Millar Western Forest Products Ltd.

Chapter 7 – Building a Case for Integrated Land Management

2007-2016 Detailed Forest Management Plan

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1. Sustainable Resource and Environmental Management

1.1 Introduction

The intent of a Forest Management Plan (FMP) is to develop a long term harvest supply scenario that meets the social needs of the community, the biological needs of the forest while at the same time producing a long term fibre supply for the forest companies that have tenure on the land. Additionally, there is an expectation that other industrial land based interests will not be adversely affected by the operations of the forest based sector or the implementation of the FMP. The guiding documents that drive the details of the plan are the Alberta Forest Management Planning Standard and the Canadian Standards Association (CSA) Z809-02 Sustainable Forest Management: Requirements and Guidance, which is well imbedded within and directs much of the thrust of the Planning Standard.

1.2 Alberta Forest Management Planning Standard

Within the Planning Standard it states that “Alberta has adopted the CAN/CSA-Z809-2002 *Sustainable Forest Management: Requirements and Guidance Document* (referred to as CSA Z809-02) as the forest management planning system. ….except where specifically excluded in the Alberta standard.”

The Alberta Standard speaks to a strong level of professionalism, one where "Alberta relies on the competence and professionalism of regulated forestry professionals (RFP) to apply sound forestry principles and practices.

The Standard also states that "FMPs prepared by industry in Alberta have limited scope owing to the rights granted in FMAs which are the rights to establish, grow and harvest and remove timber subject to FMP approval by Alberta.

Finally the Standard states that from time to time, Alberta prepares strategic land use plans (e.g., Integrated Resource Plans, Regional Sustainable Development Strategies) that address the integration of resource uses. Existing strategic land use plans take precedence over FMPs and provide strategic direction that shall be honored in the FMPs.

1.3 CSA Z809-02

Within the CSA document and specifically regarding the Criteria centered on the maintenance of the biotic and physical systems, four specific directions, out of a total of 6, are detailed with appropriate generalities for attainment:

- CCFM Criterion 1 — Conservation of Biological Diversity. Conserve biological diversity by maintaining integrity, function, and diversity of living organisms.
- CCFM Criterion 2 — Maintenance and Enhancement of Forest Ecosystem Condition and Productivity. Conserve forest ecosystem condition and productivity by maintaining the health, vitality, and rates of biological production.
- CCFM Criterion 3 — Conservation of Soil and Water Resources. Conserve soil and water resources by maintaining their quantity and quality in forest ecosystems.
- CCFM Criterion 4 — Forest Ecosystem Contributions to Global Ecological Cycles. Maintain forest conditions and management activities that contribute to the health of global ecological cycles.

2. Landscape Planning

2.1 Beyond the FMP

Millar Western has abided by the FMP document and produced a Plan that meets all requirements, or where inconsistencies do arise, has documented these inconsistencies with explanations as to why any deviations do occur. Upon reviewing the Planning Standard and before actual Plan development the Company undertook a review of potential outcomes based on scenarios that investigated non traditional planning elements. These elements were drivers of landscape biodiversity that within the time frames of the planning period had the potential to significantly alter the natural biological processes. Understanding the Planning Standard and the incorporation of CSA Z809-02 into the Standard it became obvious that, as professional foresters, these elements needed to be further investigated within the context of the Forest Management Plan (FMP) if we were to reliably report to the people of Alberta on forest sustainability over the planning period. Forest sustainability, in this case, is the maintenance of the natural environment over time and the processes therein.

In the Company's opinion, these non traditional planning elements needed to be discussed within the context of an Integrated Land Management and Cumulative Impact Assessment approach. Scenario outcomes needed to be developed that reflected realistic projections based on non traditional inputs and where the projections developed and the final suite of land projection scenarios presented were complete and accurate and portrayed realistic comprehensive outcomes based on all physical, biological and social patterns. These outcomes would represent potential forest states through time with the corresponding attributes, processes and values that make up the forest state. The outcomes needed to detail how these values were maintained, lost or deviated from natural trajectories as may be the case. It needed to be a sensitivity analysis of all relevant factors. This thought process came from the general assumption that there is a public value. The value being: one of maintenance of the natural environment and maintenance of all the processes and components therein. From this, as professionals in charge of that public trust, we should be developing ways and means to compliment this value and protect the natural capital over time.

