

PLANNING FOR TREE COVER

Agroforestry practices require some forethought. Some initial planning can help you turn your intentions into reality. Planning helps you:

- ▶ organize and document your ideas
- ▶ set and achieve your goals
- ▶ avoid costly mistakes
- ▶ ensure that resources are well-managed
- ▶ maximize potential returns
- ▶ monitor your progress
- ▶ prepare for the tax implications of owning a woodlot.

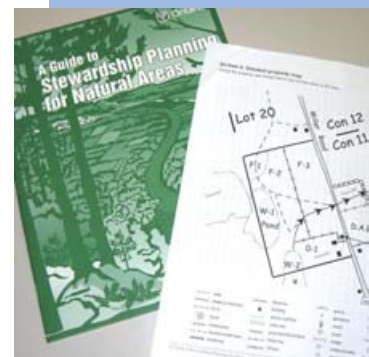
Management planning starts with creating a vision for your property – an idea of what you would like to do over the next few decades. The effort to develop a tree cover plan should match the level of detail needed. For example, planning a 20-hectare planting on a diverse site requires considerably more effort and operational detail than a 5-hectare planting on a very uniform site.

The need to develop a management plan for your entire property is usually related to your goals. If your goals are to manage a large, diverse property for stewardship and for profit, then a detailed, comprehensive, farm and natural area stewardship plan may be in order. Make sure that the tree planting component of your plan is compatible with your overall goals for your property and with specific objectives you have for any of your land that adjoins the area to be planted.

The management plan can be as detailed as you want it to be, and although there is no standard structure for such plans, there are a number of common sections.

Important sections of a good management plan will contain the:

- ▶ scope – what the plan is all about, who wrote it, where the property is located
- ▶ term – how long the plan is valid for
 - ▷ many plans have a five-, 10- or 20-year lifespan
- ▶ objectives – what you want to achieve over the short and long term
- ▶ inventory – what you have (land, forest) to work with
- ▶ management actions – what activities you plan to undertake to achieve your objectives
- ▶ record of activities – list of what you have accomplished.



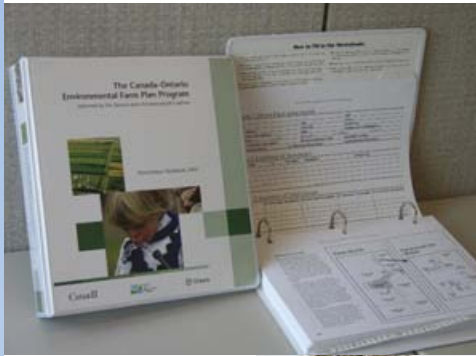
A management plan is a document that maps out a way of achieving your objectives.



Planning – it's a family activity.

You may want to include the following additional information in the plan:

- ▶ a section on the management history – what has been done in the past will have a major impact on what can be done in the future
- ▶ maps of the property – these make the job of implementing the plan easier
 - ▷ aerial photographs can also be very beneficial
 - ▷ stand boundary maps help during forest operations
- ▶ incorporation of a wildlife management plan (see EFP worksheet #23).



The Environmental Farm Plan identifies forest resource planning as a BMP.



Idle land can be an opportunity.

