Draft Land Use Options Atlas
Deh Cho Land Use Planning Committee - July 2004
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Introduction

The Deh Cho Land Use Planning Committee was established in May 2001 following the signing of the Deh Cho First Nations Interim Measures Agreement (IMA). The Committee consists of 2 representatives from the Deh Cho First Nations (Tim Lennie and Petr Cizek), one representative from the Government of the Northwest Territories (Bea Lepine), one representative from the Government of Canada (Adrian Boyd), and the Chairman (Herb Norwegian). The Deh Cho Land Use Planning Committee will develop a land use plan as a management tool to determine what type of land use activities should occur and where they should take place. This plan will balance economic, social, environmental and cultural needs and interests. It will be guided by the principles of sustainable development and respect for the land as understood and explained by the Deh Cho Elders.

What is Land Use Planning?

Land use planning outlines what types of activities should occur, where they should take place and the terms and conditions necessary to guide land use decisions over time. It requires a clear vision of how we want the land and the people to be in 20 or 30 years. The plan becomes the roadmap that guides decisions at every turn to take us where we want to go. Once approved the land use plan will provide legally binding direction to regulatory agencies and decision-makers in their assessment of development projects, protected area proposals and other land uses. The planning area (see map) excludes municipal areas and Nahanni National Park Reserve.

The Planning Process

The Committee’s process was established through a set of guidelines in the IMA which were formally adopted as our Terms of Reference. This process set out four phases:

- PHASE 1 – Committee Establishment and Office Setup
- PHASE 2 – Information Gathering and Analysis
- PHASE 3 – Plan Preparation
- PHASE 4 – Plan Implementation

The Committee spent considerable time in Phase 2 - Information Gathering and Analysis. We completed a seven year mapping project on Traditional Use and Occupancy and has provided our Committee with summary information for use in our planning process. We have now combined all the available information we have into a set of preliminary Land Use Options for your consideration. While we consider Phase 2 essentially complete, there may be a need to revisit some of these topics again as we move through the planning process towards a completed land use plan.

Our next phase – Plan Development – involves revising the Land Use Options as required until a final land use map has been selected. The land use plan will then be developed to support and explain the land use decisions.

Plan Implementation begins after the land use plan has been approved. All new developments must conform to the land use plan or they will not be approved. The completed land use plan will be revised upon the completion of the Deh Cho Process (estimated for 2008) to be consistent with the terms of the Final Agreement. Thereafter, the Plan will be revised every 5 years.

Land Use Options

Land Use Options represent different visions for how we might develop the land and resources in the Deh Cho territory. We have chosen 5 options that show different levels of resource development to start discussions about overall priorities. The Land Use Options are based on the available information the Committee has collected. We will be presenting these options to communities and planning partners and asking for detailed feedback. We will then be revising the Land Use Options based on the feedback we get to better reflect regional priorities.

Purpose

The purpose of this document is to provide a summary of the information and analysis used to develop preliminary Land Use Options and run the Economic Development Assessment Model. We’ve chosen a combination of text and maps to fully explain all the steps we’ve taken to move from the original data to the Land Use Options. It begins with a look at the current situation, then proceeds through the conservation and development input layers. Next the Land Use Options are presented, followed by a comparison of the economic implications of each option. We would like communities and planning partners to carefully review this document and consider the following questions:

- Does the information adequately describe common land uses in the Deh Cho territory?
- Are the analysis and assumptions used appropriate?
- Do the options adequately represent your interests?
- Which option provides for a level of development and conservation that you are most comfortable with?
- Which option (or combination) best meets your needs?
- How should the options be revised?

This document is meant to provide communities and planning partners with the background information required to make informed decisions about the future development of the Deh Cho territory. Please review it and send us your comments.
The Deh Cho Territory

The Deh Cho territory is located in the southwestern corner of the Northwest Territories and covers approximately 210,000 square kilometers (see Figure 1 on this page). The Deh Cho Land Use Plan includes all areas within the boundary on Map 1, except Nahanni National Park Reserve and municipal boundaries.

The Deh Cho territory is home to 6866 people, of which 56.3% are of Dene or Metis descent. There are 11 communities: Fort Providence, Kakisa, Enterprise, Hay River, Hay River Reserve, Trout Lake, Jean Marie River, Fort Simpson, Wrigley, Nahanni Butte and Fort Liard. Hay River and Enterprise are non-aboriginal communities. Hay River is the largest with 3611 people and serves as a major business centre for the Deh Cho. Besides Fort Simpson (1257 people), Fort Providence (748 people) and Fort Liard (512 people), the remaining communities range in size from approximately 36 people (Kakisa) to around 167 (Wrigley).

Aboriginal rights and title are currently being negotiated in the Deh Cho territory through the lands and self-government talks known as the Deh Cho Process (http://nwt-tno.inac-aic.gc.ca/dehcho/index_e.html). There is a regional office plus 13 aboriginal organizations that form the Deh Cho First Nations (DCFN). They are:

- Deh Cho First Nations (regional office in Fort Simpson)
- Acho Dene Koe Band (Fort Liard)
- Fort Liard Metis Local 67
- Jean Marie River First Nation
- Nahanni Butte Band
- Sambaa K’e Dene Band
- Deh Gah Gotie Dene Council (Fort Providence)
- Fort Providence Metis Local 57
- Ka’a’gee Tu First Nation (Kakisa)
- Pehdzeh Ki First Nation (Wrigley)
- Katlodeeche First Nation (Hay River Reserve)
- West Point First Nation (Hay River)
- Liidli Kue First Nation (Fort Simpson) and
- Fort Simpson Metis Local 52.

Most of the communities are accessible by the main highway system. Trout Lake and Nahanni Butte have winter road access only. There are ferry/winter road crossings over the Mackenzie River near Fort Providence and Camsell Bend, and another over the Liard River by Fort Simpson. There are plans to construct a bridge at the Fort Providence crossing for 2006.

1 – 2001 Census, Statistics Canada. Available at www.statscan.ca)
On April 17th, 2003 the Government of Canada and the Deh Cho First Nations signed the Interim Land Withdrawals Agreement, withdrawing 70,718 square kilometres or 33% of the Deh Cho territory from development for the next 5 years. Coupled with the existing Nahanni National Park Reserve, and Edehzhie (withdrawn in October 2002 through the Protected Areas Strategy), almost 50% of the Deh Cho is now off limits to new development. Pehdzeh Ki Deh is a new candidate site for the Protected Areas Strategy and has not yet been withdrawn. Trout Lake has recently completed a background document to advance lands around their community for protection under the Protected Areas Strategy.

Land is withdrawn through a Federal Order in Council under the Territorial Lands Act. Withdrawals can be for both the surface and subsurface rights, or subsurface only. The Deh Cho First Nations Interim Measures Agreement states that lands may be withdrawn using the following criteria:

a. Lands harvested for food and medicinal purposes;
b. Culturally and spiritually significant areas;
c. Lands which are ecologically sensitive; and
d. Watershed protection.

The land withdrawals were determined by combining maps of traditional use with known sensitive ecological areas. In most cases, both the surface and subsurface rights were withdrawn. The subsurface only withdrawals were used in known timber productive areas to allow timber harvesting to occur.

The purpose of the withdrawal is to provide interim protection while the planning process is undertaken. The Deh Cho Land Use Planning Committee has been busy gathering new information to better identify areas of high conservation value and areas with high resource potential where development should be focused. We will compare our results with the current withdrawals and revise them as required, in consultation with communities and our planning partners.

The designation does not protect the land or habitat.

Example: The Wildlife Act designates Wildlife Sanctuaries, which protect specific species (e.g., Bison).

Note: A Wildlife Sanctuary, designated by the GNWT Wildlife Act, places controls on the hunting of wildlife to protect specific species (e.g., Bison).

The designation does not protect the land or habitat.

