

Predictive EcoSite Mapping Project

Creating & Commercializing a Predictive Ecosite Classification Platform for Alberta

Final Report

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1 EXECUTIVE SUMMARY

Over the past several months, representatives from industry, government and private sector service providers were engaged to garner greater understanding and insight specifically to inform the business case for employing a proposed predictive ecosite mapping approach.

Discussions with industry focused on users of ecosite information to determine their operational needs from planning through to closure phases of development. Engagement with government focused on developing an understanding the current and future requirements to fulfill mandates and inform policy.

Perspectives provided by interviewees along with recent changes in the operating/policy environment in Alberta will have a significant influence on this initiative, and particularly how it might be governed, operated and sustainably funded.

Without exception, there was agreement, that ecosite data and information products are one of the key inputs supporting the ongoing and future management of Alberta's biophysical resources. The changes and shifts in regional land use planning and the movement towards establishing hard targets, triggers and thresholds were cited as prime examples where data and information are required. There is also a common concern that managing the risks associated with natural resource decision-making would be undermined if data and information products are not reliable or credible.

Managing the linkages between: data, data manipulation, information product development, IT, and product distribution is seen as critical. Standardization was a common concern expressed, particularly related to: how data is gathered, how it is held or maintained, and how it is distributed. Success of this initiative will be measured against how data and information is managed and how well the data/information management system are understood and communicated.

The predictive framework was developed under the key assumption that soils and vegetation data and information from the current Pre-Disturbance Assessment (PDA), Closure & Reclamation(C&R) and other land and resource planning processes is and will continue to be readily available. Sources of such information include government, but primarily come from industry. There is a risk that shifts in policy or regulatory requirements may result in critical data inputs being unavailable, incompatible, or not easily useable within the predictive framework.

During typical development years, expenditures on PDA/C&R plan requirements can be from \$15 million to \$30 million per year. These expenditures afford a significant opportunity for this initiative to provide a more cost effective alternative to the current approach provided industry, government and public accept a new mapping approach.

In terms of costs and corresponding quality, the current "system" utilizes products that are generally either low cost and lower quality or higher cost and high quality. Stakeholders will view the data and products from this initiative in comparison to what is currently in use and therefore could conclude that the "new way" simply costs too much or does not provide products

of sufficient quality. Going forward, this initiative must be strategically positioned as a land and resource management policy innovation if it is to attract support for change, along with sources of revenue and sustainable funding.

The vision for the platform developed under this initiative is that it is widely accepted as a trusted source of objective and scientifically credible ecosite and other natural resource data and information. However, realizing the benefits of providing a new way of creating and accessing natural resource information as envisioned by this initiative is contingent on policy and regulatory changes which would enable companies to utilize information from the mapping platform to strategically conduct field sampling to achieve desired accuracy levels.

There is consensus that the governance and operating model should contain a Governing Body and three functional components –data acquisition, product development and data and product distribution. There are several organizations which could provide leadership in geospatial product development and distribution including: government departments, universities, not-for-profit agencies like ABMI, and also private companies. Within the Government of Alberta, GeoDiscover Alberta manages the Spatial Data Infrastructure framework and fosters the collaboration needed to make geographic data and information more widely available. As well, Alberta Data Partnerships (ADP) is a non-profit, public-private partnership (P3) that was created to provide long-term management of comprehensive digital data sets for a multitude of stakeholders, and could also fulfill various functional roles of this model.

Financial sustainability for the mapping platform model will likely come from two sources: 1) financial support from beneficiaries seeking broad “system” benefits and 2) collection and redistribution of fees from customers and users of the data and information products developed. There will be a need to balance the approach between market pull vs market push.

Going forward, this initiative must be strategically positioned as a land and resource management policy innovation to attract support and advocacy for change and in turn sources of revenue and sustainable funding from both industry and government. Sustainable sources of revenue for this initiative will come from two sources and perspective. This initiative will need to strategically position itself as providing value to beneficiaries (or program donors) as well as value to customers.

The operating model envisioned for the framework is comprised of three functional units - data acquisition, product development, and distribution. In addition to the primary functions the model contemplates the need for a central coordinator for one-window reporting and accountability to the Governing Body and the establishment of Communities of Practice to provide ongoing support and expertise.

In summary:

- There has always been a weak linkage between the requirements for regulatory approval and the use of information in preparing construction and reclamation plans and further using the ecological benchmark data in the issuance of reclamation plans.

- Expenditures on expenditures on PDA/C&R plan requirements can be from \$15 million to \$30 million per year and little value is being realized from the data and information being collected.
- There is widespread agreement that much of the field data on vegetation and soils that is presently collected in support of PDA/C&R plans is under-utilized, nor is it affectively archived and shared to support environmental and cost efficiencies. The ability to access and reuse field information for improving spatial products does not currently exist.
- Changes to aspects of the regulatory system are required to realize greater ecological value from the data which is being collected, and also to reduce industry costs.
- Regardless of what refinements are made to the system, the need for ecological benchmarks will continue to be a fundamental input for land management in Alberta since benchmarks will provide information that will lead to the modification of policies or regulations which are not achieving their desired outcomes.
- Given the importance of data (soils) currently collected by industry for PDA/C&R plans to the predictive framework, any related shifts in policy or regulation will need to be monitored closely to ensure critical data and information is available and in a compatible format.
- This is an opportunity to introduce cost effective fit-for-purpose options to meet and support management and regulatory needs.