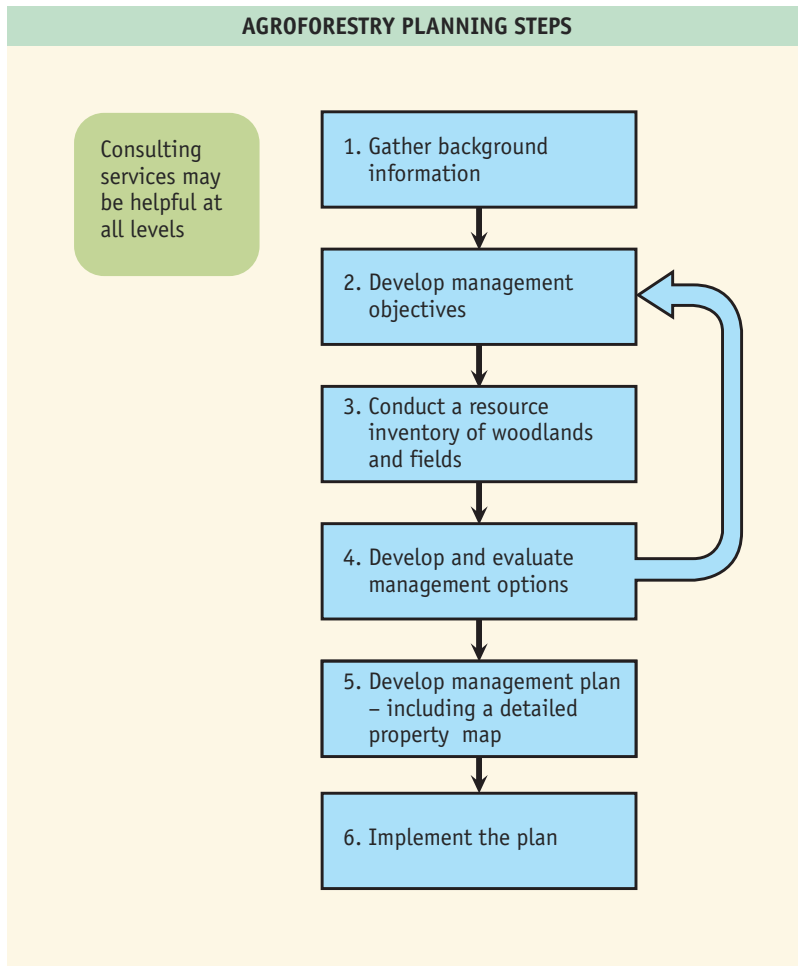
Planning has long-term implications. Discuss goals with your family before developing your plan.



6-STEP PLANNING

Management planning can be looked at as a series of steps. Each step brings you closer to benefiting from the potential of your property.

The following flow chart lists some of the more common steps in the planning process. For the balance of this section, we'll explore the general principles underlying the six steps. The rest of the book will explore BMPs for specific agroforestry applications. Draw from these to develop your plan.



Part of planning is taking the time to develop a vision of what you want your property to do and look like in the future.

Your inventory will tell you if your management objectives are reasonable. In some cases, you may need to adjust your objectives or your planned activities.

PLANNING FOR TREE COVER STEPS:

Step 1. Gather background information

Step 2. Develop management objectives

Step 3. Conduct resource inventory

Step 4. Develop and evaluate management options

Step 5. Develop management plan

Step 6. Implement plan

STEP 1 – GATHER BACKGROUND INFORMATION

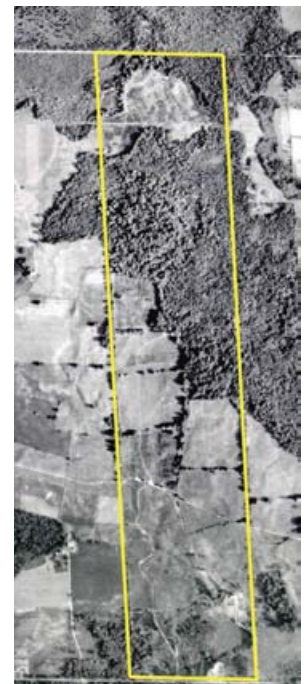
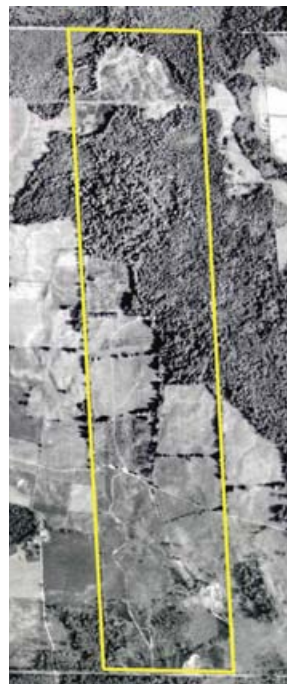
Checklist

Have the following items on hand before getting started:

