P Mitigations discussion at LandTAG

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PHOSPHORUS (P) LOSS:

Largely by surface runoff

Depends on - soil, climate and topography
- management e.g. fertiliser and Farm Dairy Effluent

Sources: Example

fertiliser	dung	plant	soil
10%	30%	20%	40%

Also
- dung direct to waterways
- runoff from lanes and gateways

P LOSS SOURCES

P fertiliser:

Timing: Losses are higher in May-October
Form: Super > serpentine super > RPR

FDE:

- Timing, soil type and location relative to waterways
- Rate of application (mm/hour)

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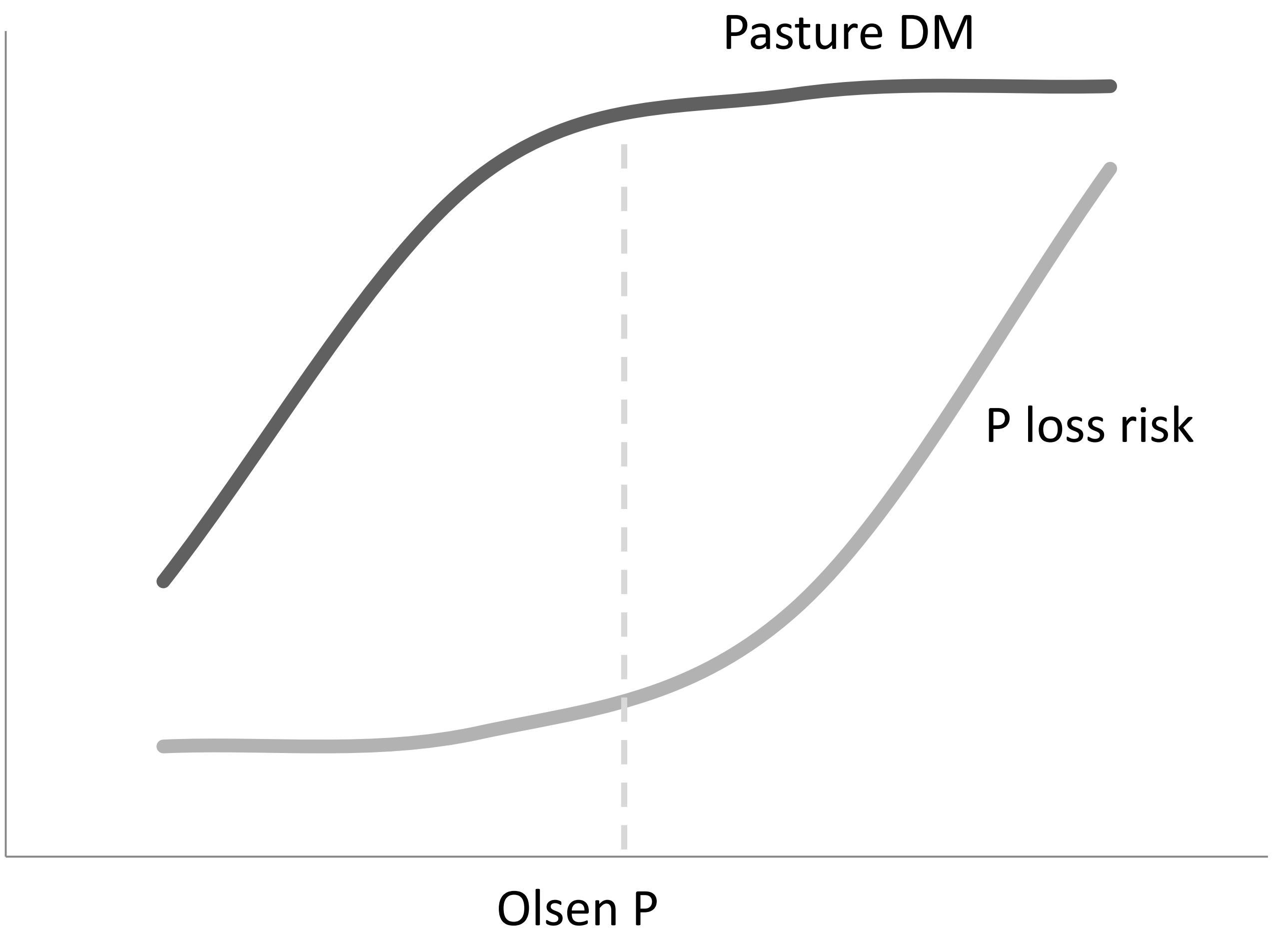
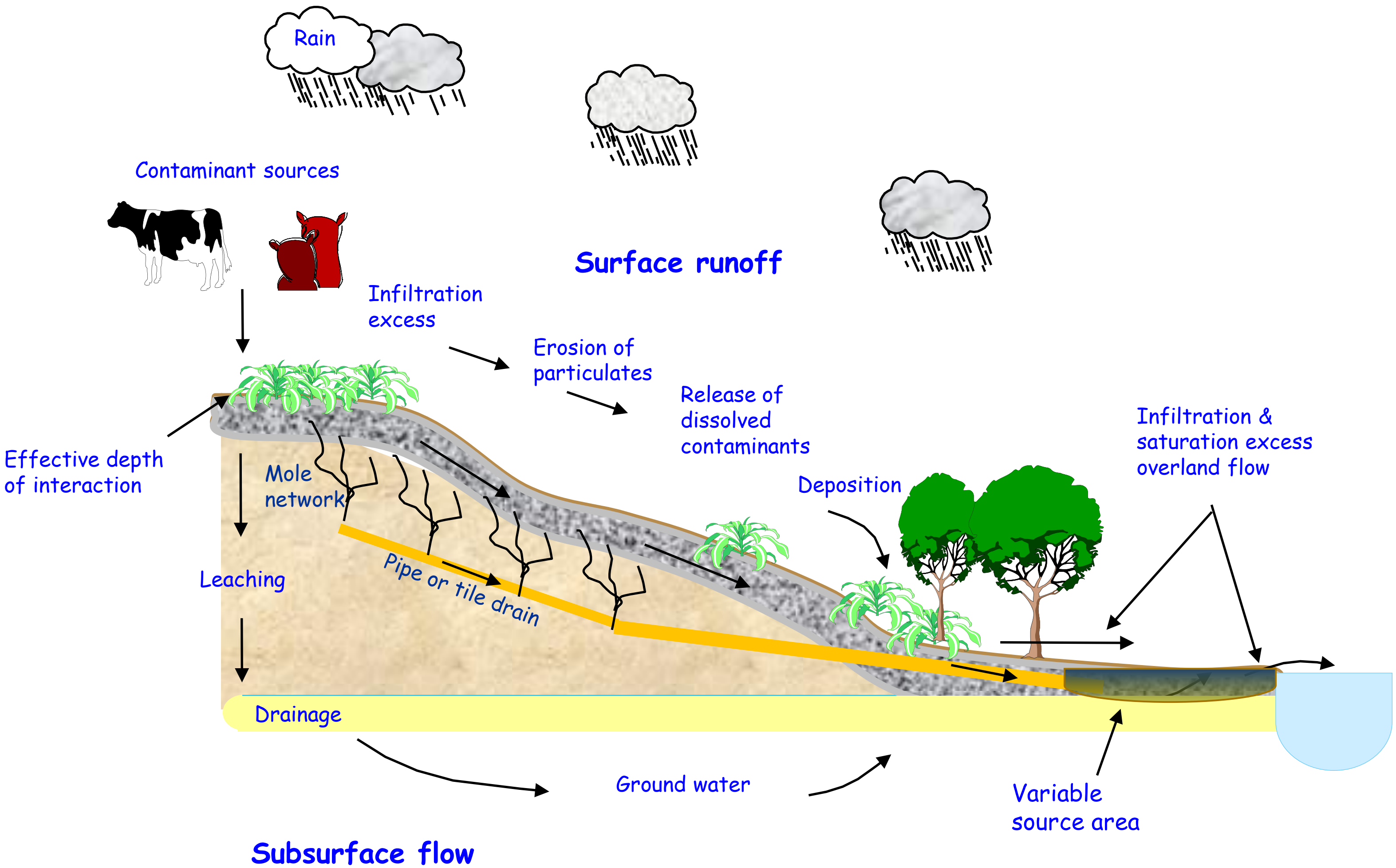
- Avoid excess soil P levels



