

Riparian plant restoration and issues impacting success

SARAH GAFFNEY

ECOGEOMORPHOLOGY

Riparian Ecosystems



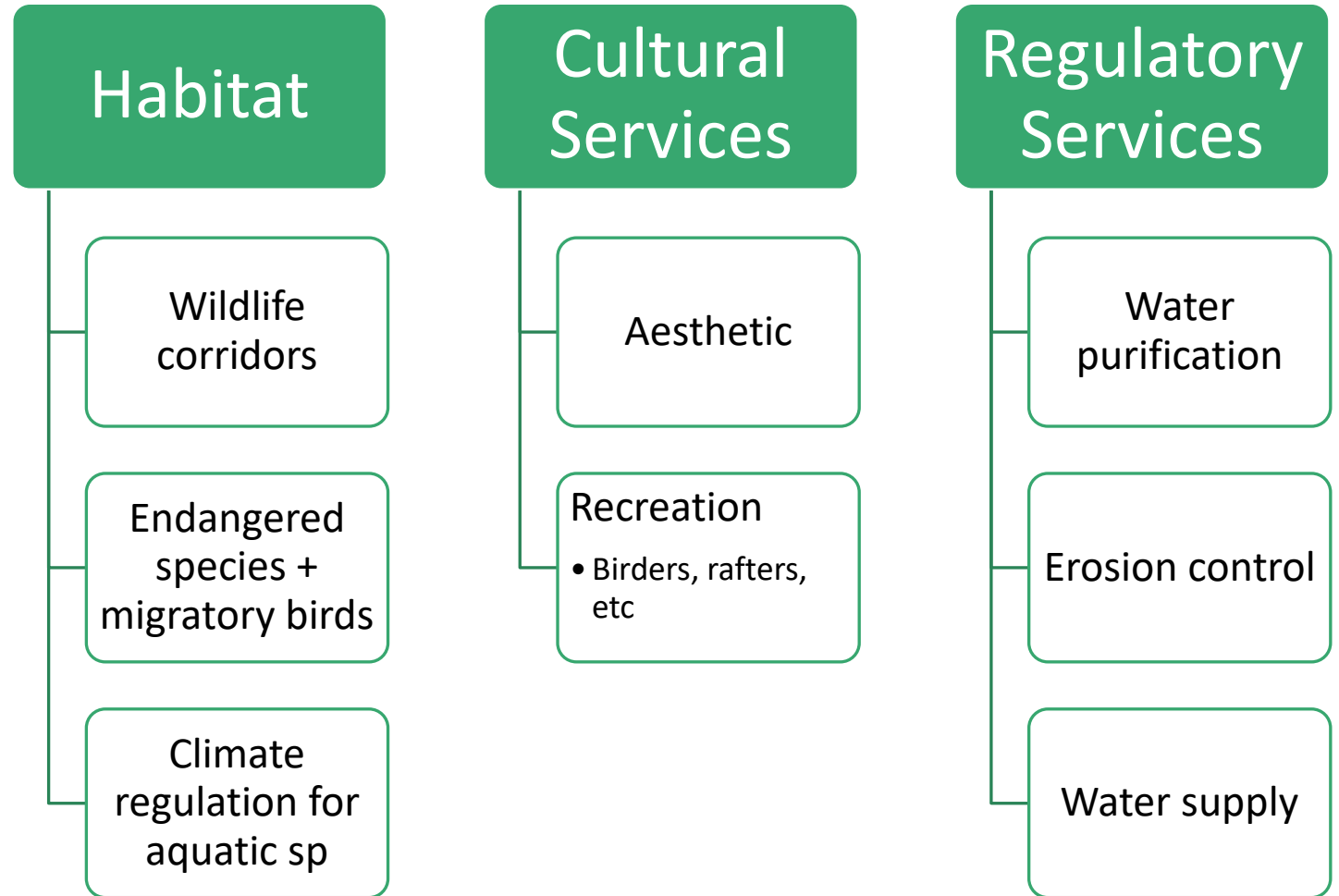
Cottonwood and
Willow-
foundation
species