- ✓ contact names for consultants, forestry services, private nurseries
- ✓ county soil map and report
- ✓ surveyor or municipal forest plan – to determine common forest cover types for the area
- ✓ sources for or actual topographic maps or aerial photographs for your property
- ✓ tools for measuring slope in the field – clinometers (surveying instruments), stake and string
- ✓ graph paper and ruler
- ✓ field measuring tape, i.e., >20 metres (66 ft)
- ✓ distance measurements between fields and natural areas, lot lines, and surface water bodies
- ✓ field slope measurements
- ✓ depth to saturated soil or evidence of water table (rust-coloured blotches and grey colours)
- ✓ land use history – crops grown, pesticides used, soil tests results and nutrients applied
- ✓ soil sampling equipment – shovel or soil auger.

Aerial photographs are excellent planning tools. They show most features needed to create accurate maps. These may be obtained from the Ontario Ministry of Natural Resources through their website at: <http://themnrstore.mnr.gov.on.ca>.

The photos to the right show the same site, the one on the far right having been taken 23 years after the one on the left.



The Ontario Woodlot Association brings woodlot owners together to learn about sustainable forest management. Their website is well worth a visit: <http://www.ont-woodlot-assoc.org/>.

STEP 2 – DEVELOP MANAGEMENT OBJECTIVES

Developing realistic and appropriate management objectives for your property is an important step in the planning process. Your objectives should encompass what you want to achieve over both the short and long term.

Short-term objectives should be quite specific for the present and near future. For example, “Over the next five years, I plan to:

- ▶ establish a Red Pine plantation
- ▶ plant 500 trees each spring adjacent to my wetland
- ▶ control competing weeds.”

Long-term objectives should be broadly worded to cover the next 20 years of your operation. For example, “Over the next 20 years, I plan to:

- ▶ promote hardwood regeneration in a Red Pine plantation
- ▶ connect two woodlots through yearly planting
- ▶ harvest nuts from my nut tree planting.”

To get started, ask yourself:

- ▶ what do I want my woodland to be like in 10 or 20 years?
- ▶ what do I need to do now to start working toward this vision?
- ▶ what am I capable of, in terms of time, equipment, financial resources?
- ▶ what type of help will I need along the way?

LINKING OBJECTIVES TO LANDSCAPE PLANNING

Now that you’ve developed objectives for your property, look at the bigger picture. Does your plan fit or clash with land use, natural areas and other agroforestry plantings in your neighbourhood?

Your property is part of the bigger landscape. Target your planned efforts in areas that will have the maximum benefit to both you and to the surrounding environment. Planting trees or leaving an area to regenerate naturally can connect woodlots, increase forest size, and provide a buffer for water bodies.

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Altering wetland features can have a disastrous impact downstream. Here we see the results of forest clearing around a natural stream two kilometres away.

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STEP 3 – CONDUCT A RESOURCE INVENTORY OF WOODLANDS AND FIELDS

Conduct a resource inventory of your property to:

- provide a snapshot of your natural resources
- determine suitable management options
- organize information on inventory features such as the land's potential to support agroforestry activities
 - ▷ include information on soils, current farm practices, and linkages to existing natural features.

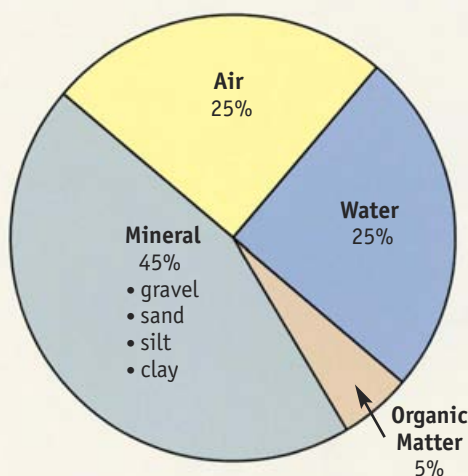
If your goal is to incorporate trees into the existing farming operation or convert some open land to treed land, then you should inventory your non-forestry areas.