Map 2: Interim Land Withdrawals

Legend:
- Interim Measures Agreement Boundary
- Provincial / Territorial Boundary
- Road, All Weather
- Road, Winter Access Only
- Trail
- Community

Protected Areas:
- National Parks (Nahanni and Wood Buffalo)
- Mackenzie Bison Wildlife Sanctuary

Interim Land Withdrawals:
- Surface and Subsurface Withdrawal
- Subsurface only Withdrawal

Candidate Protected Areas:
- Edézhé (Horn Plateau) Candidate Protected Area with Interim Protection
- Pehdzeh Ki Deh Candidate Protected Area
- Sambaa K'e Candidate Protected Area

Lands Advanced for Protection under the PAS:
- Subsurface only Withdrawal

Scale:
- Standard Parallels at 60°N and 65°N
- Central Meridian 122°W, Reference Latitude 60°N

Projection: Lambert Conformal Conic

Compiled By: Dah Cho Land Use Planning Committee
June 2004
Existing Activities and Third Party Interests

Map 3 shows the existing activities and third party interests in the Deh Cho. These are areas where someone has certain rights to the land that must be recognized. This might be the right to drill a gas well, look for minerals, build a cabin, access the land, etc. Development has been proceeding in the Deh Cho for many years now. The land use plan will not affect existing 3rd party interests; that is, any new terms and conditions set in the plan will not apply to existing developments, dispositions, permits, licenses, claims, or leases.

We are also showing existing disturbance on map 3. These are areas where the land has been changed by human use, usually for resource development or settlement purposes. Disturbed areas include clearings, airports, road-side pullouts, highways, trails, winter roads, seismic lines, campgrounds, dumps, town sites, quarries, cutblocks, and any other kind of human use area. It is important to show these areas, because once human use becomes too high in an area, some animals such as caribou will leave in search of places where there is less human activity.

It is important to know where development already exists when planning for future land uses. For example, you would not want to propose a new protected area in a spot with many 3rd party dispositions or lots of disturbance. On the other hand, it makes sense to plan for more development in areas where it is already concentrated as there is usually some basic infrastructure and access already setup which makes new projects cheaper to develop.

Most of the activity and disturbance is concentrated in a few areas. Fort Liard and Cameron Hills have seen a lot of oil and gas activity as shown by the amount of third party interests in those areas. There are a number of oil and gas wells all across the southern part of the Deh Cho. Since access is a major cost for any kind of development, those that can be reached by existing roads or rivers will be developed first. That creates a lot of activity along the major transportation routes. The two existing mines in the Deh Cho, Prairie Creek and Cantung near Nahanni National Park Reserve, are shown as existing mineral leases.

Finally, the existing Enbridge pipeline is shown as well as the proposed corridor for the Mackenzie Valley Pipeline. While the pipeline has not yet been approved, it is important to keep the route in mind when making future land use decisions.
Map 3: Existing Activities and Third Party Interests

LEGEND

- Human Disturbance as interpreted from Indian Resource Satellite (IRS) Images (both linear and area features)
- Setlu Settlement Land
- Mineral Claim / Lease (active)
- Prospecting Permit (active)
- Oil and Gas Lease / License / Permit (active)
- Proposed Mackenzie Gas Pipeline
- Existing Pipelines
- Oil and Gas Occurrences
  - Oil and Gas Wells (active and historic)
  - Well Activity (Winter 02 - 03)
- Land Use Permits (active)
- Surface Dispositions (active)
- Mineral Showings
- Mine Sites (e.g. Poxon Creek, Centung, Coates Lake, Pine Point)
Overview of Land Use Options Analysis

Land use options were created in a two step process. The first step was to group the input layers into two major layers – the Conservation Value and Development Potential maps.

The Conservation Value map was created by combining 6 input layers using a “Maximum Rank” method – the highest rank of the 6 input layers set the rank for the Conservation Value map. This process is illustrated below. The input layers were combined into the following 3 maps:
- Wildlife Habitat Value
- Traditional Land Use and Occupancy
- Archeology, Rare Features, Historic Sites and Cabins

The Development Potential Map was created by combining the following input layers using a Maximum Rank method:
- Oil and Gas Potential
- Mineral Development Potential
- Agriculture Potential
- Forestry Potential
- Tourism Potential

The second step of the process was to combine the Conservation Value and Development Potential Maps into 5 Land Use Options. This was done by changing the weight or importance of each map. We wanted to create options that were suitably different. The final weighting used was:

<table>
<thead>
<tr>
<th>Option #</th>
<th>Conservation Value (%)</th>
<th>Development Potential (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40 %</td>
<td>60 %</td>
</tr>
<tr>
<td>2</td>
<td>45 %</td>
<td>55 %</td>
</tr>
<tr>
<td>3</td>
<td>50 %</td>
<td>50 %</td>
</tr>
<tr>
<td>4</td>
<td>55 %</td>
<td>45 %</td>
</tr>
<tr>
<td>5</td>
<td>60 %</td>
<td>40 %</td>
</tr>
</tbody>
</table>

Figure 1. Illustration of Maximum Rank method used to overlay multiple maps into a final composite of conservation values and development potential.
EBA Engineering Consulting Ltd of Yellowknife conducted a literature review and analysis of wildlife and wildlife habitat in the Deh Cho\(^1\). The purpose of the research was to identify areas of low, moderate, high and very high habitat value for key wildlife species in the Deh Cho. A total of 308 vertebrate species (animals with spines – e.g. not insects) are thought to occur in the Deh Cho territory – 3 amphibians, 36 fish, 213 birds and 56 mammals. Species of special concern were evaluated individually, including caribou, moose, bison, whooping crane and grizzly bear. Other species such as birds, fur-bearers, and fish were evaluated in groups. While the report summarized all available research, the final map was not an accurate picture of wildlife habitat value because a number of species had not been adequately studied yet.

A regional wildlife workshop was held during November 2003\(^2\) where harvesters, trappers and biologists met to fill in the map on wildlife habitat value based on traditional knowledge and known observations of habitat use. Species mapped include fish, birds, waterfowl, bears, wolves, foxes, coyotes, caribou, beaver, muskrat, otter, marten, other fur-bearers, cougars, lynx, sheep, goats, moose, bison, deer and elk.

The final Wildlife Habitat Value map consists of many maps from the original EBA analysis, the Traditional and expert knowledge gathered at the Wildlife Workshop, and other sources compiled over the last year, including critical wildlife habitat maps from the 1970s pipeline initiative\(^3\). A number of inaccurate or generalized files were removed from analysis to provide more accurate results. The remaining files were all overlayed in the GIS and the maximum rank in any given spot was used as the overall conservation value.

There are a number of important wildlife areas in the Deh Cho. Nahanni National Park Reserve and the surrounding area are critical for woodland caribou, mountain goats, and Dall sheep. The strip of land between Fort Liard and Wrigley running North-South through the centre of the map provides habitat and nesting areas for 15% of Canada’s Trumpeter Swan population. The Mackenzie Bison Sanctuary has been identified as a critical wildlife area for the bison population and a calving area for woodland caribou. There are other caribou calving areas distributed throughout the Deh Cho, but especially east of Nahanni Butte and in the Kakisa Lake-Tathlina Lake area. Most rivers, creeks and lakes are important fish spawning and migration areas and are an important habitat component for aquatic mammals and many terrestrial species as well.

**Ranking:**
Wildlife habitat values are ranked as follows:
- Low - Areas identified as general range for a species;
- Moderate - Areas that provide for year round habitat functions; or seasonally important areas
- High - Areas serving a more critical role for the species (e.g. migration corridor);
- Very high - Areas providing habitat for critical life requirements (e.g. calving, nesting, staging, and denning areas)

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Density of Traditional Land Use and Occupancy (TLUO) is the second input layer into the Conservation Priority map. The purpose of the TLUO study was to document traditional use for input into:

- Lands and Resource Negotiations
- Land Use Planning/Protected Area Design
- Environmental Impact Assessment and
- Natural Resource Management.

