



DETERMINING THE VALUE OF YOUR TREES

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The forested areas on lands are often overlooked for their values by many, but these forests and other treed areas often extremely valuable, holding values both in their ability to be sold as a product, and through natural functions that trees can provide while living. This document seeks to introduce you to major values and to help realise the potential that is in these areas. Please note that these are just some of the values that could be present; to properly assess the value of your trees, an individual assessment should be conducted, which can be facilitated by the Agroforestry and Woodlot Extension Society (AWES).



An example of a landowner participating in small scale harvesting of a wooded area.

ECONOMIC BENEFITS

The commercial benefits of trees and treed areas on land can come in many different forms and these values are not always a direct product of the trees themselves. Outlined in the first section is five areas that where their values can be directly realised.

Timber Value

One of the most obvious values of trees on land is in their value as timber, achieved by allowing a forestry company to harvest the woodlots or shelterbelts on your property, or by selling self-harvested wood directly.

How much you may receive for your timber is dependent on numerous factors, but here are some key considerations:

- Conifer vs. Broadleaf In general, conifers are more valuable in Alberta, due to their ability to be used in more valuable forest products (e.g. Dimensional lumber).
- **Distance from a mill** It becomes less economical to transport harvested wood the further you are from a suitable mill.
- **Number of trees** The more harvestable trees you have, the more economical harvesting becomes.

- **Age of the trees** The younger a stand of tree is, the lower it's value. Keep in mind, however, that these young forests can be kept as an investment and harvested when more profitable
- **Quality of the trees** Healthier, straighter, and less knotted trees will all have a higher value, particularly for softwood
- **Other Potentials** Even if your forests do not meet the harvesting criteria of a large forest company, there may be other ways of extracting value. Exploring local markets can yield benefits through smaller sawmills, in log homes or as firewood. There may even be opportunities for entrepreneurship.

Combining all of these values it is possible to obtain an approximate value for your forest. For example: A 30-year-old aspen forest, at a density of 1000 trees/ hectare, may be worth (as a rough minimum) \$1000/ Hectare (~\$400/acre). However, because there are so many variables, it is **highly recommended** to speak to a Wood Purchaser at a local forestry company, or a local market to obtain a more accurate picture of the value of your forested area before making any decisions.

Also, keep in mind that while the direct lumber value is the main economic value of trees in large forested areas, the decision on whether to harvest trees can be a difficult one at times, and you must assess what other values the trees may have, some of which are explored later in this document.

Crop Yield Increases

One of the most important values of a shelterbelt is seen in how they affect the microclimate (climate of a localised area) around them, primarily by altering wind patterns. This has several effects, one of which is how they affect the yields of crops grown under their windaltering influence.

While there is minimal data on how shelterbelts affect yields in Alberta, the consensus internationally is toward them being beneficial. Yields are increased due to less crop damage and improved growing conditions behind a shelterbelt. For Alberta, the potential increase seen in a field with shelterbelts could be between 3.97 to 11.40 bushels/acre, an 8-23% increase. Additionally, the warmer soil temperatures afforded by cutting wind speeds may allow seeds to germinate earlier, allowing for a head start on the growing season.

Of course, there are some downsides, with land potentially being pulled out of production for the growth of the trees, but often the areas planted with shelterbelts are on field margins, with minimal area pulled out of production for growing trees. There is also a consistent decrease in the yields of crops surrounding shelterbelts, but these are outweighed by the yield increases further out in the fields. Additionally, these trees may make it difficult to maneuver large equipment in tighter areas.

Livestock Feed Costs

Another area in which shelterbelts can benefit agriculture is in the protection of livestock. Their shade helps animals stay cool in heatwaves and the windspeed reductions offered by shelterbelts will reduce stress on animals, particularly in the winter months. These improved conditions behind a shelterbelt may cause an animal to lose 10.6 lb less in a harsh winter or gain 34.9 lb more in a mild winter than those unsheltered by shelterbelts. Which, in Alberta, historically would confer a benefit of between \$17.10 to \$61.08 per head for a mild winter, or \$5.19 to \$18.55 for a harsh one (in 2019 Canadian dollars).



