



THREE DISTRIBUTED WATER STORAGE OPTIONS FOR MANITOBA

A Cost-Benefit Analysis

An International Institute for Sustainable Development Infographic

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Best practices in land management to prevent floods and droughts can also provide significant nutrient management and other types of co-benefits.

An analysis carried out on three different land management options outlines the related costs and benefits. This analysis was performed on a field scale, modelled for a typical quarter-section. The results presented, while not indisputable, provide an instructive means of assessing the relative merits of each proposed option.



Expanded Ditches OPTION

Expanded ditches and various other forms of drainage systems are used to capture larger amounts of runoff and nutrients that can be recycled for irrigating purposes in agricultural production. Biomass production opportunities abound in managed cattail crops planted along the ditches to capture nutrients and purify runoff.

BENEFITS	
AVOIDED DROUGHT 201.91 MILLION LITRES OF WATER	MONETIZED IMPACT → \$30,286
NEW WETLAND HABITAT 50.61 ACRES OF WETLAND	MONETIZED IMPACT → \$4,156
CATTAILS PRODUCED 122.90 TONNES OF CATTAILS	MONETIZED IMPACT → \$2,039
CARBON CREDITS 129.05 TONNES OF CARBON CREDITS	MONETIZED IMPACT → \$1,936
AVOIDED FLOODING COSTS 201.91 MILLION LITRES OF FLOOD MITIGATION	MONETIZED IMPACT → \$261,903
REDUCED EUTROPHICATION 201.91 KILOGRAMS OF PHOSPHORUS	MONETIZED IMPACT → \$2,704
TOTAL TOTAL MONETIZED BENEFITS	\$303,024

COSTS	
CAPITAL COSTS \$150 K 20 YEAR AMORTIZATION	MONETIZED IMPACT → \$150,000
OPERATING COSTS 2% OF CAPITAL COSTS	MONETIZED IMPACT → \$3,000
OPPORTUNITY COSTS 50.61 HECTARES OF LOST FARMLAND	MONETIZED IMPACT → \$3,037
TOTAL TOTAL MONETIZED COSTS	\$156,037

TOTAL ANNUAL NET BENEFIT \$146,988

BENEFIT/COST RATIO 194%

Filter Fields and Ponds OPTION

Large retention ponds on farmland capture nutrient-rich runoff on the farm itself. The runoff captured in the retention ponds is recycled on agricultural lands and promotes the growth of biomass fuel sources such as cattails around the ponds.

BENEFITS	
AVOIDED DROUGHT 100.95 MILLION LITRES OF WATER	MONETIZED IMPACT → \$15,143
NEW WETLAND HABITAT 7.17 ACRES OF WETLAND	MONETIZED IMPACT → \$589
CATTAILS PRODUCED 93.60 TONNES OF CATTAILS	MONETIZED IMPACT → \$1,553
CARBON CREDITS 98.28 TONNES OF CARBON CREDITS	MONETIZED IMPACT → \$1,474
AVOIDED FLOODING COSTS 100.95 MILLION LITRES OF FLOOD MITIGATION	MONETIZED IMPACT → \$130,952
REDUCED EUTROPHICATION 205.92 KILOGRAMS OF PHOSPHORUS	MONETIZED IMPACT → \$2,060
TOTAL TOTAL MONETIZED BENEFITS	\$151,770

COSTS	
CAPITAL COSTS \$115 K 20 YEAR AMORTIZATION	MONETIZED IMPACT → \$115,000
OPERATING COSTS 2% OF CAPITAL COSTS	MONETIZED IMPACT → \$2,300
OPPORTUNITY COSTS 26.44 HECTARES OF LOST FARMLAND	MONETIZED IMPACT → \$1,586
TOTAL TOTAL MONETIZED COSTS	\$118,886

TOTAL ANNUAL NET BENEFIT \$32,884

BENEFIT/COST RATIO 128%

Back Flooded Dams OPTION

Berms built around the perimeter of agricultural lands capture nutrient-rich spring runoff. Dependent on the season and the amount of moisture, the berms allow the field boundaries to hold in the excess water to either drain to support livestock or soak back into the soil.

BENEFITS	
AVOIDED DROUGHT 0.00 MILLION LITRES OF WATER	MONETIZED IMPACT → \$0
NEW WETLAND HABITAT 80.00 ACRES OF WETLAND	MONETIZED IMPACT → \$6,570
CATTAILS PRODUCED 388.50 TONNES OF CATTAILS	MONETIZED IMPACT → \$6,445
CARBON CREDITS 407.93 TONNES OF CARBON CREDITS	MONETIZED IMPACT → \$6,119
AVOIDED FLOODING COSTS 12.77 MILLION LITRES OF FLOOD MITIGATION	MONETIZED IMPACT → \$16,561
REDUCED EUTROPHICATION 854.70 KILOGRAMS OF PHOSPHORUS	MONETIZED IMPACT → \$8,547
TOTAL TOTAL MONETIZED BENEFITS	\$44,242

COSTS	
CAPITAL COSTS \$7 K 20 YEAR AMORTIZATION	MONETIZED IMPACT → \$7,000
OPERATING COSTS 2% OF CAPITAL COSTS	MONETIZED IMPACT → \$140
OPPORTUNITY COSTS 80 HECTARES OF LOST FARMLAND	MONETIZED IMPACT → \$4,800
TOTAL TOTAL MONETIZED COSTS	\$11,940

TOTAL ANNUAL NET BENEFIT \$32,302

BENEFIT/COST RATIO 371%

Option I. Expanded Ditches Cost/Benefit Ratio 194%

Option II. Filter Fields and Ponds Cost/Benefit Ratio 128%

Option III. Back-filled Dams Cost/Benefit Ratio 371%

