

The background of the slide is an aerial photograph of a dense, lush green forest. The trees are tightly packed, creating a vibrant green canopy that fills the entire frame. The lighting appears to be natural daylight, highlighting the various shades of green in the foliage.

# Targeting Investments in Resource Conservation with RIOS

(Resource Investment  
Optimization System)

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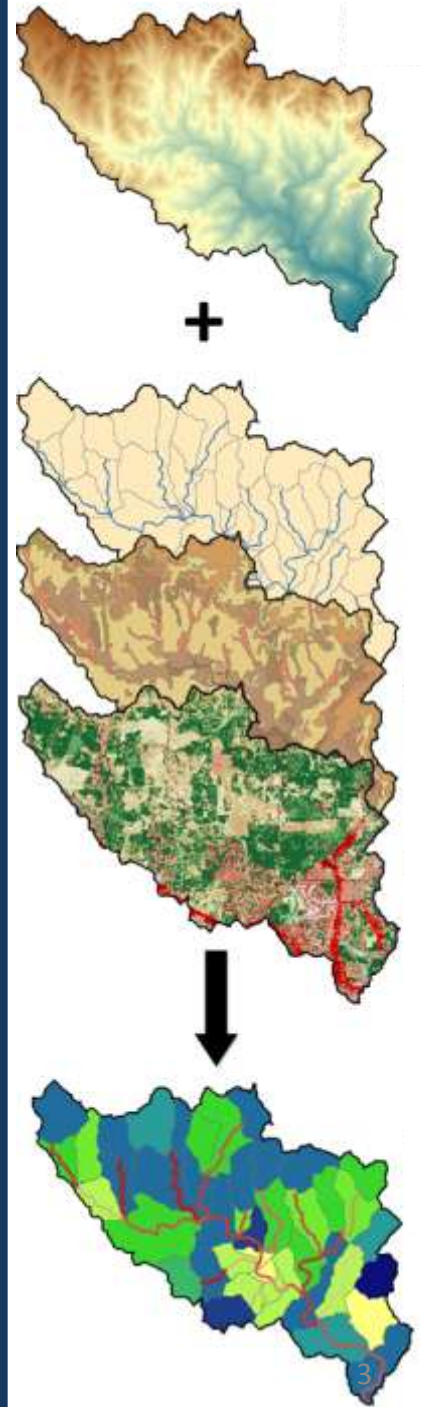
Heather Tallis, Stacie Wolny, Rich Sharp, James Douglass, Doug Denu,  
Silvia Benitez, Fernando Veiga, Juan Sebastian Lozano, Paulo Petry,  
Jorge Leon, Joao Guimaraes, Eddie Game

Can we do a better job of targeting investments in watershed services by using a science-based approach with biophysical and social data?



# Science-based approaches

- Use biophysical data with models to target where services are highest
- Scenario analyses of vulnerability or sensitivity to interventions
- Specific to context and available data



# Limitations

- Data requirements often extensive, computationally intensive
- Available data limited in quality and scope
- Need to integrate multiple model results to move beyond single objective & single activity
- Often address effectiveness only, not feasibility or cost effectiveness
- Does not tell you both where you get best results for ***multiple goals*** AND where it is ***practical*** to work

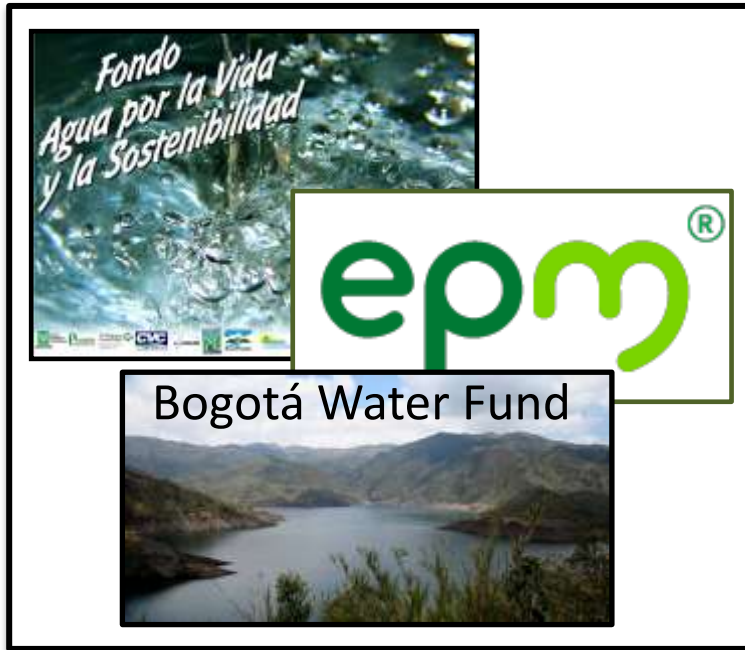
# Resource Investment Optimization System

- An approach **general** enough to work everywhere in Latin America
- Easy with **available** data
- Give **standard outputs**