Original
Plant
Community



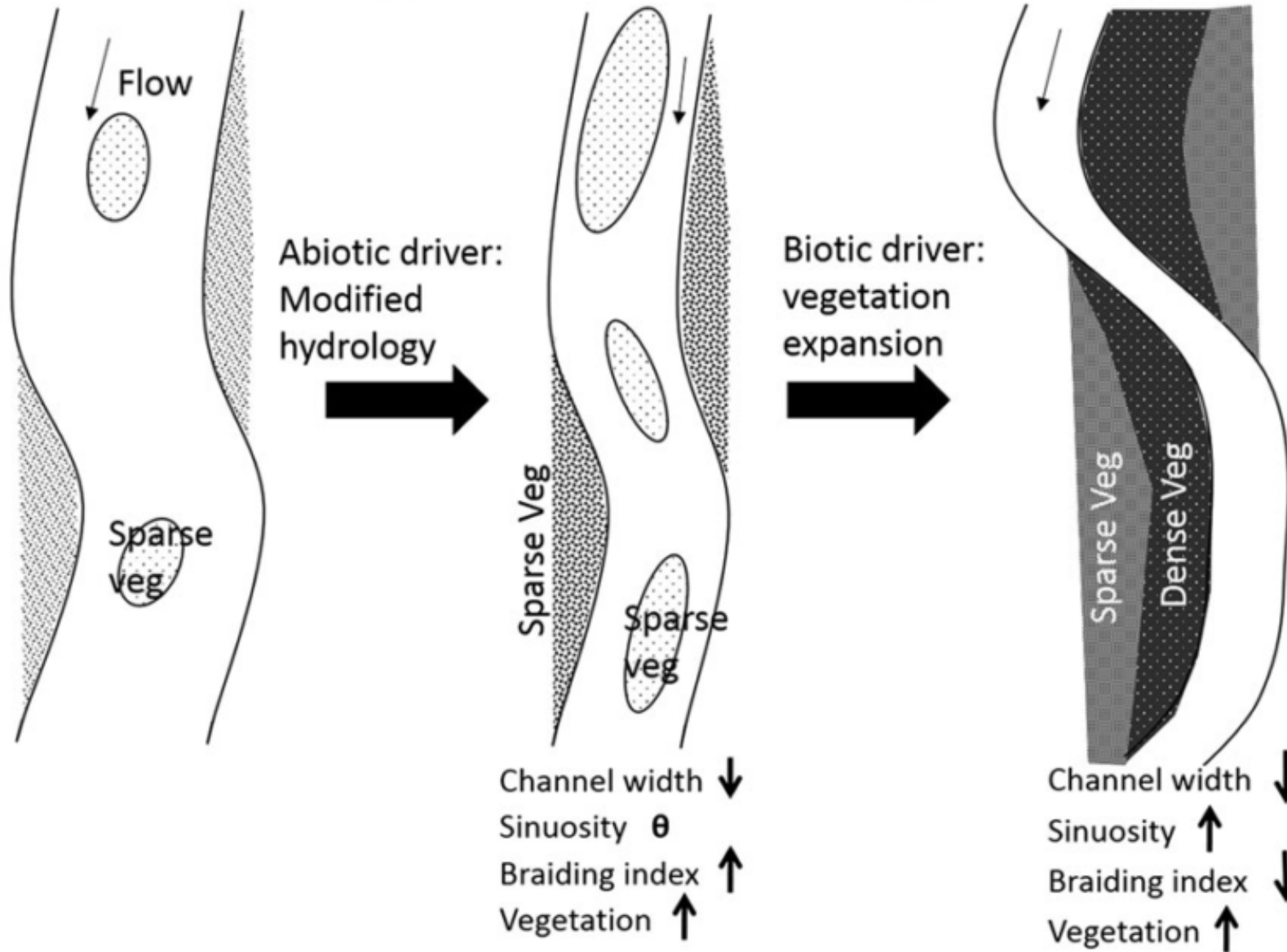
Functions and Services





Then came
dams and
invasions...