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2 INTRODUCTION

Despite the need for ecosite information by a large number of users (both industry and government), the current approach to producing and delivering ecosite information in Alberta: is considered inefficient; beset by information barriers; produces low quality products; and is focused largely on single use, site level requirements rather than delivering regional information. To inform how the mapping platform could be made operational, Shore Pine Consulting Inc. was engaged to undertake the task of supporting the developing the business case for using the proposed predictive ecosite mapping approach and focused on:

- Determining operational needs for ecosite data and information;
- Clarification of current business objectives and policy/regulatory requirements for industry and government and comparison to what is actually being used to fulfill regulatory mandates and inform policy;
- Determination of general costs associated with ecosite regulatory compliance; and
- Identifying possible cost saving opportunities for government and/or industry.

Stakeholder consultations were undertaken to:

- Determine the operational needs for ecosite data and information;
- Get clarification of current business objectives and policy/regulatory requirements for industry and government, and comparing these to what is actually being done to fulfill regulatory mandates and inform policy;
- Determine the general costs associated with ecosite regulatory compliance, and potential cost-saving opportunities which would also create greater environmental value for both industry and government;
- Identify how this platform might be sustainably funded; and
- Identify the functional components of a governance and operating model for the platform.

The subsections below describe how these engagements were undertaken (Section 3), and the key messages heard across different sectors with regards to the use and collection of ecosite information (Section 4). Across all interviewees, several universal themes became evident which present both challenges and opportunities for the current initiative and these are summarized in Section 5. The way in which revenue streams could be secured for the long-term operation of this platform are described in Section 6, and the key functional components of the governance and operating model are described in Section 7. Finally, some of the risks which could impact the successful implementation of this platform are described in Section 8.

3 APPROACH

Representatives from industry, government and private sector service providers were engaged to garner greater understanding and insight specifically to inform the business case for using the proposed predictive ecosite mapping approach. Semi-structured interviews were conducted mainly over-the-phone supplemented by face-to-face meetings where possible. Individuals were interviewed from across several government departments (Energy, Agriculture and Rural Development, Environment and Sustainable Resource Development, and Tourism, Parks and Recreation), private sector consulting and industry sectors (see Appendix 9).

Discussions with industry/private sector stakeholders focused on users of ecosite information to determine their operational needs from planning through to closure phases of development. Engagement with government focused on understanding the current and future requirements to fulfill mandates and inform policy.

Discussions explored what the current practice is, who is providing ecosite mapping products, how are they being used and what the sentiment is with respect to effectiveness and efficiency of the current approach. Contacts were encouraged to discuss possible issues, opportunities, and barriers that would need to be considered in moving to a new approach.

4 FINDINGS

4.1 USER PERSPECTIVES ON THE NEED FOR AND USE OF ECOSITE DATA AND INFORMATION

In general, interviewees fell within two groups – (1) those intimately familiar with ecosite classification systems, data, and information products and (2) individuals with limited direct or specific knowledge on the subject, but once explained recognized how constituent components of ecosite classification and information products (maps) are (or could be) used to support their business requirements.

Without exception, there was agreement, that ecosite classification, data and information products are key to supporting the ongoing and future management of Alberta’s biophysical resources. While some view this initiative as a solution looking for a problem, most see the potential to support better management. Those interviewed highlighted the opportunity for this initiative to:

- Meet existing needs more cost effectively;
- Strengthen the management loop (plan-do-check-report-adjust);
- Support the demonstration of management and performance against objectives;
- Assist policy makers, regulators and resource managers to understand how ecosite data and information could be effectively utilized; and
- Fill a data and information gap early on in the land use planning process.

Ecosite data and information products are currently intended (more or less) to support:

- Establishment of ecological benchmarks;
- Set performance objectives/targets;
- Facilitate the monitoring of performance; and
- Assist with the reporting on the progress of reclamation performance against the reclamation plan.

However, the actual operational application of ecosite classification systems, data and information products is not consistent. Operationally, the need for ecosite data and information is largely driven by regulation, risk management, and the need to demonstrate a clear line-of-site between inputs (data/information) and decisions. As a result, ecosite data and information products seem to be either:

- Low cost, lower quality, derived from converting existing products and generally not utilized beyond the initial purpose;
- High cost, high quality, derived from intensive field sampling and not used for purposes beyond obtaining regulatory approvals.

4.2 FORESTRY

Current use of ecosite data and information products in forestry is considered “best practice” to support the development of harvest plans, silviculture prescriptions, strategies to manage water tables, and avoid sensitive environmental areas. At one time the use of ecosite classification was mandated through regulation/policy. However, it was considered too costly, resulted in poor mapping products, and the scale was considered too broad with little value. Today, the use of

ecosite classification is seen as a key benefit to both industry and government for efficient and timely review and approval of plans. Less time is spent debating the classification and more time is spent on evaluating the merits of treatments. Most of the large industry players have tied silvicultural prescriptions to ecosite classes. However, even with the linkage of prescriptions to ecosite class, some argue that as much as 10-20% of the cost of reforestation treatments may be spent unwisely simply because the resolution of their ecosite data and information is not sufficiently detailed. There have also been efforts to employ ecosite data and information in growth and yield modeling, development of more sensitive yield curves, and defining tree improvement gains.

4.3 ENERGY

In the energy sector, the application of ecosite classification, data and information products is required to fulfill regulatory requirements for Environmental Impact Assessments, Pre-disturbance Assessments, and in some instances Environmental Field Reports. In all cases, establishment of baseline information upon which to make decisions and the regulatory requirements and processes are designed to provide assurance to stakeholders, regulators, and industry that land that is developed will be returned to an equivalent capability at the time of project closure.