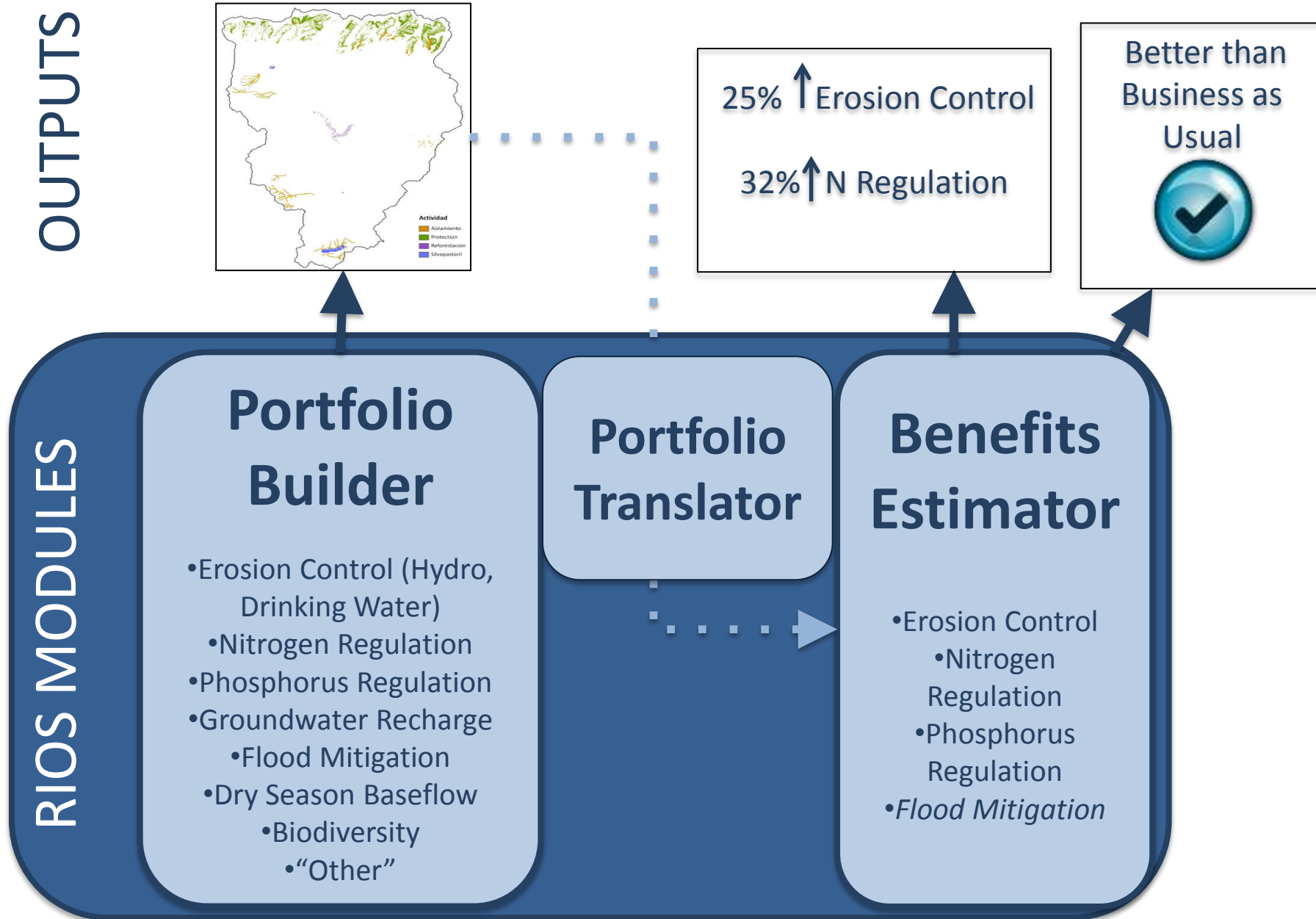
# Can We Do Better? YES!