It is argued that the FMP is not the vehicle to address long term biodiversity issues relative to all anthropogenic activities and natural processes. In fact the Province has and does address this issue through other planning processes some of which have been in existence for many decades. Processes such as Integrated Resource Plans have been in place since the 1980’s and current directives such as the Land Use Framework of Alberta promote the concepts of integrated land use development. In reality the FMP as directed through the Forest Management Agreement and reiterated through the Standard limit what the Plan can actually direct “FMPs prepared by industry in Alberta have limited scope owing to the rights granted in FMAs which are the rights to establish, grow and harvest and remove timber”. It is clear that the Province has no expectations that the FMP will direct land use at the higher level and that the Plan will only address the forest state relative to the timber industries operation within the forest and in isolation of all other projected anthropogenic activities. Additionally, the Province, through the Standard states that the FMP will take guidance from existing land use plans that take these higher level issues into account “Existing strategic land use plans take precedence over FMPs and provide strategic direction that shall be honored in the FMPs”.

Another direction given by the Standard is one of the competence of Professional Foresters. It states that “Alberta relies on the competence and professionalism of regulated forestry professionals (RFP) to apply sound forestry principles and practices” and that “the standard’s focus is to ensure a strong and direct connection between the desired future forest condition and a spatially planned harvest sequence…”.

These two factors, one of strategic direction from other land use plans and the other of professionalism raised a number of issues within the Company’s planning team. To the team there was no strong direction from other plans relative to the desired future forest condition and secondly it would be professionally compromising to produce a plan under the new Standard that did not address the issues surrounding multiple anthropogenic activities on the landscape and natural condition change (biological and physical) through time. That is not to say that the Plan was developed to take into account all activities, natural and anthropogenic, that impact on the forest state and give guidance as to how thresholds and tradeoffs should be developed. This is not within the scope of the Standard’s direction, but it was felt it was within the intent of the Standard for a FMP to be able to address perceived shortcomings and indicate areas of concern relative to the holistic planning approach the Province is developing. This is the professional minimal that is required when administering a public asset, one of understanding and expressing the limitations of the process. The Planning Team felt it was critical to undertake this type of review at this stage as the direction the Standard sets is different relative to previous documents that directed the FMP process and Millar Western was one of the first Companies to develop a FMP under the new Standard.

2.2 Cumulative Impact Modeling Methods

The issues that the Company undertook were of a landscape nature, that is to say, issues that had the potential of fundamentally changing the forest landscape through time. Forest harvesting operations is obviously one element that has a high potential to move the forest state along a certain trajectory and is the one that the Planning Standard focuses on but there are other issues outside the scope of the Standard that impact on the landscape to the same if not higher degree. Elements such as climate change, human population, wildfire incidence relative to changes in climate and human population and finally oil and gas activity all have significant permanent impacts on the landscape relative to the forest condition (Figure 1). These are the elements that the Company undertook to investigate as minimal inputs into understanding forest trajectories over time. There is no direction from strategic level plans or accommodations within the Standard that allow for this level of analysis, yet these issues are the ones that will drive the greatest change to the forest state over the next 200 years.

