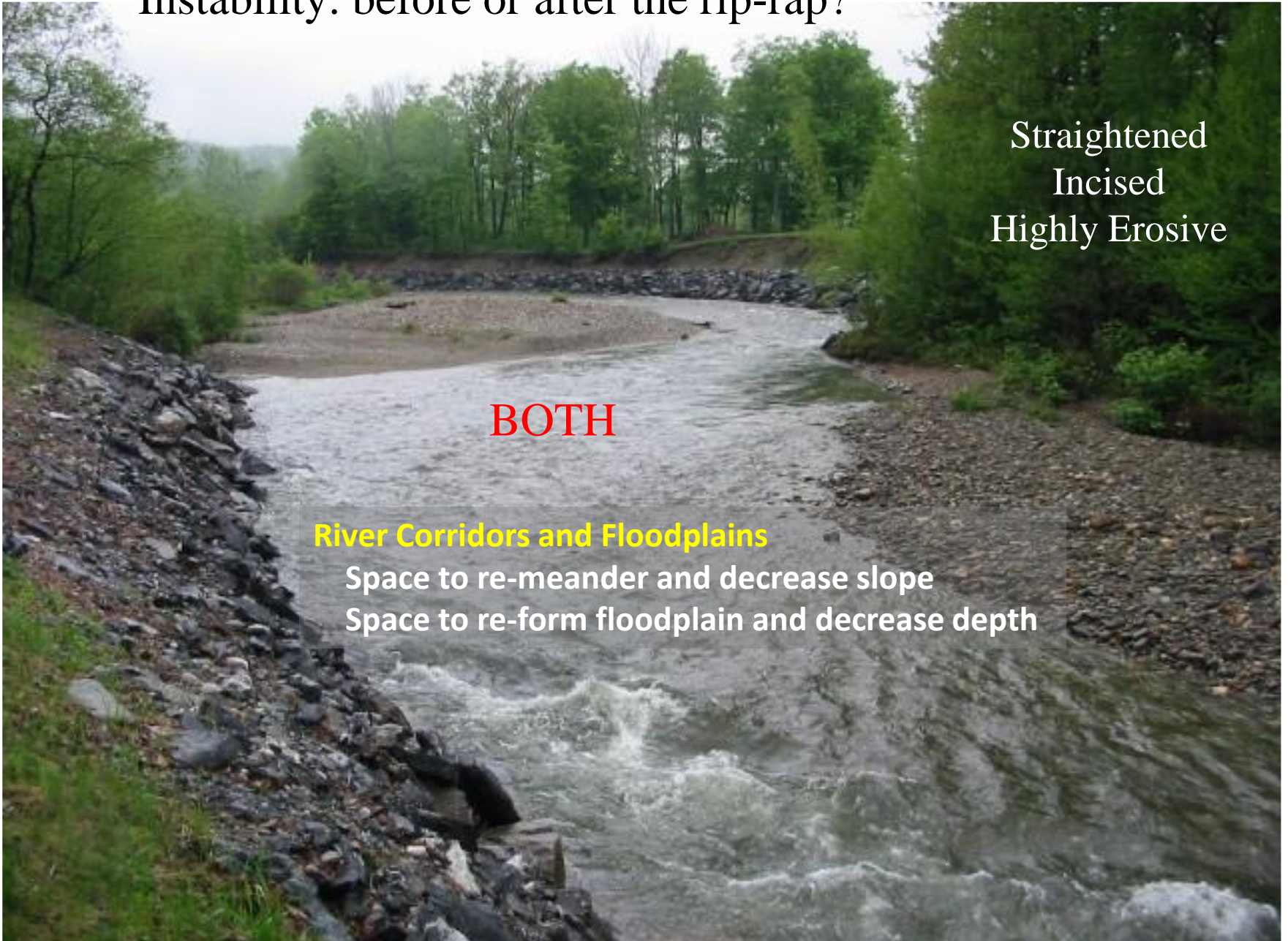
Straightened
Incised
Highly Erosive

BOTH

River Corridors and Floodplains

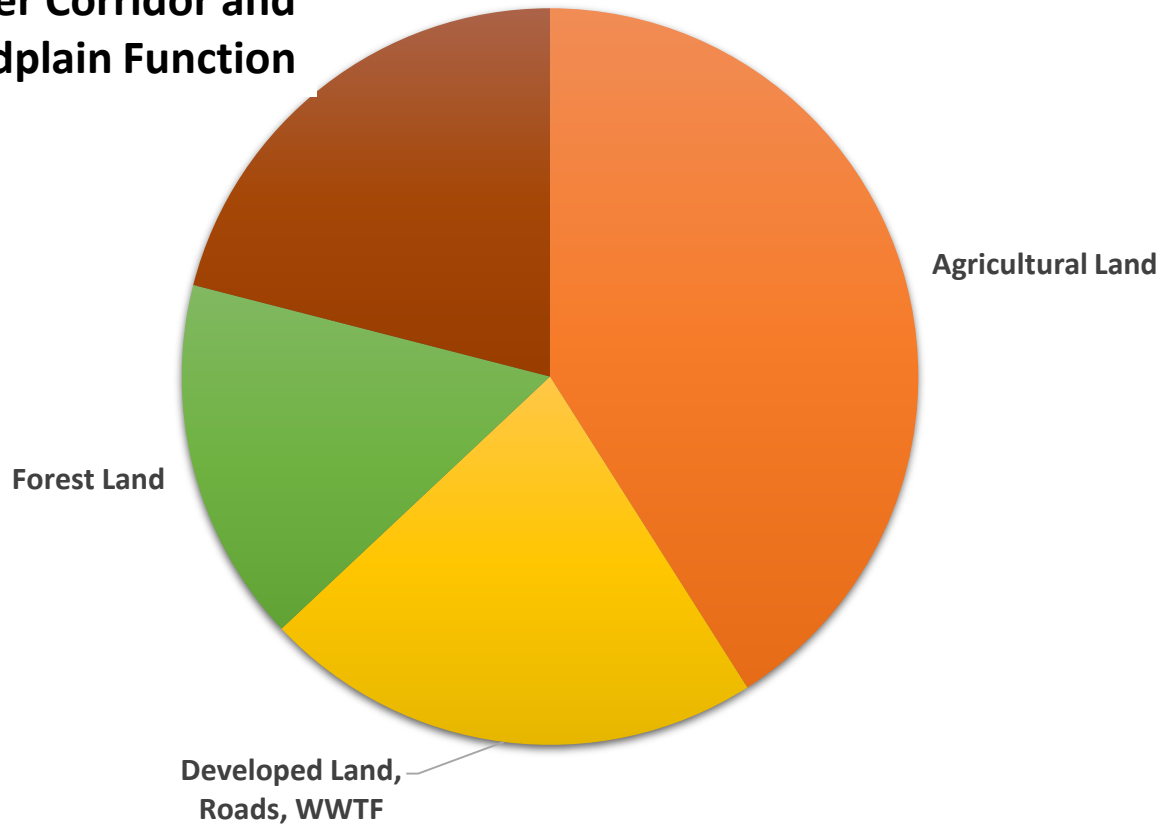
Space to re-meander and decrease slope

Space to re-form floodplain and decrease depth



VT Sources of Phosphorus Loading to Lake Champlain

**Loss of River Corridor and
Floodplain Function**



2016 LC TMDL
Tetra Tech (2015)
EPA

BREE and IAM Research Questions: What are properties within the Lake Champlain Basin that drive hydrologic and nutrient responses to extreme events, what strategies can be implemented to manage the risk from extreme events, and what are the trade-offs for prioritizing public sector investments?

LCB Properties: Floodplains / River Corridors – space for decreasing depth and slope to minimize erosion and increase depositional processes

Strategies: *Functioning Floodplains Initiative (FFI)* – VTANR/UVM/LCBP/TNC/others

- Floodplain Functions Mapping and Tracking
 - Stream and Floodplain Connectivity
 - Floodplain-Channel Hydrology and Hydraulics
- Socio-Economic Evaluations and Public Outreach
- Strategic Floodplain/Wetland Restoration and Protection Practices

UVM Research (supporting the FFI)

- a. In-channel and floodplain sediment regime classification
 - (existing and potential erosion, transport, and deposition zones)
- b. Flood inundation zones (frequent and infrequent stages -- existing and potential)
- c. Floodplain and in-channel specific stream power, velocity and shear gradients
 - (existing and potential SSP Signatures across range of flood stages)
- d. Practice Optimization

Looking forward to more EPSCoR/BREE & Gund involvement



Trade-offs

How do we prioritize
public sector investments
to achieve greater
floodplain function