## Deep Dive Sites

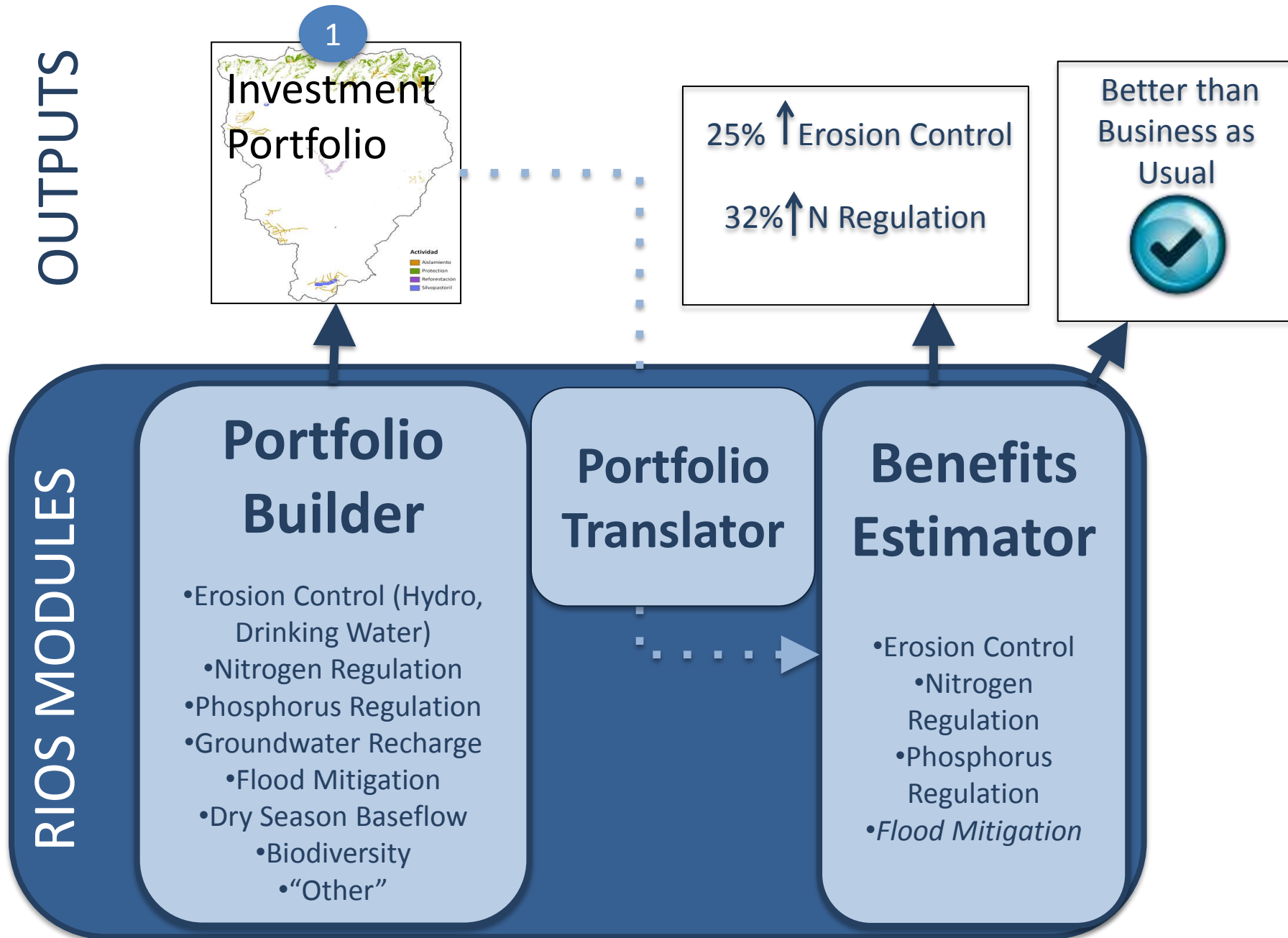


**30% to 600%**  
better estimated  
returns than  
business as usual

# RIOS Structure

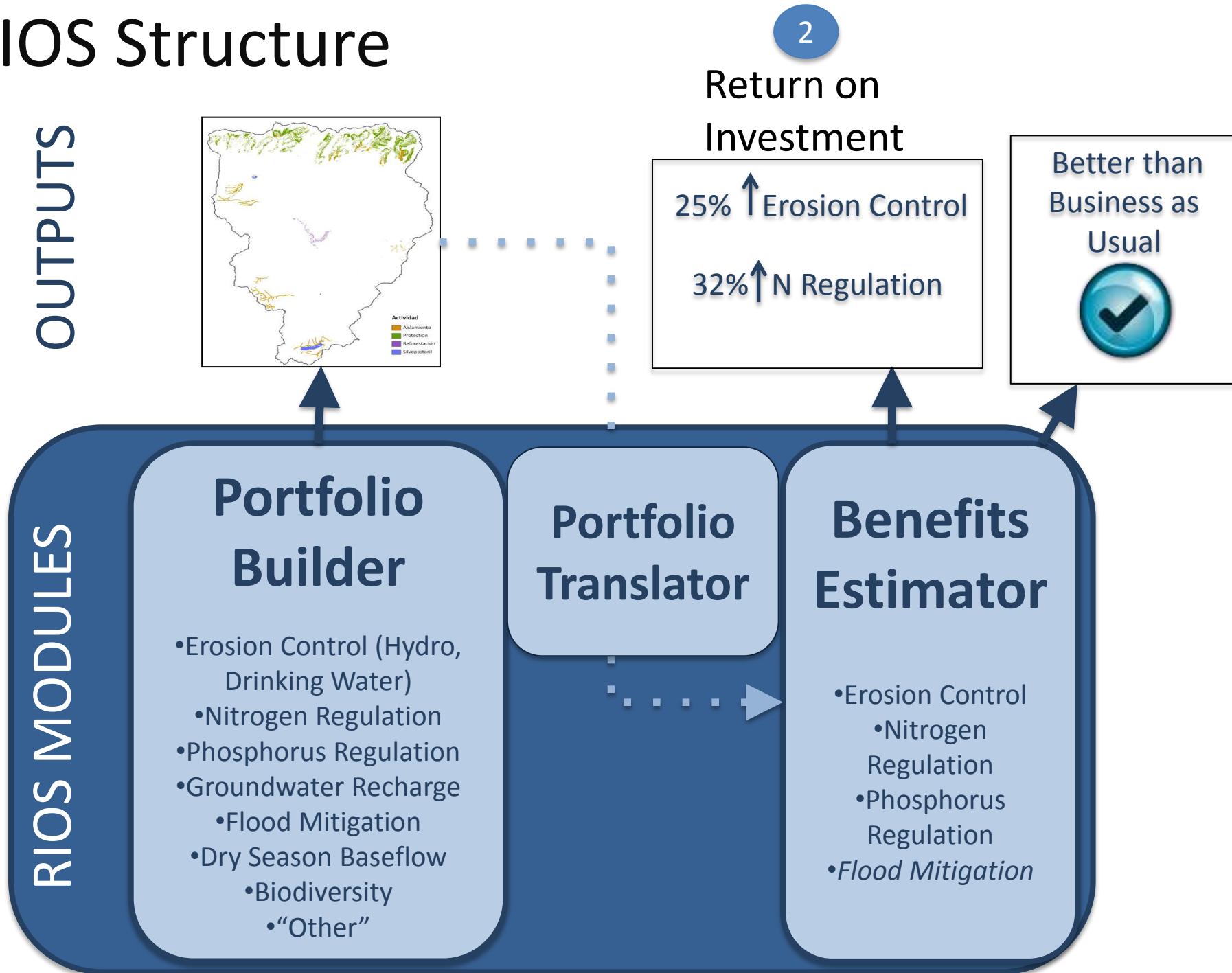


# RIOS Structure

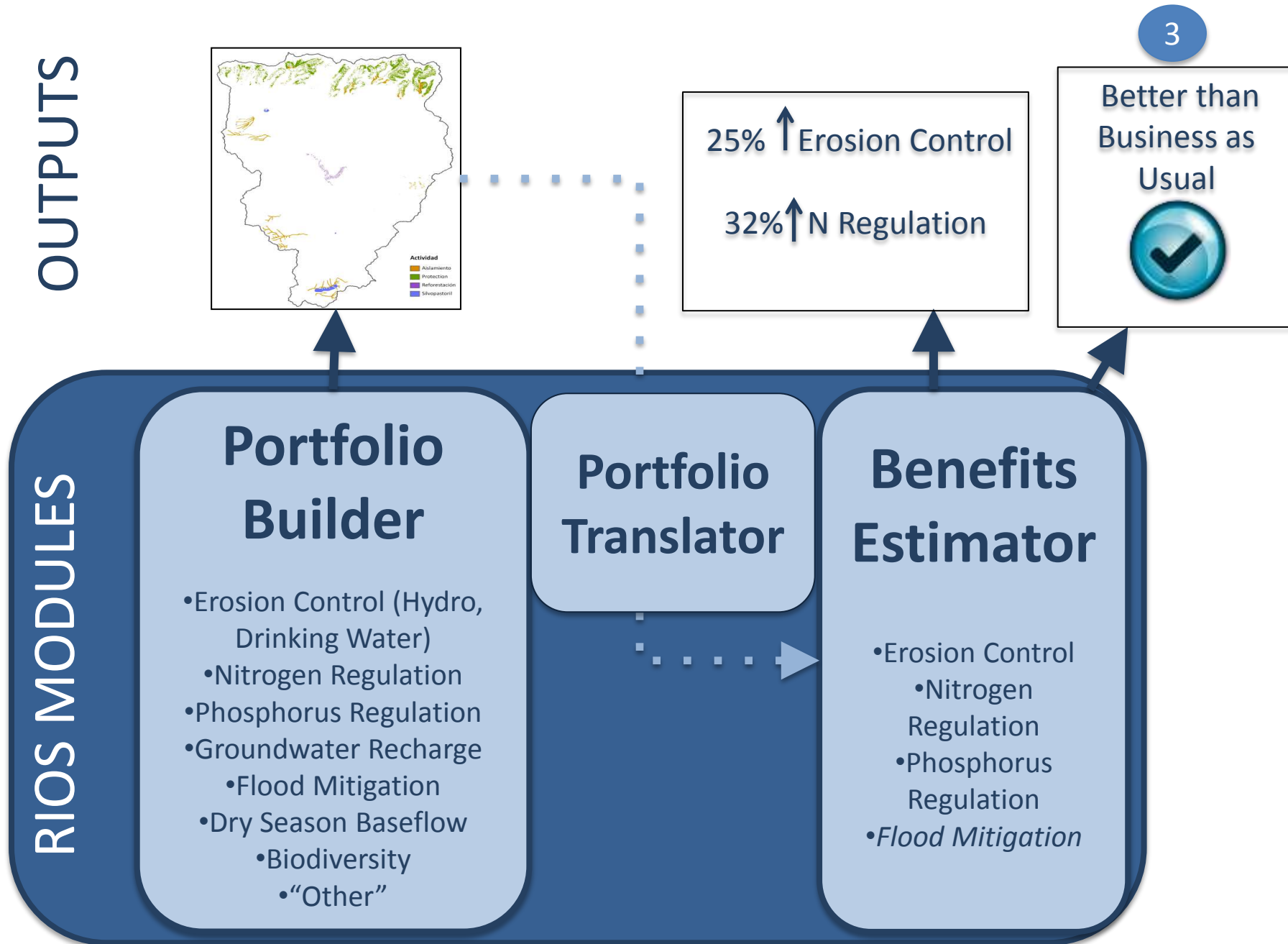




# RIOS Structure



# RIOS Structure



# **OUTPUT I**

## **INVESTMENT PORTFOLIO**

# Objectives

What are the fund's objectives?

## Diagnostic Screening

### Land Use Changes

- Which land use transitions do you want to cause?
- Will some be more effective than others?