These assessments are considered by many to be very costly, require significant field-work and on-the-ground verification throughout the various seasons. Some large oilsands producers are spending in excess of \$1 million per year on PDAs to cover their in-situ oilsands operations. Pipeline companies incur similar costs. In theory, pre-disturbance ecosite types and distribution provides the basis for stewardship and reclamation. However, those interviewed suggested that stewarding on a hectare for a hectare basis is not a “real” requirement, is considered to be impractical, is difficult to enforce, and does little to factor in the need for flexibility in planning over time.

There seems to be a disconnection between the regulatory requirements for pre-disturbance benchmarking, the actual operations, the work of reclamation, and the desired outcomes post reclamation. Energy producers and service providers to the industry felt that the current “system” may have gravitated over time to a point where too much emphasis is being placed on establishing detailed benchmarks. Interviewees reported that pre-disturbance assessment (PDA’s) and plans are submitted for each disposition each year but are not thoroughly reviewed or scrutinized. Many believe that PDA’s simply exist as an up-front commitment to reclamation and how reclamation will take place. There is little debate that up-front understanding (and benchmarking) of biophysical conditions is important. But there is great interest in any approach that was less costly and more efficient. Interviewees from government and industry stated that the emphasis should be shifted toward more comprehensive reclamation planning, innovative operational techniques, and redefining what acceptable results should be. The issues seem to center on the obligation to establish pre-disturbance benchmarks (regardless of cost) with the understanding that assessment of reclamation success relative to the benchmarks is an acceptable uncertainty.

4.4 AGRICULTURE

In the agriculture sector, ecosite classification, data and information products contemplated under this initiative are not being used directly because there is not a perception of need. Agriculture producers are focused on conservation of soil and water, management of critical habitat, and adoption of beneficial farming practices on a quarter section-by-quarter section basis. Agriculture does use comprehensive soils data and information as the basis for most of the current decision support tools employed to increase crop production since moisture and nutrient information is an implicit part of agricultural management practices.

However, due to market-based pressures, agriculture producers are being pushed to demonstrate they are managing for broader outcomes related to ecosystem function and ecosystem services that are influenced by agriculture sector activities. In support of agriculture producers, Alberta Agriculture and Forestry (AAF) are seeking opportunities to develop a stronger social license for their key stakeholders – agriculture producers. While AAF does not have a regulatory role, they do provide policy input and direction to regulators. As a result, there is recognition that biophysical resource measurement and management is being integrated across all sectors on both public and private lands. Agriculture data and information (soils and productivity) would be useful in building more comprehensive ecosite information products contemplated in this initiative. However, the main consideration for the agriculture sector and those supporting them is the cost of such data and information products beyond what is currently being provided and utilized.

4.5 GOVERNMENT

In response to considerable growth and development, Alberta's new land-use planning system defines a new approach to managing lands and natural resources, and guides how decisions are to be made. Land-use planning, integrated resource management, cumulative effects management, conservation offsets planning, access management, linear disturbance evaluation and planning, species at risk management etc. are all considerations within Alberta's Integrated Resource Management System. To deliver on the integration of all of these various aspects and levels of planning requires detailed information. There is also a need for specificity of data and information to make choices and develop optimization scenarios. While there is a need for more detailed information at the regional planning level, in many cases it does not exist. Currently, the use of ecosite data and information seems to be pushed into the sub-regional scale of planning. Detailed analysis and decision making is required at finer scales than broad based plans and as a result data and information is being generated on a one-off basis to address singular issues or problems.

Ecosite data and information generation is largely constrained by time and budgets. Costs to generate this information are reported to be as low as \$10K per township. However, the resulting products produced are considered to be of low quality. Those interviewed stated that data and information developed for one project is often not applicable or useful beyond its specified project intent. There was a consistent view that if standardized, scientifically reliable data and information existed and were available at the front end of the planning system, it would help focus place-based decisions (what to do where); make it easier to develop land and natural

resource management tools; and in turn provide more efficient use of scarce financial resources in land use planning.

4.6 OTHER STAKEHOLDERS

While not contacted directly, those interviewed did provide their perspectives on what ENGOs, First Nations, Public at Large, etc. might say about the use of ecosite data and information currently and into the future. Based on their experiences working with these other stakeholders the main considerations put forth included: reasonable and open access to data and information, ease of use of data and information products, transparency of data and information products, and low (no) cost.

Of the service providers interviewed, all could see opportunity to develop and provide higher value services beyond the provision of data/information products to meet regulatory requirements. Examples included data analysis, interpretation of data, development of plans, and support of management.

5 IMPLICATIONS AND CONSIDERATIONS FOR THE NEW SYSTEM

During the course of conducting this work, several universal themes were revealed by those interviewed. These include both issues and opportunities for this initiative. The perspectives provided will be challenging to address largely because they have been provided from a forward looking perspective. Interviewees were eager to share their views on what this initiative should provide going forward. When discussing these themes relative to current operations, the responses were difficult to decipher. For those looking at their current uses and application of ecosite data and information there is a desire to have it provided cheaper, faster and to a higher level of quality and reliability. It was less about how this initiative could fulfill existing needs and more about how this initiative might influence the use and application of ecosite data and information going forward. Those interviewed had trouble buying into a new approach as a replacement for current uses of ecosite data and information, but readily shared their view on how a new approach might be evaluated or judged. Going forward, it may be more useful to articulate what this initiative will provide in terms of benefits and cost, and thereby stimulate a more useful discussion related to meeting the needs of the various stakeholders.