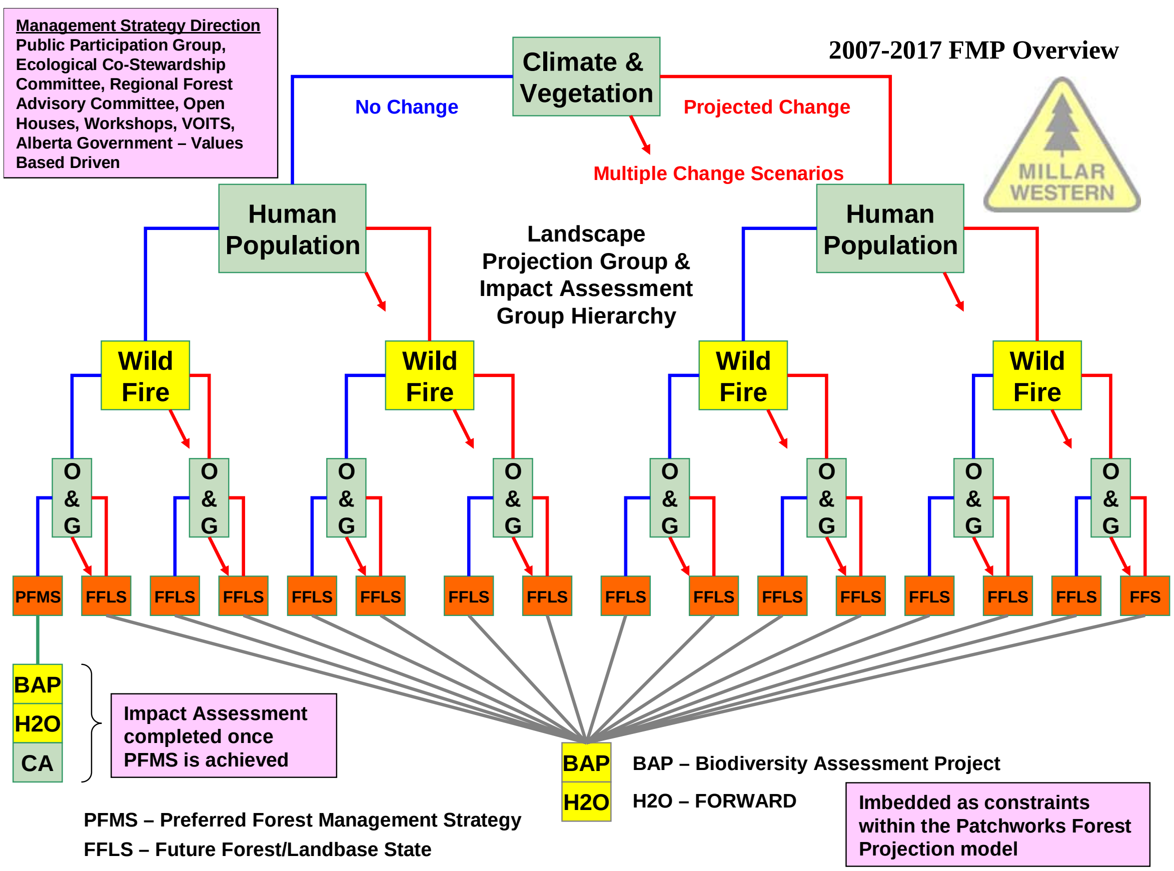

Figure 1. Landscape modeling framework

The Company structured the FMP into two distinct areas of analyses, one being the traditional timber supply scenarios with accompanying state of the art output analysis using indicator models regarding biodiversity and water quantity. The other area was one of landscape change through time reviewing combinations of the five landscape level drivers (climate change, human population, wild fire, oil & gas, timber harvesting). In addition to the landscape issue scenarios, some level of coarse filter biodiversity measures were added for comparative analysis. The first area of analysis (traditional timber supply) is the section that is directed by the Planning Standard. This forms the bulk of the FMP and sets the annual allowable cut for the next ten years. Coupled with this timber supply is the Company's biodiversity analysis (BAP) and water quantity analysis (FORWARD), both of which are leading edge applied research initiatives that help form constraints to the forecasting, annual allowable cut and SHS and additionally perform post preferred forest management scenario development analysis at multiple levels.

The second area of analysis (landscape projections) is the section found in Appendices XIX, XX and XXI where the concepts of Integrated Land Management and Cumulative Impact Assessment are introduced. The premise within the work contained within these Appendices was not to develop a definitive future forest scenario based on landscape projections or develop a landscape projection that could be subsequently used to calculate timber supply. The premise was to develop a proof of concept approach to demonstrate that larger issues relative to landscape changes over time could be addressed in a holistic fashion. To demonstrate that these landscape issues need to be addressed, it is technically possible to address these issues and that it is necessary to further develop mechanisms that adequately address cumulative impacts and integrated resource management issues. This second area of approach, that of developing an understanding of landscape change and cumulative impact assessment, focused on developing realistic scenarios that produced results that could be compared to the Planning Standard PFMP run and were comparable when similar parameters of initiation and projection were used.

Within Figure 1, the TSA run that can be compared to the PFMP TSA is the one stream where climate change, human population change, wildfire and oil & gas have a "no change" projection. This represents a static landbase relative to these four conditions over the planning period of 200 years with the only dynamic in the forest state being that of timber harvesting. This focused scope of analysis was developed using similar yield curves, calibrated to those of MGM and verified against those applied in the TSA (Duchesneau et al., *Appendix XX*), an identical land base, similar rules for post harvest stand establishment and a method to establish the highest harvest rate so that shortfalls in supply are never encountered. The remaining 15 runs (Figure 1) illustrate the potential projections and analysis that could have been undertaken relative to the landscape projection level of analysis. This shows the combinations of different landscape activities that the Planning Team initially thought wise to investigate. Each of the four landscape parameters shows two trajectories being "no change" and "projected change". This is a simplistic representation of what was actually analyzed. The no change scenario is obviously only tracked on that one path but the projected change scenario can have multiple trajectories associated with it dependent upon what parameters or combinations of parameters were incorporated into each run. For example, climate change is a projection and within this area of prediction many models and many iterations of each model produce multiple trajectories. These trajectories could then be combined with other activities such as harvesting and oil & gas to further increase the scenarios developed for review.