- Will some factors be more important than others in determining the impact of each transition?

### Activities

- Which activities can be used for each land use transition? Do you prefer some over others?
- Where can each activity be done?
- How much does each activity cost?

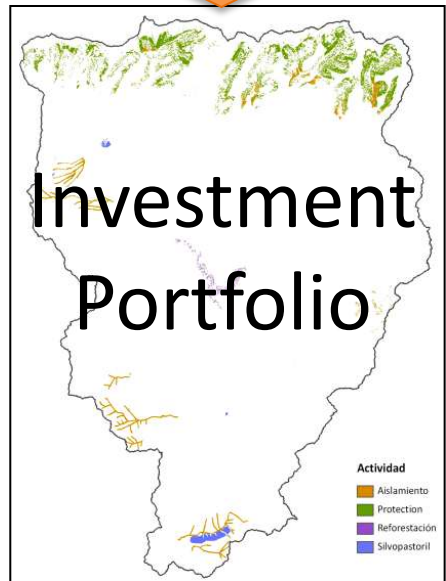
## Priority Area Selection

### Budget

- What is the budget?
- How do you want to spend it?

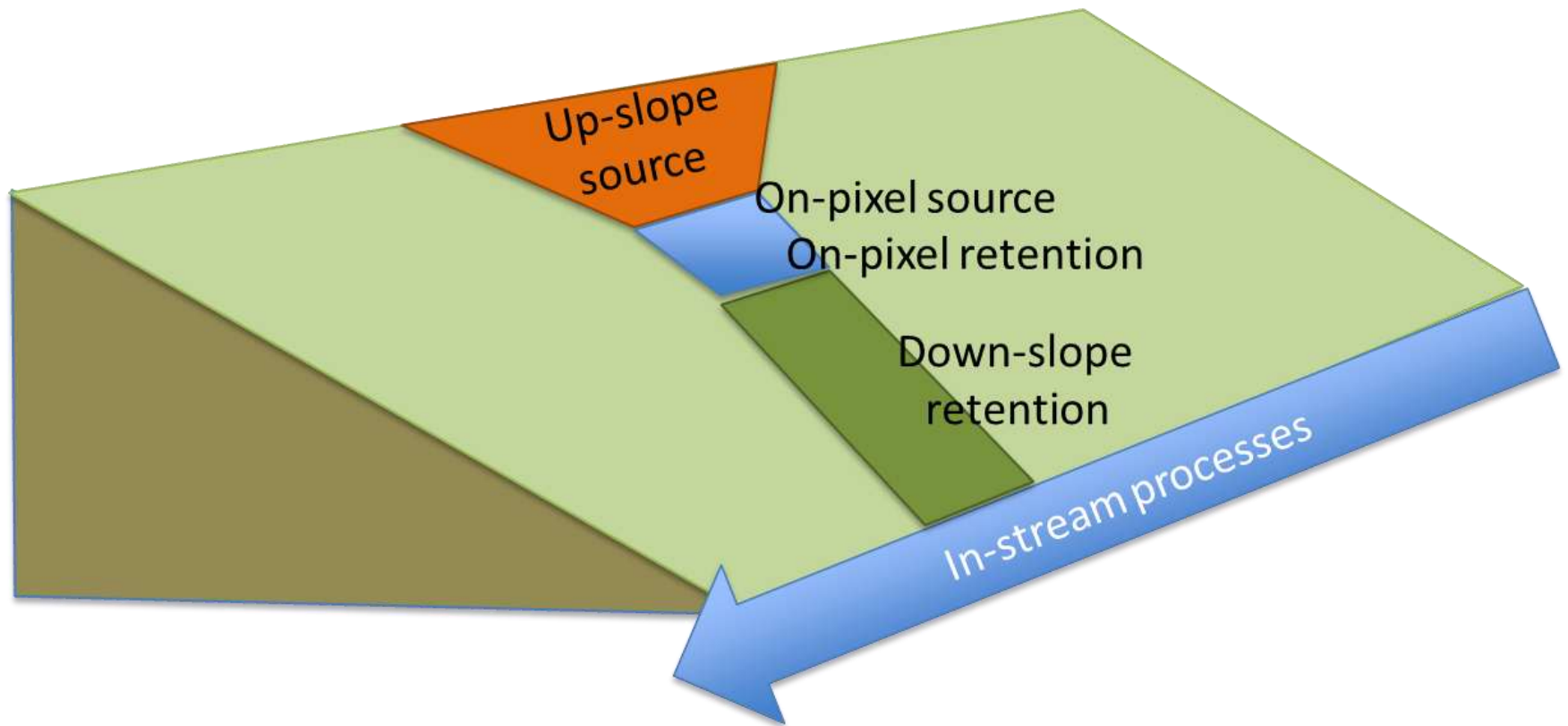
### Activities

- How much does each activity cost?





