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Conceptual Diagrams of Ecosystem Services from Watershed Projects

American Water Resources Association Annual Conference, November 9, 2017

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Why Ecosystem Services Are Important to NRCS

- Authority for watershed activity under PL 83-566 and PL 78-734
- Assisted local sponsors in constructing over 11,000 “small” dams
- Economic/environmental evaluation required
- Ecosystem Services (ES) Framework is the basis for economic/environmental evaluation
- ES Framework is an Executive Branch Requirement
- ES Framework enhances ability to coordinate PR&G and NEPA analysis



PR&G Links to Ecosystem Services Framework

- PR&G is an update of the evaluation process for Federal water resources investments
- PR&G removed the requirement to identify the plan that maximizes monetized benefits (NED Requirement)
- PR&G more clearly defines the linkage between ecosystem services to both monetized benefits and the Cultural and Environmental framework of NEPA
- PR&G suggest using means-end diagrams or wire frames to map the effects of activities (project or practice) on the human environment in an ecosystem services framework
- Diagramming ecosystem services illustrates the direct linkage of investment decisions to outcomes (effects) on the human environment
- Replaces a guidance process (P&G) in place since 1983



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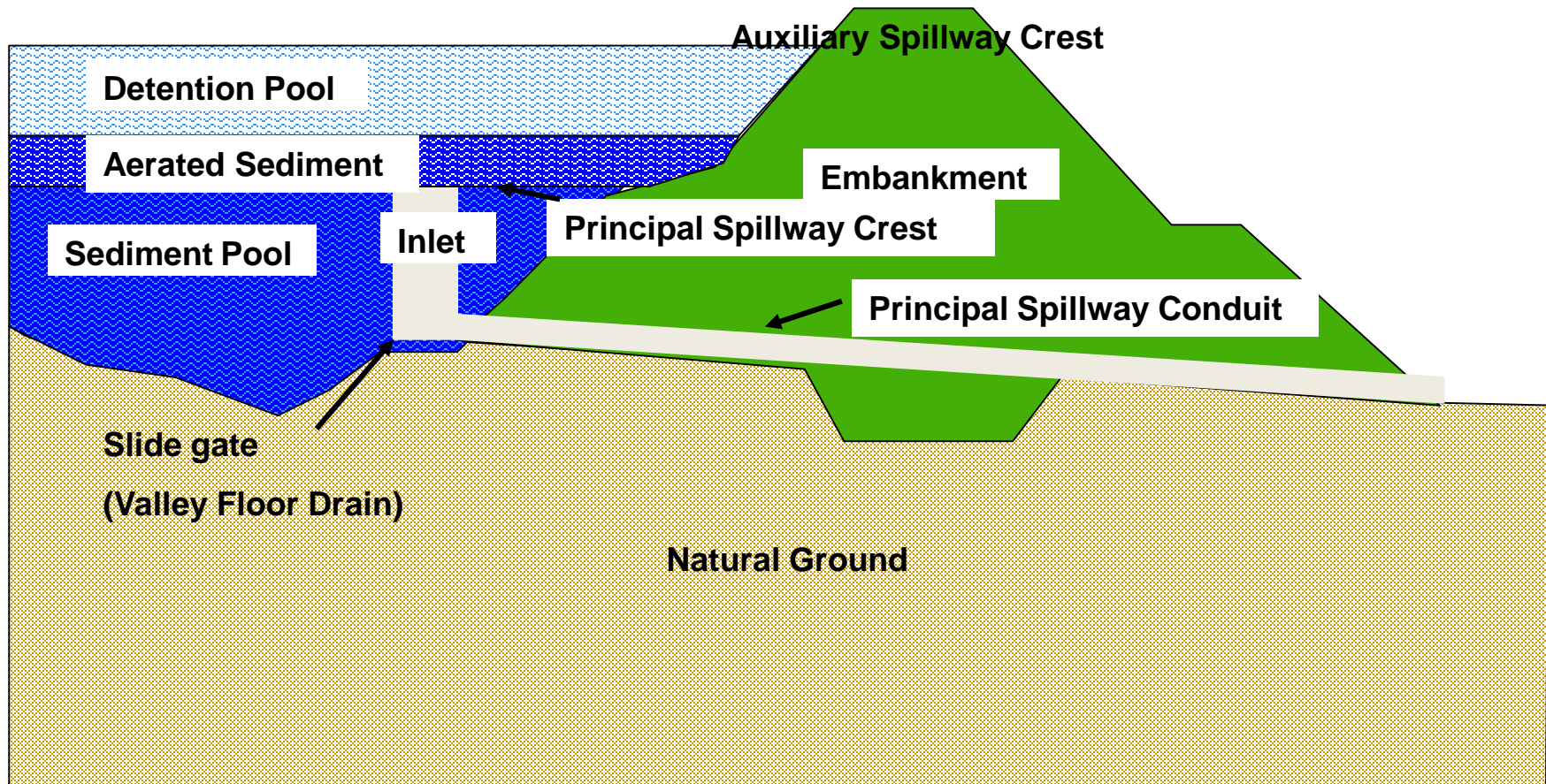


ES in NRCS: What's to come today

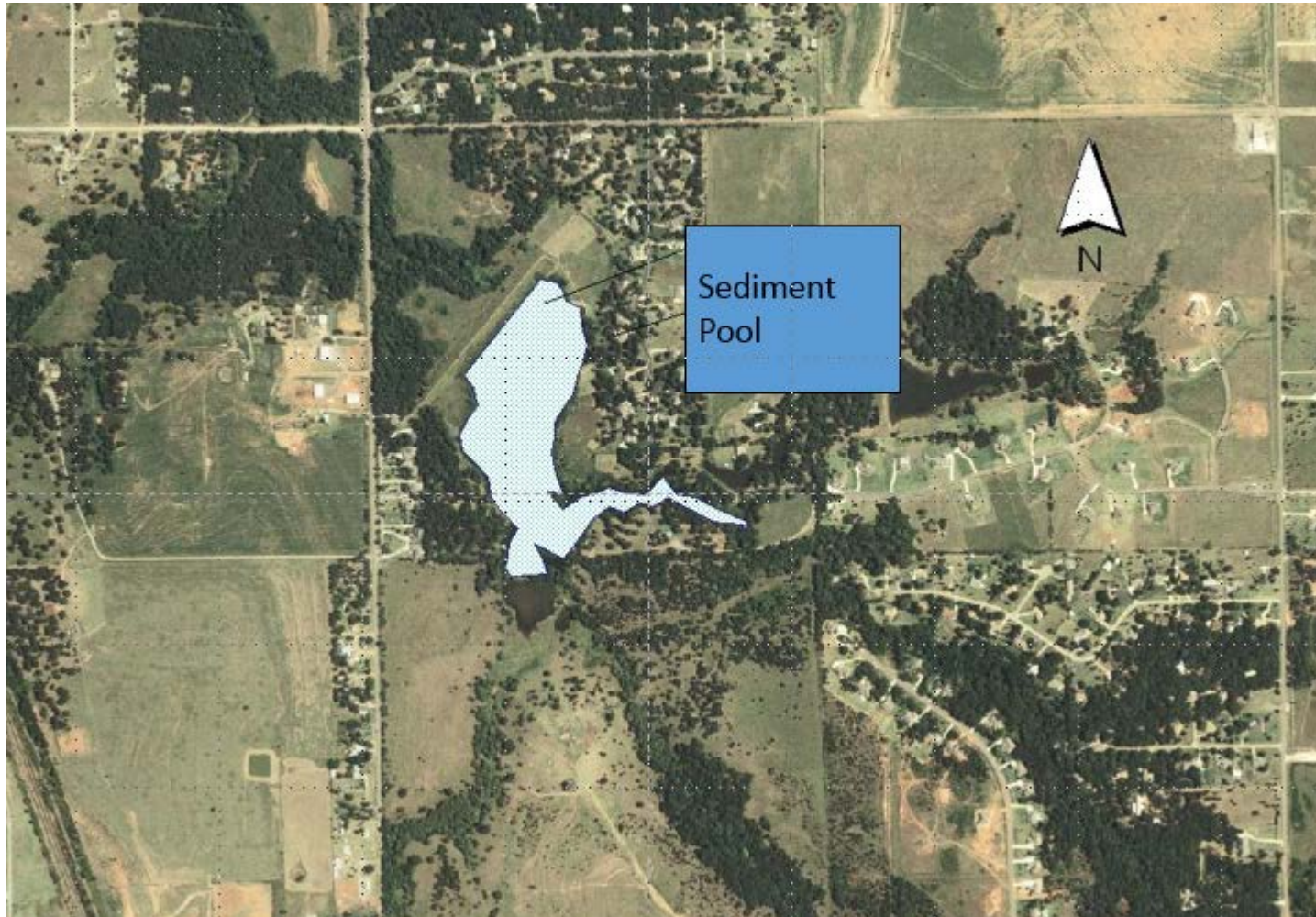
- Talked about
 - the role of ES in NRCS watershed evaluations
 - PR&G with its ES framework is replacing the monetized account driven P&G
- Examine the characteristics of a few NRCS projects and discuss the potential ES provided
- Present some ES diagrams that represent “work-in-progress”
- Seeking your feedback