The data collection was based on methods developed by Terry Tobias1. Petr Cizek and Herb Norwegian interviewed 386 land users out of a target list of 531 individuals between 1996 and 20022. They documented places where harvesters and Elders killed animals, set traps, gathered plants, used cabins or camp-sites and knew of spiritual sites. The information was recorded on 1:250,000 map sheets as points, lines or polygons. The resulting maps were digitized by Alan Udell into ArcView 3.x. The database contains 54,769 data elements and is coded according to community, name of harvester, and the type of land use. These 54,769 data elements were analyzed using ArcView 3.x Spatial Analyst 2.0 to determine the relative density of traditional use and occupancy for a given area. The final map shows areas of low, moderate, high and very high use.

The Deh Cho Land Use Planning Committee recognizes that aboriginal traditional knowledge is a valid and essential source of information about the traditional environment and its resources, the use of natural resources, and the relationship of people to the land and to each other, and will incorporate traditional knowledge into planning decisions and actions wherever possible.

The generalized density of traditional land use and occupancy map on the next page is shown with permission from Deh Cho First Nations. On June 30, 2004, DCFN passed a resolution at their Kakisa Assembly granting the Committee permission to print and display this map in its communications materials with all planning partners (attached as Appendix 1). The Committee would like to thank DCFN for taking this important step and sharing their traditional use information. A copy of the summary report on traditional land use and occupancy and other information can be found on DCFN’s website at [www.dehchofirstnations.com](http://www.dehchofirstnations.com) (detailed link provided at bottom of page). For more information on the traditional use mapping, please contact Deh Cho First Nations at (867) 695-2355.

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Map 5: Generalized Density of Traditional Land Use and Occupancy

Legend:
- Plan Area: Interim Measures Agreement Boundary
- Provincial / Territorial Boundary
- National Park / PAS Area
- Mackenzie Bison Sanctuary
- Road, All Weather
- Road, Winter Access Only
- Trail
- Community

Density of Traditional Land Use and Occupancy (based on Standard Deviation):
- Very High
- High
- Moderate
- Low
Archeology, Cabins, Historic Sites and Rare Features

Archeology is the study of past human life as revealed by relics left by ancient peoples. The Archeology layer was created using data from the Prince of Wales Northern Heritage Centre.

The Cabins and Cottages layer was created using data from RWED’s “Values at Risk” database and the Land Use Dispositions data from Indian and Northern Affairs Canada. The Values at Risk dataset consists of buildings and features that are at risk from fire and are used in making decisions about forest fire management.

The Historic sites layer was created using data from RWED’s “Values at Risk” data. Historic Sites include places of historic significance such as historic village sites, trading posts and historic cabins. Both the cabins and cottages and historic sites layers may not be complete but they are the most up to date information available. The Committee will continue to update our layers as new information becomes available.

Rare features include hot springs and karst formations as discussed in EBA’s Wildlife Report. Karst formations are shaped by the dissolving action of water on bedrock and include sinkholes, vertical shafts, disappearing streams and springs, complex underground drainage systems and caves. Karst and hot springs ecosystems often have unique flora and fauna associated with them and provide critical habitat for multiple species. Karst streams increase productivity of downstream habitat and increase fish productivity. There are 51 known karst sites and 10 known hot spring sites within the Deh Cho territory.

Conservation value was determined by the distance from these important sites. The site itself and the immediate surrounding area has very high conservation value. As you move further away from the site, the value decreases. Exact distance rankings are provided in the table below.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Archeology Site</th>
<th>Karst or Hot Spring</th>
<th>Historic Site</th>
<th>Cabin or Cottage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&gt; 3 km - &lt; 4 km</td>
<td>&gt; 2.25 km - &lt; 3 km</td>
<td>&gt; 4.5 km - &lt; 6 km</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>&gt; 2 km - &lt; 3 km</td>
<td>&gt; 1 km - &lt; 1.5 km</td>
<td>&gt; 3 km - &lt; 4.5 km</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>&gt; 1 km - &lt; 2 km</td>
<td>&gt; 0.5 km - &lt; 1 km</td>
<td>&gt; 1.5 km - &lt; 3 km</td>
<td></td>
</tr>
<tr>
<td>Very High</td>
<td>&lt; 1 km from a site</td>
<td>&lt; 0.75 km - &lt; 1.5 km</td>
<td>&lt; 1.5 km</td>
<td></td>
</tr>
</tbody>
</table>
Map 6: Archeology, Cabins, Historic Sites and Rare Features

LEGEND

- Plan Area
- Provincial / Territorial Boundary
- National Park / PAS Area
- Mackenzie Bison Sanctuary
- Road, All Weather
- Road, Winter Access Only
- Trail
- Community

Conservation Value Rank
- Very High
- High
- Moderate
- Low

Scale: 1:1,000,000

Projection: Lambert Conformal Conic
Central Meridian 122°W, Reference Latitude 60°N
Standard Parallels 61°N and 67°N

Compiled By: Deh Cho Land Use Planning Committee
June 2004
Summary of Conservation Values

The Conservation Input Layers reflect past and current land use in the Deh Cho. Data was compiled into three layers covering Wildlife Habitat Value, Traditional Land Use Occupancy, and Archaeology, Rare Features, Historic Sites and Cabins. The three layers were combined in MAP 7 using a Maximum Rank method as illustrated earlier in this document.

It is interesting to note that these land uses often overlap and have existed together for many generations. The question of how much importance to give to conservation priorities relative to development potential is a key question in developing a land use plan.
Map 7: Summary of Conservation Values

LEGEND

Plan Area
Interim Measures Agreement Boundary
Provincial / Territorial Boundary
National Park / PAS Area
Mackenzie Bison Sanctuary
Road, All Weather
Road, Winter Access Only
Trail
Community

Conservation Value Rank

- Very High
- High
- Moderate
- Low

Scale: 1:1,000,000

Projection: Lambert Conformal Conic

Compiled By: Deh Cho Land Use Planning Committee

June 2004
Oil and Gas Potential

The C.S. Lord Northern Geoscience Centre (http://www.nwtgeoscience.ca) was contracted by the Deh Cho Land Use Planning Committee to carry out an Oil and Gas Potential Evaluation of the Deh Cho territory\textsuperscript{1}. Potential was determined by looking at a combination of overall geological potential and confirmed occurrences. The Deh Cho was broken down into 20 areas of similar geology called hydrocarbon plays – 9 of these plays are established with confirmed oil and gas occurrences and 11 are conceptual - thought to have oil and gas but not yet confirmed. Confirmed plays were given more weight in the final potential rankings because information is more certain.

There are currently 419 hydrocarbon wells drilled in the region. Most of these are new wildcat wells (exploratory), but 127 of them have found hydrocarbons, ranging from minor oil streaks and gas bubbles to producing wells. The current producing regions are Fort Liard for natural gas and Cameron Hills for gas with oil. Several other significant discoveries have been made that are not developed. Discovered gas volumes are estimated at 69 billion cubic metres worth $13.8 billion dollars, while undiscovered volumes are estimated to be 31 billion cubic metres worth $6.2 billion dollars\textsuperscript{2}.

The greatest potential for hydrocarbons is in the Liard Plateau (east of Fort Liard) and the Great Slave Plain (south-central and southeastern part of the Deh Cho). The southern Great Slave Plain is the northern extension of the well known Western Canadian Sedimentary Basin – a high producing region in Saskatchewan, Alberta and northeastern BC.

Ranking:

C.S. Lord identified a 6 class ranking scheme for oil and gas potential based on the number of confirmed and conceptual plays in each region. The rankings are:

- **Low** – Geological environment is favourable for gas. Significant probability of blind structural/stratigraphic closures.
- **Low to Moderate** – Geological environment is favourable for oil and/or gas. At least one conceptual play. High probability of blind structural/stratigraphic closures.
- **Moderate** – Geological environment is favourable for oil and/or gas. At least 2 plays. High probability of blind structural,stratigraphic closures.
- **Moderate to High** - Geological environment is favourable for oil and/or gas. At least 3 plays. Closures identified and mapped for at least one play.
- **High** - Geological environment is favourable for oil and/or gas. Multiple plays (at least 3) with closures identified and mapped. At least one play is established.
- **Very High** - Geological environment is favourable for oil and/or gas. At least two plays are established, with closures identified and mapped.