5.1 RELEVANCE, RESOLUTION, QUALITY AND COST

For many, the business environment is changing. Access to the market for Alberta products and the need to transparently report on performance were highlighted as the drivers for change. For those familiar with ecosite classification, a predictive ecosite mapping system was seen as the means to support better decisions, influence policy, and improve cost competitiveness. For others, perhaps less familiar with ecosite classification, this initiative was perceived as a solution looking for a problem. In either case, there is an opportunity to communicate with all relevant stakeholders about the attributes of ecosite classification and the value data and information products bring in support of management and decision-making. Stakeholders appear eager to shape the business case for this initiative.

Resolution and scale were terms used interchangeably. Without exception, there is an expectation that environmental stewardship is shifting toward smaller or more tightly defined units. Most see the need to develop more options for management; however, this has been slow to happen because information with sufficient detail required to make informed decision is not consistently available.

Coupled with the desire for detail there is also acute awareness that provision of detail is costly - particularly using intensive field based survey and validation. The benchmark for resolution is high and while there is optimism for this initiative, there is also skepticism that predictive modeling will be able to produce products of sufficient quality. Matters relating to resolution and quality will need to be addressed very directly. Resolution and quality (although quality was not specifically defined) were identified as key issues that if not addressed could be exploited by those not supportive of change.

Given the tight relationship between quality and cost, current ecosite data and information falls into two broad categories: 1) high quality products with high costs driven by the need to fulfill regulatory requirements and obtain operating approvals (PDA's etc) ; 2) lower quality products

with lower costs driven by specific need (silviculture prescriptions, land use access planning etc.). There may be opportunity to explore how this initiative might fit in the middle between low cost/low quality and high cost/high quality data and products.

5.2 CREDIBILITY AND RELIABILITY

A shared perspective on credibility and reliability stems from the concept that data and information is considered an asset. Those interviewed suggested that data will be considered reliable (trustworthy) if it comes from trusted sources, is grounded in science, is transparently produced, is reproducible, has an objectively assessed accuracy, is properly managed, and is credible. In turn, decisions based upon and supported by credible and reliable information are the best way to manage risk related to decision making. As a result, there was a common concern expressed that managing risks would be undermined if data and information is not reliable or credible. The anticipated changes and shifts in regional land use planning and the movement towards establishing hard targets, triggers and thresholds etc. was cited as an example where credible and reliable data will be required.

5.3 STANDARDIZATION

Standardization was a common concern expressed by many of the interviewees. Three phases or stages of standardization needed include: how data is gathered; how it is held or maintained; and how it is distributed. Some took issue that different standards exist for different products although specific examples were not provided. In the energy sector, an opportunity was identified whereby standard ecosite data and information could be used to fulfill multiple regulatory requirements (EIAs, PDAs, FRA's) related to development. In the forestry sector, standardization was also suggested as a way to eliminate the debate over data and information products as part of regulatory approvals. While specific mechanisms or models for standardization were not discussed at length, there was mention and support for seeing that standards were established and met as related to ecosite data and information products.

5.4 TRACEABILITY AND ACCOUNTABILITY

For those in the business of policy, controlling the linkages between: data; information product development; IT; and data and information distribution is seen as critical to 1) managing risk and 2) fulfilling organizational mandates. Traceability across the chain is seen as a key consideration for this initiative. Interviewees called for accountability to those that interpret and make decision based on data. There needs to be transparency between data and any processing required to create information products. Some felt that the entire platform needs to be developed with strong communication materials that define what the data is, how products were developed from the data, how such products can be used, and what limitations exist on their use. Concern was expressed regarding the potential for decisions and policy makers (business need) to be driven by the modellers or information product developers (solution provider). One of the pitfalls identified is that business requirements can be shaped or reshaped due to the constraints of the data, information products, or management tools. As a result, a clear structure is needed to ensure that the data and information informs policy, limits, targets etc. and does not inadvertently set them.

5.5 DATA MANAGEMENT

This initiative is a highly complex undertaking requiring use and processing of data and information. Many of the issues and opportunities described by stakeholders centered around data and information management, what it means, and how it might function.

Quality, credibility, standardization, traceability and accountability are all terms used by interviewees to express the need to manage risk. In turn, if data is defined as the input in the information creation process, then one can assume that the greatest source for risk exists if data is not managed or managed in an ad hoc manner. Success of this initiative will be measured against how data and information is managed and how well the data management system is understood and communicated.

Based on the prevailing perspectives shared during the course of this work, several key outcomes relating to the management of data and information products included:

1. Ecosite data and information products should be managed as a strategic assets supported by strong governance and control;
2. Data and information products must provide value and have credibility which is based on objective, quantitative scientific assessments and not from subjective personal opinions;
3. Data and information must be accessible and maintain currency through pursuit of continuous improvements;
4. Requirements for transparency and accountability must be satisfied;
5. Data and information products must be flexible and adaptable to change.

5.6 GOVERNANCE AND FUNDING

Data and information governance was a key issue raised. Data is considered an asset and needs to be managed to ensure quality and security. Traceability of data and information products is needed as part of data governance to drive accountability throughout the system from creation to use. There is a sense that in order for an organization responsible for ecosite data and information products to be seen as credible they must be known as data stewards and the trusted source for data.