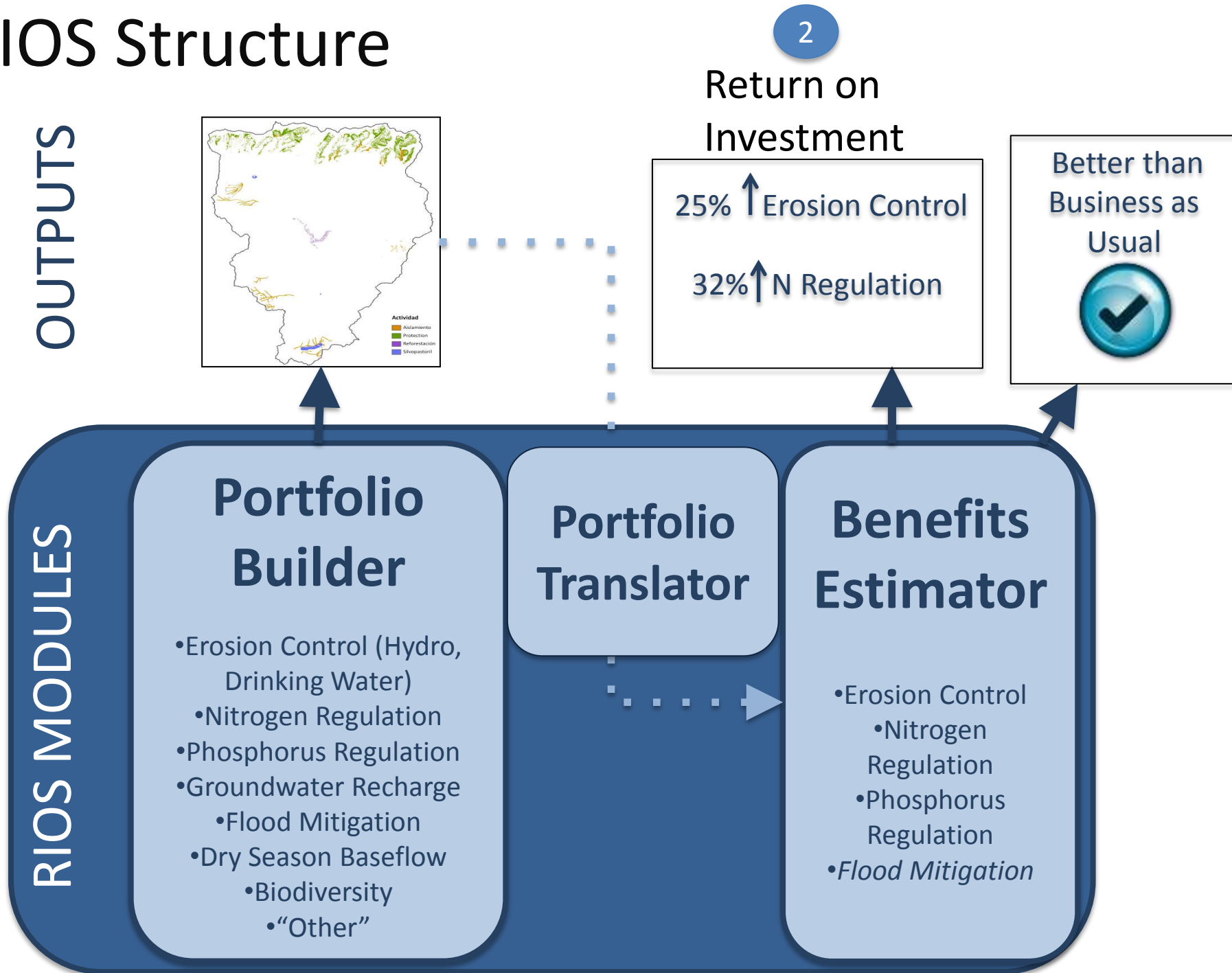
# Key Components



# **OUTPUT II**

## **ESTIMATE SERVICE RETURNS**

# RIOS Structure



# RIOS MODULES

## Portfolio Builder

- Relative Benefit Models
- Social and Economic Data
- Cost Effectiveness Maximization

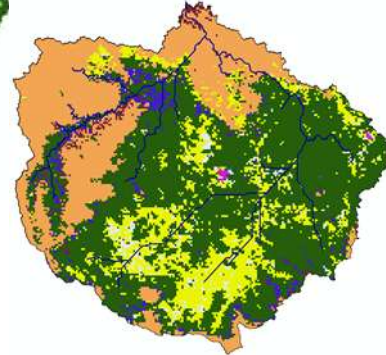
### Investment Portfolio



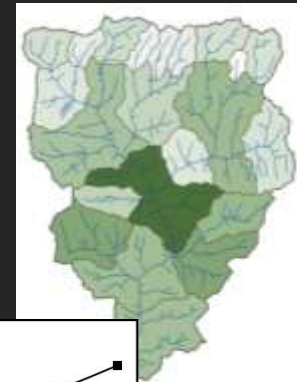
### Portfolio land cover



### Base land cover



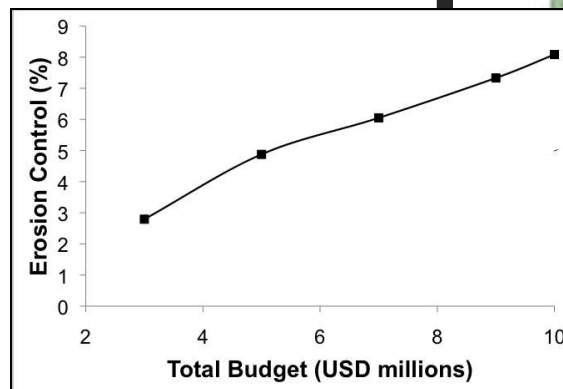
### Estimate Returns



### Models



DIFFERENCE





# InVEST Tier 1 Tools

## RIOS TOOL















### 2 Objectives:

Erosion Control for Drinking Water Quality  
Erosion Control for Reservoir Maintenance  
Phosphorus Retention for Water Quality  
Nitrogen Retention for Water Quality  
*Flood Mitigation*