---


\textsuperscript{2} - From the Canadian Gas Potential Committee (http://www.canadiangaspotential.com) in Gal and Jones report. Value based on conservative price of $0.20/m\textsuperscript{3}.
Map 8: Oil and Gas Potential

LEGEND

- Plan Area
- Provincial / Territorial Boundary
- National Park / PAS Area
- Mackenzie Bison Sanctuary
- Road, All Weather
- Road, Winter Access Only
- Trail
- Community

Oil and Gas Potential

- Very High
- High
- Moderate to High
- Moderate
- Low to Moderate
- Low

Scale:

Projection:
Lambert Conformal Conic

Compiled By: Deh Cho Land Use Planning Committee
June 2004
Mineral Development Potential

The C.S. Lord Northern Geoscience Centre (http://www.nwtgeoscience.ca) was contracted to evaluate mineral potential for the Deh Cho territory. An initial comparison of current conditions against known mineral types allowed them to focus the research on 9 types thought to have the most potential in the region. The evaluation combined geological favourability (likelihood of being present) and known mineral occurrences to determine overall mineral potential.

All areas within the Deh Cho have some potential for one or more of the nine mineral types. Overall, mineral potential is highest in the western tip and moderate to low in the remaining areas. The western portion has high to very high potential for Skarn (Lead-Zinc, Gold and Tungsten), SEDEX and Mississippi Valley Type Lead-Zinc. SEDEX is “sedimentary exhalative sulphides”. These are stratiform sulphide deposits of zinc, lead and silver that are concordant or parallel with their host sedimentary rocks. It is in these areas that the potential for discovery of new mineral deposits is most likely. Lead-zinc and Tungsten are also significant mineral types in the Deh Cho with proven occurrences and operating mines. The only operating mine in the Deh Cho is the Cantung mine which has recently shut down. Prairie Creek, a lead-zinc-silver mine, is in advanced exploration.

The potential for diamonds was also evaluated due to the current interest in the Northwest Territories. Based on the methodology of this analysis - on the geology and what we know about primary diamond deposits in Canada - the Deh Cho potential for diamonds was rated as uncertain. While significant diamond indicators have been found over the last 30 years, no diamonds or kimberlite have been discovered in the Deh Cho.

A second evaluation was completed to identify priority areas for mineral development. The researcher, Brian Eddy of GSI-Geosystems Integration (http://www.geoconnections.org/CGDI.cfm?FuseAction=organizationServices.details/arg/arg/id/769/gcs.cfm), asked geologists from C.S. Lord to rank development zones based on their likelihood of development. The geologists considered a variety of geological, economic, and political factors. The final map of Mineral Development Potential used in the planning process borrows elements of both research projects to provide the greatest level of detail for decision-making.

The final rankings show areas of low, moderate, high and very high potential for mineral development.

2 – http://geosurv.gov.nf.ca/matty/glossary_o-u.htm
Timber Potential

The forests of the Deh Cho lie within the northern portion of the boreal forest region. PACTeam (http://www.pacteam-ca.org) of Edmonton conducted a review of timber potential in the Deh Cho. Timber was limited to saw logs for this study – white spruce, lodgepole pine, jackpine, and aspen with specific age and height criteria. Timber stands were evaluated on the basis of species, site characteristics, and access (distance to roads). Detailed inventories are not available for much of the Deh Cho, so potential stands had to be identified using a variety of vegetation data of varying age, accuracy and scale. Burned areas were removed from the timber potential areas. Tree species and distance to roads were then used to identify the value of each stand as low, moderate, high or very high.

The best timber is found in scattered stands on upland sites that encourage good drainage or in narrow strips along the river valleys. These include south of Wrigley, Cameron Hills, Jean Marie River and the Liard River valley. Fire has removed many potential areas over recent years.

Timber harvesting in the NWT is economically marginal due to high access and transportation costs. It only occurs when the price is high enough to cover costs so annual harvesting levels vary widely (from 46,000 to over 200,000 cubic metres). Sustainable harvest levels are thought to be around 500,000 cubic metres of spruce and pine saw logs and the same again for aspen/poplar and birch, but this has not been confirmed with detailed forest inventories or growth and yield analysis.

Map 10: Timber Potential
Tourism Potential

Deh Cho Environmental evaluated the tourism potential of the Deh Cho. They identified over 140 existing or potential tourism sites through discussions with managers, operators and review of documents. Each site was given an overall ranking of low, moderate, high or very high based on a combination of the following criteria:

- Prominence in the market (how well-known it is),
- Marketability (how well it suits current tourist demands),
- Accessibility (how easy it is to get to), and
- Local economic benefits.

The highest potential for tourism follows the Mackenzie and Liard River valleys and radiates out from communities. The river valleys are exceptionally scenic, offer various types of tourism experiences, and have good access. The proximity of communities to the river valleys increases the marketability for both the towns and the rivers as tourism destinations.

Key tourism destinations include the Nahanni National Park Reserve (UNESCO World Heritage Site), the Ram Plateau and North Nahanni River, Little Doctor Lake, Cil Lake, Trout Lake, etc. Areas of low potential or where information was unavailable are east of Wrigley and Tulita, northeast of Fort Simpson, and west of Fort Liard. While there is potential for tourism in these areas, they are currently limited by access, development and marketing.

The Deh Cho contains world class icon attractions and pristine wilderness, but it is currently not well developed for tourism. With careful planning and marketing, the potential exists to develop a thriving tourism industry in this region.

Agricultural Potential

Agriculture potential was assessed by the Committee staff with assistance from Gene Hachey\(^1\). Because the Committee has no jurisdiction within community boundaries, research was limited to large-scale agricultural potential and does not include things like market gardening. Outside of municipal areas, agriculture is a minor land use in the Deh Cho territory. The Deh Cho is at the northern edge of the agricultural zone and faces considerable limitations to widespread agri-food production including climate, water-logged soils and stoniness. Maps were compiled from soil surveys and agriculture capability analysis of the Upper Mackenzie and Liard Valleys by J.H. Day in the 1960s\(^2\&3\). There is no data beyond the map boundaries so agricultural potential for much of the Deh Cho is unknown but thought to be severely limited.

Day identified 8 classes ranging from no limitations (very good potential) to no potential. We simplified these into 5 categories, including no potential.

- **Very High**: Class 1 – No significant limitations; wide range of crops possible; not found in the Deh Cho.
- **High**: Class 2 – Moderate limitations; restricted range of crops; some conservation practices required; moderate to high productivity; found in the Liard Valley.
- **Moderate**: Classes 3 and 4 – Moderate to severe limitations; reduced choice of crops; special conservation practices required; high risk of crop failure; found throughout the upper Mackenzie River and Liard River valleys.
- **Low**: Classes 5 and 6 – Unsuitable for annual field crops; only grasses, legumes, or perennial forage plants; limited improvements possible; some natural grazing capacity; limitations too severe for other crops; scattered throughout the upper Mackenzie River and Liard River valleys.
- **No Potential**: Class 7 - organic soils and unmapped areas.

Initial research identified a number of other barriers to widespread agricultural development in the region, including the unavailability of land or financing and the high costs of accessing more remote areas. RWED suggested there will be no agriculture beyond 20 km from an existing power grid (Gene Hachey pers. Comm.). Given this restriction, we combined the agriculture capability layer with a “distance from power” layer using the centre of each community and inter-community power lines as the centre point.

