How to Best Manage Water Retention Sites to Protect Manitoba's Environment

Water retention sites—vital for protecting Manitoba from floods—must be well managed for Manitobans to enjoy the abundance of additional environmental benefits they can bring.

Key Messages

- Increasing water retention in Manitoba is an important **way to reduce risks from floods, drought and nutrient loading**. It also confers a host of other environmental benefits.
- For this natural infrastructure to effectively protect the environment and provide value for money, they **must be strategically managed**. Mere implementation is not enough.
- Managed water retention sites include: consideration of engineered wetlands, **how long** the water is retained for, **how water levels are controlled** and **when biomass is harvested**.

Background

Here in Manitoba and in the Lake Winnipeg basin, the climate has always been variable, with times of high spring runoff, unpredictable high rainfall and droughts—and climate change is exacerbating the issue.

We have lost much of our water retention capacity through loss of wetlands and other natural features that would naturally retain and filter large volumes of water. Now we are at increasing risk of floods and drought (and the associated nutrient loading) and the costs run into the billions.

We need *planned and well-managed water retention schemes* in Manitoba and the Lake Winnipeg basin to protect the province from these risks.

Flood prevention is far from being the only benefit of planned and managed water retention sites. A well-designed engineered wetland for water retention **will also clean the water through nutrient and contaminant capture, provide critical wildlife habitat, improve air quality, sequester carbon and provide a biomass crop**.

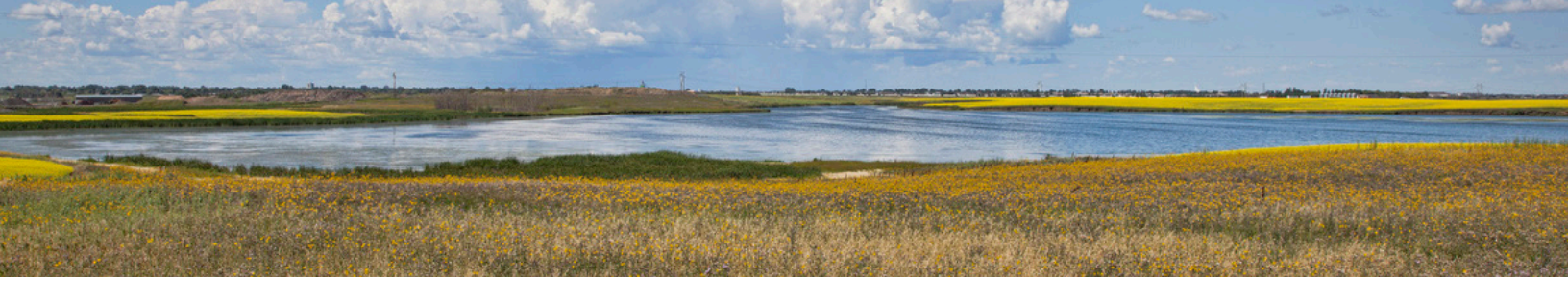
What Does Well-Managed Water Retention Look Like?

Merely implementing water retention sites is not enough—they must be strategically and well managed.

What does "well managed" mean? When planning these water retention schemes, we must consider the wetland plants, retention times, controlling water levels and harvesting.

How long is water retained?

- Retaining water will kill off weeds and allow wetland plants such as cattail to grow. Water retention must happen long enough for sediment and plants to absorb nutrients and contaminants.
- The length of retention time will vary depending on objectives. For example, to maintain fish habitats, water is retained until mid-June; ensuring some water through spring/early summer also provides habitat for nesting marsh birds. Even so, water must be drained by late August so the site is dry enough for harvesting.



How are water levels controlled?

- We must retain the ability to control water levels (and drain when necessary). This allows us to retain water during summer storm events and release it during times of drought.
- Drawing water below the water table means the ground is dry for heavy equipment to access the site when necessary.

Controlling biomass growth and harvesting

- Plant biomass housed by water retention sites must be managed to prevent aggressive species like cattail from dominating a habitat, making it unattractive to diverse species.
- Plants capture carbon, phosphorus and other harmful contaminants, which must then be removed. For example, IISD has calculated that if we remove 22 per cent of this plant biomass from agricultural fields and 25 per cent of harvestable wetlands biomass, we can remove 11 million tonnes of biomass in the province annually. Even a conservative estimate of 2 million to 5 million tonnes would remove 2,000 to 5,000 tonnes of phosphorus from our landscape.
- This harvested biomass can be used for everything from livestock bedding and "green manure" to sources of local, renewable energy—an initiative pioneered by IISD that has grown in the province in recent years and is the foundation of a burgeoning Manitoba "bioeconomy."

Where Has this Worked Before?

In Manitoba, the 500-hectare Pelly's Lake engineered wetland provides 1,200 acre-feet of controlled water storage and has removed over 5 tonnes of phosphorus through management. In Minnesota, the 780-hectare North Ottawa impoundment provides 16,000 acre-feet of controlled storage; prevents chronic flooding of 40 square km of cropland, roads and farms; reduces 68 per cent of nitrogen and 54 per cent of phosphorus loads; and provides critical waterfowl habitat annually.

Engineered wetlands for water retention—by the numbers

- Biomass = 5 to 15 tonnes/ha
- Biomass value = $25 /tonne
- Carbon Offset (2.06 CO_2e) = $50/tonne of cattail
- Phosphorous reduction > 50%

What Needs to Happen Now?

- The Manitoba government's proposed drainage/retention policy and Growing Outcomes in Watersheds (GROW) program provide a strong framework context for water retention projects. Building in strong management mechanisms and aspiring for economic returns will ensure sustainability.
- We need Light Detection and Ranging data for the entire province to understand topography, land use and other geographic information to ensure retention areas are located for maximum impact.
- We need to develop clear criteria for water retention, including consideration of engineered wetlands, retention time and biomass harvesting for maximum benefits.
- Monitoring and measuring these sites to ensure that they continue to provide positive impacts and value for money is vital for success.

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