



PIMACHIOWIN AKI  
WORLD HERITAGE PROJECT

*The Land that Gives Life*

iisd International Institute for Sustainable Development Institut international du développement durable

# Pimachiowin Aki – The Land That Gives Life

## Ecosystem Services Assessment: Measuring benefits provided by natural landscapes

<http://www.pimachiowinaki.org/>



Pimachiowin Aki Corp. is a non-profit organization working to establish a World Heritage Site within an area of about 40,000 square kilometres of intact boreal forest on the Ontario-Manitoba border.

Pimachiowin Aki's members are the First Nations of Pauingassi, Pikangikum, Poplar and Little Grand Rapids, and the governments of Manitoba and Ontario. The proposed World Heritage Site consists of the communities and traditional lands of these First Nations, as well as Atikaki Provincial Park (Manitoba), and Woodland Caribou Provincial Park (Ontario) as indicated on the map (Figure 1).

The Anishinabe communities living in this area have co-existed harmoniously with their natural surroundings for many years. Establishing this World Heritage Site will celebrate the preservation of their culture, which is intimately interwoven with the natural landscape.

### Estimating the economic value of ecosystem services

Pimachiowin Aki asked the International Institute for Sustainable Development to examine some of the economic aspects of the proposed site as part of its application to the United Nations Educational, Scientific and Cultural Organization (UNESCO) for inscription on the World Heritage List. The purpose was to provide an estimate of the economic value of the services provided by Pimachiowin Aki's natural environments to people, for both residents and non-residents.

Of course, there are many aspects of the area—spiritual and cultural aspects, for example—that cannot be valued in economic terms. However, other ecosystem services do indeed have economic value, such as the sequestration of carbon, the provision of tourism opportunities and the provision of pure water and air. Estimating the monetary value of these services helps demonstrate that the value of the site in its current state is far higher than the current level of economic activity would suggest.

**Figure 1: Pimachiowin Aki straddles the border of Manitoba and Ontario, Canada.**







### **Value to residents and non-residents differ**

The economic value of Pimachiowin Aki's ecosystem services was estimated by mapping its land cover and using valuation studies from similar environments such as the Lac Seul Upland Ecoregion 90. In general, ecosystem services are made up of the many natural processes that sustain and fulfill human life. The value will differ for resident and non-resident populations of the area. This distinction is important, as people who live and work within the site will derive different values from it than will people who visit the site to experience its special natural and cultural characteristics.

### **Conservative value over \$121 million a year**

The overall ecosystem service value provided by the World Heritage project area is estimated to be approximately \$121.35 to \$130.30 million per year (see Table 1 for details). The largest components of this estimate are:

- Fishing (\$35 million/year);
- Water treatment (\$32 million/year); and
- Water supply for hydro-power (\$20 million/year).





**Table 1: Conservative ecosystem service economic values provided by the proposed World Heritage Site (in CDN\$ million/year)<sup>1</sup>**