LANDSCAPE FLOWS



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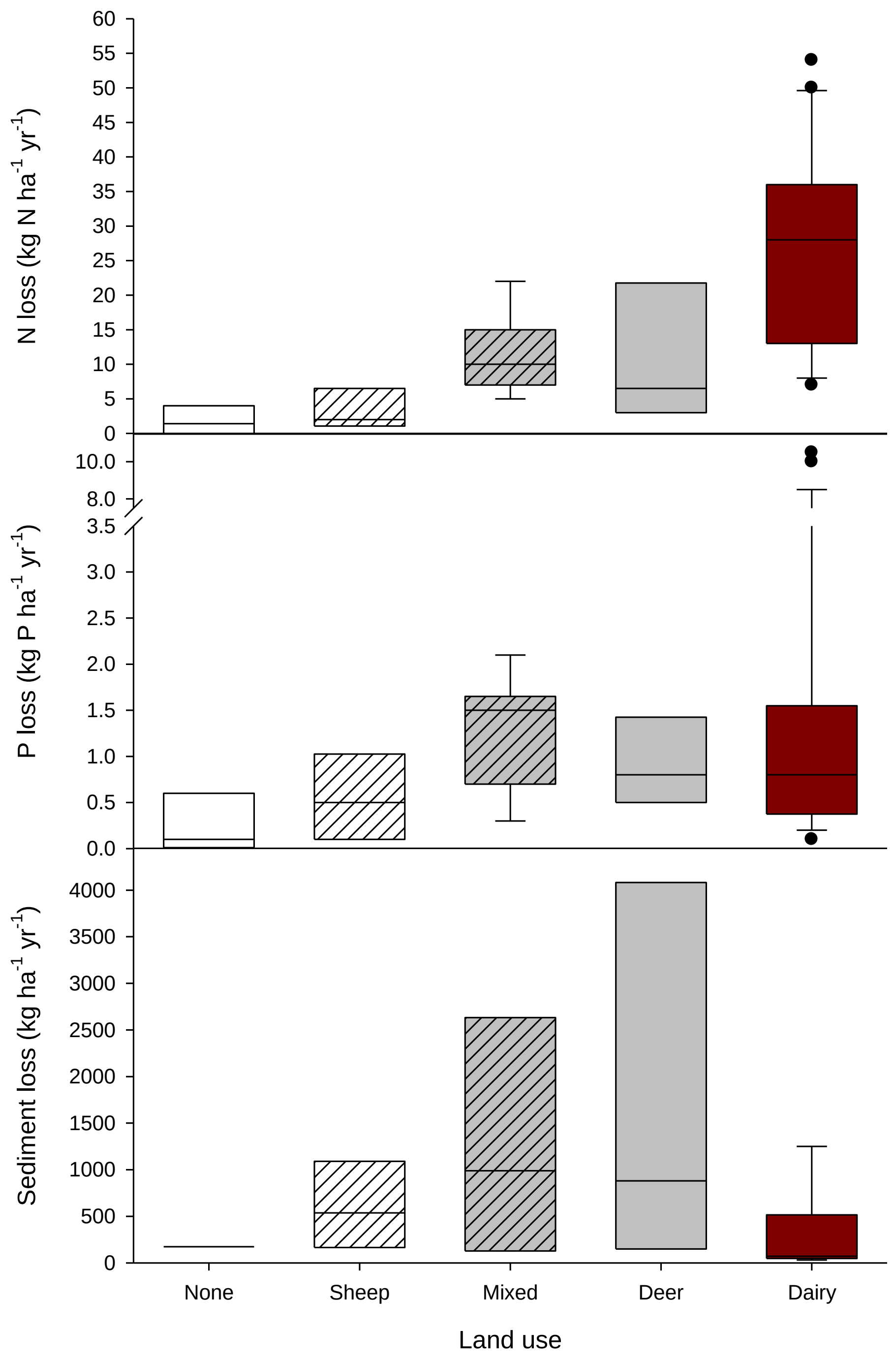
Land use impacts