The above rankings were modified to account for the increased costs of extending the power grid as follows:

- **Within 5 km of existing power**, agricultural potential rankings were not changed.
- **Areas 5 – 10 km from the power grid** were downgraded one rank to account for additional costs which might prevent some potential areas from being developed (i.e. if the area was ranked moderate based on agricultural potential, it would be downgraded to low). We did not downgrade low potential areas as they are already at the lowest class.
- **Areas 10 – 20 km from the power grid** were downgraded 2 ranks. Again, we did not downgrade past low so both high and moderate agriculture classes would now be ranked as low.
- **Areas greater than 20 km from the power grid** were considered to have no potential.

---


Summary of Development Potential

The Development Potential Layers reflect the potential of various development opportunities related to land use in the Deh Cho. These include the development of Oil and Gas, Minerals, Forestry, Tourism and Agriculture. Data was compiled into individual layers for each development, shown earlier in this document. The five layers were then combined into map 13 as a summary of development potential using the Maximum Rank method as described earlier. Determining the appropriate level of development relative to conservation priorities is a key question in land use planning.
Current Land Withdrawals Scenario

Around 33% of the Deh Cho is withdrawn from development and represents the most important ecological and traditional use areas. Edehzhie has also been withdrawn through the Protected Areas Strategy (PAS). Combined with Nahanni National Park Reserve, approximately 50% of the Deh Cho is currently protected in some way. Pehdzeh Ki Deh is also a PAS candidate site but it has not yet been withdrawn. The rest of the Deh Cho is potentially available for development subject to the Interim Measures Agreement requiring consent of affected First Nations for certain activities (http://nwt-tno.inac-ainc.gc.ca/dehcho/pdf/DehChoIMA_e.pdf).

Currently there is little resource development occurring in the Deh Cho although there are many opportunities available. Oil and gas exploration and development has been proceeding in the Fort Liard and Cameron Hills Areas. There is also considerable interest in mining in the western tip of the Deh Cho. Prairie Creek mine (lead-zinc and silver) is in advanced exploration while Cantung mine (tungsten) has recently shut down due to changes in world markets. There is some political uncertainty which has slowed the pace of new projects. This shows that although there is potential for development and it is a permitted use, many other factors determine the level of development that actually occurs.

Current unemployment is estimated at 20.7% for the whole Deh Cho region. This translates into approximately 1012 people unemployed and wanting a job. Employment in smaller communities is mostly in government services (governance, health, education, wildlife and economic development). There are some small businesses and stores in most communities. Larger regional centers like Fort Simpson and Hay River have more business opportunities. Some employment comes from outside the region (e.g. the diamond mines) while others benefit from the seasonal work associated with oil and gas development. There are a few small scale forestry operations, some tourism and a bit of agriculture. There is a high reliance on traditional harvesting to supplement seasonal employment and reduce the cost of living. The major source of revenue for the region is federal transfer payments and other external funding sources.

If the current land withdrawals were maintained for the next 20 years and no other changes were made in resource development zoning, the following resource potential would be available for development:

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Level of Development</th>
<th>Year Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>5,203 Ha</td>
<td>2005</td>
</tr>
<tr>
<td>Forestry</td>
<td>156 million m³</td>
<td>2005-2010</td>
</tr>
<tr>
<td>Mining</td>
<td>Cantung, Prairie Creek and Coates Lake mines would all be developed</td>
<td>2010</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>38.6 billion m³</td>
<td>2005-2020</td>
</tr>
<tr>
<td>Tourism</td>
<td>51 new sites</td>
<td>2005-2010</td>
</tr>
<tr>
<td>MV Pipeline</td>
<td>Developed</td>
<td>2006</td>
</tr>
<tr>
<td>Mackenzie Bridge</td>
<td>Developed</td>
<td>2005</td>
</tr>
</tbody>
</table>

The economic results of this pattern of development turn out to be very similar to Option 2. If all the resources in the Multiple Use Zones were fully developed over the next 20 years, the region would generate over $9 billion dollars in Gross Domestic Product (GDP) and almost $2.5 billion dollars in tax revenues to drive the economy.

That level of development would create close to 41,000 person years of employment or an average of 2,045 person years every year. Again, this is many more jobs than required to meet employment demand so 2099 new people would move into the Deh Cho to fill those vacancies. The regional unemployment rate would drop to around 9.4%. Despite having more jobs than people, there will always be some unemployment in the Deh Cho. Small community size means there is a challenge in matching skill levels and training with appropriate jobs in the same spot. Often, people must choose whether to stay in their home community and be unemployed (or employed in different jobs) or move away to find a job to match their training, interests and skills.

While all this development is possible with the current zoning, many other factors determine the actual level of development – the amount of infrastructure available, market values, changes in regulations, environmental issues, etc. Decisions will have to be made about the overall priorities and needs of the Deh Cho, economically, ecologically, and culturally.
The designation does not protect the land or habitat. A Wildlife Sanctuary, designated by the GNWT Wildlife Act, places

Protected Areas

- National Park
- Edéhzhíe (Horn Plateau) – Candidate Protected Area with Interim Protection
- Pehdzeh Kí Déh – Candidate Protected Area
- Sambaa K’i
- Mackenzie Bison Wildlife Sanctuary
- Lands Advanced for Protection under the PAS
- Edéhzhíe (Horn Plateau) – Candidate Protected Area with Interim Protection
- Oil and Gas Lease / License / Permit (active)
- Proposed Mackenzie Gas Pipeline
- Existing Pipelines

Third Party Interests

- Sahtu Settlement Land
- Mineral Claim / Lease (active)
- Prospecting Permit (active)
- oil and Gas Lease / License / Permit (active)
- Proposed Mackenzie Gas Pipeline
- Existing Pipelines

Map 14: Current Land Withdrawals

Scale: 1:1,000,000
Projection: Lambert Conformal Conic
Central Meridian - 120°W, Standard Parallel - 60°N

Compiled By: Deh Cho Land Use Planning Committee
June 30, 2004

Map 14: Current Land Withdrawals

Scale: 1:1,000,000
Projection: Lambert Conformal Conic
Central Meridian - 120°W, Standard Parallel - 60°N

Compiled By: Deh Cho Land Use Planning Committee
June 30, 2004
Land Use Option 1 – Development Emphasis

The Land Use Options divide the Deh Cho territory into 3 Zones – Conservation Zones, Multiple Use Zones and Uncertain Zones. Uncertain zones are areas where conservation values and development potential hold equal priority and no decision can be made. In the future, these Uncertain Zones will either become Conservation Zones, Multiple Use Zones or Special Management Zones (where special management conditions may apply to guide development in sensitive areas).

Development (Oil and Gas, Mining, Forestry, Tourism and Agriculture) is limited to the Multiple Use Zones for the purpose of the economic analysis. For each option we identify the development projects that fall into the Multiple Use Zones and determine the economic impacts of developing that resource over the next 20 years. If a development project falls in a Multiple Use Zone, we “turn it on” or activate it in the economic model. So what changes for each option is the extent or level of development (i.e. how many hectares, sites or cubic metres of resource are developed).

The same timing has been used for each scenario. Development is paced out development over 20 years to provide a continuous stream of employment opportunities without requiring a huge influx of southern workers. Basic assumptions have been made about when certain projects might go ahead. For instance, any areas currently being developed (e.g. Cameron Hills or Fort Liard) are developed immediately in the economic analysis. Those with higher risk or less potential are delayed. All options assume the Mackenzie Valley Pipeline and the Mackenzie Bridge will proceed according to schedule. Because the pipeline is so labour intensive, we’ve also assumed no other major projects will occur during the construction phase as there will be few workers available. By keeping the timing constant for all options, we can compare results based only on the level of development and conservation.

Land Use Option 1 gives priority to development uses, represented in the layers for Oil and Gas, Mining, Forestry, Agriculture and Tourism. Most of the region is covered by Multiple Use Zones. Only Edehzhie, Nahanni National Park Reserve and the few Conservation Zones prohibit development. There are a few Uncertain Zones where special management conditions may apply for development to occur.

