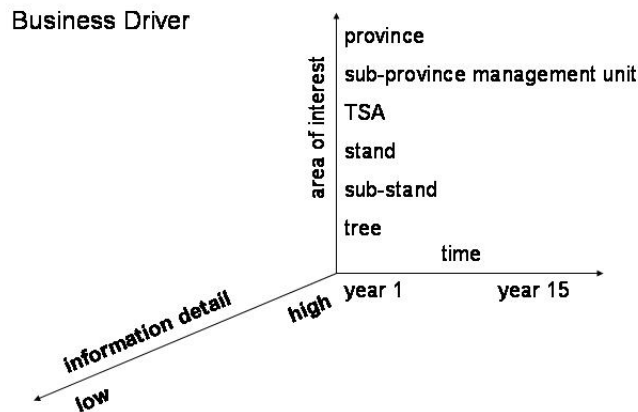


Image Primer January 9, 2006

When determining what imagery will meet specific business needs, business areas need to determine where information is needed, when it will be needed and how soon it can be provided, what is the required currency of information, how large is the area of interest or the area of the target population, and what level of information detail is needed. The following diagram is used to illustrate these concepts.



The information provided below should guide acquisitions of new image data. Acquisitions should consider the specific risks and cost benefits associated with the different image data sets for each business area use and specific location. The net benefit of one data source over another for a given use will vary due to the risks and the local situation. As a best practice, information compiled from source images should have the source identified as an attribute within feature metadata records.

Applications and Optimal Image Use

Extent of forest mortality caused by pests and/or disease at the stand level:

1. Multi-temporal multispectral Landsat images for use from strategic down to operational planning levels e.g. Mountain Pine Beetle red attack. These data are suitable for mapping the extent and monitoring over time. These data should provide the 90% answer for the extent and location of forest mortality.
2. Multi-temporal SPOT 5 MSS is not currently available over large areas of the province. There are higher costs and increased time involved in mapping the extent and monitoring over time with these data.
3. Annual coverage of colour aerial photography/orthophotos is rarely available over large areas of the province due to costs. These are used for more detailed information such as mapped classes of mortality severity.

Year of forest mortality caused by pests and/or disease at the stand level:

1. Multi-temporal Landsat multispectral images for use from strategic down to operational planning levels. These data combined with other GIS information should provide the 90% answer for year of forest mortality.

Small scale salvage:

1. Multi-temporal multispectral Landsat images for use from strategic down to operational planning levels. These data are suitable for mapping the extent, location, area, and monitoring small scale salvage over time. These data should provide the 90% answer for the extent, location, and area of small scale salvage openings down to 0.25 hectares.
2. Multi-temporal SPOT 5 MSS is not currently available over large areas of the province. Tasking this satellite for acquisitions for multi-temporal coverage should be based on the risks and cost benefits.
3. If higher resolution current imagery is available (SPOT 5, aerial photography/orthophoto), these data should be used based on the risks and cost benefit.

Forest fire boundary extent and year of fire:

1. Current and multi-date multispectral Landsat images for use from strategic down to operational planning levels. These data are suitable for mapping the extent of forest fires and monitoring over time. These data should provide the 90% answer for the extent and location of forest fires.
2. If higher resolution current colour imagery is available (SPOT 5 MSS, aerial photography/orthophoto), these data should be used based on the risks and cost benefit.

Forest cover (VRI) update of harvest openings and Results audit:

1. Multispectral Landsat multi-date images for use from strategic down to operational planning levels. These data are suitable for mapping the extent, location, area, and monitoring over time.
2. If higher resolution current colour imagery is available (SPOT 5 MSS, aerial photography/orthophoto), these data should be used based on the risks and cost benefit.

Emergency Response:

1. Current multispectral Landsat images for use from strategic down to operational planning levels. These data are suitable for locating new roads and landings that may not be available from other sources in planning response strategies e.g. forest fires.
2. Fires having greater risk such as interface fires will require more current and higher resolution imagery.
3. Radar satellite data can be used effectively to respond to large scale flooding emergencies and monitoring.

Forests Compliance & Enforcement:

1. Current multispectral Landsat images for use from strategic down to operational planning levels. These data are suitable for identifying likely areas of forest harvest trespass prior to field survey confirmation.