Catchment losses (1970-present)

Wide range due to:
climate
soil type
topography
management



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Sources

SOURCE	Nitrogen	Phosphorus	Sediment	Faecal bacteria
Urine	*****	-	-	-
Effluent	**	****	***	****
Fertiliser	*	***	-	-
Drainage	**	**	*	***
Soil status	*	***	*	?
Flood irrigation wash	*	****	**	****
Stock wintering	*****	****	****	****
Track/lanes/fence-lines	*	***	***	***
Direct stock access	***	*****	*****	*****

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Choosing mitigations

Strategy	Applicable land use	Cost ($/kg P mitigated)	TP effect (%)
Low rate effluent application to land	Dairy	Low	High
Stream fencing	All	Low	Medium
Greater effluent pond storage/appl.	Dairy	Low	High
Optimum soil test P	All	Low	High
Low solubility P fertiliser	All	Low	Medium
Grass buffer strips	All	Medium	Medium
Restricted grazing of cropland	All	High	Medium
Alum to pasture	All	High	Low
Sorbents in and near streams	All	Very high	Very high
Natural seepage wetlands	All	Very high	Low
Sediment traps	All	Very high	Low

Tier 1 BMPs

BMP	Target	Cost effectv.	
		N	P
Improved FDE management - storage, low rate & low depth applic.	P, ***E. coli***, NH_4-N	M	L
Stock exclusion from streams wetlands swales & wet gullies (esp on winter crops)	P, ***E. coli***, NH_4-N, sediment	H	H
Nutrient management plans	N, P	H	H
Tracks and lanes sited away from streams & lane runoff diverted to land	P, ***E. coli***, NH_4-N, sediment	M	M
Facilitated wetlands	N, sediment, *E. coli*	H	*L-M*

Cost effectiveness, $/kg	*High*	*<25*	*<100*
	Med	*25-75*	*100-250*
	Low	*>75*	*>250*

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Tier 2 BMPs

BMP	Target	Cost effectv.	
		N	P
Nitrification inhibitors	NO_3-N	H	na
Wintering cows in Herd Shelters	NO_3-N, P, *E. coli*, NH_4-N, sediment	M	L
- with restricted autumn grazing	NO_3-N	M	?
Substituting N-fertilised pasture with low N feeds	NO_3-N	M-H	na
Constructed wetlands	NO_3-N, *E. coli*, NH_4-N, sediment	M	L
Grass buffer strips	NO_3-N, P, *E. coli*, NH_4-N, sediment	L	L
Limiting N fertiliser use	NO_3-N	M-H	na