A **non-forested land inventory** will help answer these questions:

- how much area is available for trees?
- what are the soil types?
- are there any site-related problems that could affect my plans?
- where should I establish trails, shelterbelts and windbreaks?
- how will my planned activities impact my current farming practices?
- can I use my existing farm machinery?

Use a map to sketch potential agroforestry activities. Where would you like to plant the windbreak or wetland buffer? Where will any new roads or trails be located? What areas are you planning to leave untouched?

SITE ASSESSMENT CONSIDERATIONS



A carefully planned tree cover project includes a site assessment. A site assessment should be done before matching species and management practices to site conditions.

Soil and site characteristics influence and in some cases dictate the survival and growth of a young plantation. A poor match of species to site is not always evident in the early years following planting.

Soils are made up of four primary components: air, water, organic matter and mineral particles. The ideal soil will have a composition similar to what's shown in the pie chart. The amount of air and water within a soil will fluctuate throughout the year.

Soil characteristics can vary greatly, sometimes in a relatively small area. If your planting site is large or if it varies in topography, then you may be dealing with a number of site types. Planting trees can be expensive and time consuming, so be sure to take the site into account before you purchase your seedlings.

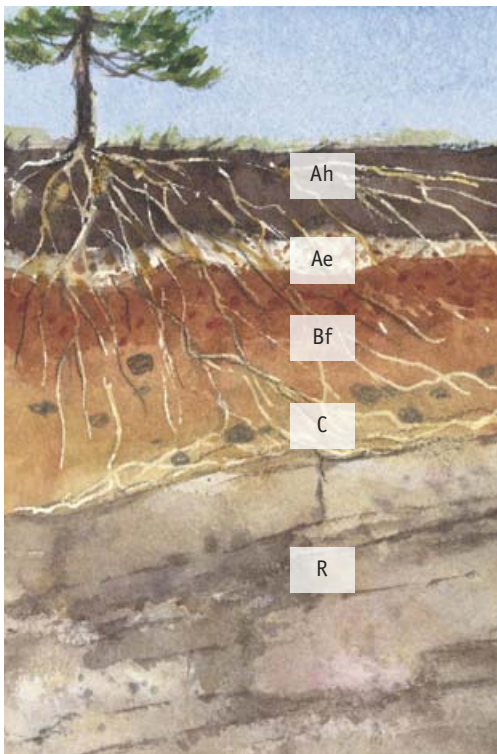
There are four main factors dictating which species have the best chance of survival on any given site. These are:

- ▶ depth to *seasonal water table*
- ▶ *soil texture* class
- ▶ presence of carbonates
- ▶ depth to bedrock or other root-restricting layers.



Match species to site. The effects of inappropriate matching of species to site on growth may not be evident in the early years after planting. If tree seedlings that are selected for planting don't suit local site conditions, trees may not survive and will not thrive.

Conversely, trees planted on sites where they thrive will grow into commercially valuable trees. Consult with a forestry professional if you have questions.



Ah horizon: Also called the topsoil. Contains most of the organic matter: roots, humus, litter, worms, fungi. Darkest in colour and most fertile.

Ae horizon: Is a light-coloured layer where iron and some organic matter have moved out of the horizon.

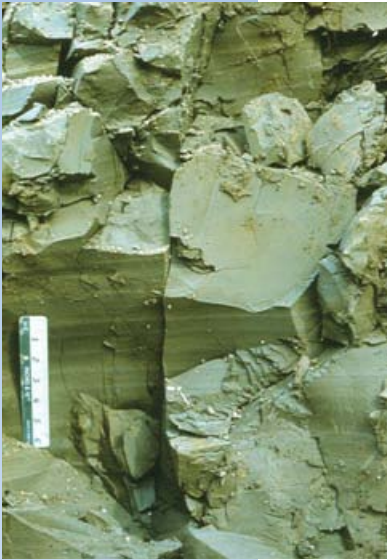
Bf horizon: Iron compounds and organic matter have moved into this horizon – giving it a rich reddish-brown colour.

C horizon: Weathered parent material that is less changed than the first two layers. Will contain mineral materials (sand, silt, clay and coarse fragments), and alone, will not support plant growth.