## DISCUSSED

Groundwater Recharge  
Bacteria Retention for Drinking Water Quality

RIOS:Sediment Retention

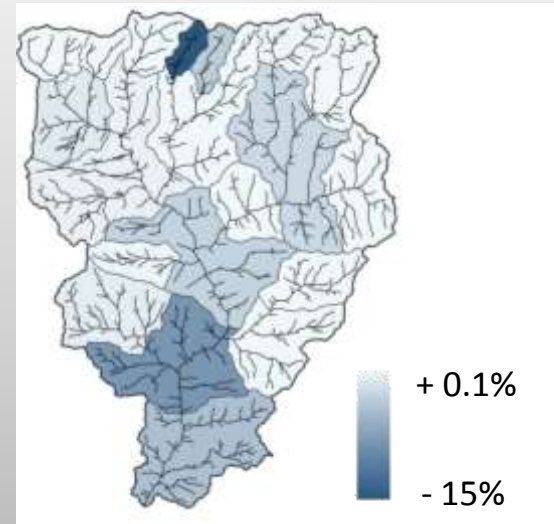
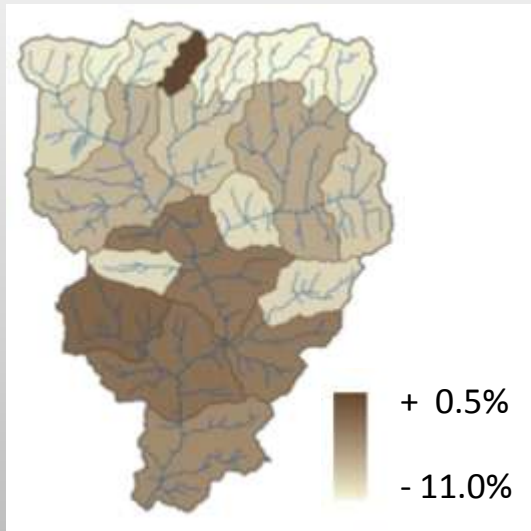
✓ Select workspace	C:\Program Files (x86)\rios_0_3_0_2012-07-30_15_23_2	
✓ DEM raster	C:/GIS/WaterFunds/Lima/General/EXT_dem/extract_dem90_m.tif	 
✓ LULC from RIOS run	C:/GIS/WaterFunds/Lima/General/Iso_class_index_RECLASS_4_90m.tif	 
✓ Erosivity raster	C:/GIS/WaterFunds/Lima/Sediment/imf_erosivity1.tif	 
✓ Erodibility raster	C:/GIS/WaterFunds/Lima/Sediment/soil_erodibility.tif	 
✓ Watersheds shapefile	C:/GIS/WaterFunds/Lima/cuencas.shp	 
✓ Sediment Value Table	C:/GIS/WaterFunds/Lima/Sediment/sed_value_sample_table_lima.csv	 
✓ Threshold Flow Accumulation	2000	
✓ Slope Threshold	5	

Parameters reset to defaults.

 Reset  Run  Quit

# Outputs - Estimation of Returns

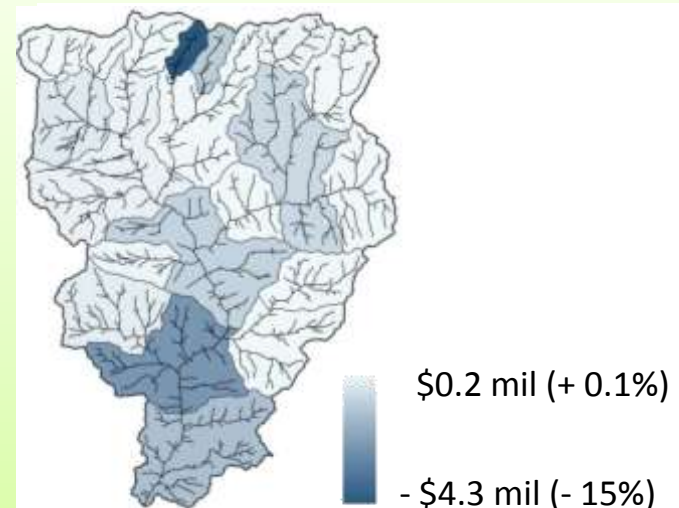
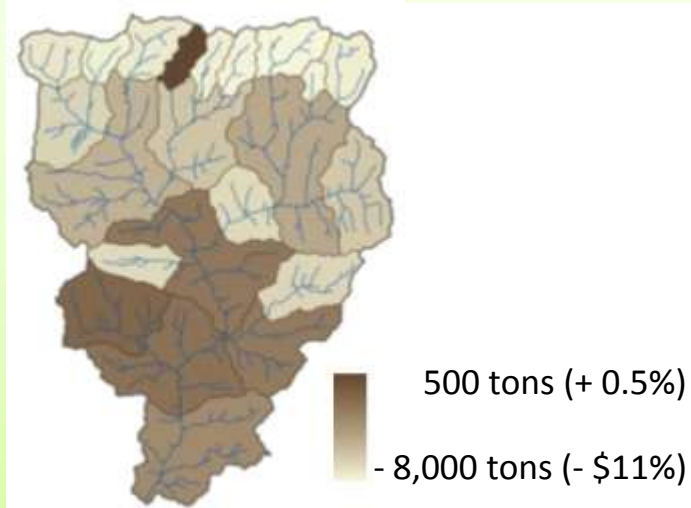
NO CALIBRATION