The Planning Team investigated the different trajectories each landscape driver could be placed upon and also the combinations of landscape drivers and arrived at a suite of 9 scenarios that were to be tested (Table 1). These scenarios not only represented the reasonable extremes of predictions that could be developed but also interactions that needed to be explored at the landscape level. The outcomes predict what, within the limitations of the analysis, will happen to the future forest landscape and as described within *Appendix XIX – Cumulative Impacts Modeling on the DFA* and differ significantly from the projected landscape outcome of the Preferred Forest Management Scenario (PFMS). This makes sense in that the Cumulative Impacts Modeling has far more complexity relative to parameter input and behavior of the forest landscape than the PFMS and that in itself illustrates the reason Millar Western undertook this analysis. The point being that the level of complexity developed to undertake a TSA is extreme but the limit of scope is far to narrow to properly asses what the future forest condition will be. An inordinate amount of time is spent developing and refining yield curves, netting down the land base, developing a SHS and assessing this SHS and TSA relative to biodiversity issues but no time is spent on other issues that drive the landbase and drive it in a manner that is just as, if not more significant, than industrial forest activities and the metrics surrounding this enterprise.

Table 1. APLM scenarios and designation

APLM Model Scenario	Designation
Harvesting only	H
Harvesting and Fire	HF
Harvesting and Oil & Gas	HO
Harvesting, Fire and Oil & Gas	HFO
Fire Only	F
Fire and Climate Change	FC
Fire, Harvesting and Climate Change	HFC
Fire, Harvesting, Oil & Gas and Climate Change	HFOC
Fire, Harvesting, Oil & Gas, Demographic and Climate Change	HFOCD

As stated in the Standard "From time to time, Alberta prepares strategic land use plans (e.g., Integrated Resource Plans, Regional Sustainable Development Strategies) that address the integration of resource uses" there is an expectation that these issues will be dealt with in some form of planning context and then incorporated into the PFMS. To date, one would be hard pressed to describe how these issues are being dealt with in a comprehensive and integrated manner. This is not a criticism of the Government of Alberta, the Planning Standard or the various industries and other users of the forest. It is a comment that states the obvious and describes a situation that must be addressed. The Planning Standard directs the development of a detailed comprehensive plan that is technically defensible and in isolation of other factors an accurate portrayal of what will occur. That is what the Planning Standard is designed to do and this is what the Planning Standard accomplishes. With the complexity of the activities within the forest state and pressures relative to biotic processes placed on the landscape the current planning process is not longer adequate to serve the interests of the public and the well being of the natural forest. There needs to be a process where cumulative impact scenarios can be developed, thresholds to activities can be set (as in the forest industry with sustained timber supply constraints) and tradeoff analysis can be undertaken.

The alternate projections developed by the Planning Team and the process therein used illustrate how this can be accomplished. The cumulative impacts modeling illustrates a relative range of likely outcomes, a range which differs significantly from the PFMS. This exercise was not completed to develop definitive future forest projections; it was developed to illustrate first and foremost a proof of concept approach that drivers could be integrated into a comprehensive planning tool that would identify areas of concern relative to the forest state. This next step needs to be taken by the people of Alberta if indeed they want to protect and maintain the natural capital of the forest over time.

2.3 Cumulative Impact Modeling Results

Within the FMP Appendices XIX, XX and XXI address the landscape issues as identified by Millar Western. *Appendix XIX – Cumulative Impact Modeling on the DFA* is the document that projects the various landscape conditions with the *Appendix XX – Impacts of Climate Change at the Stand Level* and *Appendix XXI –Population Projections and Impacts* being part of the supporting documentation for the Cumulative Impacts Modeling of the DFA. The cumulative impacts modeling developed future forest scenarios for 16 combinations of landscape activities, and then analyzed these landscape patterns using some coarse filter biodiversity metrics and timber supply outcomes. From this analysis significant differences became apparent and are explained in detail in *Appendix XIX*.

An example of the output is mean patch size of old forest at the end of the 200-year planning horizon which fluctuates from a natural condition (fire only) of approximately 4,000 ha., to 6,000 ha. (harvesting only - TSA run) to a high of 19,000 ha. (fire with harvest) (refer to *Appendix XIX* page 51 for these results). These are dramatic differences especially if one is relying on old growth patches to be used as a surrogate for other values such as Pine Martin populations. These differences will have dramatic outcomes on how this value is understood in terms of abundance and additionally, how it is placed on the landscape and how management strategies can be developed to account for and maintain this attribute.