R horizon: Unweathered bedrock.

Choosing a species that suits your site and will meet your objectives is the key to successful planting and the future forest it creates.

Mottles (rust blotches) and gley (grey colours) in the same profile indicate generally wet soil conditions, with a fluctuating soil water table. Grey colours alone usually mean a permanently high water table.



DEPTH TO SEASONAL WATER TABLE OR MOTTLES

Depth to the seasonal water table is important because it indicates the amount of water available for tree growth, and whether the site is too wet for some tree species.

The groundwater table moves up and down throughout the year – usually hitting its highest level (closest to the surface) in the spring or fall. Seasonal flooding can kill trees like White and Red Pine that are intolerant of high groundwater levels.

Soil layers with gley (grey colours) indicate a permanently high water table. The higher the gley colours and mottles are in the soil profile, the poorer the drainage of the site.



Tree roots need to breathe. Species such as White Cedar adapt to wetter sites by developing shallow rooting systems.

SOIL TEXTURE CLASS

Every soil is made of individual grains or particles that may be amassed into larger soil aggregates. Larger aggregates are most noticeable when the soils are fine-textured, e.g., clay or high clay content. The size of these particles dramatically influences:

► water-holding capacity

- ▷ soils with larger particles tend to hold less water than soils with smaller-sized particles
- ▷ this is very important for both tree survival and tree growth processes, but too much water can create undesirable conditions for growth, such as poor aeration

► **aeration**

▷ tree roots need air for respiration, growing best where there’s a balance of air space and water between the particles

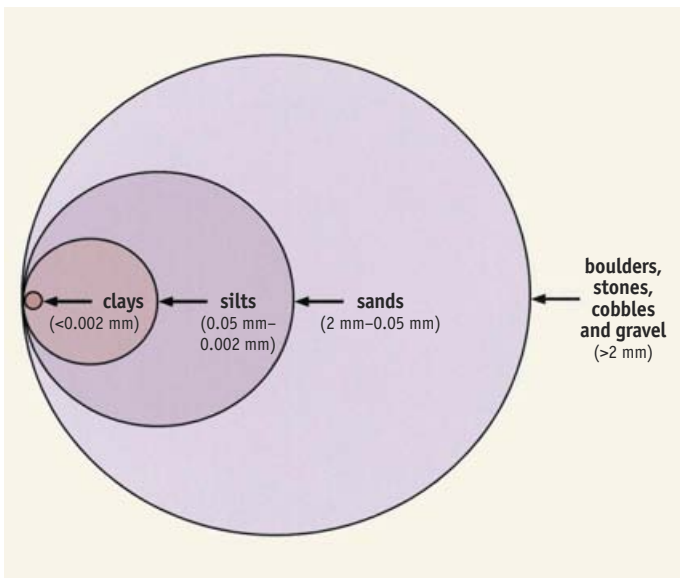
► **surface area**

- ▷ surface area is important because it helps maintain water films and affects nutrient availability
- ▷ finer soils have a higher surface area than coarser soils
- ▷ a 1-gram sample of coarse sand would have a total surface area of roughly a Canadian toonie – the same 1-gram sample of clay would have a total surface area that would cover a tennis court