Regarding governance, ecosite data and information is seen largely as a public good and critical to manage resources that are effectively controlled by the public. As a result, governance over data and information should be transparent with opportunity for open access. For many, access to ecosite data and information in principle should not be limited based on ability to pay. Industrial users, however, see risks in data and information being openly available given the potential for such data to be used in opposition of their operations, and therefore it is important for them to have influence to manage their risk (real and perceived) and exposure. While there were some interviewees that were strongly in favor of a governance model that was largely controlled by government, most suggested a structure that was independent and represented multi-stakeholder interests would be preferred.

Based on the assumption that a predictive system can be developed, sustainable funding to support the acquisition of data, creation of information products, and distribution of data and products to users will be a key consideration. Those interviewed had several and varied perspectives on funding beyond this initiative. Again, access to data and information in principle should not be limited based on ability to pay. The dominant funding model envisioned was a shared responsibility between government, industry and other public users or customers. It was expressed several times that sole funding by government may not be practical (or desirable) and could have a detrimental impact on product quality over the longer term. Regardless, if public funding is used, there needs to be a clearly defined rationale demonstrating that the products support better decisions that are in the public interest. It will be necessary to work with a coalition of the willing.

6 SUSTAINABLE FUNDING FOR THE MAPPING PLATFORM

6.1 ESTIMATED COSTS OF THE CURRENT SITUATION

Currently, the vast majority of annual expenditures related to ecosite mapping are associated with the industry meeting regulatory requirements for PDAs. While a comprehensive cost survey was not conducted, the following cost information gathered fell within a consistent range among those consulted and is therefore considered reasonable.

1. Lower quality, lower cost products derived from converting existing products (enhanced vegetation interpretation). These lower cost products are driven by specific needs (silviculture prescriptions, land use access planning etc.). Typical costs associated with these products range between \$2 and \$25 per hectare based largely on the extent of vegetation interpretation, ecosite classification and limited field inspection. It is believed that the annual expenditures is likely not to exceed \$1 million on average as these products are not driven by a regulatory requirement and are often constrained by the project budgets that support this work.
2. High quality, high cost products derived from intensive field sampling. These products are driven by the need to fulfill regulatory requirements and obtain operating approvals (PDA/C&R plans, environmental field reports, EIAs etc.). For insitu oil sands mining projects soils and vegetation surveys range between \$400 and \$750 per hectare depending on several factors including access, total number of inspection sites, density of inspection sites and if there is pre-existing survey data. Pre-field mapping efforts add additional cost ranging between \$80 and \$120 per hectare. Finally, preparation of the PDA report and mapping services add \$100 to \$200 per hectare. For linear disturbances, soil surveys and ecosite typing costs range between \$1000 and \$1500 per kilometer and can increase two-fold if full vegetation and rare plant surveys are required. Based on information shared during stakeholder interviews, individual oil sands producers are spending \$1 to \$3 million each year on PDA's. Pipeline companies are likely spending similar amounts. As a result, it is not unreasonable to estimate some \$15 to \$30 million per year is being spent fulfilling the requirements of PDA/C&R plan requirements during typical development years.

Combined, these expenditures afford a significant opportunity for this initiative to provide a more cost effective alternative to the current approach.

Sources of sustainable funding for this initiative are likely to come through acceptance of value through provision of cost effective data and information products to industry, government and public users. However, the value proposition from this initiative will be challenged. The following illustration characterizes the relative position of ecosite data and information products that currently exist on the continuum of quality and cost.

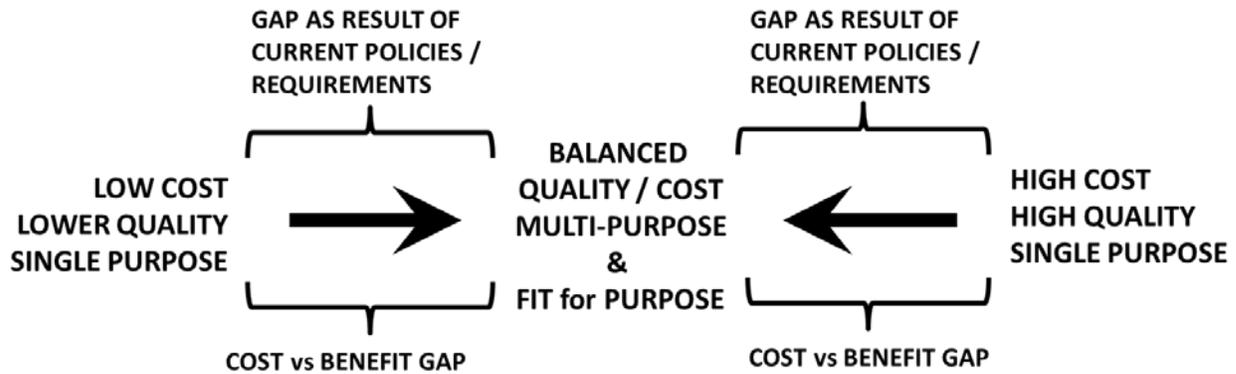


Figure 6–1: Gap which current initiative is attempting to fill between low-cost, lower quality products and high-cost, higher quality products

The challenge with the current “system” is that costs and corresponding quality generally fall at two ends of the spectrum – either low cost and lower quality or higher cost and high quality. As a result stakeholders’ view of the value proposition related to this initiative is one that provides high quality at low cost. Discussion with others working on this initiative suggest that data and information products are likely to land somewhere in the middle of the continuum. This is significant insofar as stakeholders could view the data and products in comparison to what is currently in use and therefore would conclude that the “new way” simply costs too much or does not provide products of sufficient quality.