Another example shows that harvesting-only leads to 239,000 ha of core area (all forest types combined) for the DFA (95,000 ha and 144,000 ha for W11 and W13, respectively), and that this amount decreases to 206,000 ha with fire and decreases yet again to 183,000 ha with fire and harvesting (Table 2). Thus, under the assumptions of the TSA, harvesting only leads to more forest core area, preferred by many species (Robinson et al. 1995), than either fire only or harvesting and fire. By comparing the F scenario (the natural disturbance regime standard) to the HF scenario, we find that there is an 11% drop in forest core area. Similar trends can be observed with other BAP indicators, such as old forest core area and contrast-weighted edge length. These results suggest an important fragmentation of habitat from the combined effects of harvesting and fire within the DFA, an effect which could only have been detected with spatial analysis of the combined impacts of fire and harvesting.

Table 2. Summary of APLM scenarios by timber supply and biodiversity indicators

Scenario	Abbrev.	Timber supply indicators[3] Mean volume harvested (m3)	Volume harvested (% of H only) (%)	Mean fire return interval[1] (years)	Biodiversity indicators[4] Sum forest core area (ha)	Sum forest patch area (ha)	Mean contrast-weighed edge length[2]	Mean forest patch size[2] (ha)	Mean edge contrast index[2]
Harvesting	H	577,746	100	N/A	238,556	48,618	19,045	9.27	0.617
Harvesting, fire	HF	434,138	75	89	182,662	8,130	22,059	5.11	0.620
Harvesting, oil & gas	HO	564,431	98	N/A	222,166	48,013	20,953	8.81	0.650
Harvesting, fire, oil & gas	HFO	419,717	73	91	168,843	6,709	24,057	4.94	0.628
Fire	F	N/A	N/A	90	205,610	21,053	21,887	5.27	0.618
Fire, climate change	FC	N/A	N/A	80	317,350	72,076	12,742	13.79	0.619
Harvesting, fire, climate change	HFC	418,997	73	67	288,172	25,476	13,005	13.63	0.603
Harvesting, fire, oil & gas, climate change	HFOC	356,851	62	68	275,500	23,343	15,354	11.91	0.595
Harvesting, fire, oil & gas, climate change, demographics	HFOCD	336,151	58	62	269,633	20,917	15,968	12.45	0.602

[1] Due to the variability of this variable, the mean over 5 repetitions is reported here.
[2] These biodiversity indicators were evaluated separately for W11 and W13, and the area-weighted mean of the two values are reported here.
[3] Timber supply indicators are 200-year mean values.
[4] Biodiversity indicators derived at end point of simulation (200 years).

APLM was run in a full factorial design to determine the potential contribution for change from each of the identified elements of landscape change (refer to *Appendix XIX* page 69). Results of the factorial experiment, showing summary values (means) of the key indicators from APLM output, for each level of the disturbance agents were prepared (Table 3). Means shown in bold identify the indicators on which the disturbance agent had a significant impact. Certain results, such as fire return interval when fire is off, were not applicable (indicated by "n.a."). Table 4 shows the percent change in the indicator variables that result from the disturbance agent being turned on.

Table 3. APLM full factorial results.

Change Element	Level	Area above 100 years (ha)	Fire Return Interval (years)	Volume Harvested (m^3/yr)	AAC Short Falls per Run (count)	Area Forested (ha)	Volume from Seismic (m^3/yr)
Fire	Off	**227,090**	n.a.	**568,188**	**3.75**	418,723	**11,329**
	On	**100,176**	78.95	**358,741**	**117.58**	418,686	**5,440**
Harvesting	Off	**227,907**	**86.44**	n.a.	n.a.	418,686	**13,786**
	On	**99,359**	**71.45**	463464	60.67	418,723	**2,983**
Oil And Gas	Off	165,190	**72.21**	472,773	60.88	**433,559**	n.a.
	Low	164,983	**80.46**	463,858	58.00	**416,602**	**5,758**
	High	160,725	**84.19**	453,762	63.13	**405,952**	**11,011**
Climate Change	Off	163,644	**83.31**	466,701	57.08	418,714	8,381
	On	163,622	**74.59**	460,228	64.25	418,695	8,388
Demographic Change	Off	164,501	**82.29**	468,743	58.75	418,724	8,350
	On	162,765	**75.61**	458,186	62.58	418,685	8,419

Table 4. APLM full factorial percent change results.

Change Element	Level	Area above 100 years (ha)	Fire Return Interval (years)	Volume Harvested (m^3/yr)	AAC Short Falls per Run (count)	Area Forested (ha)	Volume from Seismic (m^3/yr)
Fire	On	**-56**	n.a.	**-37**	**3036**	0	**-52**
Harvesting	On	**-56**	**-17**	n.a.	n.a.	0	**-78**
Oil And Gas	Low	0	**11**	-2	-5	**-4**	n.a.
	High	-3	**5**	-2	9	**-3**	**91**
Climate Change	On	0	**-10**	-1	13	0	0
Demographic Change	On	-1	**-8**	-2	7	0	1

Based on these results, fire and harvesting had similar, significant impacts on forest age. Fire was the only change element to have a significant negative impact on harvest volume and AAC shortfalls (the number of periods when AAC volumes could not be attained).