(a) Undammed channel (b) Post-dam short term (1-5 year) (c) Post-dam long term (>10 years)



- ↑ salinity
- ↑ erosion
- ↑ bank height
- ↓ overflowing banks
- ↓ water table
- ↓ water recharge

Tamarisk invasion

- High tolerance of low water availability and high salinity (both in soil and water)
- Abundant seed production
- Long seed dispersal period



Russian Olive



1991

2010

Escalante River

Status:
Degraded

Goal:
Restoration

How?

Decrease in biodiversity, erosion control, water supply, etc

Restore native plant communities and get those services back

Can't we just get rid of the invasives and actively plant cottonwood and willow?



Tamarisk Beetle



Controlled Burns



Cut-stump herbicide



Heavy Machinery



Mechanical removal

Tamarisk Removal Methods

Restoration of river's natural processes



River is disconnected from it's flood plain

Need pulse flows to restore water table, scour veg, deposit sediment

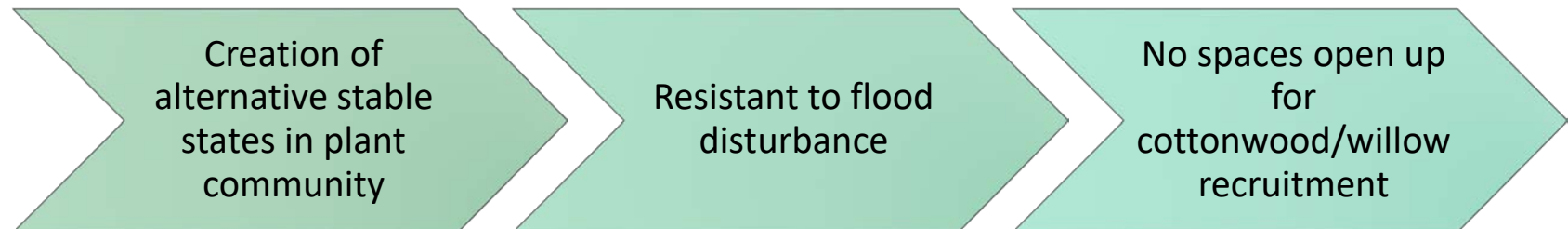
Flood timing and recession rate needs to occur at time of seed rain

Sometimes...short-term



Is that good enough??

Unfortunately...





Case study: Bill Williams River

Successes

Base flow release high enough to support shallow water table

Sediment deposition and scouring enabled cottonwood and willow establishment

Lessons

- ❖ Native establishment spatially limited
- Not all floods resulted in establishment
- Tamarisks also like the flood

Case study: Minute 319



29 September 2014

Successes

Wetted surface soils,
restored shallow
groundwater, lowered
soil salinity

Lessons

- ❖ Tamarisk still persisted
- ❖ Did not restore erosion, sediment deposition nor vegetation scour
- ❖ Cottonwood/willow recruitment only in active restoration sites
- ❖ Try to focus water flow to be near areas of active restoration

How to move on?



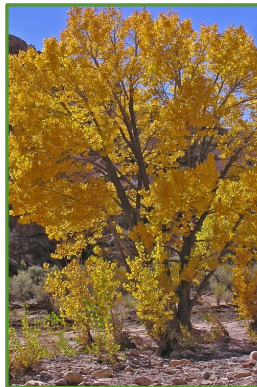
Consensus: need to treat environmental flows as large scale experiments

- Treat scientifically
- Get more evidence on how flows achieve goals
- More leverage with stakeholders



Couple experiments with invasive removal treatment

- Need to fully understand the interaction between these two drivers of ecosystem degradation.



Time is of essence

- As years go we lose adult cottonwoods and willows
- Decrease native seed source



Russian Olive Infested



2 years after removal