Silviculture survey planning:

1. Current colour orthophotos are the preferred image data source for Silviculture Survey planning. These data are suitable for identifying all road and transport features, vegetation patterns, and tree patches within cut blocks.
2. Current SPOT 5 MSS and/or SPOT black and white (panchromatic) merged with current Landsat multispectral. These data are likely to achieve results similar to those from orthophoto but with less detail and precision.
3. Current Landsat images can be used for this application with a further reduction in detail and precision.

Timber Sales operational planning:

1. Current colour orthophotos are the preferred image data source for Timber Sales operational planning. These data are suitable for identifying all road and transport features, vegetation patterns and current cut block openings.
2. Current SPOT 5 MSS and/or SPOT black and white (panchromatic) merged with current Landsat multispectral. These data are likely to achieve results similar to those from orthophoto but with less detail and precision.
3. Current Landsat images can be used for this application with a further reduction in detail and precision.

Cost Comparisons (prices in CDN)

LANDSAT 5 *	30 Multi, Therm	\$0.03	no copyright
LANDSAT 7 **	15 Pan, 30 Multi, Therm	\$0.03	no copyright
SPOT 2 & 4	10 Pan, 20 MSS	\$0.77	unrestricted within BC Govt
IRS	5.8 Pan, 23.5 MSS	\$0.92	unrestricted within BC Govt
SPOT 5	5 Pan, 10 MSS	\$1.33	unrestricted within BC Govt
SPOT 5	2.5 Pan	\$2.00	unrestricted within BC Govt
IKONOS	1 Pan, 4 MSS	\$24.75	unrestricted within BC Govt
QUICKBIRD	0.6 Pan, 2.5 MSS	\$27.25	unrestricted within BC Govt
1:30,000 Ortho	B/W 0.5 or 1	\$18.00	BC Govt owns copyright
1:30,000 Ortho	Colour 0.5 or 1	\$19.00	BC Govt owns copyright
1:15,000 Ortho	B/W 0.25 or 0.5	\$30.70	BC Govt owns copyright
1:15,000 Ortho	Colour 0.25 or 0.5	\$32.70	BC Govt owns copyright

Aerial Photography to Orthophoto Cost Comparisons

Photo Scale	Aerial Photo Acquisition and Scanning cost/sq km	Aerial Triangulation cost/sq km	Orthophoto cost/sq km	Total
1:15,000 B/W	\$21.00	\$7.50	\$2.20	\$30.70
1:15,000 Colour	\$23.00	\$7.50	\$2.20	\$32.70
1:30,000 B/W	\$14.00	\$2.67	\$1.33	\$18.00
1:30,000 Colour	\$15.00	\$2.67	\$1.33	\$19.00

* Landsat 5 suffered a malfunction on November 26, 2005. The availability of quality data from this date forward is currently unknown.

** Landsat7 suffered a permanent malfunction on May 31, 2003. Quality full scene data has not been available from Landsat7 since this date.

Satellite data costs are based on orthorectified GIS ready products.

Aerial photography costs are based on recent block flying programs from the Base Mapping and Geomatic Services Branch, Air Photo Operations.

Aerial photography acquisition costs are related to; remoteness of the area of interest, size of the area of interest, season, start up costs and the availability of air crews and equipment. Price of aviation fuel!

Aerial Triangulation and Orthophoto costs per hectare from the Base Mapping and Geomatic Services Branch 1:20,000 map tile costs, converted to cost per sq km.

Orthophoto costs include photo acquisition, scanning, and aerial triangulation.

Satellite Earth Observation (EO) Systems

(pixel size in metres, swath width in Kilometres)

<u>satellite</u>	<u>pixel size</u>	<u>swath width</u>
LANDSAT 5	30 m	180 km
LANDSAT 7	15 and 30 m	180 km
SPOT 2 and 4	10 and 20 m	60 km
IRS-1C and 1D	5.8 and 23 m	70 km
SPOT 5	5 and 10 m	120 km
SPOT 5	2.5 m	60 km
Radarsat-1	10 to 100 m	50 to 500 km
Radarsat-2	3 to 100 m	50 to 500 km
IKONOS	1 and 4 m	11 km
ORBVUE-3	1 and 4 m	8 km
EROS-1A	1.8 m	13 km
QUICKBIRD	0.6 and 2.5 m	16.5 km

Document:

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