Oil and gas activity, had a significant positive impact on the fire return interval because the additional roads and other linear features stopped fire spread within the model. This may not represent the impact of grass on spring fire behaviour such as the Virginia Hills burn where fire spread along grassed linear disturbances. Oil and gas activity had a small negative impact on the forest landbase, but did not have a significant impact on AAC. Coal bed methane extraction was not included in APLM, so the oil and gas activity level and impacts are conservative.

Climate change had a significant negative impact (-10%) on the fire return interval, but not on the annual harvest volume. The insignificant harvest volume impact is likely due to increases in stand level growth (of approximately 10%) from warmer climate, offsetting the decrease due to more fires. The impact of migration of ecotypes across the DFA due to less moisture (*i.e.* more aspen parkland in the DFA) was not included in this version of APLM and would be expected to increase climate change effects.

Human population (demographic change) had a significant impact only on the fire return interval. More people utilizing the forest increases the chance of human caused fires. Increases in human population would likely be felt more on the social level; via pressure to change forested green zone to other uses, or to reduce harvesting if forested areas are used more for recreation. Indicators and processes were not developed for these impacts.

2.4 Patterns on the Landscape

One of the major limitations within the landscape projection work that we undertook was that of landscape pattern and the interconnections of landscapes across a much broader terrain than just a single FMA area or indeed that of just the industrial forest. Additionally, when Cumulative Impacts and Integrated Land Management concepts are discussed, the issues surrounding complex landscapes are rarely, if ever, defined. Due to costs, time and the shear complexity of the analysis necessary these issues were never dealt with in the Company's Landscape projection process. It is of such an importance, however, that some explanation as per the concept itself needs to be brought forward. To illustrate this point, the terrestrial landscape units can be divided into five categories.

Non-inhabited land is land that contains neither industrial nor societal activities and that, for all intents and purposes, has a high level of natural environmental integrity. These areas may, to some extent, be impacted by world-wide pollutant levels and may also be under some level of stress due to global climate change. But for the most part, man's direct impact on the local environment is small to non existent. An example of this type of area would be Axel Heiberg Island in Canada's arctic archipelago.

Protected land is land that may contain human encroachments of various types and may contain distorted natural ecological trajectories due to various anthropogenic activities such as wildfire protection or park infrastructures. The types and extent of human involvement vary depending on protected area designation, but many of the natural processes persist in a relatively undisturbed state. An example of this type of area would be Banff National Park.

Urban land usually contains none or an exceedingly small and distorted level of some natural processes. These areas are constructed and maintained entirely for human habitation and commerce. An example would be any major city, but small cities, towns and villages follow similar concepts in design and use. Included in these areas would also be industrial complexes and infrastructure designed to maintain the urban and industrial settings.

Rural Lands, although more aesthetically pleasing and, at a quick glance, seem to maintain many aspects of the natural environment, are in actuality very similar to urban environments in their paucity of natural processes. Most rural areas, such as farms, are monocultures where natural processes are not only virtually nonexistent but actively discouraged through pesticide applications, cultivation practices and minimum retention of natural areas such as woodlots and riparian areas. If any processes do occur, they are limited in extent, type and complexity by the heavily fragmented nature of the rural setting.

Industrial lands are areas where all or much of the natural resources contained within are commercially extracted for human use. By far these lands are usually forested lands. Many environmental elements or processes are maintained; however, the extent, both spatially and quantitatively, may be distorted from natural trajectories. There is also the possibility that some processes have been reduced to critical levels or possibly eliminated altogether. Most Industrial land is made up of industrial forests, which include not just forestry but also oil & gas, mining, trapping, hunting, fishing, hiking, ATV/snowmobile use, horse back riding and many other activities that have influence on the trajectories of natural processes. These trajectories or variances, within the natural process are called the natural range of variation. To define natural range of variation, most biotic elements under normal natural conditions are not in a steady state relative to amount and distribution. The temporal cycles that these biotic elements go through with attending populations, densities and spatial distributions are called the natural range of variation. Millar Western's FMA area forms part of an Industrial land complex within the Whitecourt area.

In general, Cumulative Impacts and Integrated Land Management are only discussed in relation to the industrial landscape unit or industrial forest state and this is done for several reasons. As the primary landowner, it is relatively easy for government to set direction for activities that occur on this land base. As well, society, by and large, does not have to make decisions that impact on their own personal land-use biases and any costs associated with these decisions can usually be deferred to industry. There is also a perception that the interface between nature and humans in these areas has the greatest potential for returns for energy expended. While these assumptions are indeed correct, they by no means preclude other land use units, extents and assemblages from being directed by an ILM process.