6.2 VALUE PROPOSITION

Land and resource management is becoming increasingly more complex and requires data and information products that have multiple applications. The results from this initiative to date strongly indicate that the predictive ecosite maps can be effectively and efficiently produced. In addition, there is a host of other intermediary data and information products or data layers (e.g. lowland delineation, detailed aspects of terrain) that have been developed. In terms of value, for many stakeholders with responsibility for the various aspects of land and resource management there is perhaps greater value in the intermediary data and the information layers that are developed to produce an ecosite map than there is in the ecosite map itself. Furthermore, while these intermediate data and information products have implicit value in their own right, there is a value proposition when they are combined with other data and information outside of those used in this pilot to enhance or create new natural resource inventories.

The acceptance of this initiative’s value proposition is heavily influenced as described earlier in this report. Firstly, the regulatory environment is not static. There is a desire to streamline administration and perhaps redefine regulatory and data and information requirements for industrial developers. Secondly, overall responsibility and accountability for monitoring, evaluation and reporting of credible scientific data and other relevant information on the conditions of Alberta’s environment now rests with AEP, although until April 2016 this was AEMERA.

Going forward, this initiative must be strategically positioned as a land and resource management policy innovation if it is to attract support and advocacy for change, and sources of revenue and sustainable funding from both industry and government. Sustainable sources of revenue for this initiative will come from two sources. This initiative will need to strategically positioning itself as providing value to beneficiaries (or program donors) as well as delivering value to customers.

First, there is the value from this work in providing broad “system” benefits. These benefits are embedded in the development of new approaches, continuous improvement and refinement of techniques and methods and creation of reliable data and information to fill gaps and support implementation of the IRMS. Support in terms of funding would largely come from government and other government agencies involved with IRMS that would view themselves as beneficiaries of this work. For government, the value of this initiative comes from:

- Creating cost effective data and information to support implementation of the IRMS.
- Lowering the cost of regulation and increasing competitiveness for industry.
- Supporting the long-term vision of province-wide environmental monitoring
- Supporting AER’s desire for regulatory efficiency.
- Supporting ongoing knowledge creation by providing a platform, data and capabilities that will encourage and facilitate wider participation in all aspects of environmental assessment with participation from NGOs, the general public, researchers, industry, and government.
- Enable ongoing improvement in land and resource management and environmental performance.

Secondly, there is the value provided to customers and users of the data and information products developed. This would generate revenue by collecting fees for service related to provision of standardized data and information products as well as customized analysis. Customers and users (both government and industry) of the data and information products from this initiative would see value from:

- Provision of products and services that are flexible, fit-for-purpose and more tightly tied toward achieving operational outcomes.
- Lower costs for compliance without decreasing environmental performance.

This distinction in value is important because this initiative will need to secure funds or revenues from both sources. The mix of funding from each source will certainly shift over time. In the short term (1-3 years) funds from government beneficiaries will likely make up the majority (90+%) of funds to provide base level support as operations get up and running. In the medium term (3-5 years) government will continue to provide funding but at a significantly smaller proportion (<50%) of overall operational costs with user fees making up the bulk of revenues to support this work. In the long run it will be important to have a minimum level of beneficiary support (30% of total operating costs) to maintain legitimacy and provide ongoing advocacy for change.

6.3 SECURING SUSTAINABLE FUNDING

Securing sustainable sources of funds will require further stakeholder engagement. To engage users (industry and government) in value proposition discussions, there is a need to specifically state what this initiative can and will produce in terms of data and information products. The value proposition will need to be positioned relative to current market needs as well as anticipate how flexible data and information products coming from this initiative could support future needs. There will be a need to balance the approach between market pull vs market push. Ultimately, the goal is to ensure that the mapping platform can continue to exist for 30+ years.

To this end, there is a need to encourage stakeholder engagement in this initiative by:

- Placing this initiative in the proper context. This is not simply a better or cheaper “mousetrap”. Rather, this is a technological innovation that enables policy innovation leading to tangible benefits for government and industry and is thus worthy of their advocacy and financial support.
- Clearly defining what this initiative will produce (data and information products) by presenting them relative to how current user requirements are being met in terms of cost, quality and fulfillment of outcomes in addition to being an alternative approach which surpasses the status quo.
- Defining the benefits and rationale (value proposition) for any new data and information products anticipated to come from this initiative.
- Defining and securing buy-in to a critical path for best positioning the outputs from this initiative (including changes to policy) going forward.
- Securing initial seed money from initial beneficiaries.

7 FUNCTIONAL GOVERNANCE AND OPERATING MODEL

On March 12, 2015 a workshop session was held to further explore the governance and operating model for this initiative. Throughout the course of the discussion there was consensus that the following model presented contained the key elements of structure – Governing Body and three functional components – including data acquisition, product development and data and product distribution. Participants provided input regarding broad principles of governance that should be employed and direction for how the elements of model should be further described.

There is a vision for the platform developed under this initiative to be a trusted source of objective and scientifically credible ecosite data and information with widespread acceptance and use by multiple stakeholders. In addition to the primary functions, the governance model contemplates the need for a central coordinator for one-window reporting and accountability to the Governing Body and the establishment of Communities of Practice to provide ongoing support and expertise.

Financial sustainability for this model comes from two sources: 1) financial support from beneficiaries (GOA and other government agencies) seeking broad “system” benefits and 2) collection and redistribution of fees from customers and users of the data and information products developed.