Cross-Section of Typical NRCS Floodwater Retarding Structure



Flood control dam operation

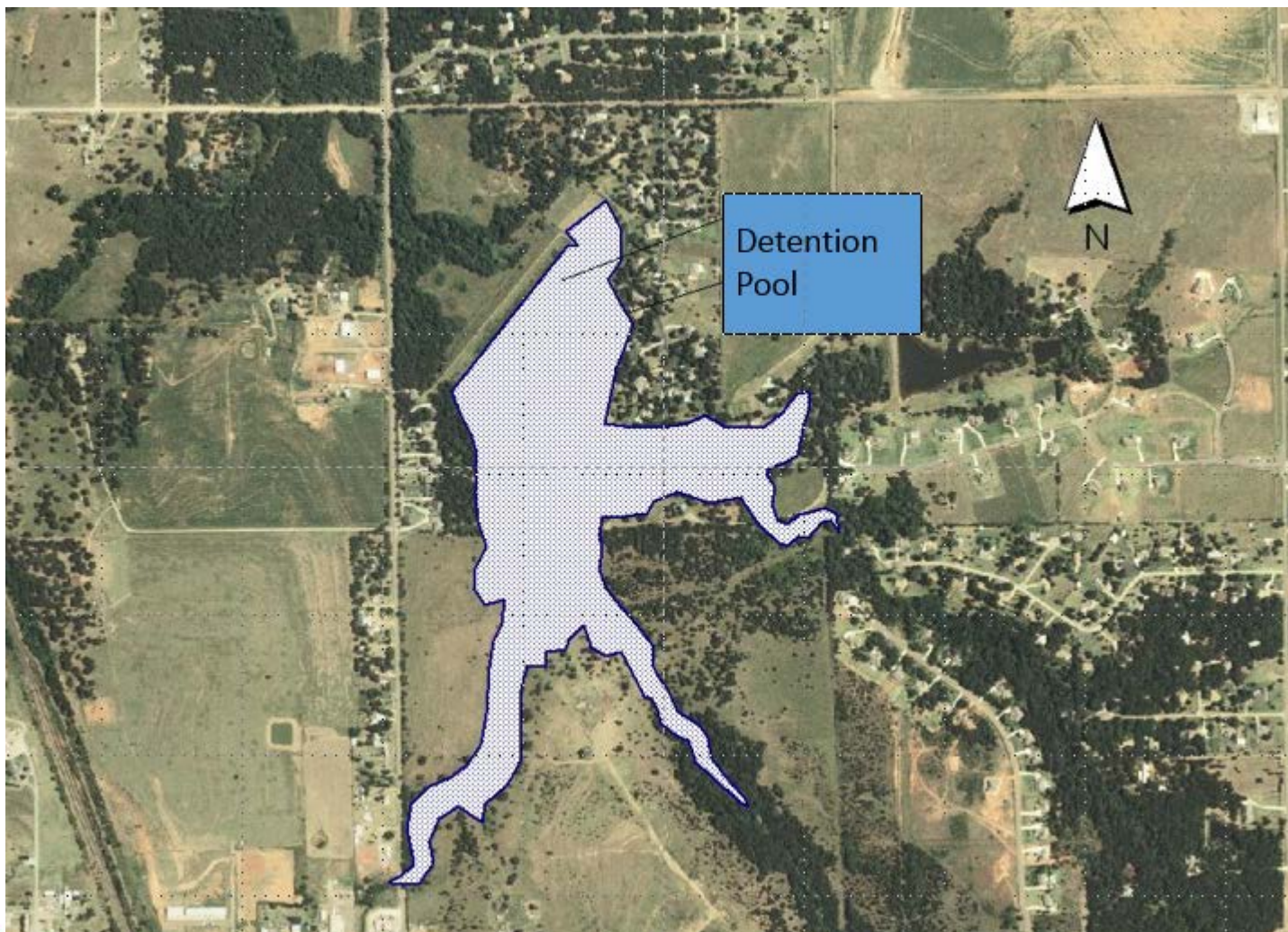


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Flood control dam operation

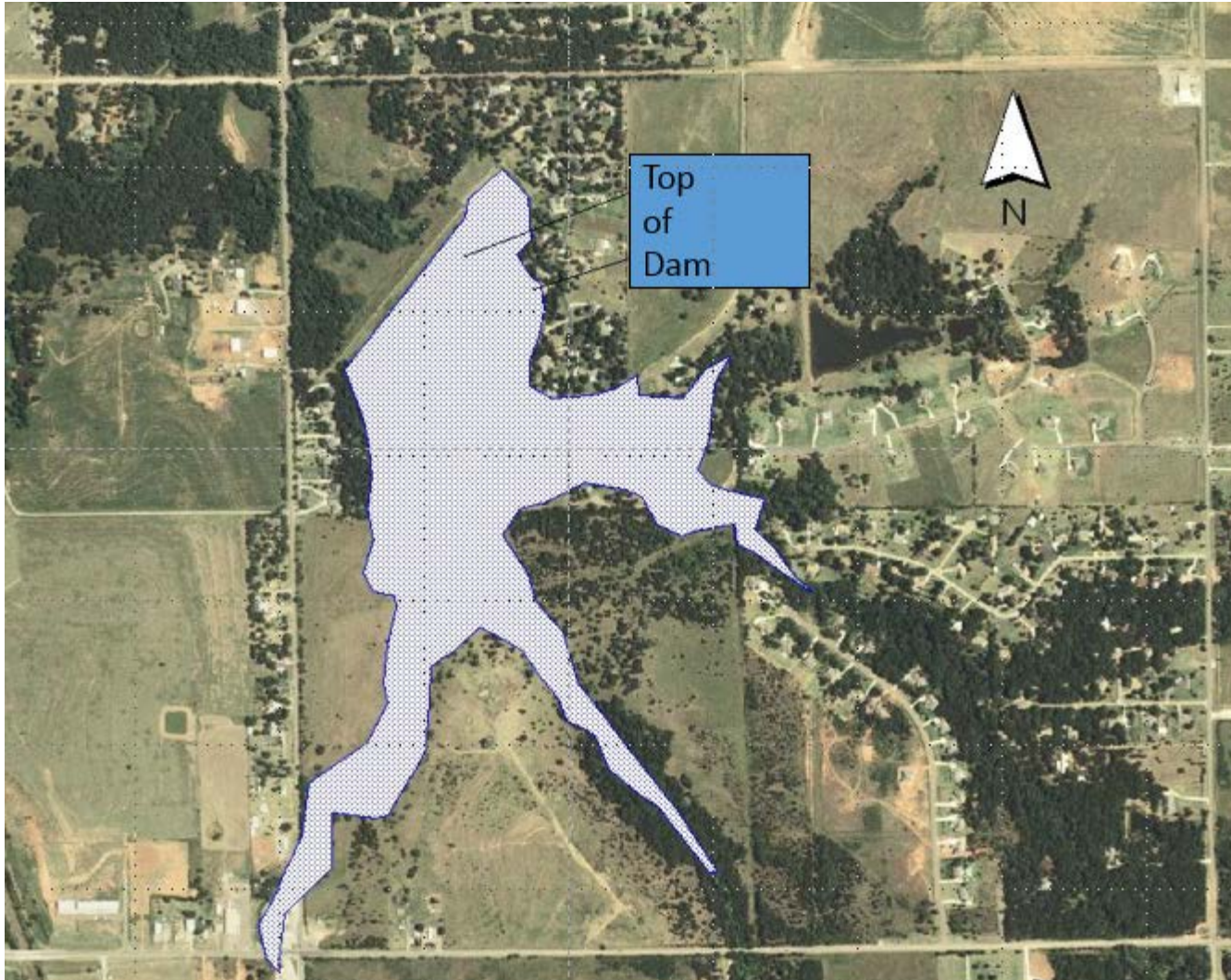


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Flood control dam operation

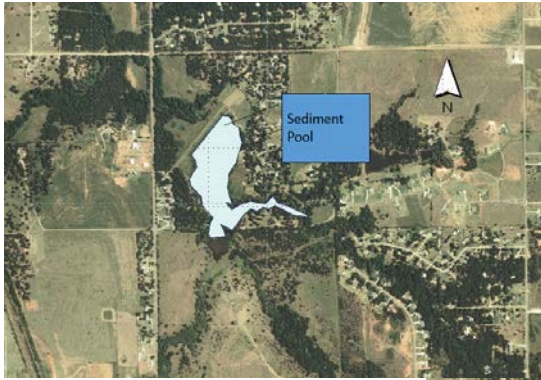


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Flood control dam operation



Flood control dam with multi-purpose operation



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Challenge: Create diagram to describe the potential for Ecosystem Services

- Start with an action

Construct Dam

- End with the valuation of the ecosystem services provided

Value of improved water supply