A row of sheltering trees on a pasture. These allow for greater protection of animals and, consequentially, less stress.





A residual shelterbelt in the background as a new buffer is planted.



A young Saskatchewan Eco-Buffer. The diversity of the Eco-Buffer can be clearly seen here.

Heating Costs

Potential benefits of shelterbelts on climate control costs are more difficult to quantify, but studies have demonstrated a 17.5% - 25% cost reduction from an established shelterbelt around your home. This reduction is reliant on windspeed, so the less wind the windbreak lets through, the better. Additionally, during the summer months, the shade provided by trees can reduce temperatures inside homes, lowering the need for air conditioning.

The cost of establishing shelterbelts

The cost of establishing a shelterbelt in Alberta today can depend on a myriad of factors, including seedling prices, what maintenance is required, and, of course, the size of the area being planted. Additional costs will be incurred depending on the intensity of site preparation and maintenance but, it has been shown that the higher the initial investment in your planting, the better the success is. If you would like a more accurate picture about how much a shelterbelt may cost you, please contact AWES for more information.

In general, there are three ways that a shelterbelt can be established, and all have their benefits. Two of these are planted; the traditional shelterbelt and a newer concept, known as the Eco-Buffer. The other is created by leaving margins of forest along boundaries when clearing forested areas to form shelterbelts, known as a residual shelterbelt.

The residual shelterbelt, formed when clearing land, is the least expensive way of attaining the benefits offered by a shelterbelt, as there is very little planting to be done, if any at all. You may have to fill gaps, initially, and maintenance is simply ensuring that any new gaps that form are filled. These also have benefits afforded by the fact that both the trees and the soils are native to the area, helping to increase the shelterbelt's resiliency.

The traditional shelterbelt Is the least expensive way to establish a shelterbelt from scratch, and it has the largest body of support behind it. Traditionally planted in five rows of tall evergreens, tall deciduous and one of large shrubs, the costs of establishing a shelterbelt are minimized by the planting density - 350 seedlings per 100 meters of a 5 row shelterbelt – and the selection of more common trees, which lowers costs again. The largest disadvantage of a shelterbelt is in the ongoing maintenance, which must be done for the lifetime of a shelterbelt, and the lack of diversity makes it more likely that entire rows may fall victim to disease, or



Boreal forests are very good at storing carbon, both above and below ground.



Example of recreational use with a well designed trail through an aspen stand commonly found in Alberta.

reach the end of their lives at the same time, swiftly reducing the ability of that belt to function. At a per seedling cost (including the costs of a seedling, the preparation, and materials), a 100m shelterbelt has historically cost anywhere between \$661.50 to \$2061.50.

The Eco-Buffer is a concept developed to address some of the issues with the traditional shelterbelt, doing so by mimicking the structure of a natural forest by planting a variety of layers and encouraging infill by suckering. These have the benefit of almost eliminating long term maintenance by allowing a natural forest structure to develop. While the long-term costs are lower for an eco-buffer, several factors tend to make the upfront costs higher. They are planted at a higher density (1 seedling per meter) and with a higher diversity of species than traditional shelterbelts, and they are more complex to design and plant, all of which raise the costs. The all inclusive per seedling costs have ranged from \$1.89 per seedling to \$5.89, which is approximately \$945-\$2945 for a five row, 100 m Eco-Buffer, with decreasing per seedling costs for larger Eco-Buffers.

For more information on the establishment and value of an Eco-buffer/Shelterbelt, please contact AWES.

ECOSYSTEM SERVICES

As defined by the Land Stewardship Center of Canada, Ecosystem services are "the benefits that humans receive from nature including provisioning (e.g. food, fuel, fibre, fresh water), regulating (e.g. air quality, climate regulation, erosion control, water quality), cultural (e.g. spiritual enrichment, recreation, aesthetic experiences) and supporting services (e.g. production of oxygen, soil formation)" (Land Stewardship Center, n.d.).

While ecosystem services provide value to humans, and attempts have been made to quantify their value by many, the results are inconsistent and can vary widely. So here, we will just focus on the services they provide, and allow you to assign your own values to these services, based on how valuable you believe them to be. Remember, the value can be extrinsic (the dollar value we assign to the service, or the cost of replacing the service) or intrinsic (the inherent value of the service itself, beyond its dollar value).