$/kg	*High*	*<25*	*<100*
	Med	*25-75*	*100-250*
	Low	*>75*	*>250*

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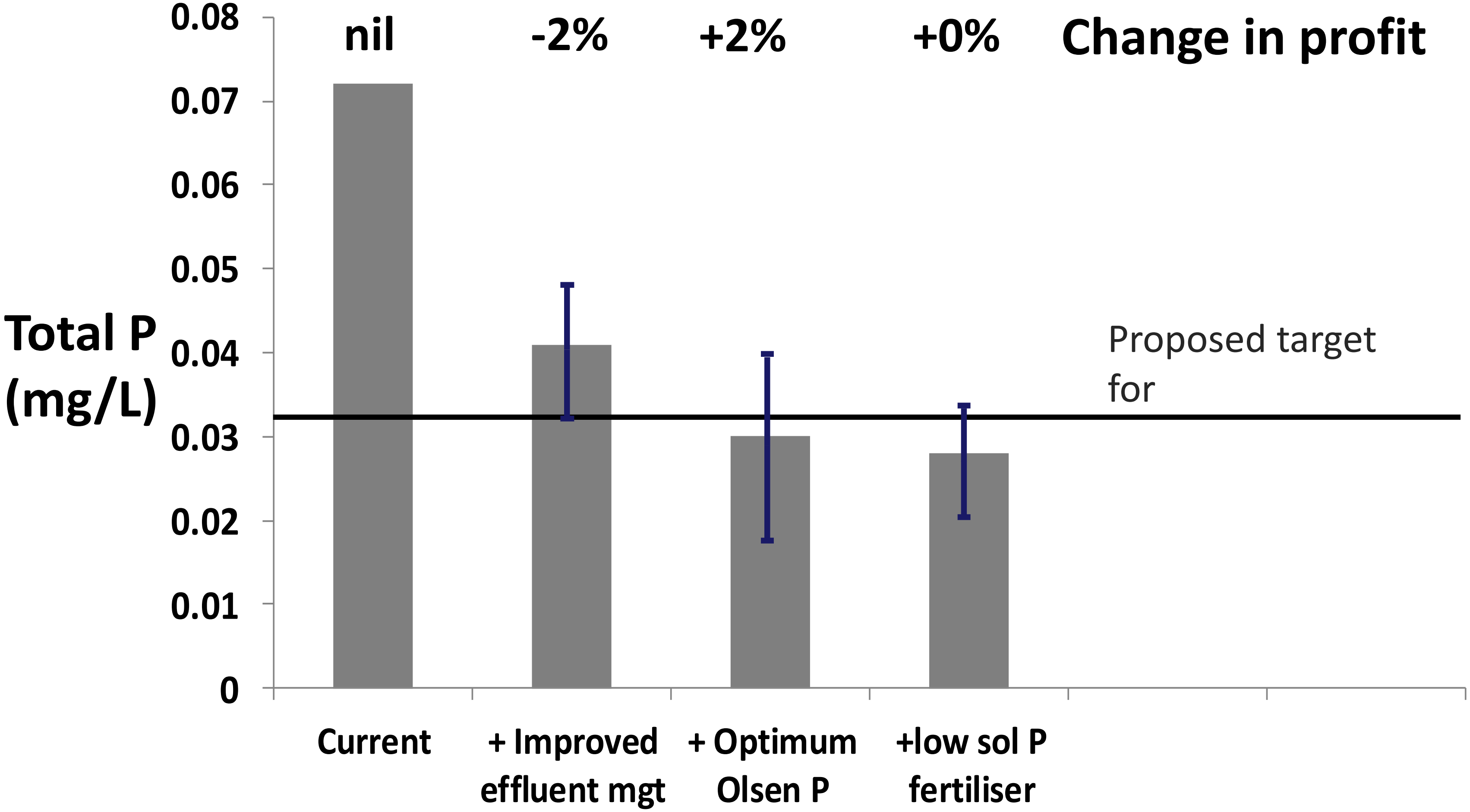
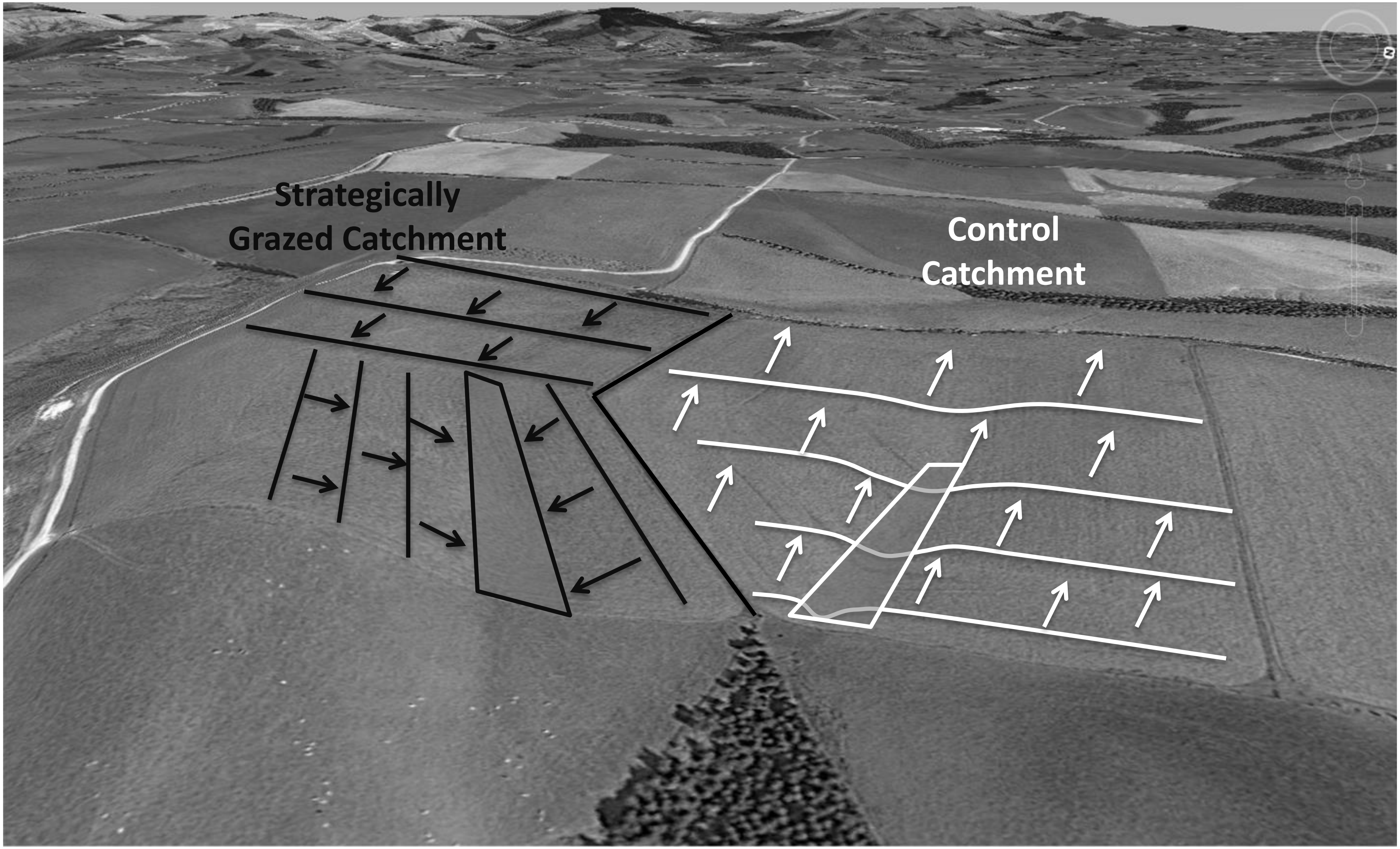
multiple mitigation effects





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Sediment Yield kg/ha		**Total Phosphorus Yield kg/ha**		**Ammonium Yield kg/ha**	
Strategic grazing	Control	Strategic grazing	Control	Strategic grazing	Control
125	1141	0.84	4.61	1.24	9.99

SUMMARY

1. Adoption of mitigations depends on:
   having a good cost:benefit ratio
   a wide range of mitigations to select from

2. Mitigations are more efficient and cost less the closer they are to the source (farm management > amendment > edge of field)