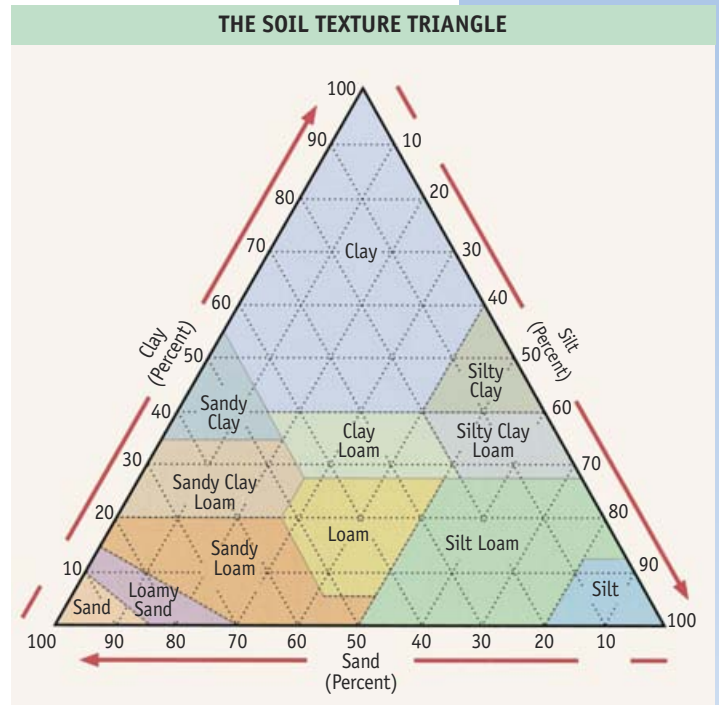
► **nutrient retention**

▷ coarser soils tend to have less available nutrients than finer soils.

Soil texture is the proportional distribution of particle sizes (sand, silt, clay) within a soil. The soil texture triangle is a method of determining the soil texture class. If your soil is 20% clay, 30% silt and 50% sand, it would classify as a loam soil. Loams are a mix of sands, silts, and clays – often sharing the best characteristics of each.



Soil particles range in size from large boulders to microscopic clay particles.



Species suitability tables on page 49 link soil texture and depth to mottles (seasonal water table). Use the site factors from your location to determine which species are best suited to the site you intend on planting.

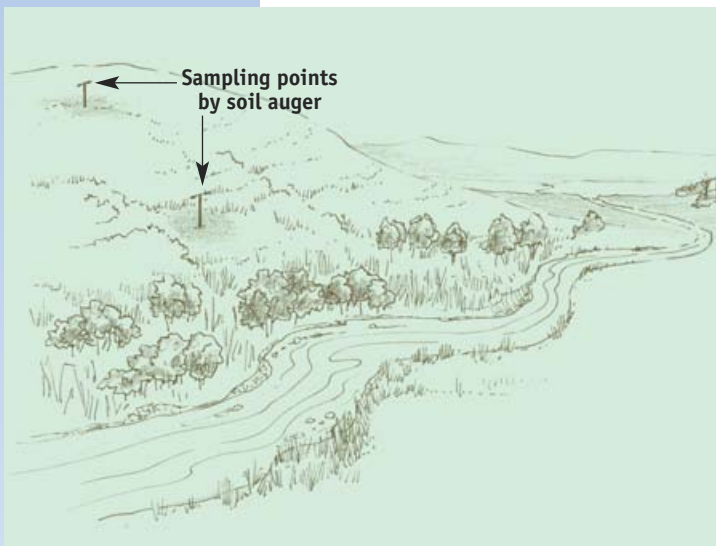
PRESENCE OF FREE CARBONATES

Free carbonates are soluble calcium carbonates that occur naturally within some soils. In severely eroded soils, the free carbonates may be found at or near the soil surface. Most species are able to tolerate carbonates and may not be severely impacted by their presence in the rooting zone.

However, Red Pine cannot tolerate high concentrations within 50 cm (20 in.) of the soil surface. Carbonates can kill a mature Red Pine once it reaches seed-bearing age (25–40 years). Red Pine will also suffer on shallow soils over limestone bedrock: decline may be noticed after 40–50 years.

Most areas with carbonates have been severely eroded. Test for free carbonates – you may want to seek assistance from a forestry professional – by dripping a 10% hydrochloric acid solution onto the soil. Note that:

- ▶ if the soil reacts to the acid, carbonates are present and Red Pine should not be planted
- ▶ if there is any doubt whether carbonates are present in the soil, do not plant Red Pine
- ▶ the presence of carbonates may also impact White Pine and Norway Spruce.



Check soil and site conditions on upper and lower slope positions.



Species such as Red and White Pine are not tolerant of high lime soils.

DEPTH TO BEDROCK OR OTHER ROOT-RESTRICTING LAYERS

Your potential for planting success is impacted by soil depth, which influences soil water retention and rooting depth.