The following governance and operating model is presented for consideration.

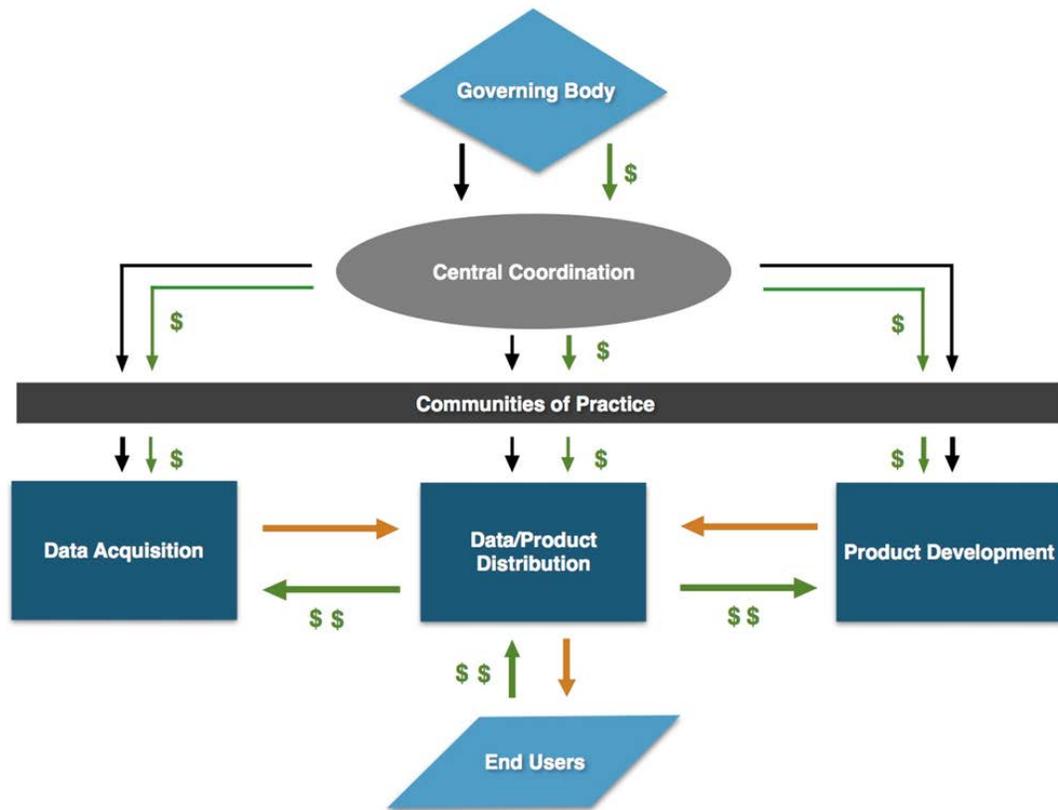


Figure 7–1: Functional governance and operating model for the mapping platform.

7.1 GOVERNING BODY

The governing body has the overall responsibility for the entire system, organizational structure, provides direction, sets accountabilities, establishes standards (for data and information products as well as terms and conditions of use) and authorizes business functions and policies of the organization and its constituent components. The governing body will provide financial support for this initiative in the form of an annual operating grant under agreement with a central coordinating entity accountable for all functional components (data acquisition, product development and data and product distribution) and support for communities of practice. In exchange for ongoing financial support the governing body will be provided with specified data and information products for their unrestricted use but not for further distribution.

While there are other options for establishing a governing body for this initiative, the current government has signaled that will have responsibility and authority for monitoring, evaluation and reporting of scientific data and other relevant information in Alberta. Consequently, the

platform being developed through this initiative including ecosite data and information products would seem to fall within the purview of AEP.

The following assumptions have been made with respect to AEP's approach to governance, operations and relationships with other organizations. These assumptions have not been endorsed by AEP but are simply an attempt to characterize a reasoned future state that provides a suite of guideposts for shaping possible governance options for this initiative. These assumptions could also serve as a starting point for future discussions with AEP when the timing is right.

- Overall responsibility and accountability for monitoring, evaluation and reporting of credible scientific data and other relevant information on the conditions of Alberta's environment, rests with AEP.
- AEP will utilize and leverage strategic partnerships and service provider agreements with selected organizations to deliver on its mandate.
- Relationships with selected organizations will be for specific data and information needs of AEP and the ability of the organizations to deliver based on legitimacy, credibility, relevance and operational excellence.
- Services provided by selected organizations will be on a transparent cost-recovery basis and will include appropriate allowances for profit.
- AEP will be the body to govern the collection, analysis and use of data that is subject to any service provider agreements and selected organizations will be accountable for meeting any standards, protocols or rules established by AEP.
- Selected service providers will be consulted by AEP in the formulation and establishment of any standards, protocols or rules that they may be accountable for under strategic partnerships or service provider agreements.

With over-arching transparency and accountability, there will be a need to show how the framework's organizational governance, structure and functions align with that of AEP.

7.2 CENTRAL COORDINATION

The Central Coordinator will have a direct reporting and accountability to the Governing Body and will have responsibility for coordination of all functional components (data acquisition, product development and data and product distribution) and establishment of communities of practice. The Central Coordinator will provide one-window reporting and accountability to the Governing Body.