- How to connect the action with the valuation



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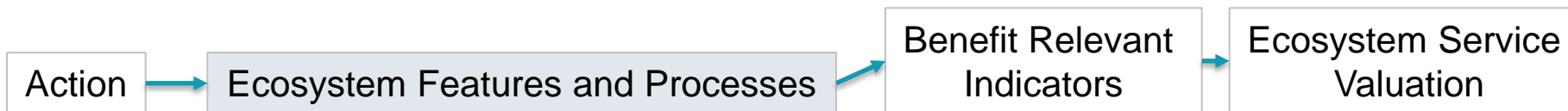
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Challenge: Create diagram to describe the potential for Ecosystem Services

Start with an action

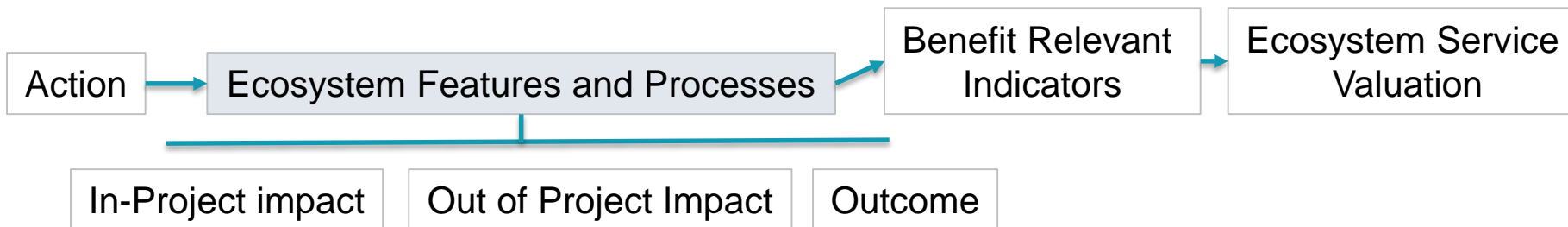
End with a monetized value of the service



Challenge: Create diagram to describe the potential for Ecosystem Services

Start with an action

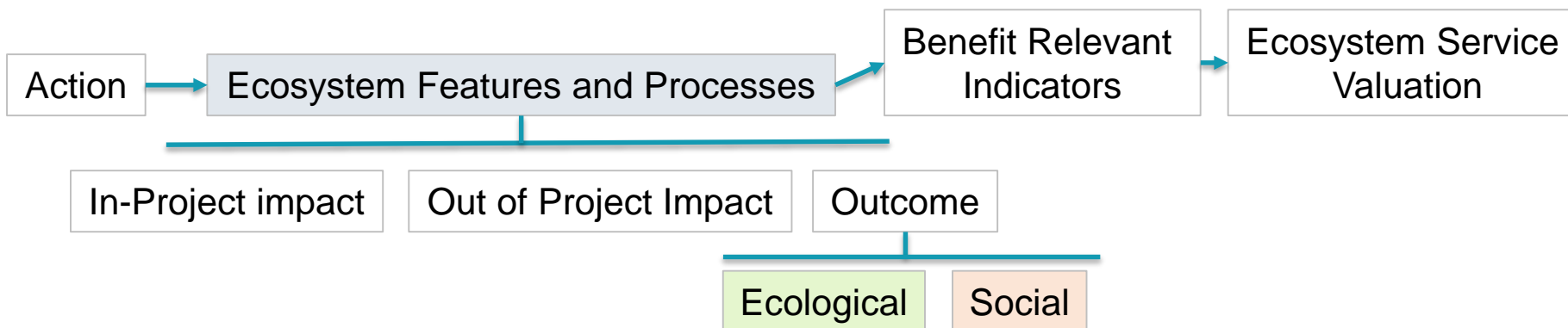
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Challenge: Create diagram to describe the potential for Ecosystem Services

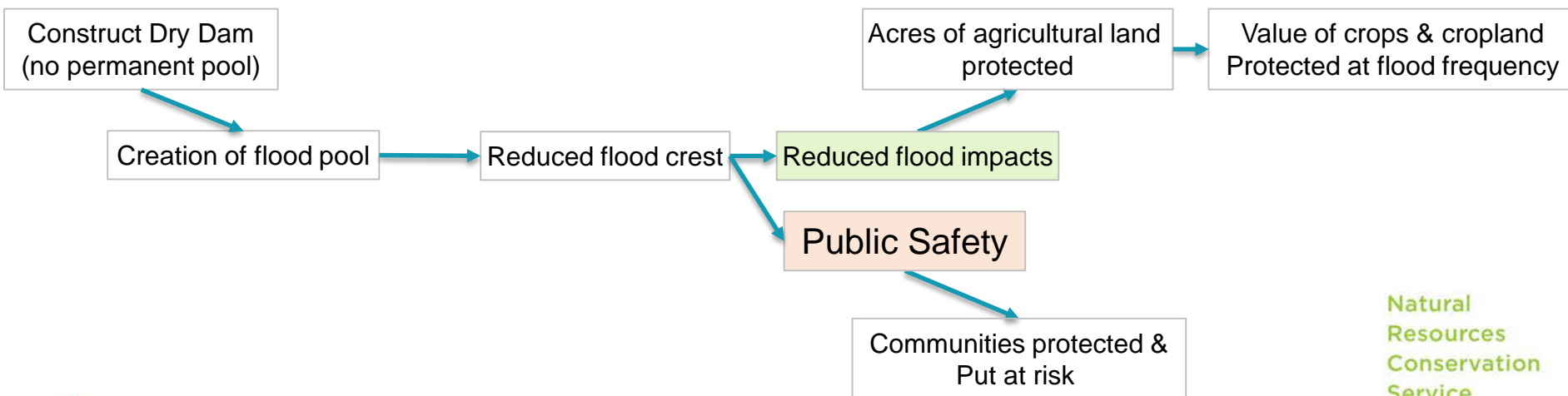
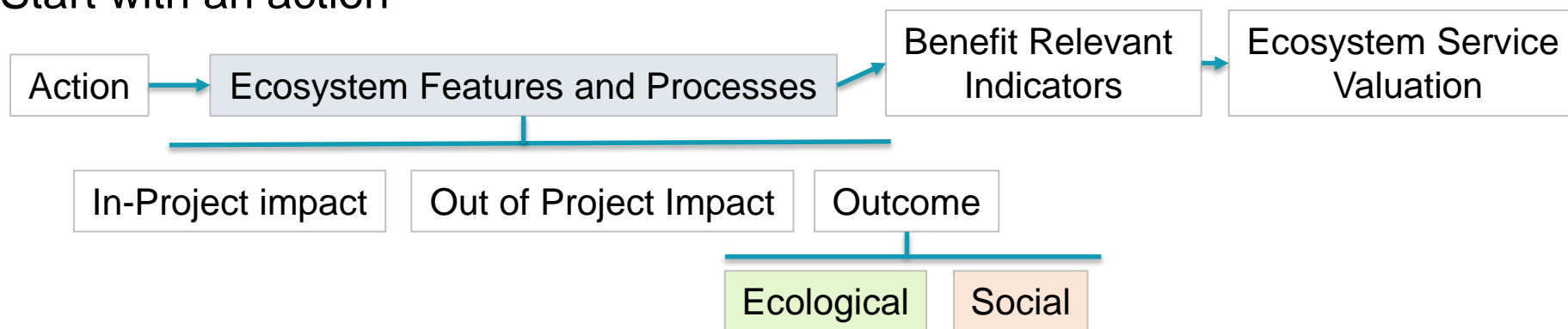
Start with an action