In this option, the following resources are developed:

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Level of Development</th>
<th>Year Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>6,808 Ha</td>
<td>2005</td>
</tr>
<tr>
<td>Forestry</td>
<td>184 million m³</td>
<td>2005-2010</td>
</tr>
<tr>
<td>Mining</td>
<td>Cantung, Prairie Creek and Coates Lake mines would all be developed</td>
<td>2010</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>58.6 billion m³</td>
<td>2005-2020</td>
</tr>
<tr>
<td>Tourism</td>
<td>92 new sites</td>
<td>2005-2010</td>
</tr>
<tr>
<td>MV Pipeline</td>
<td>Developed</td>
<td>2006</td>
</tr>
<tr>
<td>Mackenzie Bridge</td>
<td>Developed</td>
<td>2005</td>
</tr>
</tbody>
</table>

Applying this option would mean moving fully to a wage economy. Resource development could occur almost everywhere, providing plenty of paid jobs. Over 20 years, 51,339 person years would be created (averaging over 3000 per year). Education and skill development would become a priority to prepare Northerners for skilled positions. Because there are not enough people to fill these jobs, 3041 people would need to move into the region to meet employment needs. Larger centers may grow with the influx of workers and their families.

Tax revenues will reach $3 billion over 20 years and provide up to $150 million a year to drive the economy and provide important regional services such as health, education and infrastructure. GDP for the region totals $11.6 billion or $580 million dollars annually. Disposable income may increase allowing families to better provide for their children. However, social problems such as drug and alcohol addictions may increase at the same time.

With increased development and habitat fragmentation, sensitive wildlife species may decline and with it traditional harvesting. People may lose their knowledge of traditional activities, culture and language in favor of a modern lifestyle.
The designation does not protect the land or habitat. Controls on the hunting of wildlife to protect specific species (e.g. Bison).

Protected Areas
- National Park
- Edéhzhíe (Horn Plateau) Candidate Protected Area with Interim Protection
- Pehdzeh Ki Deh Candidate Protected Area
- Sambaa K'e Candidate Protected Area with Interim Protection
- Mackenzie Bison Wildlife Sanctuary

Third Party Interests
- Sahtu Settlement Land
- Mineral Claim / Lease (active)
- Prospecting Permit (active)
- Oil and Gas Lease / License / Permit (active)
- Proposed Mackenzie Gas Pipeline
- Existing Pipelines

Map 15: Land Use Option 1 -- Development Emphasis
Land Use Option 2 – Moderate Development Emphasis

Land Use Option 2 again emphasizes development although more weight is given to conservation than in Option 1. While about 60% of the Deh Cho is a Multiple Use Zone, there are more Conservation Zones which protect key wildlife and traditional use areas such as the river and lakes system east of Wrigley, important trumpeter swan habitat stretching north-south between Nahanni Butte and Wrigley, and important bison and caribou habitat in the Mackenzie Bison Sanctuary. Edehzhie is a fully Protected Area and additional Conservation Zones may be established around the western tip of Nahanni National Park.

In this option, the following resources are developed:

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Level of Development</th>
<th>Year Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>6,026 Ha</td>
<td>2005</td>
</tr>
<tr>
<td>Forestry</td>
<td>181 million m³</td>
<td>2005-2010</td>
</tr>
<tr>
<td>Mining</td>
<td>Cantung mine opened</td>
<td>2010</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>57.7 billion m³</td>
<td>2005-2020</td>
</tr>
<tr>
<td>Tourism</td>
<td>83 new sites</td>
<td>2005-2010</td>
</tr>
<tr>
<td>MV Pipeline</td>
<td>Developed</td>
<td>2006</td>
</tr>
<tr>
<td>Mackenzie Bridge</td>
<td>Developed</td>
<td>2005</td>
</tr>
</tbody>
</table>

Because of the amount of land opened for development, the economy may be strong and relatively self-sufficient, with good employment opportunities for most communities, but especially in the southern portion of the Deh Cho. Over the next 20 years, almost 41,000 person years would be created under this option (or 2044 per year on average). Again, there will not be enough residents to fill all the available jobs, driving 1941 new people to move into the region. Unemployment would drop to 9% from the current average of 20.7%. Education would become a priority to ensure community residents benefit from employment in higher level positions. There are no special management zones, so there is greater certainty about where development is permitted. Development could proceed quickly under such conditions.

With high levels of development come high revenues to help run the government, pay for services, and improve the quality of life for Deh Cho residents. The regional GDP could reach as high as $8.8 billion dollars ($440 million per year) and tax revenues are projected at $2 billion dollars for the 20 year period ($100 million per year).

There are many small Conservation Zones scattered throughout the central and northern portions of the region. Many of the traditional hunting and fishing sites are included but the harvests may decline because the Conservation Zones may not be large enough to sustain wildlife populations. This may impact workers who rely on traditional harvesting to supplement seasonal employment and increase reliance on social assistance.
**Map 16: Land Use Option 2 -- Moderate Development Emphasis**

**Potential Land Uses**
- Multiple Use
- Uncertain Zone
- Conservation

**Protected Areas**
- National Park
- Edéhzhíe (Horn Plateau) Candidate Protected Area with interim Protection
- Pehdzeh Ki Denh Candidate Protected Area
- Sambaa K'ee Lands Advanced for Protection under the PAS
- Edéhzhíe (Horn Plateau) Candidate Protected Area with Interim Protection
- Mackenzie Bison Wildlife Sanctuary

**Third Party Interests**
- Sahtu Settlement Land
- Mineral Claim / Lease (active)
- Prospecting Permit (active)
- Oil and Gas Lease / License / Permit (active)
- Proposed Mackenzie Gas Pipeline
- Existing Pipelines

**Scale**
- Standard Prallels at 60°N and 65°N
- Central Meridian 122°W, Reference Latitude 60°N

**Projection**
- Lambert Conformal Conic
  - False North at 60°N, False Easting at 0°E
  - North and East Principal Meridians: 122°W and 117°W

**Compiled By**
- Deh Cho Land Use Planning Committee

**Notes**
- Wildlife Sanctuary, designated by the GNWT Wildlife Act, places controls on the hunting of wildlife to protect specific species (e.g. Bison). The designation does not protect the land or habitat.

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**Legend**
- Standard Prallels at 60°N and 65°N
- Central Meridian 122°W, Reference Latitude 60°N
- Map showing land use options and protected areas in the Deh Cho region.

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**Map Details**
- British Columbia
- Alaska
- Yukon
- Wood Buffalo National Park

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**Map credits**
- Created by: Deh Cho Land Use Planning Committee
- June 27, 2004
Land Use Option 3 – Balanced Priorities

Land Use Option 3 gives equal importance to conservation and development-based uses. This is reflected in the amount of Uncertain Zones where development and conservation layers overlap and hold equal importance. Special conditions may be placed on these areas to protect their conservation values while development is allowed to proceed at a more cautious level.

In this option, the following resources are developed:

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Level of Development</th>
<th>Year Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>2,508 Ha</td>
<td>2005</td>
</tr>
<tr>
<td>Forestry</td>
<td>99 million m³</td>
<td>2005-2010</td>
</tr>
<tr>
<td>Mining</td>
<td>Cantung mine opened</td>
<td>2010</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>35.4 billion m³</td>
<td>2005-2020</td>
</tr>
<tr>
<td>Tourism</td>
<td>42 new sites</td>
<td>2005-2010</td>
</tr>
<tr>
<td>MV Pipeline</td>
<td>Developed</td>
<td>2006</td>
</tr>
<tr>
<td>Mackenzie Bridge</td>
<td>Developed</td>
<td>2005</td>
</tr>
</tbody>
</table>

About 40% of the Deh Cho falls in the Multiple Use Zone. This is enough to allow the Deh Cho to benefit from resource development although this would be lower than in Option 2. The large tracts of land in the south would encourage larger companies, additional private investment and bring employment and training opportunities to the Deh Cho. This scenario is projected to create 25,128 person years of employment in the Deh Cho over the next 20 years – an average of 1250 person years a year. Though fewer than in the previous options, it will still require 1000 people migrating into the region to fill job opportunities. Since some of those moving in bring family members who do not have jobs, there will still be 11.7% unemployment overall. Immigration of southerners may increase salary levels and add to pressure on housing and other social and medical support systems. However, young people may be encouraged to stay in school to be prepared for these new opportunities.