Picture the soil as a sponge: the deeper (thicker) the sponge, the more water it can hold or retain. Trees planted in shallow sites are subject to the effects of dry weather before trees that were planted on deeper soils. Soil depths that are:

- ▶ less than 15 cm (6 in.) over bedrock may be too dry to plant most tree species
 - ▷ avoid planting on sites where you can't get your shovel in the full depth
- ▶ 15–30 cm (6–12 in.) can be planted with a number of drought-tolerant species such as Jack Pine, White Pine, White Spruce and Bur Oak
 - ▷ application of mulch around seedlings may enhance survival
 - ▷ some mortality should be expected
- ▶ shallow soils greater than 30 cm (12 in.) are generally tolerable for most species
 - ▷ drought-related mortality may still occur depending on environmental conditions
 - ▷ rocky soil – 50% rock means 50% less root space and nutrients.

Other root-restricting layers such as compacted soils can also limit tree growth by limiting root development and subsequent water and nutrient uptake. Compacted soil layers can occur both naturally in soil and as a result of some farming practices. Severely compacted layers can be somewhat alleviated with sub-soiling tillage equipment. Deep-rooting forages such as alfalfa can also help to break up compacted layers or hardpans.

Some soils are so shallow that leaving them for natural field *succession* may be the most suitable management decision.



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STEP 4 – DEVELOP AND EVALUATE MANAGEMENT OPTIONS

Armed with the background and resource inventory you've collected, you can now develop and assess management options. A forestry consultant would be helpful during this process. Reflect on your values, goals and objectives when assessing options.

- ✓ **Assess and select a silvicultural or management system suitable for the type of tree cover you want to establish.** Plantations will have different needs than windbreaks or buffers.
- ✓ **Identify business goals.** Are you looking for short-term income or a long-term investment? Do you burn fuelwood or use wood products in-kind? Are you planning to do this work yourself?
- ✓ **Protect the environment.** This is the time to assess the impact of management on wildlife habitat goals, recreational needs, and the protection of fragile and natural areas on your land (e.g., steep slopes, streams, wetlands).

AGROFORESTRY ON LEASED LAND

Like all agricultural activities, agroforestry opportunities may be realized on leased land. Some agroforestry activities, however, may not be feasible on leased land where lease agreements can be short-term (generally one to three years). Planting trees is a long-term commitment requiring many years of input and expenses before any return on investment is generated.

Longer-term leases might, in some cases, allow for the planting of Christmas trees, nut trees or other crops on leased land. Some Christmas tree species such as Balsam Fir may take 10 years to reach maturity. At the end of the lease, the land could be put back into other agricultural production.

Lease agreements for agroforestry activities should:

- be reviewed by a lawyer
- have a specific term that is appropriate to the agroforestry activity
- clearly lay out costs, responsibilities, and liabilities of all the parties involved
- list the ramifications of selling the property or cancelling the lease.

INVESTMENT CONSIDERATIONS

Depending on the agroforestry operation, it may take several decades before a landowner can begin to see a return on an investment in trees. A new plantation of Red Pine, for example, will require a considerable investment upfront to establish and maintain. A landowner may not see any significant return on this investment until the plantation is over 50 years old.

Christmas trees can be harvested after approximately 10 years.

It's vitally important to evaluate the potential return on your investment for all agroforestry practices. Is it worth it? If so, when will you recover your costs? When will you earn a profit?

Unfortunately, these questions cannot be easily answered. Your agroforestry operation is subject to:

- ▶ variability in forest growth and development, and natural disasters
- ▶ variability in market conditions and future commodity prices
- ▶ interest rates, inflation and other economic forces.

As you begin to plan your agroforestry operation, you should consult:

- ▶ an accountant or tax specialist with experience in counselling farm and woodlot owners
- ▶ a forester as you develop your management plan.

Don't Forget a Business Plan

As part of your management plan, create a business plan. A business plan summarizes the operational and financial objectives for your planned activities. Your aim will be to demonstrate how your woodlot can become a viable, income-generating business venture with expectation of future profit.