End with a monetized value of the service

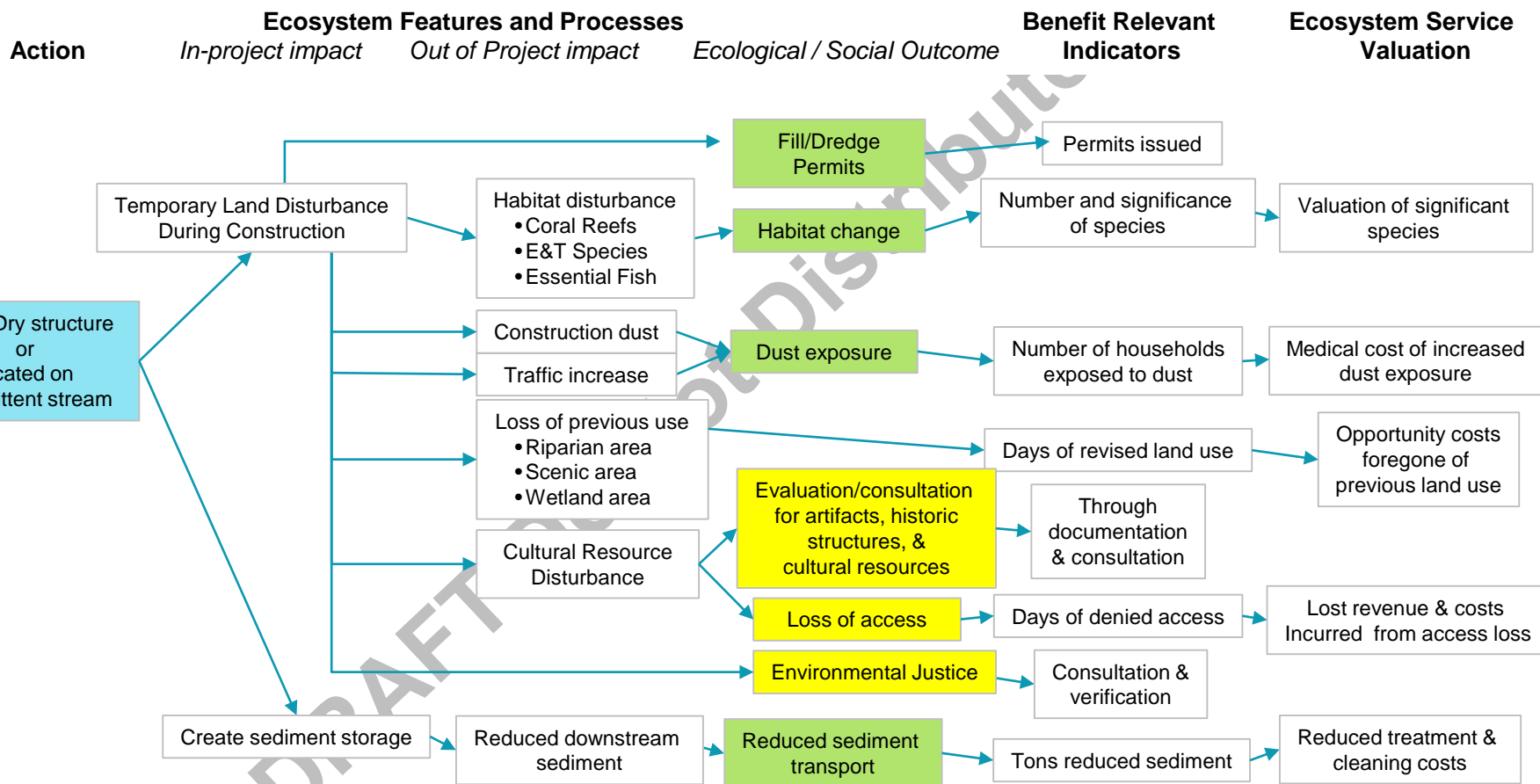


Challenge: Create diagram to describe the potential for Ecosystem Services

Start with an action



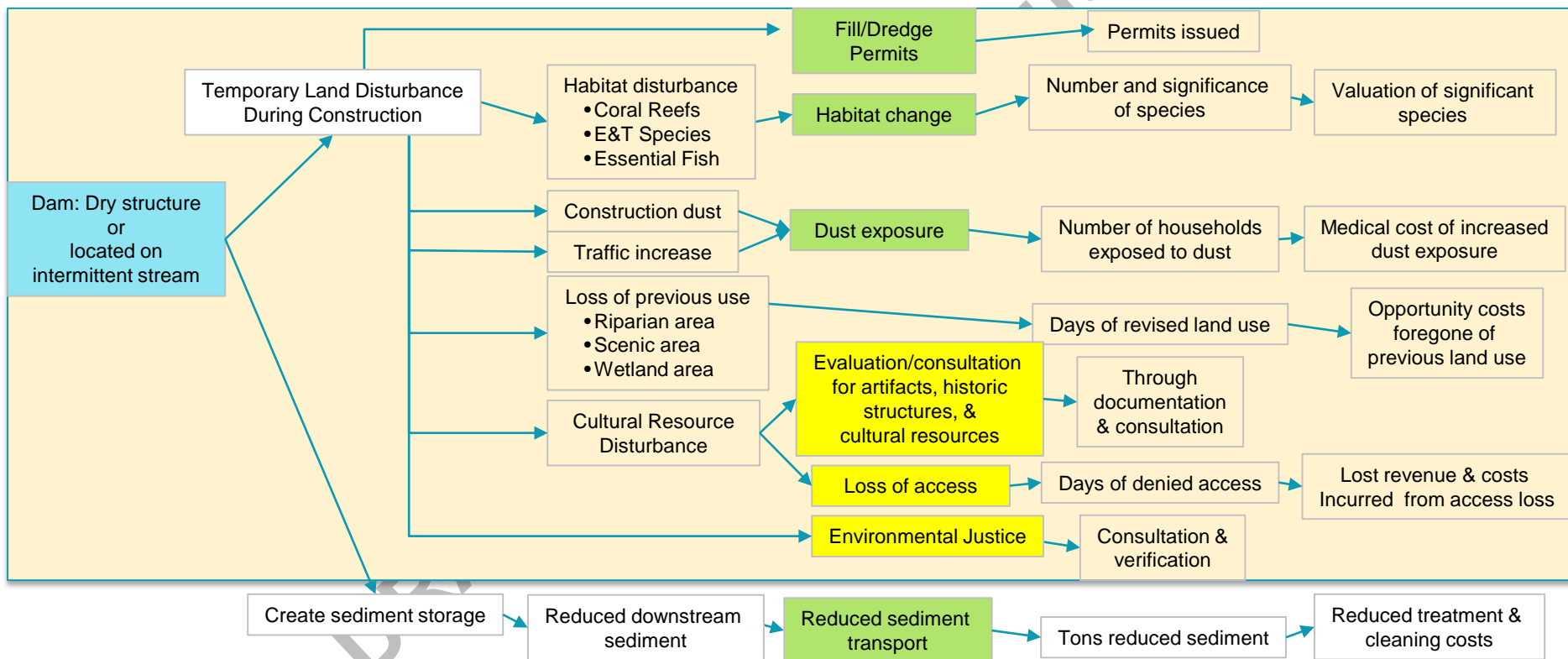
Conceptual Value Diagram for NRCS Watershed Project Structures–Dam (1)