The critical issue that appears to be missing is that of a long term direction or coordination for the entire assemblage of landbase units. It is not just the interactions within a landbase unit, such as Industrial Forest Land or a specific FMA, but also the interactions between landbase units, such as Urban Land Encroachment on Industrial Forested Land that need to be understood and accounted for. When developing an ILM process and to truly protect and maintain natural environmental processes and identified values, it becomes obvious that we must, initially, take a jurisdictional approach and start to investigate meaningful scales both in time and landscape to address the complexities that arise from these issues. Jurisdictional approach, in that you need a level of authority over the landscape that allows for coordination and direction of the human interface and one that is ultimately directed by that human element. There needs to be a jurisdictional level of authority that develops tradeoffs based on human values and needs, one that is accountable to the public.

To try to maintain biodiversity in a landbase unit in isolation of its surroundings and the internal developments within landscape units surrounding it is not truly understanding the entire scope of the ILM issue. Ideally, you must formulate gross trajectories and goals at these higher levels and then develop lower level goals and objectives within each landscape pattern to have any long term positive impact on maintenance of bio-integrity and land unit goals.

In addition to the issues of landbase assemblages and patterns on the landscape, is one of size. A natural area of 36,000 square miles in isolation of all other natural areas will probably have more biotic integrity than an area of 36 square miles in isolation of all other natural areas. The assemblage of pattern, size and interconnectedness between landbase units are considerations that need to be fully explored when developing an ILM system.

When developing a landscape plan for a specific geographic area, one needs to step back and develop tactics for the larger issue of landbase units, external factors impacting on all units, the size of these units, the placement, the interfaces, the interactions and the potential for encroachment before coming down to the question of processes within each unit. A focus on both these scales and multiple others as necessary are truly important in developing an integrated land management program.

The problem that arises with the entire landscape in general is one of planning. There is none. Management of land at these scales is not done with biointegrity being a major factor in the equation. It is not done fully understanding, even at a coarse level, the impacts landscape unit change has on biointegrity. It is not done with any real formal planning approach and unfortunately it is usually done in an ad hoc manner with economics and politics being the only considerations.

There should be a clear, transparent and organized process that develops landscape trajectories, monitors these trajectories through time and develops adaptive management techniques to ensure trajectories are maintained. ILM is not an issue that should just be directed towards a forest state that is commercially exploited, as is the common mindset. It should be a societal undertaking by which we manage all lands in an environmentally acceptable way and include a human interface that accepts limitations and has respect for the environment. All land types, whether non-inhabited, protected, urban, rural or industrial, should have an ILM process. Indeed, the process should extend to the assemblages and extents of these types across the entire landscape.

3. Integrated Land Management

3.1 Integrated Land Management Planning

The entire concept of ILM must involve, on a technical level, a method of implementation. There also needs to be the political will and the bureaucratic understanding to implement the concepts of ILM and industrial involvement to move from conceptual understanding to actual implementation. Generally, people tend to agree with the idea of ILM but lack the willingness to follow through with implementation. It is not difficult to understand the concepts, the difficulty lies in generating the desire to carry them forward.

Integrated Land Management consists of two basic concepts:

- Better coordination and integration of policy, planning and decision-making, including adaptive management; and

- A central role for cumulative effects assessment and management in the formal planning and decision making process.

3.2 Integration of Policy, Planning and Decisions

In general, legislation is written for specific purposes and government structure is developed and enabled to handle implementation of the legislation. This develops a silo effect in government where specific bureaucratic processes evolve around specific issues in isolation of broader concepts for management.

There is a need, therefore, to shift the management focus from control of individual activities, approvals and dispositions to developing an understanding of regional values and, thereby, setting and achieving regional goals. These goals must be set within the triad of human values being social, environmental and economic. In this way the tradeoffs between conflicting values and goals are understood in advance and debate as to the accepted course of action has fully been reviewed and has taken into consideration the science, analysis of long term implications and outcomes of these decisions

There are technical issues that need to be addressed when implementing ILM specific to integration of policy, planning and decision making.

- ILM needs to be done at appropriate land scales. It needs to be done understanding the influences of the surrounding landscape units and it needs to be done understanding the trajectories that the surrounding landscape units are projected to be on.

- A management system has to be developed to foster integrated, transparent and fair processes that ensures that a strategic direction is implemented and cumulative effects are addressed. This process, to remain credible and effective must not be subordinate to short term economic gain or political influence.