PUBLIC PROGRAMS FOR LANDOWNERS

Trees are a long-term investment and you should be aware of any opportunities to help you achieve your long-term goals.

Over the years there have been a number of woodlot incentive programs that have subsidized management operations. Although some of these programs may no longer be in existence by the time you read this, it seems very likely that new ones will evolve in the future.

Managed Forest Tax Incentive Program (MFTIP)

- ▶ encourages eligible non-farm landowners to create and follow a management plan
- ▶ taxes eligible areas at 25% of the municipal tax rate for residential property
- ▶ contact the Ontario Forestry Association (1-800-387-0790) or the Ontario Woodlot Association (1-888-791-1103)

Conservation Land Tax Incentive Program

- ▶ protects significant wetlands and other areas of interest
- ▶ contact your local office of the Ontario Ministry of Natural Resources

Environmental Farm Plan (EFP)

- ▶ helps farmers adopt more environmentally sustainable practices
- ▶ refer to worksheets #22 and #23 and their accompanying info sheets to assess your forestry practices.
- ▶ contact the Ontario Soil and Crop Improvement Association (1-800-265-9751)

Trees Ontario Foundation

- ▶ provides a variety of incentive-based planting programs (1-800-265-9751)

Land Trusts

- ▶ are registered, charitable, non-profit organizations dedicated to preserving and protecting natural, historic and cultural areas
- ▶ designed to secure and protect sites through land purchase or donation, conservation easements, or cooperative programs with landowners

CONTINGENCY PLANNING

Like all agricultural practices, agroforestry operations are subject to unexpected events that may require a change in management philosophy. The management planning process can and should be considered a dynamic process where adjustments to the management plan may be required periodically.

As the planner, you can't be expected to account for everything. Here's what you can do:

- ▶ acknowledge that unexpected events may impact your existing management plan
- ▶ be aware that areas that are subject to invasive plants, like Buckthorn, may require a different management strategy
- ▶ identify firebreaks and access roads in your management plan for use during an emergency.

Not all disasters can be prevented. However, safety and prevention should be paramount. Remember to:

- ▶ promote forest health in your choices
- ▶ carefully assess safety risks
- ▶ remember that native insects are a natural part of the life cycle of a forest – evaluate any risks and options while considering a pest control operation
- ▶ seek professional help and advice.



Both plantings are 10 years old. The difference is that the Christmas tree plantation on the far left is ready for harvest and the Spruce plantation on the right will be managed for future timber harvests. Return on investment is not just measured in dollars, but time as well. Consider the time required for a proposed tree cover planting to provide return on investment.

PLANNING CONTINGENCIES	
EVENT	IMPACT
DROUGHT	<ul style="list-style-type: none"> drought can have both short- and long-term impacts on forest health moisture is the most limiting biological requirement
INSECT ATTACK	<ul style="list-style-type: none"> forests are often adapted to periodic insect damage or defoliation insects such as the Pine sawfly can seriously impact quality and value of young Pine and Spruce
DISEASE	<ul style="list-style-type: none"> invasive diseases such as White Pine blister rust can devastate plantings, causing economic loss and a decrease in reforestation
FIRE	<ul style="list-style-type: none"> seldom a problem in southern Ontario forests conifer stands are more susceptible than hardwoods
ICE, SNOW, WIND	<ul style="list-style-type: none"> physical damage to growing trees

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STEP 5 – DEVELOP MANAGEMENT PLAN

The management plan can be a formal document or an informal file, depending on the needs and intent of the landowner. The plan usually consists of a written section and maps. The written portion should include a:

- ▶ description of goals and objectives
- ▶ description of areas where tree cover is to be established
- ▶ description of long- and short-term goals
- ▶ management plans and prescriptions (actions to achieve goals and objectives)
- ▶ records for expenses, income and other information.

STEP 6 – IMPLEMENT PLAN

When implementing your plan:

- ▶ follow the management prescription – include environmental protection considerations
- ▶ record what you have done (even the briefest of notes will be helpful)
- ▶ take advantage of local sources of knowledge.



White Pine weevil can impact the quality and value of White Pine crop trees.