Conceptual Value Diagram for NRCS Watershed Project Structures–Dam (1)

Action **Ecosystem Features and Processes** **Benefit Relevant Indicators** **Ecosystem Service Valuation**

In-project impact *Out of Project impact* *Ecological / Social Outcome*



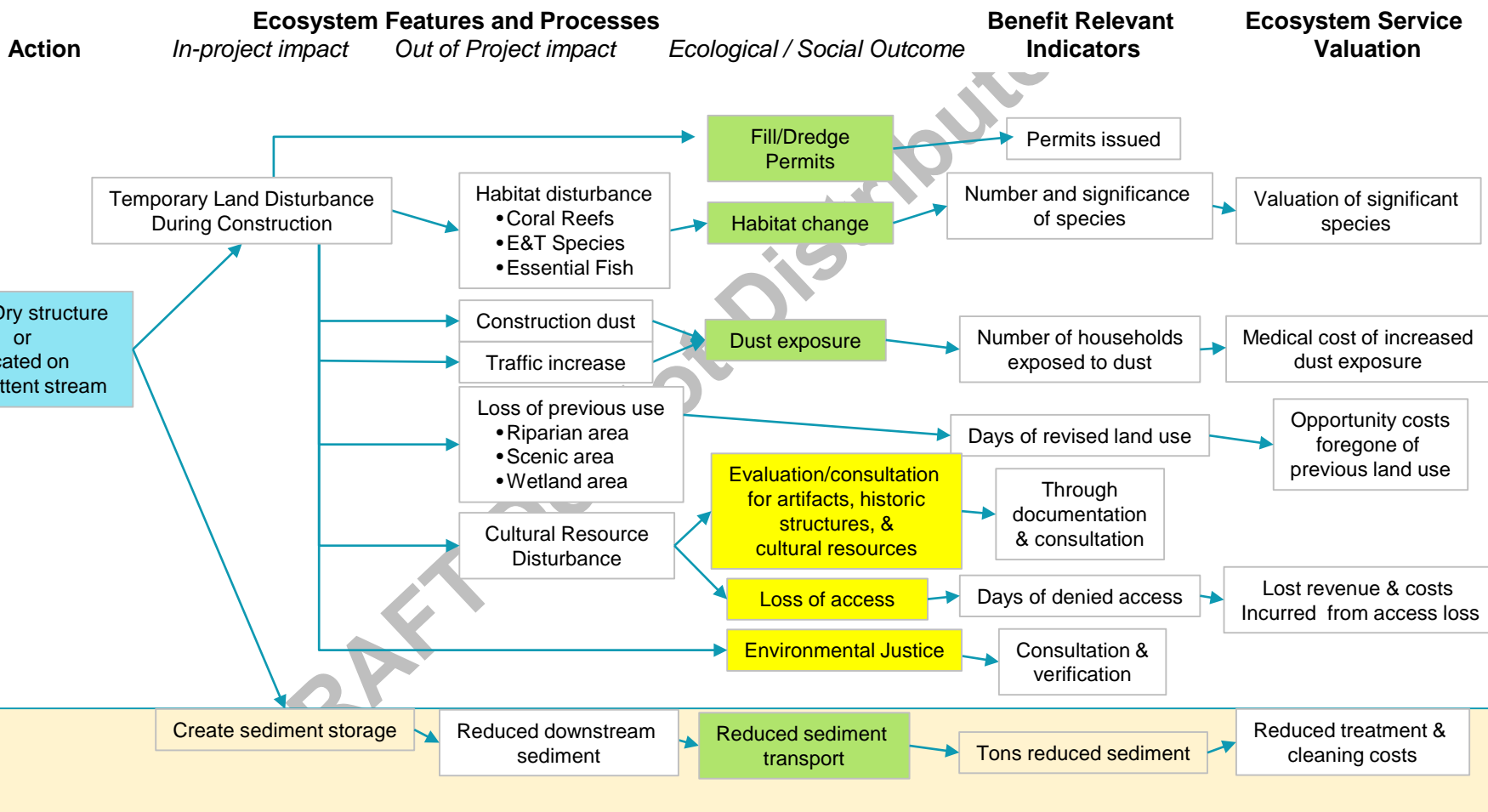
Conceptual Value Diagram – more detail

Action/In-project Impact: Dam/Temporary Land Disturbance

Out-of-Project Impact	Outcome	Benefit Relevant Indicator	Ecosystem Service Valuation
Habitat disturbance	Habitat Change	Number & significance of species	Valuation of significant species
Construction dust	Dust exposure	Number of households exposed to dust	Medical cost of increased dust exposure
Traffic increase			
Loss of previous land use		Days of revised land use	Opportunity costs foregone of previous land use
Cultural Resource Disturbance	Evaluation/consultation for artifacts, structures, & cultural resources	Through documentation & consultation	
	Loss of access	Days of denied access	Lost revenue & costs incurred
	Environmental Justice	Consultation	



Conceptual Value Diagram for NRCS Watershed Project Structures–Dam (1)