Ecosystem Service	Resident	Non-resident	Shared	Source
Food harvested from hunting activities	2.59	0.98	3.57	<ul style="list-style-type: none"> <li>Hunting harvest and expenditures from Manitoba Conservation</li> <li>Market value of farmed wild animals from commercial outlets</li> </ul>
Food harvested from fishing activities	29.05	6.05	35.10	<ul style="list-style-type: none"> <li>Market value for commercial fishery from Ecoregion 90 study</li> <li>Recreational fishing expenditures and fish replacement cost from Wikipedia, Manitoba Conservation and Ecoregion 90 study</li> </ul>
Food harvested from wild rice cultivation	0.38	0	0.38	<ul style="list-style-type: none"> <li>Wild rice yields and market values from the Ecoregion 90 study</li> </ul>
Clean water supplied by natural ecosystems	0.13	0	0.13	<ul style="list-style-type: none"> <li>Willingness to pay, per Winnipeg household, for improved water</li> </ul>
Fur harvested from trapping activities	0.07	0	0.07	<ul style="list-style-type: none"> <li>Total harvest and market value from Manitoba Conservation</li> </ul>
Water supply for producing electricity	-	-	20.17	<ul style="list-style-type: none"> <li>River flow rates from Environment Canada and Ecoregion 90 study</li> <li>Manitoba Hydro power production and gross revenues</li> </ul>
Regulation of atmospheric carbon dioxide concentrations by appropriating carbon	-	-	12.32–21.27	<ul style="list-style-type: none"> <li>Forest coverage and density based on 2000 LandSat imagery</li> <li>Average value of \$14.16 ha/year from Anielski &amp; Wilson (2005)</li> </ul>
Filtration of air pollutants by vegetation	0.02	-	0.02	<ul style="list-style-type: none"> <li>The proposed World Heritage Site's settled areas (50.42 km<sup>2</sup>) has 60 trees/km<sup>2</sup></li> <li>Air filtration value of \$6.66/tree from Anielski &amp; Wilson (2005)</li> </ul>
Removal and breakdown of water pollutants	-	-	31.83	<ul style="list-style-type: none"> <li>Wetland nutrient removal capacity from Olewiler (2004)</li> <li>Fraser Valley wastewater treatment costs from Olewiler (2004)</li> </ul>
Lower soil losses leading to water siltation	-	-	3.35	<ul style="list-style-type: none"> <li>Vegetation coverage based on 2000 LandSat imagery</li> <li>Water quality impact costs from Olewiler (2004)</li> </ul>
Opportunities for recreation and refreshment	0	3.05	3.05	<ul style="list-style-type: none"> <li>Camping user fees and non-consumptive wildlife activity costs from Manitoba Conservation, Environment Canada, Ecoregion 90 study</li> </ul>
Protection of natural landscape	-	2.28	2.28	<ul style="list-style-type: none"> <li>Willingness to pay per household in Manitoba to double the size of protected areas (\$503/household) with a 1% discount rate</li> </ul>
Suitable living space for species to evolve and breed	-	-	9.08	<ul style="list-style-type: none"> <li>Willingness to pay to preserve Woodland Caribou habitat in Saskatchewan applied to Manitoba (\$20.23/household/year)</li> </ul>
<b>Totals</b>	<b>32.24</b>	<b>12.36</b>	<b>121.35–130.3</b>	

<sup>1</sup> Some ecosystem services are valued equally between resident and non-resident populations, therefore the ecosystem service values can only be added along each column.

The values of some ecosystem services have been excluded from the report's total estimate, because they cannot be accurately quantified. For example, spiritual and religious values were excluded as any estimate would likely under-represent the value held by the First Nations communities.

Valuations of other potential ecosystem services were also omitted, as they were based on studies with larger population areas than represented in the proposed site. These include:

- Water supply from the major rivers (\$0.27 to \$5.55 billion/year);
- Air filtration provided by trees (\$0.35 to \$0.60 billion/year); and
- Flood prevention provided by wetlands (\$0.38 billion/year).

These assets draw attention to the significant economic values provided by the site's ecosystems, beyond the values included in the report's conservative estimate.

### **Value of natural assets would add billions more**

In addition to the services provided by the area's ecosystems, the World Heritage project area is rich in natural assets, such as the forests and peat lands that store carbon. Their carbon content has an estimated value of \$2.7 to \$17.5 billion. This carbon reserve is treated as an asset and is excluded from the total estimate of annual revenues provided by ecosystem services. However, forests and peat lands deliver an ecosystem service known as carbon sequestration, which regulates atmospheric carbon dioxide concentrations. This can be valued on an annual basis and has been included in the report's overall estimate.



IISD also examined various public expenditures to protect and manage natural resources and provide visitor services in the Pimachiowin Aki area. Annual provincial expenditures on parks and forest fire management were estimated to be approximately \$4.48 million, compared with ecosystem service benefits, which were estimated to be at least 28 times greater than the estimated public expenditures.

### **Report intended to generate discussion**

It is important to note that the estimated values of ecosystem services included in the report should not be viewed as being perfectly accurate. They are a conservative estimate of value, intended to initiate discussion with local, national and international stakeholders on the valuable benefits we receive from the natural environment of the proposed site on annual basis.

**The full report, "Pimachiowin Aki World Heritage Project Area Ecosystem Services Valuation Assessment" is available at [http://www.iisd.org/pdf/2008/ecosystem\\_valuation.pdf](http://www.iisd.org/pdf/2008/ecosystem_valuation.pdf)**