7.3 DATA ACQUISITION FUNCTION

The Data Acquisition function will be responsible for all data stewardship (including in-house creation and data received from others) and ensures that all data is acquired, stored, accessed and controlled in accordance with the standards and policies approved by the governing body. Currently, data to support the work of this initiative has come from several public and private sources and securing data from these various sources will be an ongoing requirement. The Data Acquisition function will be responsible for managing all agreements and transactions related to

data acquisition. The Data Acquisition function would also be responsible for supplying data to the Central Distribution function.

7.4 PRODUCT DEVELOPMENT

The Product Development function will be responsible for developing products as approved by the Governing Body. The Product Developer will be accountable for documentation of the data manipulation and product development processes to ensure traceability and any caveats, limitations or conditions for use of products developed. The Product Developer is also responsible for transferring Products to the Central Distributor.

7.5 CENTRAL DISTRIBUTOR

The Central Distributor is responsible for the distribution of data and products to customers and users under the approval of the governing body. The Central Distributor is also responsible for the management and accounting of all transactions with Customers and Users.

7.6 COMMUNITIES OF PRACTICE

Within each function of the operating model (data acquisition, data manipulation and product development and distribution) there will be a need to establish strong mechanisms to capture and utilize expert advice from communities of practice. These communities of practice will assist with the establishment of data/information product stewardship policies and standard operating procedures for review and approval by the governing body.

It is anticipated that two types of data and information products will exist within the framework that will need to be appropriately controlled. First there are “interim” or intermediary data and products that will have carefully described specifications regarding how they were produced and if there are any potential limitations on their distribution and use. There will also be “final” products that will be subject to detailed review and quantitative assessment of quality, accuracy and reliability before they are released for widespread distribution and use.

Expert communities of practice may also serve an independent oversight role in conducting periodic reviews or audits of the various functions within the operating model to provide assurance that data and information products are being developed in accordance with established and approved standards or protocols.

7.7 LEVERAGING SUCCESS

There are several organizations that could fulfill various functional roles of this model. Several organizations provide leadership in geospatial product development including government departments, universities, not-for-profit agencies like ABMI and private companies. Within the Government of Alberta, GeoDiscover Alberta manages the Spatial Data Infrastructure framework and fosters the collaboration needed to make geographic data and information more widely available. As well, Alberta Data Partnerships (ADP) is a non-profit, public-private

partnership (P3) that was created to provide long-term management of comprehensive digital data sets for a multitude of stakeholders.

8 KEY INFLUENCES AND RISKS IN ESTABLISHING THE GOVERNANCE & OPERATING MODELS

Recent changes in the external environment will have a significant influence on this initiative, and particularly how it might be governed, operated and sustainably funded.

Potential Shifts in Policy / Regulation

Currently, the application of ecosite classification, data and information products is required to fulfill regulatory requirements for Environmental Impact Assessments, Pre-disturbance Assessments (PDA), Conservation and Reclamation (C&R) Plans and in some instances Environmental Field Reports and Environmental Impact Assessments (EIA). In all cases, establishment of baseline information upon which to make decisions and other regulatory requirements and processes is required to provide assurance to stakeholders, regulators, and industry that land that is developed will be returned to an equivalent land capability at the time of project closure. The Alberta Energy Regulator (AER) expects industrial operators to use the site-specific information they collect to guide construction operations.

There appears to be growing recognition of the disconnection between the regulatory requirements for pre-disturbance benchmarking, the actual operations, the work of reclamation, and the desired outcomes post reclamation. As reported previously, many energy producers and service providers to the industry believe there that the current “system” may have gravitated over time to a point where too much emphasis is being placed on establishing detailed benchmarks. Interviewees reported that pre-disturbance assessment (PDA’s) and plans are submitted for each disposition each year but are not thoroughly reviewed or scrutinized. Government and industry acknowledge that the emphasis might be better placed toward more comprehensive reclamation planning, innovative operational techniques, and redefining what acceptable results should be.

In this regard, changes to the Guidelines for Submission of a Predisturbance Assessment and Conservation and Reclamation Plan have been made effective October 2014. However, many in industry feel the changes have not gone far enough. In discussions with the AER, there is a desire to continue to streamline the PDA/C&R plan process and requirements. However, this will require broader policy analysis to ensure data and information is in place to support:

- Strategic and operational planning requirements of both industry and government;
- Monitoring of development scenarios from established baselines; and
- Reporting on both current and future states of Alberta’s landscape.

The predictive framework is being developed under the broad assumption that soils and vegetation data and information from the current PDA/C&R planning process is available. There is a risk that shifts in policy or regulatory requirements may result in critical data inputs required for this initiative to be unavailable or in formats that are not compatible. This risk presents an opportunity for this initiative to introduce cost effective fit-for-purpose options to meet and support data and information needs.

Alberta Environmental Monitoring, Evaluation and Reporting Agency

Established in 2014, the Alberta Environmental Monitoring, Evaluation and Reporting Agency (AEMERA) was an arm's length organization responsible for collecting credible scientific data and other relevant information on the conditions of Alberta's environment and providing the public with open and transparent reporting and access to the data and information. In April 2016, the government announced that AEMERA would be folded back into AEP.

What is presently less certain is the division of roles and responsibilities between AEP and other organizations supporting land and resource management in Alberta. This includes the degree of autonomy that would be suitable to their work and how they might exercise this autonomy. Thus, there is a risk that benefits of providing a new way of creating and accessing natural resource information stemming from this initiative is constrained because the governance and operating model developed does not fit within or is not supported by AEP.

9 APPENDIX: INTERVIEWEES FOR GOVERNANCE & OPERATING FRAMEWORK

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