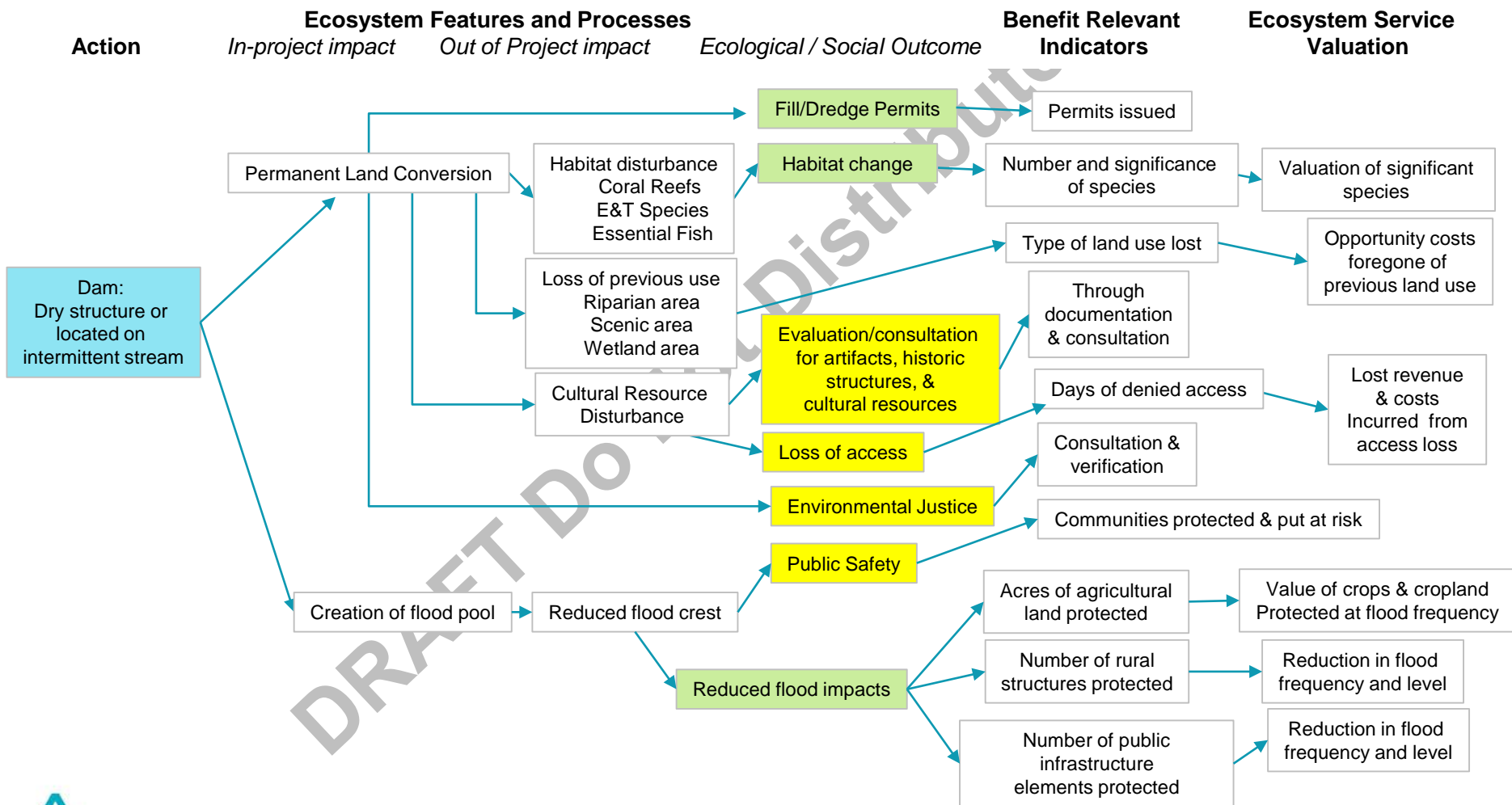
Conceptual Value Diagram – more detail

Action/In-project Impact: Dam/Create sediment storage

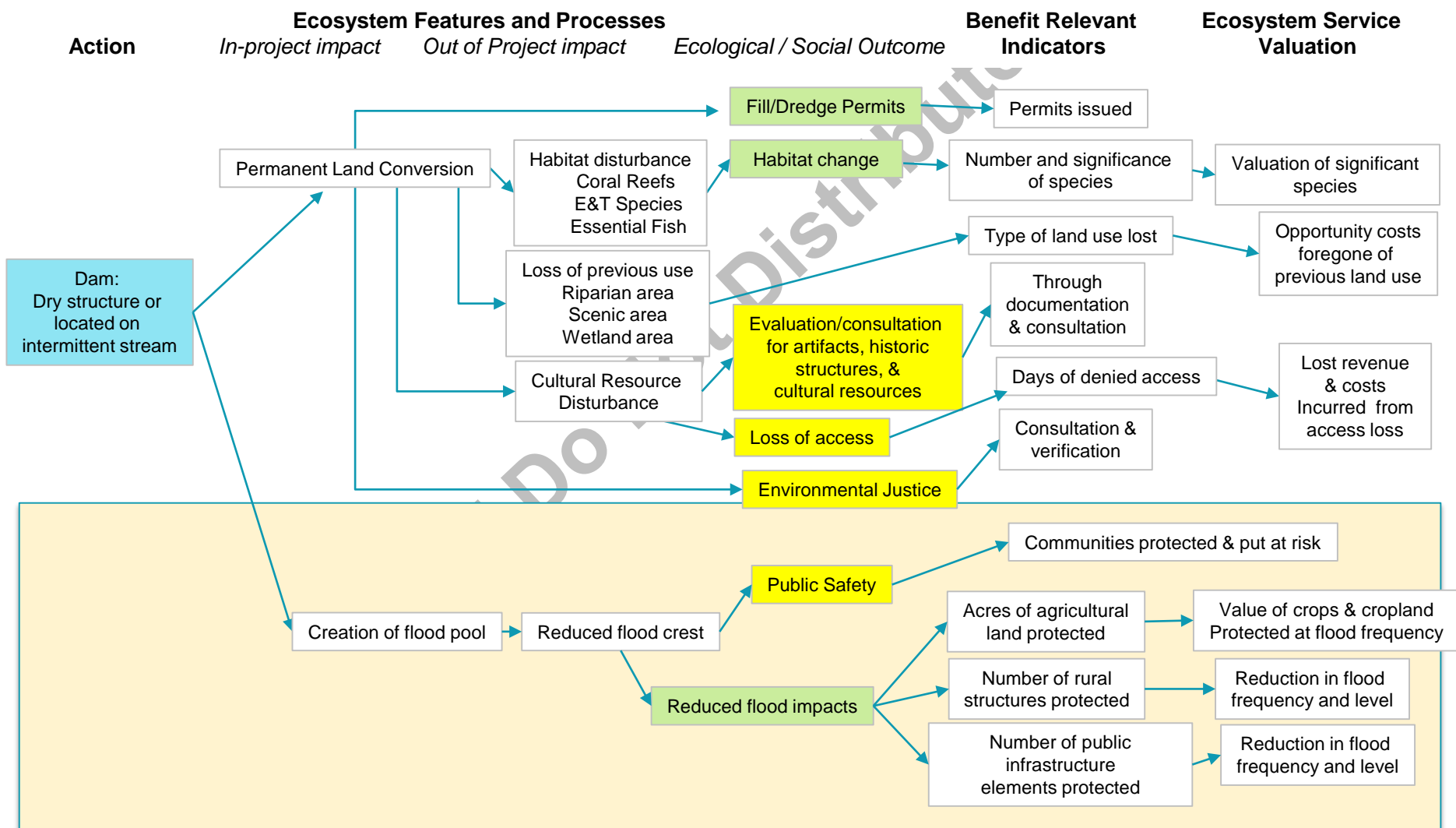
Out-of-Project Impact	Outcome	Benefit Relevant Indicator	Ecosystem Service Valuation
Reduced downstream sediment	Reduced sediment transport	Tons reduced sediment	Reduced treatment & cleaning costs



Conceptual Value Diagram for NRCS Watershed Project Structures–Dam (2)



Conceptual Value Diagram for NRCS Watershed Project Structures–Dam (2)



