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Update on Economic Impacts of Subsidence and Accretion in the Sacramento-San Joaquin Delta

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Paper presented at the 60th Annual Conference of the Australian Agricultural & Resource Economics, Canberra, Australia February 1-5, 2016







Hydrologic Risk Factors of Levee Failure



Objectives

- The objective of our project is to show that establishing rice-based cropping systems in the Delta can:
 - Slow or stop subsidence → decreased soil loss → increased stability of levees → reduced risk of failure of Delta for conveyance of water
 - Reduce GHG emissions and increase C sequestration
 - Improve water quality
- Evaluate the economics of introducing rice in the Delta

Approach

- We use Bernoulli trials in simulations to estimate the number of levee failures simultaneously for each of 3 scenarios (BAU, Rice) for each year for 50 years.
- For each levee failure the PV of the cost of levee repair, cost savings (PV of BAU cost – PV Cost of Rice), and NPV is estimated for Rice.
- Evaluate the feasibility of growing rice on different Delta islands
 - Cost, returns, and cultural practices vary widely across the Delta

Costs and Benefits

Benefits: The cost savings associated with reduced levee failure by slowing, stopping or reversing subsidence, plus any ecosystem service benefits.

Costs: The subsidy cost to incentivize growers to introduce rice on at-risk Delta islands.

Modeling Framework

1. An Excel model that assumes rice can be grown on Delta islands at a fixed subsidy rate, and evaluates the risks and uncertainty of levee failures and other variables.

2. A calibrated model (DAP) that evaluates the feasibility of rice, island-by-island, by taking into account producers decisions based on crops grown, resource constraints, island-specific physical capital, and market conditions.

\$500 70,000 \$400 60,000 \$300 50,000 \$200 000 Total Acres Converted to Rice (acres) Net Present Value (\$m) \$100 \$0 -\$100 20,000 -\$200 10,000 -\$300 -\$400 0 \$0 \$25 \$50 \$75 \$100 \$125 \$150 \$175 \$200 \$225 \$250 \$275 \$300 Subsidy Level (\$/acre)

Net Present Value for Rice and Acres Converted to Rice at various levels of Subsidy

Issues

- Subsidizing agricultural producers in the Delta to convert to rice is not with out significant limitations.
- There are upper limits to the subsidies that can be applied while maintaining positive NPV.
- This limits the number of acres that can be converted.
- Therefore, it will have to be fairly tightly controlled, and targeted at specific areas of the Delta.
 - The calibrated model simulates these factors

Net returns above total cost per acre, at current prices (\$19/cwt)

	Baseline Budget	Short rotation	Small farm	Short rotation and Small Farm
Rotation with Average Yields	\$248	\$184	\$36	-\$67
Continuous Rice with Average Yields	\$231	\$124	-\$32	-\$202
Continuous Rice with Low Yields	-\$5	-\$111	-\$243	-\$395

Grower willingness to accept payment to grow rice on Delta islands (\$/cwt)



Preliminary Findings

- When we evaluate the State returns to investing in subsidizing rice in the Delta. This indicates <u>positive</u> returns and limited risk to the State for many levels of subsidy.
- However, when we factor in grower response to price subsidies we find that in most cases, costs of growing rice exceed the benefits.

Questions??