The economy would become more resource based, relying less on Governments. Full development of resources in the Multiple Use Zones would generate $5.4 billion dollars in Gross Domestic Product (GDP) over 20 years or $270 million annually. It would also generate $1.25 billion dollars in tax revenues (or $62.5 million dollars a year). Priorities would need to be established to ensure resource development revenues are used effectively for job creation and addressing social needs.

Conservation Zones would expand slightly from Option 3, and are better able to sustain wildlife populations. Most are bordered by Uncertain Zones in which special measures could be established to protect key species and traditional use areas while permitting development. There would be sufficient employment for those who want it, but also large areas set aside to promote and maintain a traditional lifestyle. Communities and families could take advantage of both choices to varying amounts.
The designation does not protect the land or habitat.
Land Use Option 4 - Moderate Conservation Emphasis

Land Use Option 4 increases the focus on Conservation layers - Wildlife Habitat Value, Traditional Land Use Occupancy and Archaeology, Rare Features and Historic Sites and Cabins, while decreasing the importance of resource development uses. There are no Uncertain Zones. The Conservation Zones have expanded around the existing protected areas and include the major lakes and rivers that are critical for wildlife habitat and traditional use areas.

In this option, the following resources are developed:

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Level of Development</th>
<th>Year Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>2,508 Ha</td>
<td>2005</td>
</tr>
<tr>
<td>Forestry</td>
<td>99 million m$^3$</td>
<td>2005-2010</td>
</tr>
<tr>
<td>Mining</td>
<td>Cantung mine opened</td>
<td>2010</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>34.9 billion m$^3$</td>
<td>2005-2020</td>
</tr>
<tr>
<td>Tourism</td>
<td>41 new sites</td>
<td>2005-2010</td>
</tr>
<tr>
<td>MV Pipeline</td>
<td>Developed</td>
<td>2006</td>
</tr>
<tr>
<td>Mackenzie Bridge</td>
<td>Developed</td>
<td>2005</td>
</tr>
</tbody>
</table>

Opportunities for subsistence harvesting and traditional activities are plenty. People may spend more time on the land, practicing their culture and language and building healthy families. Seasonal or occasional employment in the resource sectors may provide additional income to supplement traditional harvesting activities and invest in new equipment. Over 20 years, 24,951 new jobs would be created (averaging 1247.6 per year).

Local and regional Government administrations would continue to be a major employer and play a lead role in skill development. Some people may attach greater importance to conventional education. In-migration of workers and their families would be limited to 1,057 due to the low level of development and fewer opportunities for skilled workers.

Tax revenues will reach $1.2 billion and GDP of $5.4 billion over 20 years’ equivalent to $60 million and $270 million respectively. The benefits are largely derived from resource development in the Multiple Use Zones which remain open for development. However, job creation, training and sources of private finance could be limited and young people may seek jobs and education outside the Deh Cho.

There may be some immigration into the region, particularly of professionals, which may in turn put some pressure on housing and social and medical support systems. The social pressures of development may begin to impact traditional culture and values.
Map 18: Land Use Option 4—Moderate Conservation Emphasis

Potential Land Uses
- Multiple Use
- Uncertain Zone
- Conservation

Protected Areas
- National Park
- Edéhzhíe (Horn Plateau) Candidate Protected Area with Interim Protection
- Pehdzeh Ki Deh Candidate Protected Area
- Sambaa K'e Lands Advanced for Protection under the PAS
- Mackenzie Bison Wildlife Sanctuary

Third Party Interests
- Sahtu Settlement Land
- Mineral Claim / Lease (active)
- Prospecting Permit (active)
- Oil and Gas Lease / License / Permit (active)
- Proposed Mackenzie Gas Pipeline
- Existing Pipelines

Scale
0 km 50 km 100 km

Projection: Lambert Conformal Conic

Compiled By: Deh Cho Land Use Planning Committee
June 27, 2004

Note: A Wildlife Sanctuary, designated by the GNWT Wildlife Act, places no restrictions on the hunting of wildlife to protect specific species (e.g. Bison). The designation does not protect the land or habitat.
Land Use Option 5 - Conservation Emphasis

Land Use Option 5 gives priority to conservation uses represented in the layers for Wildlife Habitat Value, Traditional Land Use Occupancy and Archaeology, Rare Features and Historic Sites and Cabins. Development is restricted to areas away from communities with high development potential. There are a few Uncertain Zones where development and conservation priorities hold equal importance. Special conditions may be placed on these areas to preserve their conservation value or to open them up for certain developments.

In this option, the following resources are developed:

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Level of Development</th>
<th>Year Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>713 Ha</td>
<td>2005</td>
</tr>
<tr>
<td>Forestry</td>
<td>99 million m³</td>
<td>2005-2010</td>
</tr>
<tr>
<td>Mining</td>
<td>No mines open</td>
<td></td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>12.6 billion m³</td>
<td>2005-2020</td>
</tr>
<tr>
<td>Tourism</td>
<td>8 new sites</td>
<td>2005-2010</td>
</tr>
<tr>
<td>Mackenzie Bridge</td>
<td>Developed</td>
<td>2006</td>
</tr>
</tbody>
</table>

Limited development opportunities may bring limited economic benefits. This may restrict the opportunity for private job creation and training, limit sources of private finance and discourage larger companies. Over 20 years, only 14,514 person years would be created (averaging 725.7 per year).

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Young people may seek education and jobs away from communities or outside the Deh Cho. Immigration of new workers would drop to around 700 people over 20 years.

This may limit demand for housing and some other social and medical support systems. Conventional education may hold less importance due to fewer employment opportunities. Local and regional Government administration would have an important role in providing employment, ensuring development is tightly controlled and social needs are addressed. Tax revenues and GDP are lower than in the other options, reaching $628 million and $2.5 billion respectively over 20 years. This translates to tax revenues of $31.4 million and $125 million in GDP annually.

The large amount of land in Conservation Zones would encourage wildlife, traditional use and culture to prosper. The lack of wage employment may encourage greater subsistence harvesting, promoting a healthy lifestyle and diet. Families may spend more time together and ensure cultural traditions are passed on. Alternatively, there may be less disposable income available for fuel and maintenance of equipment for subsistence activities. The lack of opportunities and services may also lead to more social problems with alcohol and drugs.
Economic Development Assessment Model

Introduction

The Economic Development Assessment Model (EDA) was developed by Ellis Consulting (YK) on behalf of the Deh Cho Land Use Planning Committee. It provides a mechanism for simulating the impact of major alternative Land Use Options in the Deh Cho. The model is based on the Deh Cho population and economy and projects basic population and economic trends 20 years into the future.

All the key development sectors and traditional harvesting activities are accounted for. It allows us to initiate development in different sectors (e.g. start a mine, increase timber harvesting, develop new tourism businesses) and at different paces to determine the impact of these changes on the Deh Cho economy over time. Outputs include estimated employment, Gross Domestic Product, tax revenues, and migration in and out of the region based on overall employment needs.

Currently the model has been used to compare the impact of 5 basic Land Use Options and Existing Land Withdrawals on the region over a 20-year period. The aim of the 2nd Round of consultations will be to narrow down the Land Use Options to one or two possible scenarios. Then we can use the full capabilities of the model to compare many different resource development scenarios over time.

Purpose

The purpose of the Economic Development Assessment Model is to estimate the potential regional economic impacts of development for the different Land Use Options. This will assist in making informed land use planning decisions and help ensure the Land Use Plan reflects stakeholder interests.

Methodology

An outline of the model format / structure is provided in the diagram. The model focuses on 5 development sectors or land uses including; Oil and Gas, Metal Mining, Forestry, Tourism and Agriculture. An allowance is included for replacement costs of the value of traditional harvesting.