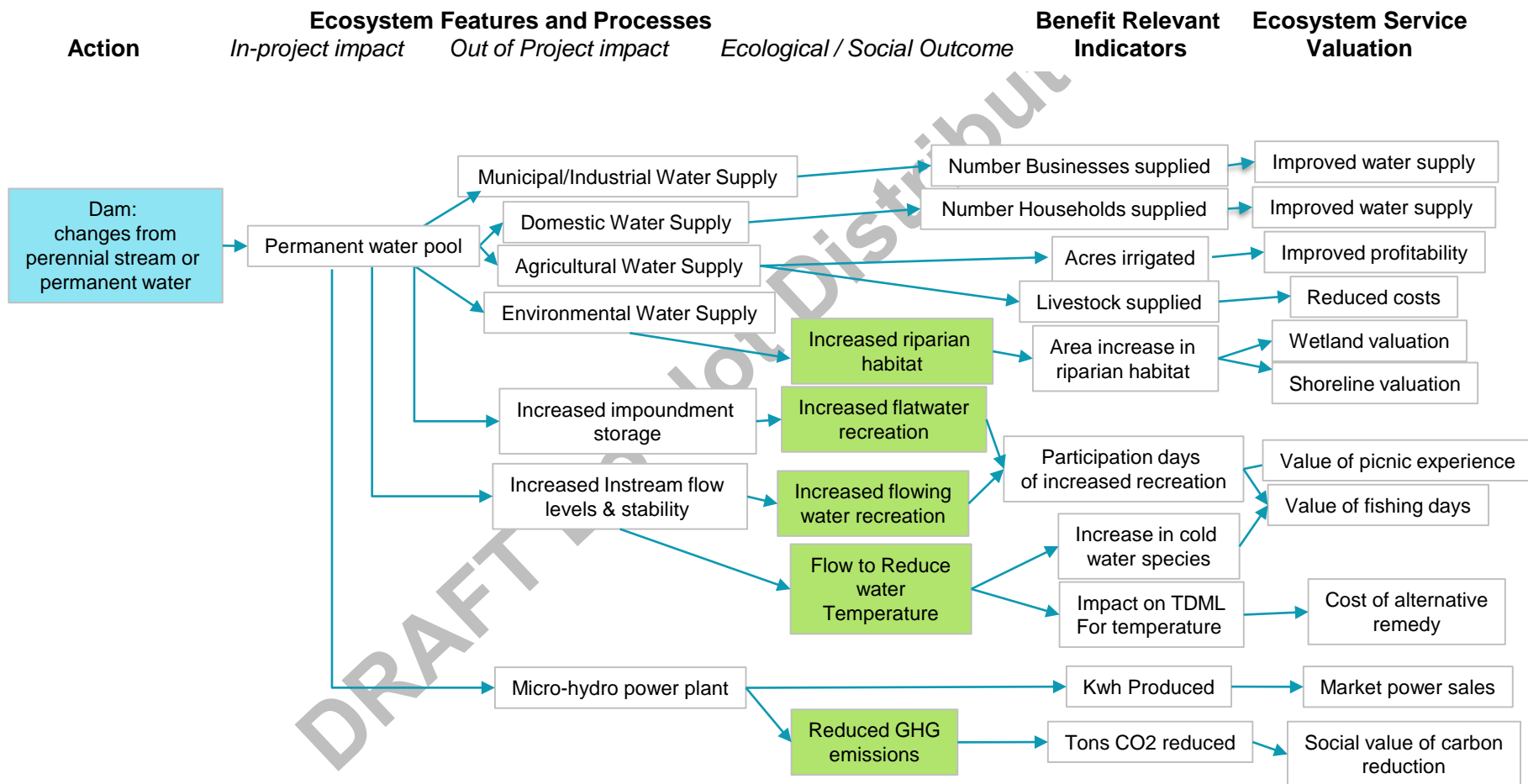
Conceptual Value Diagram – more detail

Action/In-project Impact: Dam/Creation of flood pool

Out-of-Project Impact	Outcome	Benefit Relevant Indicator	Ecosystem Service Valuation
Reduced flood crest	Public Safety	Communities protected & put at risk	Valuation of significant species
	Reduced flood impacts	Acres of agricultural land protected	Value of crops & cropland protected at flood frequency
		Number of rural structures protected	Reduction in flood frequency and level
		Number of public infrastructure elements protected	Reduction in flood frequency and level



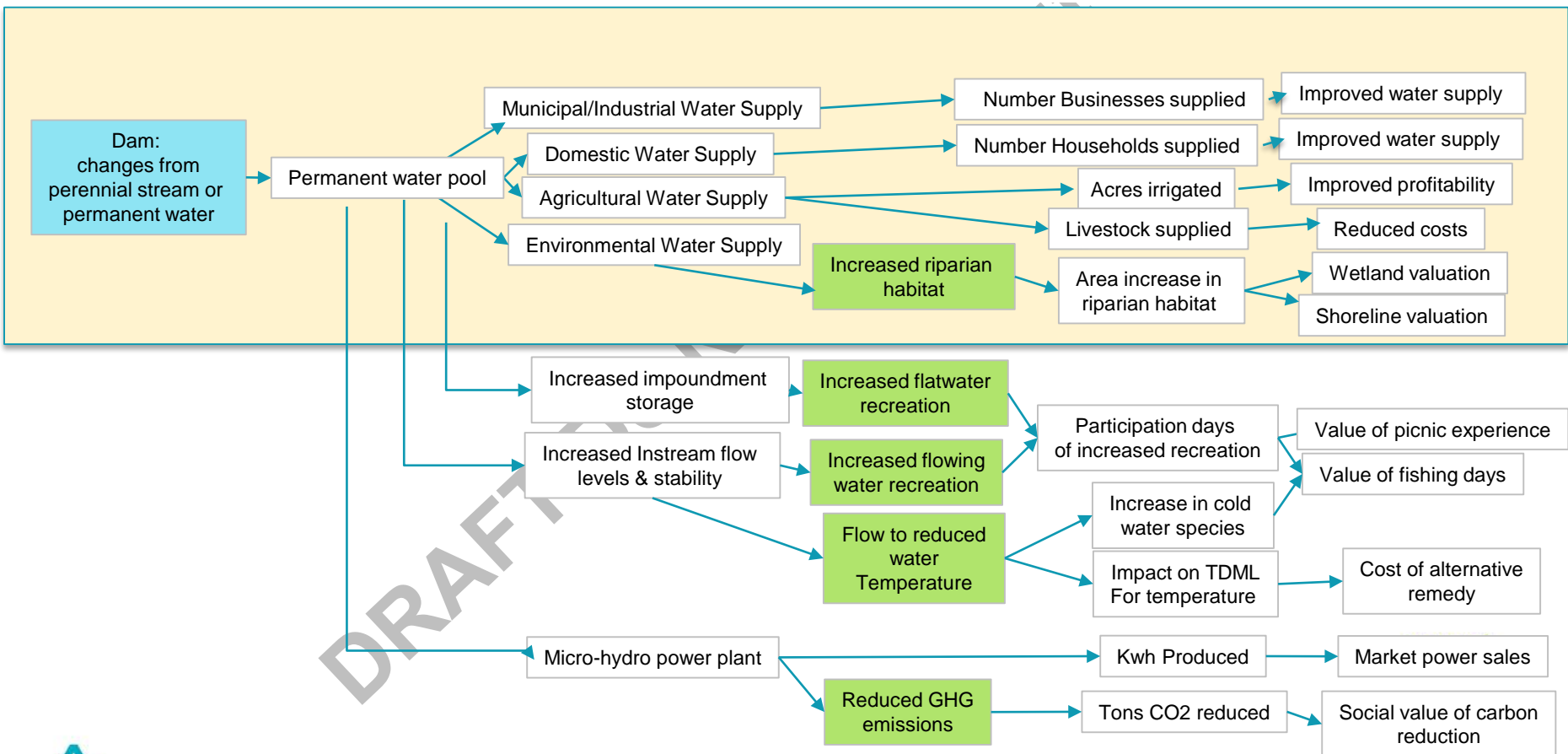
Conceptual Value Diagram for NRCS Watershed Project Structures–Dam (3)



Conceptual Value Diagram for NRCS Watershed Project Structures–Dam (3)

Action **Ecosystem Features and Processes** **Benefit Relevant Indicators** **Ecosystem Service Valuation**