CHANGE IN SEDIMENT EXPORT

CHANGE IN VALUE – AVOIDED TREATMENT COST

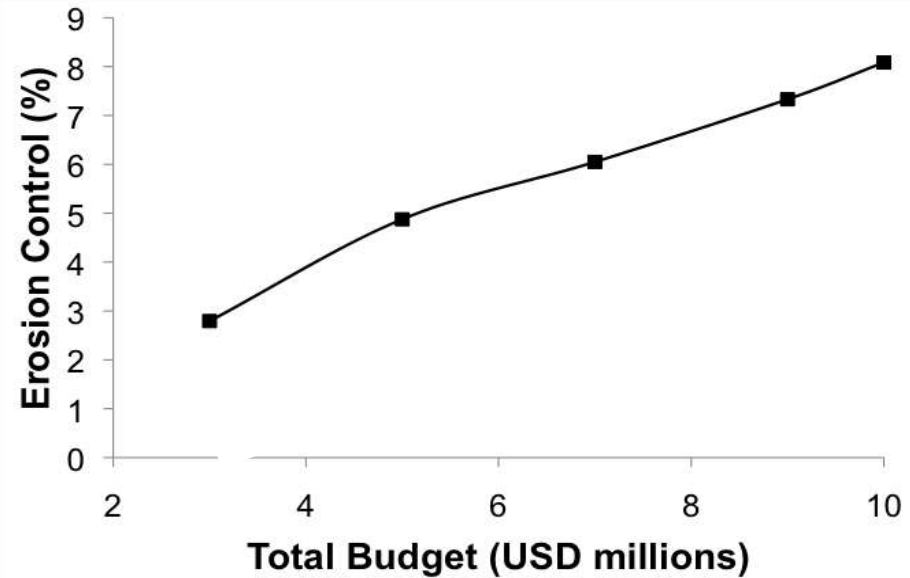
WITH CALIBRATION



# Outputs - Estimation of Returns

NO CALIBRATION

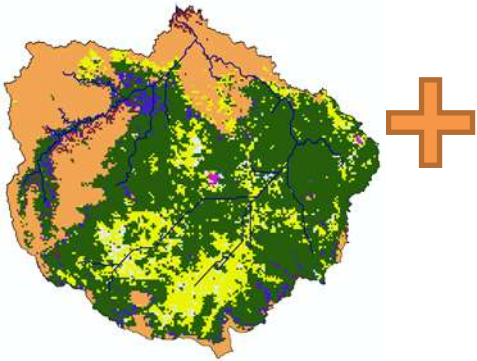
	Sediment Exp		Value (change in treatment cost)		Bene-ficiaries
Sub-basin	$\Delta$	% $\Delta$	$\Delta$	% $\Delta$	TTL
1		0.5 %		0.1 %	5,341
2		- 17 %		- 14 %	10,700
3		- 5 %		- 6 %	12,550
ALL		- 9 %		- 11 %	240,300



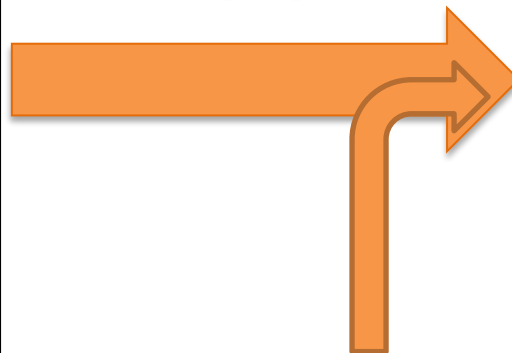
WITH CALIBRATION

	Sediment Exp		Value (change in treatment cost)		Bene-ficiaries
Sub-basin	$\Delta$	% $\Delta$	$\Delta$	% $\Delta$	TTL
1	495	0.5 %	\$0.2 mil	0.1 %	5,341
2	-7,998	- 17 %	- \$4.3 mil	- 14.5 %	10,700
3	-2,123	- 5 %	- \$0.9 mil	- 6.2 %	12,550
ALL	-1,375	- 9 %	- \$13 mil	- 11 %	240,300

Base land  
cover



??