A diverse wooded riparian area that stabilises the banks, and filters water.



Creating habitat for beneficial insects can lower costs on pesticides, and increase crop yields.

Air

Wooded areas, and shelterbelts specifically, can have a significant impact on air quality directly behind them, as well as further downwind, as they act as a physical buffer for odours and particulates, as well as preventing the movement of these problems in the first place. For feed lots, odours will not travel as far, and in agricultural fields, these reductions in windspeed will reduce soil erosion, maintaining soil fertility for longer.

Additionally, these wooded areas have the ability to sequester large amounts of carbon in the soil, between 0.8-2.4 tonnes per hectare in boreal environments. Forests also store carbon in the woody biomass that accumulates, with a mature forest storing over 10 tonnes of carbon per hectare.

Soil Conservation

The reduction of windspeed prevents the movement of valuable topsoil off of fields and helps prevent the drying situation that leads to loose soils in the first place. Of course, this benefit is reduced in a no-till agriculture system, but the enhanced soil moisture can still have great benefits, including reducing the need for costly irrigation. Additionally, buffers on field margins can slow overland water flow, reducing the amount of surface erosion due to water.

Water

One of the areas in which shelterbelts provide the most benefits is in how they interact with water and water bodies on a property. They are known to have a direct influence on water quality of water bodies in the area. Water filtration is improved if there are wooded buffer areas in the riparian zone of waterbodies, which, in addition to preventing erosion, resulting in the migration of streams, also helps to control flooding, and how destructive floods may be. In fact, the vegetation in a riparian area can help to increase soil fertility by slowing the waters down, preventing catastrophic erosion, and even adding nutrients in the flooded area.

With a properly designed shelterbelt, their ability to control snow can be quite extensive. Through wind speed reduction they are able to reduce the size of snow drifts. Depending on the density of the shelterbelt, where the snow will be deposited will change too. With more porous shelterbelts carrying snow further, and depositing it more evenly; an ideal situation for agricultural fields, which benefit from an even snow coverage for spring meltwater availability. This is opposite for road protecting shelterbelts, where a deep narrow drift is preferred to keep snow off roads.

Wildlife

Shelterbelts and wooded areas also offer a variety of habitats for wildlife, which can offer their own benefits. The habitat they create can be beneficial for game animals, as they provide shelter and allow corridors through which these animals can safely move from one area to another, along with an abundance of habitat for birds, facilitating birdwatching. On top of these values, the increased biodiversity that is harboured in these areas increases the area's resiliency to diseases and provides more services than if the land was left as field margin or cropland.



The mental benefits of wooded areas should be considered, too. Walking and interacting with these areas can improve your well-being in many ways.

Standing wooded areas have also been shown to increase the habitats for pollinating insects, which allows for greater crop yields from more pollination. Additionally, these areas can harbour pest suppressing insects, which provide a natural way of selectively reducing problem pests.

Socio-economic benefits (non-market good and service)

The social benefits forested areas provide can be a major reason for owning a forest, The benefits of these areas are a little more subjective, but often cited are the spiritual, or psychological benefits to these areas. These benefits can be a consequence of services they provide, such as the learning benefits of leisure, or direct psychological benefits from the presence of wooded areas. Some of these benefits include a positive effect on psychological healing and wellbeing in terms of recovering from stress, improving concentration, productivity and the psychological state. There is also evidence for improved longevity. Due to the elusiveness of these benefits, this is an area of ongoing research with new benefits of natural areas being discovered and quantified every year.

SUMMARY

There are many and varied values the forested areas and trees can have from their economic values to their inherent value as natural areas. Due to the complexity of these forested areas and trees, it is important to look at each case individually, and assess a forest or shelterbelt's value on a case-by-case basis. For this, or any other questions regarding the trees on your land, please contact the **Agroforestry and Woodlot Extension Society**, or visit our website at <u>www.awes-ab.ca.</u> Funded by





Contact Info

Agroforestry and Woodlot Extension Society

17507 Fort Road Edmonton, AB T5Y 6H3 Phone: 780-643-6732 Fax: 780-422-6096