In-project impact *Out of Project impact* *Ecological / Social Outcome*



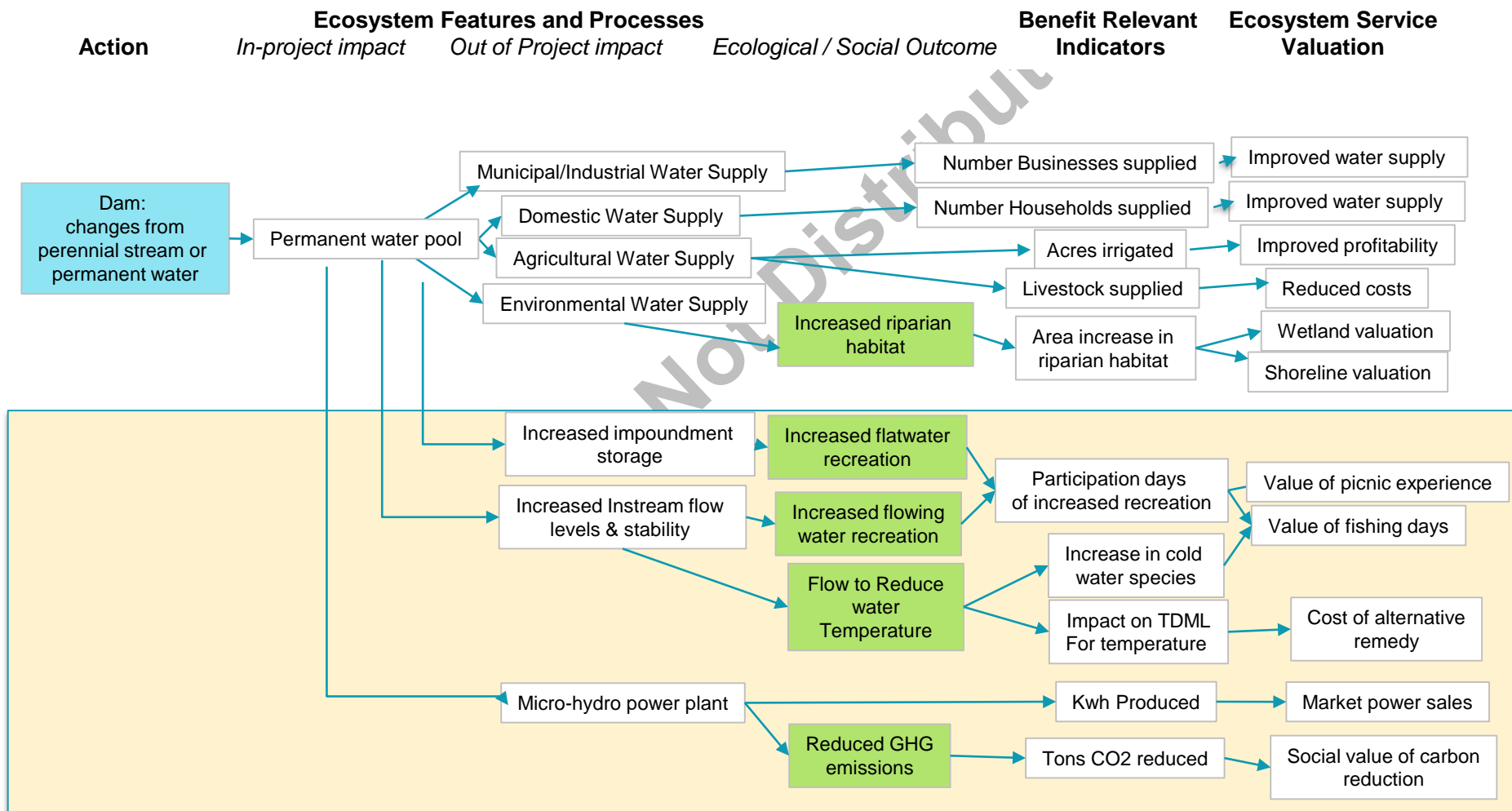
Conceptual Value Diagram – more detail

Action/In-project Impact: Dam/Permanent water pool

Out-of-Project Impact	Outcome	Benefit Relevant Indicator	Ecosystem Service Valuation
Municipal/ Industrial Water Supply		Number Businesses supplied	Improved water supply
Domestic Water Supply		Number Households supplied	Improved water supply
Agricultural Water Supply		Acres irrigated	Improved profitability
		Livestock supplied	Reduced costs
Environmental Water Supply	Increased riparian habitat	Area increase in riparian habitat	Wetland valuation
			Shoreline valuation



Conceptual Value Diagram for NRCS Watershed Project Structures–Dam (3)



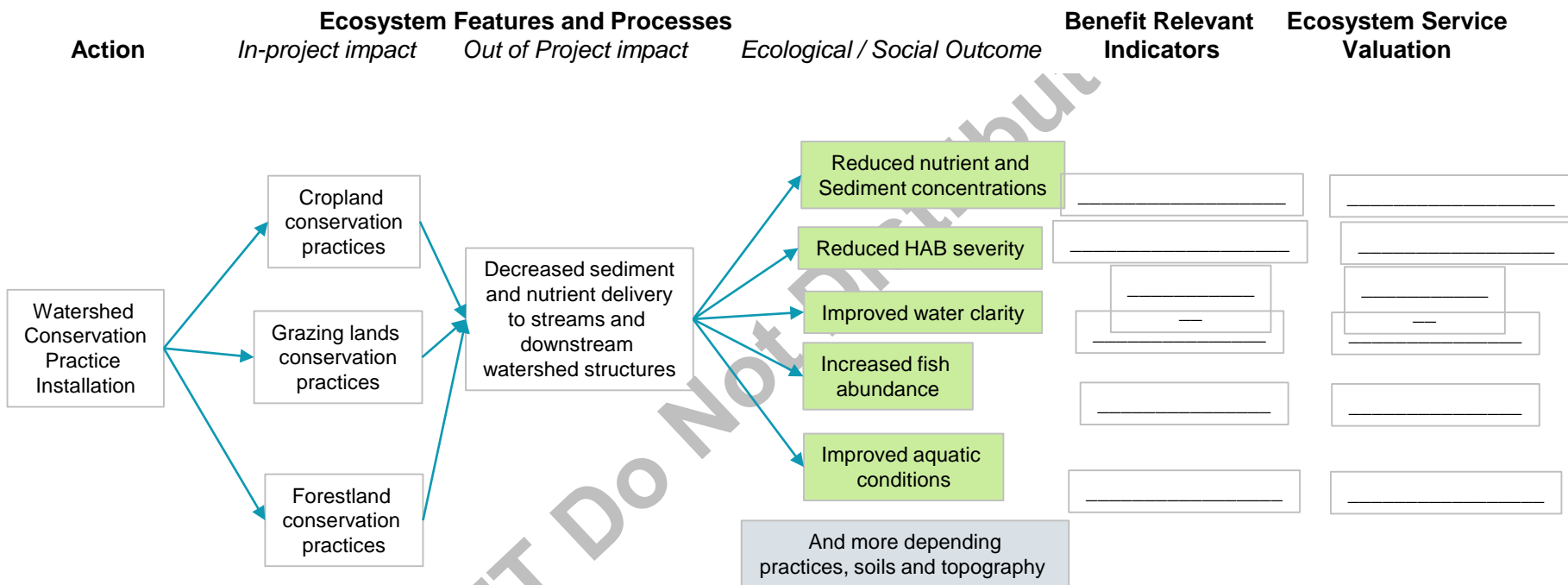
Conceptual Value Diagram – more detail

Action/In-project Impact: Dam/Permanent water pool

Out-of-Project Impact	Outcome	Benefit Relevant Indicator	Ecosystem Service Valuation
Increased impoundment storage	Increased flatwater recreation	Participation days of increased recreation	Value of fishing days
Increased Instream flow levels & stability	Increased flowing water recreation	Participation days of increased recreation	Value of fishing days
	Flow to reduced water temperature	Increase in cold water species	Value of fishing days
		Impact on TDML for temperature	Cost of alternative remedy
Micro-hydro power plant		Kwh Produced	Market power sales
	Reduced GHG emissions	Tons CO2 reduced	Social value of carbon reduction



Conceptual Value Diagram for NRCS Watershed Projects – Upland Conservation Activities — IN PROCESS



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NRCS & Ecosystem Services Framework: Summary

- Adoption of the PR&G at the Federal level is driving an update in project and program evaluation methods at NRCS
- An ecosystem services framework is the basis of the PR&G recommended evaluation process
- PR&G suggests diagramming the ecosystem services framework
- NRCS is attempting conceptual diagrams to describe the linkages from the project action to valuation.
 - Identify how the linkages between action and valuation involve ecosystem services
 - Expand the potential set of benefits to consider the entire human environment
 - Construct a systematic approach for NRCS evaluation of watershed structures and eventually watershed activities
 - Your feedback is appreciated!





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 Thank you for the opportunity to speak with you today.

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