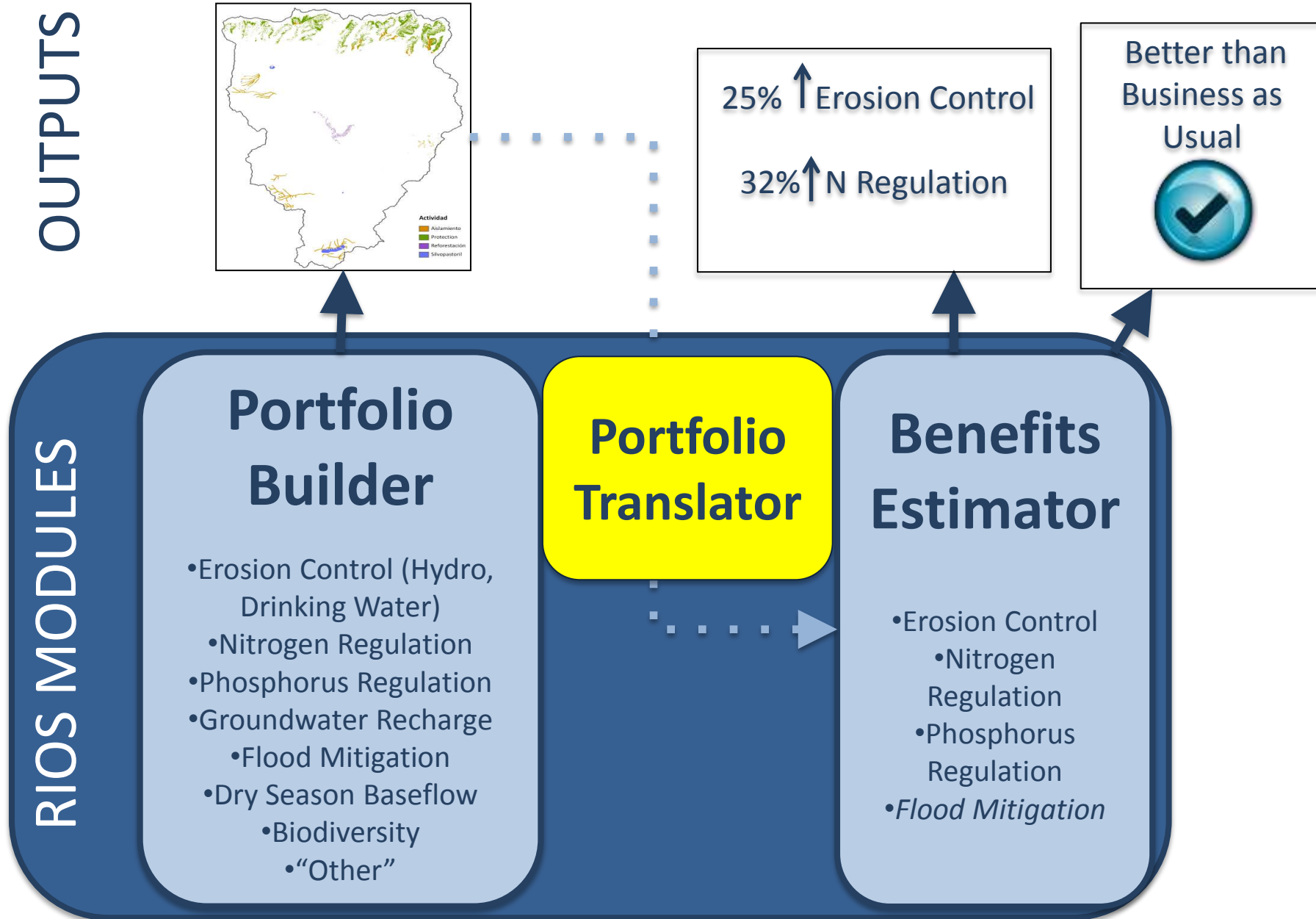
Portfolio land  
cover

Water Fund Investments



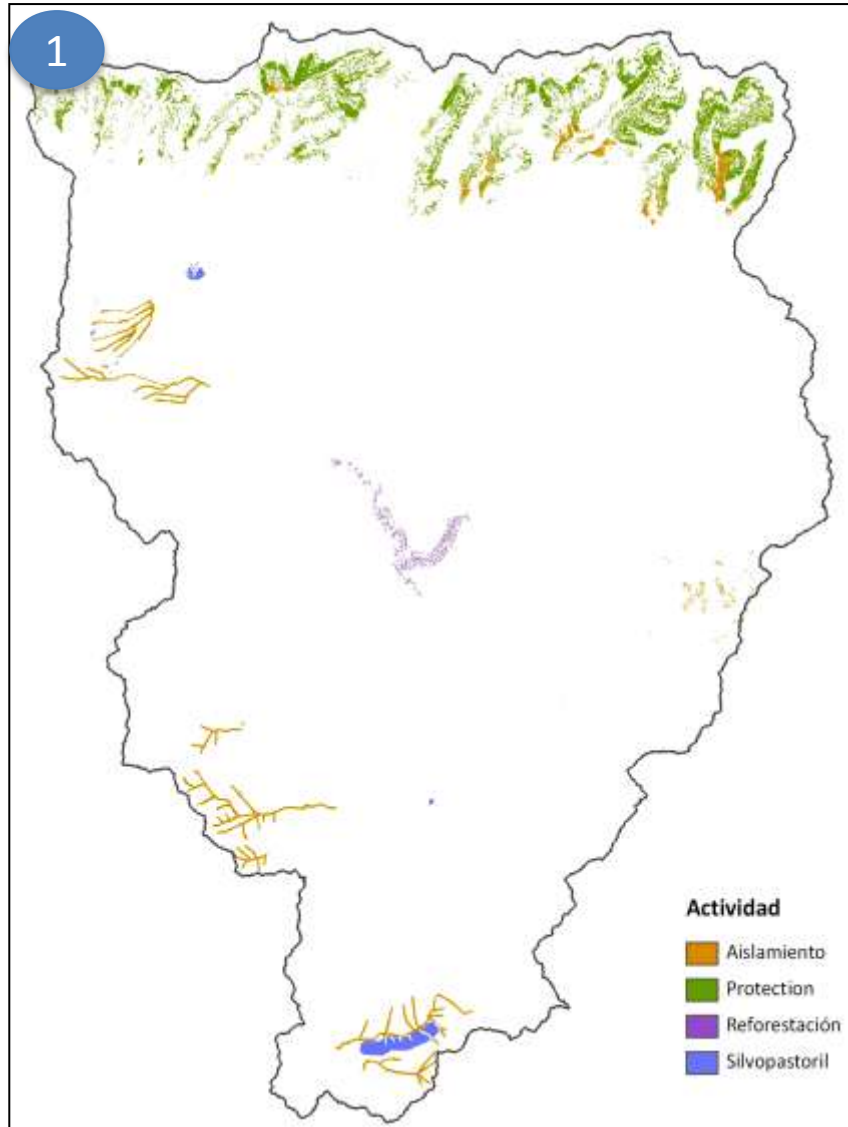


# RIOS Structure

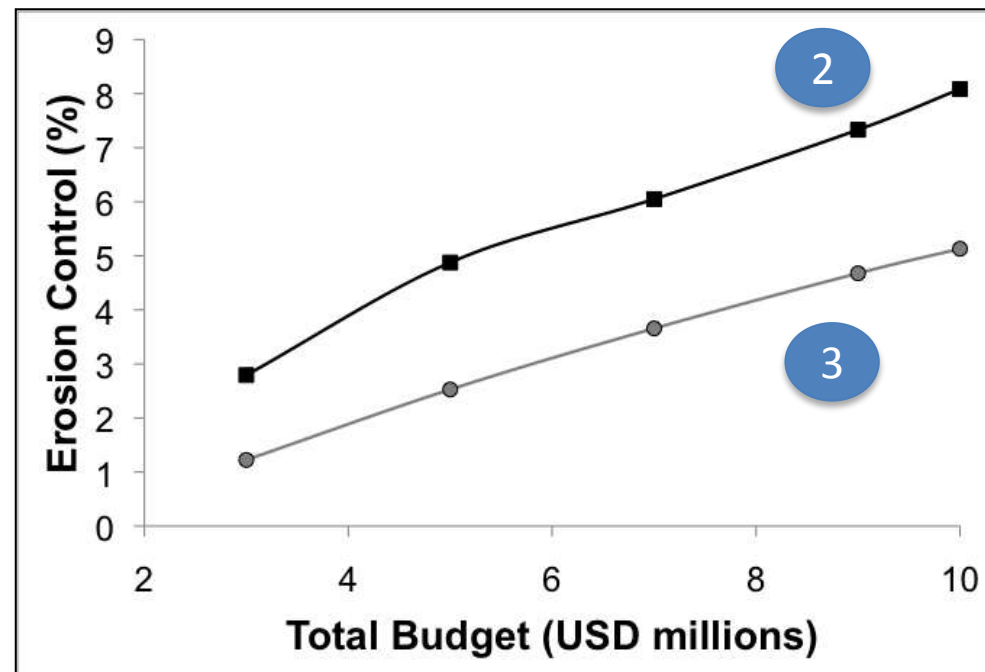


**OUTPUT III**  
**COMPARE TO BUSINESS AS USUAL**

# Estimated Value of Science



- 1 Investment Portfolio  
(Multi-objective, ranking & diagnostic screen)
- 2 Estimated Return on Investment  
(Estimate Returns)
- 3 Estimated Value of Science  
(Business case for approach)



# Next Steps

- Ongoing testing and development
- Expert Elicitation to estimate magnitude of change different activities can cause
- Plan Public Launch (March/April)
- Considering Launch in DC in early summer