- Management needs to be shifted from control of individual activities and approvals to regional outcomes and achievement of regional goals based on values that have been derived from an ILM process. These values must be clear and understood and if there is political redirection, an explanation relative to the redirection with accompanying science and cumulative effects assessment must be produced and defended.

- An adaptive management processes within a Cumulative Effects Management System (CEMS) needs to be developed.

- Government departments must coordinate their review and approval processes taking into consideration multi-sector activities and the potential cumulative impacts these activities will have. They must develop an integrated system of review, one that reflects the landscape unit's values and one that ensures accountable for the decisions made, with ultimately one department being charged with and accountable for integrated decision making at the landscape level.

3.3 Cumulative Effects Assessment & Management

There needs to be an emphasis placed on the integration of regional cumulative assessment and management into the planning, approval and management processes. In other words, we need to take into account all activities and end the practice of thinking in silos. This precludes the use of the present system for planning and disposition approval and requires the development of new processes that incorporate projections based on current and future land-use decisions.

It should be understood that the current process of Forest Management Agreements, Forest Management Plans, oil & gas leases, trap lines, public access and all other land use reviews and approvals represent dated methods of landbase management, methods that reflect the silo approach to land management. If ILM is to truly move us forward we must reconsider how planning is done and implemented on the landscape. System redesign, not based on incremental changes to the current process, but based on implementing an ILM system needs to be considered as an initial step to land base use reform.

There is also a need to develop within government the mentality to review and approve applications based on cumulative impacts where goals for the landscape unit have been set and there is an understanding that they will be maintained. This must be done considering multi-stakeholder activities and with the understanding that there will definitely be limits placed on activities, whether industrial, municipal or recreational in nature.

The concepts spoken to in this section are not new to the industries of Alberta or to the Government of Alberta. These concepts were well developed within the North East Slops Resource and Environmental Management Strategy produced for the Government of Alberta in March, 2003. That Document detailed the current resource strategy of the Province and outlined an alternative process, the Cumulative Effects Management System. This system has merit and was the basis for the development of the Landscape Modeling process that Millar Western undertook in this Forest Management Plan.

The Company wanted to demonstrate that ILM can be done. There are modeling capabilities that can accomplish complex tasks with disparate pieces of information. Experts in specific fields can combine with other experts in entirely different fields and come to a common understanding and develop inputs to solve problems with cross disciplinary links. Data sets can be developed and shared with common cross over languages and outcomes can be developed incorporating diverse value sets.

Millar Western has developed fields of expertise that involve water quality and quantity experts, social scientists, biologists, programmers, foresters, engineers and other disciplines that work together as a unit to produce scenarios as described in the Landscape Modeling report. Additionally these groups have also contributed to the PFMS by way of contributing constraints to the Patchworks model and additionally as post TSA development where various levels of assessment are undertaken on the TSA and SHS. The proof of concept approach has been developed successfully within the Company planning process. The results and knowledge gained from the development and implementation of this process could easily be exported to any other level of planning. The major issues surrounding the concept of ILM are ones of value development, cumulative impact assessment and tradeoff analysis. These can be, as demonstrated by this plan, and need to be, as explained within this section, fully incorporated into any landscape planning process for ILM to work successfully.

It should be noted that ILM, ultimately, is based on social values, however, there is no universal value for all situations, and the value for today in all likelihood will change tomorrow as the values of society change through time. It can only be hoped that within society, there will always be an ethic to preserve the natural community and allow it to thrive alongside mans ambition for development and exploitation.

4. Conclusion

In addition to the Impact Assessment Groups established to meet Alberta Planning Standard requirements, Millar Western also established a number of Landscape Projection Groups (LPGs), to identify, for the purposes of discussion, emerging issues that have the potential to greatly influence the landbase but which are not within the scope of the current Alberta planning standard: climate change, human population dynamics, wildfire and oil and gas development. The findings of these LPGs, confirm that these emerging issues are indeed significant and likely to have a major bearing on future sustainability of the forest. The challenge for governments, forest companies and other stakeholders is to try to understand their implications at an early stage and develop policies and management strategies that are anticipatory rather than reactive. Millar Western is committed to continuing to monitor these issues, both to make informed contributions to policy discussions and to ensure its own management plans reflect developments on all fronts – economic, ecological and social.

5. References

Alberta Sustainable Resource Development, April 2006. Alberta Forest Management Planning Standard. Version 4.1.

Canadian Standards Association, 2002 (updated May 2003), Z809-02 Sustainable Forest Management: Requirements and Guidance, Mississauga, ON, Canada, ISBN 1-55397-087-X.

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