Individual sector reports were prepared to provide estimates of the potential for each development activity e.g. mineral development potential and tourism potential. This data is reflected in the separate Development layers which make up the Development Potential and Conservation value maps. Input structures were developed to translate this data into economic values and to determine the change in demand for goods and services in the Deh Cho economy.

The information or “User Inputs” were then fed into the EDA Model. The model consists of a set of input-output tables linked to a tax, labor force and demographic model run together as a system to generate outputs reflecting changes in revenue from tax, skill levels and population across the region.

For the purposes of comparing Options 1-5 and the Existing Land Withdrawals realistic assumptions were made regarding the extent and development within Multiple Use Zones over the next 20 years:

It is assumed all the Oil and Gas potential within these areas comes on stream over the 20 years. For Mineral potential, it is assumed Cantung is developed in all but Option 5 where conservation holds the highest priority. However, for Prairie Creek and Coates Lake, mine site development only occurs in Option 1 and the Current
Land Withdrawals. Forestry development has been assumed only where high and very high potential exists and begins with larger, more accessible potential areas (such as Fort Liard) before moving onto less feasible areas. Likewise, Agricultural development is restricted to only 10% of the medium and high potential areas due to the difficulties in establishing production and distribution in the North. It is anticipated Tourism capacity would be developed relative to its potential with 100% of the highest potential areas being developed and 75%, 50% and 25% of high, medium and low potential sites being developed respectively.

Model Outputs include direct, indirect and induced estimates by industry for: Gross Expenditure, GDP, Total and Direct Employment, Tax Revenues (Federal and GNWT), Population Trends and Unemployment and Employment Rates. The results for Options 1-5 and the impact of Current Land Withdrawals are outlined below. Additional information on in-migration may also be derived. Definitions are provided in the attached sheet.

Results

These results compare Land Use Options 1-5 and the Existing Land Withdrawals over a 20-year period. They illustrate the possible impacts of varying levels of development relative to conservation. Charts are provided.

There are a number of general trends. Higher levels of development lead to higher Gross Expenditure, Gross Domestic Product, Employment, Tax Revenues and Population Levels. This trend is observed from Option 1 through to Option 5. It is also born out in the high proportion of Gross Expenditure (79%), Gross Domestic Product (87-89%) and Employment (75%) arising directly from Development activities for all the Options. This shows the major effect that resource development has on the Deh Cho economy.

As the amount of land available for development declines so does the Gross Expenditure, GDP, Employment and Tax Revenue. These represent the Opportunity Costs for conserving additional land. For example protecting an additional 63,370.2 Km³ in Option 4 compared to Option 2 has an Opportunity Cost of $3.4 billion over 20 years. This area represents 29% of the Deh Cho and the Opportunity Cost will vary with different development activities and the area’s development potential. An indication of the variations in Development, Conservation and Uncertain Zones is illustrated in the Zone Areas Chart.

There appears little difference between Options 3 and 4 due to a large number of Uncertain Use Zones in Option 3 and limited difference in the actual Development Zone. Decisions will need to be made regarding the use of Uncertain Use Zones.

A comparison of Direct and Total Employment indicates a lower labor requirement per unit of Gross Domestic Product compared to the wider economy. This reflects the scale, mechanization and high value of products from development activities.

Option 1 has the highest level of Total Employment reaching 51,339 person years over 20 years or 3,122 annually compared to 14,514 person years over 20 years and 721 annually for Option 5. In both cases more than 74% of this demand is directly related to development activities. With such a heavy reliance on development related employment and revenue it may be important to diversify activities in all the Options. As renewable resources, Tourism, Agriculture and Forestry can continually re-use the same land base, while non-renewable resources such as oil and gas and mining must continually open up new areas to be sustained. A mix of both types of resource development may be desired.
Skill levels may also be easier to satisfy with the Tourism, Agriculture and Forestry sectors. At higher levels of development such as Option 3 shown in the Chart a large number of Southern workers are required, particularly during construction periods, where the demand for skilled workers is high and cannot be satisfied within the local population. In contrast Option 5 would require very little imported labor due to the small scale and level of development.

These factors also impact the population with a 28% increase in population over 20 years for the highest level of development in Option 1, compared to only 7% for the lowest level of development in Option 5. An aging population and declining birth rate may slightly offset population growth.

The unemployment rate (%) falls with higher levels of development. This reflects the limited employment opportunities offered in traditional pursuits compared to development activities.

It should be noted that GDP and Gross Expenditure is in constant 2003 dollars. Changes in market conditions over 20 years could impact viability of projects and the level of development. More assessment may be required to refine the likely development of capacity.

The sixth option examined the impact of Current Land Withdrawals. Gross Expenditure, GDP and employment were found to be approximately the same as Option 2. Adjustments will have to be made in the Land Use Plan to the areas currently withdrawn to reflect community interests.

Future
As the Land Use Plan is refined to reflect stakeholder interests, decisions on the pace of development and the priority of certain developments may be considered i.e. mining could be delayed and tourism promoted in the first 5 years or until there is local capacity. Risk assessment can be made to assess the level of uncertainty, particularly in relation to mine development.
**Model Definitions**

**Direct Outputs**
arise directly from the development activity.

**Employment by Industry (EBI)**
is the number of additional hours of employment provided as a result of development in the region.

**Gross Domestic Product (GDP)**
is the sum of value added by all resident producers with respect to development plus any product taxes (less subsidies) not included in the valuation of output.

**Gross Production (GP)**
is the total volume of the product (oil or gas, minerals or timber) directly related to the specified developments in the Deh Cho.

**Gross Expenditure (GE)**
is total value of ($) Gross Production derived from the Deh Cho economy.

**Indirect Outputs**
arise as a result of the effects of development activity throughout the economy. These might be secondary industries e.g. building / wood manufacturing.

**Induced Output**
relates to economic activity induced in other local industries.

**Labour Force (LF)**
the group of people who have a potential for being employed. All persons 15 and over who are either employed, temporarily idle, or unemployed and seeking employment.

**Labour Income (LI)**
is the gross wages and salaries and supplementary labour income earned by the people employed by a project. It includes income taxes, employment insurance, pension fund contributions, etc. It can apply to direct or spinoff employment. Household income is part of GDP.

**Population (P)**
the whole number of people or inhabitants in a country or region.

**Tax Revenue (TR)**
government income due to taxation.
Appendix 1: Deh Cho First Nations Resolution

12th Annual Deh Cho Assembly
K'akwa Lake, NT
June 28th - July 2nd, 2004

Resolution #1

Moved by:

ARCHIE LOUIS Constant
Deh Cho Golic Dene
Band

Seconded by:

Chief KAREE FELIC
West Point First Nation

Opposed: None
Abstentions: None
CARRIED UNANIMOUSLY

Certified copy of resolution made at
K'akwa Lake, NT dated
June 30, 2004

HERB NOVUVJOEG
Grand Chief

RE: LUPC-Density of Traditional Use

WHEREAS, the Deh Cho Land Use Planning Committee are using the generalized 'density of traditional use' map for the planning process, but do not have access to the original data, and;

WHEREAS, the DCLUPC recognizes the confidential nature of traditional use information and will not display, print or distribute information without explicit permission from the Deh Cho Communities, and;

WHEREAS, the DCFN passed resolution #13 at the Winter 2004 Leadership Meeting (February 17th-18th, 2004) in Fort Providence to publish a summary report which includes the generalized Density of Traditional Use Map and have placed this report on their website for public distribution, and;

WHEREAS, the DCLUPC is requesting permission to use the Density of Traditional Use map in their reports and presentations on land use planning in pdf, jpeg or other image formats (not GIS shape files) up to 11"x17"; and;

WHEREAS, the DCLUPC documents are widely distributed to communities, government, businesses and other planning partners and will be placed on our website for public distributions;

THEREFORE BE IT RESOLVED, that the DCFN agrees to allow the DCLUPC to display, print and distribute the generalized DCFN Density of Traditional Use Map in oral, written and graphical reports.